

Aboriginal young people staying smoke-free

Christina Lana Heris

ORCHID ID: 0000-0003-3857-6817

Doctor of Philosophy

March 2020

Faculty of Medicine, Dentistry and Health Sciences
Melbourne School of Population and Global Health
University of Melbourne

Submitted in total fulfilment of the degree of Doctor of Philosophy

Abstract

Tobacco use is the leading risk factor for poor health outcomes in Australia. Aboriginal and Torres Strait Islander people (Aboriginal people) are disproportionately affected due to the historical legacies that have embedded social inequities associated with higher smoking prevalence in all population groups. However, smoking prevalence has declined over recent decades for all Australians, including Aboriginal people, although a persisting disparity remains. While encouraging existing smokers to quit is a key part of reducing smoking prevalence overall, as most smoking initiation occurs during adolescence and young adulthood, preventing young people from becoming established, long term smokers is also critically important to this effort.

This thesis presents the work from a multi-component PhD project exploring trends in smoking initiation; the experiences of non-smokers; and individual, social, cultural and environmental risk and protective factors influencing Aboriginal adolescents. Using a multi-methods research design the project has synthesised findings from a systematic review, cross-sectional analysis of survey data from several datasets, as well as qualitative research.

A systematic review of international evidence indicates that young Indigenous peoples globally experience similar smoking influences to other youth populations, such as smoking among family, friends and the broader community, however few studies have explored the unique historical and cultural factors. In Australia, Aboriginal youth smoking prevalence has declined steadily with the majority of secondary students identifying as never smokers. However, these changes in smoking prevalence are occurring in parallel to the total population and remain significantly higher for Aboriginal youth. While initiation of regular daily smoking mostly occurs before aged 18, it can occur over a wide age range and has been increasingly delayed until early adulthood for some. Factors which may protect against smoking initiation among young Aboriginal people are good social and emotional wellbeing, connections to community and school, not being sexually active, using alcohol or having contact with the justice system.

Sustained investment in tobacco control is required to accelerate declines in prevalence and not reverse earlier gains. This includes whole of population approaches as well as targeted programs. Community organisations should be resourced to deliver programs promoting positive engagement with family, school and community as these may be protective against smoking initiation. Programs should aim to reach young people in early adolescence and continue to reinforce smoke-free intentions into young adulthood. However, some young people may have already developed nicotine dependency and need support to quit. Community priorities are for broader, holistic programs that build on cultural strengths and empower young people, reducing smoking as part of a process that improves health and wellbeing overall.

Declaration

This is to certify that:

- I. This thesis comprises only my original work towards the Doctor of Philosophy except where indicated in the preface;
- II. Due acknowledgement has been made in the text to all other material used; and
- III. The thesis is fewer than the maximum word limit in length of 100,000 words, exclusive of tables, maps, bibliographies and appendices.

Signed

Christina Lana Heris

29 March 2020

Preface

This PhD explores changes in smoking prevalence, age of initiation and individual, social, cultural and environmental risk and protective factors for Aboriginal adolescents.

This thesis is comprised of work undertaken in four studies forming six results chapters/papers:

- A systematic review of the literature (published)
- Quantitative analysis of Australian Bureau of Statistics (ABS) data (published)
- Quantitative analysis of the Australian Secondary Students' Alcohol and Drug Survey (ASSAD) data (two studies, published)
- Quantitative analysis of the Study of Environment on Aboriginal Resilience and Child Health (SEARCH) survey data (accepted for publication)
- Qualitative primary data collection with SEARCH study participants (paper in progress).

No work presented in this thesis was carried out prior to enrolment or in fulfilment of other degrees. Third party editorial assistance has not been utilised.

Research outcomes during enrolment

Peer review publications

Christina Heris, Sandra Eades, Louise Lyons, Catherine Chamberlain, David Thomas. (2020). Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Research & Practice*, 30(2), e29121906. doi:10.17061/phrp29121906
(First published 'Online Early' 2 May 2019) - See Chapter 5 / Appendix 3

Christina Heris, Catherine Chamberlain, Lina Gubhaju, David Thomas, Sandra Eades. (2019). Factors influencing smoking among Indigenous adolescents aged 10–24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine & Tobacco Research*. doi:10.1093/ntr/ntz219
(Published online 28 November 2019) - See Chapter 3 / Appendix 1

Christina Heris, Nicola Guerin, David Thomas, Sandra Eades, Catherine Chamberlain, Victoria White. (2020). The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy. *Australian & New Zealand Journal of Public Health*, 44(5):397–403. doi:10.1111/1753-6405.13022
(Published online 11 August 2020) - See Chapter 4 / Appendix 2

Christina Heris, Nicola Guerin, David Thomas, Catherine Chamberlain, Sandra Eades, Victoria White. (2020). Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017. *Drug & Alcohol Review*. doi:10.1111/dar.13130
(Published online 12 August 2020) - See Chapter 6 / Appendix 4

Christina Heris, Katherine Thurber, Darryl Wright, David Thomas, Catherine Chamberlain, Lina Gubhaju, Simone Sherriff, Bridgette McNamara, Emily Banks, Natalie Smith, Sandra Eades. Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). *Health Promotion Journal of Australia*.
(Accepted for publication 4 October 2020) - See Chapter 7 / Appendix 5

Oral presentations

Christina Heris, Lina Gubhaju, Catherine Chamberlain, Sandra Eades. (2017, October). *Living life smoke-free: the social and environmental context of urban Aboriginal adolescents in NSW*. Paper presented at the Oceania Tobacco Control Conference, Hobart, TAS.

Christina Heris, Lina Gubhaju, Catherine Chamberlain, Sandra Eades. (2018, May). *Smoke-free opportunities: understanding factors associated with non-smoking among urban NSW Aboriginal adolescents*. Paper presented at the Public Health Prevention Conference, Sydney, NSW.

Christina Heris, Lina Gubhaju, Catherine Chamberlain, Sandra Eades. (2018, September). *Living life smoke-free: factors associated with non-smoking among urban NSW Aboriginal adolescents*. Paper presented at the Australian Public Health Conference, Cairns, QLD.

Christina Heris, Lina Gubhaju, Catherine Chamberlain, Sandra Eades. (2018, November). *Living life smoke-free: factors associated with non-smoking among urban NSW Aboriginal adolescents*. Paper presented at the Youth Health Conference, Gold Coast, QLD.

Christina Heris, Sandra Eades, Louise Lyons, Catherine Chamberlain, David Thomas. (2018, November). *Changes in the age smoking commences for young Indigenous people*. Paper presented at the Youth Health Conference, Gold Coast, QLD.

Christina Heris, Catherine Chamberlain, Lina Gubhaju, David Thomas, Sandra Eades. (2019, April). *Living life smoke-free: factors associated with smoking initiation among urban Australian Aboriginal adolescents*. Paper presented at the IUHPE International Health Promotion Conference, Rotorua, New Zealand.

Christina Heris, Mandy Cutmore, Natalie Smith, Victor Simpson, Simone Sherriff, Sandra Eades. (2019, September). *Don't follow the smoke – listening to the experiences of SEARCH Aboriginal adolescents*. Paper presented at the Australian Public Health Conference, Adelaide. SA.

Christina Heris, Nicola Guerin, David Thomas, Catherine Chamberlain, Sandra Eades, Vicki White. (2019, September). *The decline of smoking among Indigenous secondary students in the ASSAD sample: key factors and implications for future policy*. Paper presented at the Australian Public Health Conference, Adelaide. SA.

Christina Heris, Mandy Cutmore, Catherine Chamberlain, Natalie Smith, Victor Simpson, Simone Sherriff, Sandra Eades. (2019, October). *Don't follow the smoke – listening to the experiences of SEARCH Aboriginal adolescents*. Paper presented at the Oceania Tobacco Control Conference, Sydney, NSW.

Christina Heris, Nicola Guerin, David Thomas, Catherine Chamberlain, Sandra Eades, Vicki White. (2019, October). *The decline of smoking among Indigenous secondary students in the ASSAD sample: Key factors and implications for future policy*. Paper presented at the Oceania Tobacco Control Conference, Sydney, NSW.

Christina Heris, Mandy Cutmore, Catherine Chamberlain, Natalie Smith, Victor Simpson, **Simone Sherriff**, Sandra Eades. (2019, November). *Don't follow the smoke – listening to the experiences of SEARCH Aboriginal adolescents*. Paper presented at the Youth Health Conference, Melbourne, VIC.

Christina Heris, Nicola Guerin, David Thomas, Catherine Chamberlain, Sandra Eades, Vicki White. (2019, November). *The decline of smoking among Indigenous secondary students in the ASSAD sample: Key factors and implications for future policy*. Paper presented at the Youth Health Conference, Melbourne, VIC.

Poster presentations

Christina Heris, Catherine Chamberlain, Lina Gubhaju, David Thomas, Sandra Eades. (2018, November). *Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review* [poster]. Poster presented at the Youth Health Conference, Gold Coast, QLD.

Christina Heris, Catherine Chamberlain, David Thomas, Sandra Eades. (2019, June). *Understanding what influences smoking initiation for young Aboriginal and Torres Strait Islander people and identifying opportunities for prevention* [digital poster presentation]. Digital poster presentation given at the Lowitja International Indigenous Health & Wellbeing Conference, Darwin, NT.

Christina Heris, Catherine Chamberlain, Lina Gubhaju, David Thomas, Sandra Eades. (2019, June). *Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review* [digital poster presentation]. Digital poster presentation given at the Lowitja International Indigenous Health & Wellbeing Conference, Darwin, NT.

Christina Heris, Nicola Guerin, David Thomas, Catherine Chamberlain, Sandra Eades, Vicki White. (2019, June). *The decline of smoking among Indigenous secondary students in the ASSAD sample: Key factors and implications for future policy* [digital poster presentation]. Digital poster presentation given at the Lowitja International Indigenous Health & Wellbeing Conference, Darwin, NT.

Other outputs and research translation

Government/Policy

On 5 July 2018, presented findings from the SEARCH and ABS studies to Australian Government staff in Canberra. Staff from the Department of Health Indigenous Health Division including the Tackling Indigenous Smoking team, Tobacco Control Branch, Communications Branch; Department of Social Services Longitudinal Study of Indigenous Children team; and the Department of Prime Minister and Cabinet Indigenous Health team were in attendance. An invitation has been extended to present the balance of this thesis on completion in 2020.

Community Engagement

Presented findings from the SEARCH survey analysis to two of the participating Aboriginal Community Controlled Health Services (ACCHSs) in New South Wales, Tharawal and RivMed, for feedback. Staff are authors on final paper which is currently under review. Study participants and staff have been part of the qualitative research

project to explore the quantitative findings and ensure their views and experiences are reported. This engagement is ongoing.

Worked with the Victorian Aboriginal Community Controlled Health Organisation (VACCHO) to undertake the ABS analysis and disseminate findings to six Victorian ACCHSs. Completed a subsequent co-design process with VACCHO and the ACCHSs to develop a related qualitative research project proposal.

Thesis with publications: publication status and contributions of co-authors

Table 1: Publication status and contributions of co-authors

Chapter	Publication Title	Status	Nature and % of student contribution	Co-authors and nature and % of contribution
3	Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review	Published in <i>Nicotine & Tobacco Research</i> 28 Nov 2019	60%. Concept, study design, search, data extraction and analysis, interpretation, manuscript preparation	1. Catherine Chamberlain Concept, study design, assistance with search, data extraction and analysis, interpretation, input into manuscript. 15% 2. Lina Gubhaju Concept, study design, interpretation, input into manuscript. 2.5% 3. David Thomas Interpretation, input into manuscript. 7.5% 4. Sandra Eades Concept, study design, interpretation, input into manuscript. 15%
4	The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy	Published in <i>Australian & New Zealand Journal of Public Health</i> 11 August 2020	60%. Concept, study design, data analysis, interpretation, manuscript preparation	1. Nicola Guerin Concept, study design, data analysis, interpretation, input into manuscript. 10% 2. David Thomas Concept, study design, data analysis, interpretation, input into manuscript. 10% 3. Sandra Eades Interpretation, input into manuscript. 5% 4. Catherine Chamberlain Interpretation, input into manuscript. 5% 5. Vicki White Concept, study design, interpretation, input into manuscript. 10%
5	Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002-2015	Published in <i>Public Health Research & Practice</i> 2020 (First published 2 May 2019 - online early)	60%. Concept, study design, data analysis, interpretation, manuscript preparation, engagement	1. Sandra Eades Concept, study design, interpretation, input into manuscript. 10% 2. Louise Lyons Interpretation, input into manuscript, engagement. 10% 3. Catherine Chamberlain Concept, study design, interpretation, input into manuscript. 5% 4. David Thomas Concept, study design, data analysis, interpretation, input into manuscript. 15%

6	Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017	Published in <i>Drug & Alcohol Review</i> (12 Aug 2020)	60%. Concept, study design, data analysis, interpretation, manuscript preparation	1. Nicola Guerin Concept, study design, data analysis, interpretation, input into manuscript. 10% 2. David Thomas Concept, study design, data analysis, interpretation, input into manuscript. 10% 3. Catherine Chamberlain Interpretation, input into manuscript. 5% 4. Sandra Eades Interpretation, input into manuscript. 5% 5. Vicki White Concept, study design, interpretation, input into manuscript. 10%
7	Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)	Under review in the <i>Health Promotion Journal of Australia</i> (Accepted for publication 4 Oct 2020)	60%. Concept, study design, data analysis, interpretation, manuscript preparation, engagement	1. Katie Thurber Assistance with data analysis, interpretation, input into manuscript. 6% 2. Darryl Wright Concept, data collection, interpretation, input into manuscript, engagement. 5% 3. David Thomas Interpretation, input into manuscript. 5% 4. Catherine Chamberlain Interpretation, input into manuscript. 5% 5. Lina Gubhaju Study design, assistance with data analysis, input into manuscript, engagement. 4% 6. Simone Sherriff Input into manuscript, engagement. 2% 7. Bridgette McNamara Assistance with data analysis, input into manuscript. 2% 8. Emily Banks Concept, input into manuscript. 2% 9. Natalie Smith Data collection, interpretation, engagement. 2% 10. Sandra Eades Concept, study design, interpretation, input into manuscript. 7%
8	Don't follow the smoke: listening to the tobacco experiences of urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)	In progress (unpublished)	--	--

Funding sources

This research was supported by The Australian Prevention Partnership Centre (TAPPC) through the National Health and Medical Research Council (NHMRC) partnership centre grant scheme (Grant ID: GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth.

Travel and publication funding support was provided by the Centre of Research Excellence in Aboriginal Child and Adolescent Health (CRE REACH) and Melbourne School of Population and Global Health PHIRST (Population Health Investing in Research Students' Training) travel grant.

Acknowledgements

First, I wish to acknowledge the Traditional Owners of the lands across Australia and pay my respects to Elders past, present, and emerging. This thesis was principally written from the University of Melbourne on Wurundjeri country using existing, national data, with primary qualitative data collection also completed on Wiradjuri and Tharawal lands. I acknowledge and thank the young Aboriginal study participants, the Aboriginal research staff and their communities from all the studies that have been included in this thesis and the support and leadership I received from Aboriginal researchers over the course of my candidature, particularly Sandra Eades, Cath Chamberlain, Louise Lyons and Simone Sherriff.

My thesis was completed as a large collaborative effort over multiple projects made possible only by the diverse talents and networks of my excellent supervisory team of Sandra Eades, Cath Chamberlain and David Thomas. It was somewhat surreal to go from citing these names in reports to assembling them as my own expert entourage that has kept me on track and focused on what is important. It is their support, more than just supervision, that has transformed me from public servant to public health researcher. And it was through their contacts that the range of studies have been brought together under one PhD project.

Beginning with the SEARCH study, I want to thank Simone Sherriff in particular, who helped me immensely in setting up the qualitative research and the approval processes for the quantitative paper. She is a great asset to the research overall and has also become a great friend. I also want to thank Mandy Cutmore who facilitated the qualitative yarns and assisted with the analysis, his natural skills with our young participants generated such rich data. Also, Darryl Wright, CEO of Tharawal, a tobacco control champion who has ensured that youth smoking remained a SEARCH priority.

Again, I thank all of the young participants in SEARCH, both in the surveys, and those who attended the yarns, the SEARCH research officers and staff at the ACCHSs, particularly those at Tharawal and RivMed who organised the groups: Kym, Sandra, Nat and Ted. This research is for you and your communities and I always have our

conversations in mind when I am writing about this work and Aboriginal tobacco control broadly. Special thanks also to Katie Thurber who held my hand through the quantitative analysis and drafting of the first paper of my PhD, but has since become a bit of a PhD life coach and mentor more generally.

I want to specifically thank Louise Lyons, formerly of VACCHO, and her then team, Susan Forrester and Jennifer Browne. Louise agreed to meet me early on in my PhD when I was looking for ways to do ‘useful’ research and came to David with the suggestion of the ABS analysis. But her focus on research translation meant that I had the incredible privilege of travelling around Victoria meeting the VACCHO members and hearing about their experiences on the ground. This frontline involvement in community designed research and the invaluable chats on long drives helped me understand the broader context for my research (alongside the occasional cryptic crossword lesson). Although this engagement work and the related proposed qualitative project did not end up forming part of this thesis, these experiences were fundamental to the skills I have developed over the past 3.5 years of this research training degree.

From the ASSAD study, Vicki White and Nicky Guerin of Cancer Council Victoria: I have loved working with you both not only on this important study but also as it gave me an opportunity to join CCV temporarily and get to know the team there and the work they do. I admire the way you both work - always looking for a better way to do things and prompting me to ask the bigger questions.

Of course, I must thank my team at UniMelb for their support. The way the Indigenous Epidemiology and Health unit fully integrates their PhD students into the team creates the perfect mix of social and productive work environments to support completion. Special acknowledgement of Lina Gubhaju, who was so involved in my work at times she could have been a supervisor and created many opportunities for me throughout my candidature which I greatly appreciated. Also, thanks to Richard Chennall, my Advisory Committee Chair, and Myra Malcolm, Graduate Research Officer, for their support in all candidature related matters.

I received a scholarship from the Australian Prevention Partnership Centre (TAPPC) but the support they provided was much more than just financial, including training,

promotion of my research and exposing me to a wider network of researchers and encouraging me to maintain a focus on translation outside academia. I also received financial support to attend conferences and conduct data collection from CRE REACH and PHIRST travel grant.

I appreciate the ongoing support and friendship from my old team at the Department of Health, particularly Louisa Bobeldijk and Kellie Masterson, whose interest in my research again helped me to keep translation front of mind.

On a more personal level I need to acknowledge the personal and occasional financial support from my Mum, Jill Heris, and my sister, Melissa Heris (who also got me over the line by organising a meal service for the late nights in the office in the final push as I write this). We don't come from a family of academics, but they encouraged me on this journey. The value my parents placed on education when they did not have the opportunity to complete school themselves has seen my sister and I study extensively at the tertiary level within one generation.

I also want to briefly mention our family GP, Dr Norm Cornish, who has been taking close care of our family over the past year and his dedication has been a factor in my ability to complete on time. But also because sitting in on an appointment with Mum years ago now he planted the seed of doing a PhD well before I had considered it as an option, just as he had set me on a course of science, health and communication when he took the time to draw pictures of my blood cells or whatever the issue was back when I was a child.

One thing I knew when I relocated to Melbourne was how much I needed social support and friends to stay afloat. So much love for my Coffs and Sydney friends who have continued to support me from afar, visiting regularly and joining me on minibreaks particularly Anthea Bakopanos, Tania Ahmed, Shanna Satya, Toby Blackman, Rezana Karim, Tim O'Mahony and Daniel Keogh – as well as Lucy Partridge and Yasinta Widjojo who are the success stories of my 'Move to Melbourne' campaign.

Finally, I am so grateful for the amazing support of my PhD friends, the Monash crew who adopted me early on and created an instant family, particularly Jo Schwarzman,

Cass Wright, Tom Ranger, Ollie Black and Susie Cartledge. Our weekend writing retreats were the thing that kept affirming I had made the right choice and had found my people here. Also, Anna Nicholson and Jenn Browne who came into my life through work/research projects while they were doing their own PhDs but have since become great friends. Doing a PhD has been a weird and intense experience and I'm so glad I was in it with you all, just a few months behind.

Table of Contents

Abstract	ii
Declaration.....	iv
Preface.....	v
<i>Research outcomes during enrolment.....</i>	<i>vi</i>
Peer review publications.....	vi
Oral presentations.....	vi
Poster presentations.....	viii
Other outputs and research translation	viii
Thesis with publications: publication status and contributions of co-authors.....	x
<i>Funding sources</i>	<i>xii</i>
Acknowledgements.....	xiii
Table of Contents.....	xvii
List of Tables	xxi
List of Figures.....	xxii
Third Party Copyright Material	xxiii
Abbreviations.....	xxvi
1 Background and Literature Review	1
1.1 <i>Smoking and tobacco use in Australia</i>	<i>1</i>
1.2 <i>Adolescence as a key life stage for smoking prevention.....</i>	<i>2</i>
1.3 <i>Tobacco control in Australia</i>	<i>5</i>
1.4 <i>What influences tobacco use and initiation.....</i>	<i>9</i>
1.4.1 Factors influencing smoking uptake in adolescence.....	12
1.4.2 Theories for understanding smoking initiation and uptake.....	14
1.5 <i>Research gaps and questions</i>	<i>18</i>

1.6	<i>Thesis overview</i>	20
2	Methods	30
2.1	<i>About the researcher: who am I and why did I choose this research topic?</i>	30
2.2	<i>Methodology and research approach</i>	31
2.3	<i>Overview of ethics, data collection and analysis methods</i>	34
3	Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: a systematic review	38
3.1	<i>Introduction</i>	38
3.2	<i>Chapter summary</i>	73
4	The decline of smoking initiation among Aboriginal and Torres Islander secondary students: implications for future policy	74
4.1	<i>Introduction</i>	74
4.2	<i>Chapter Summary</i>	99
5	Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002-2015	100
5.1	<i>Introduction</i>	100
5.2	<i>Chapter summary</i>	118
6	Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017	120
6.1	<i>Introduction</i>	120
6.2	<i>Chapter summary</i>	145
7	Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)	146
7.1	<i>Introduction</i>	146
7.2	<i>Chapter summary</i>	172
8	Don't follow the smoke: listening to the tobacco experiences of urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)	173

8.1	<i>Introduction</i>	173
8.2	<i>Chapter summary</i>	239
9	Discussion	240
9.1	<i>Summary of findings by project</i>	240
	Systematic Review – Chapter 3.....	240
	Australian Secondary Students’ Alcohol and Drug Survey (ASSAD) – Chapter 4 and 6.....	240
	Australian Bureau of Statistics (ABS) – Chapter 5	241
	The Study of Environment on Aboriginal Resilience and Child Health (SEARCH) – Chapter 7 and 8.....	242
9.2	<i>Implications for policy and practice by research question</i>	243
	1. Are fewer Aboriginal adolescents becoming regular smokers and is the prevalence of never smoking increasing?.....	243
	2. Is the incidence of regular smoking occurring later in adolescence?	245
	3. Are there common factors that protect against uptake and increase the likelihood of being a never smoker?.....	247
9.3	<i>Program recommendations</i>	248
	Settings for comprehensive programs: school, family, community.....	249
	Communicate harms of smoking in an engaging way and within a personal and historical context	250
	Address addiction and support to quit	250
	Aim to improve resilience, mental health and stress management strategies.....	251
	The importance of programs under Aboriginal Community Control	252
	Programs run by young people	252
9.4	<i>Implications for future research</i>	253
9.5	<i>Strengths and limitations</i>	255
9.6	<i>Concluding statements</i>	256
10	Full Reference List	265
11	Appendices	289
11.1	<i>Appendix 1 – Chapter 3 E-Print and Supplementary Material</i>	289
11.1.1	E-print of published paper at Chapter 3	289
11.1.2	Chapter 3 - Supplementary File 1: Search terms.....	301
11.1.3	Chapter 3 - Supplementary File 2: NVIVO coding structure.....	303
11.1.4	Chapter 3 - Supplementary File 3: Adapted Risk of Bias Assessment Tool	306

11.1.5	Chapter 3 - Supplementary File 4: Characteristics of Included Studies	308
11.1.6	Chapter 3 - Supplementary File 5: Assessment of Confidence	316
11.1.7	Chapter 3 - Supplementary File 6: Starburst Chart Large Reproduction.....	323
11.2	<i>Appendix 2 – Chapter 4 E-print and Supplementary Material.....</i>	<i>327</i>
11.2.1	E-print of published paper at Chapter 4.....	327
11.2.2	Chapter 4 - Supplementary File 1: Figure 1 supporting data.....	335
11.2.3	Chapter 4 - Supplementary File 2: Additional data for never, past month and past week smoking and smoking intensity.....	336
11.3	<i>Appendix 3 – Chapter 5 E-Print and Supplementary Material.....</i>	<i>345</i>
11.3.1	E-print of published paper at Chapter 5	345
11.3.2	Chapter 5 - Supplementary File 1: Summary of questionnaire wording 2002 – 2014-15	354
11.3.3	Chapter 5 - Supplementary File 2: Additional analysis.....	356
11.4	<i>Appendix 4 – Chapter 6 E-print</i>	<i>357</i>
11.4.1	E-print of published paper at Chapter 6.....	357
11.5	<i>Appendix 5 – Chapter 7 Supplementary Material.....</i>	<i>368</i>
11.5.1	Chapter 7 - Supplementary File 1: Summary of survey questions used in analysis	368
11.5.2	Chapter 7 - Supplementary File 2: Comparison of key characteristics and exposures between those with and without complete smoking data	372
11.6	<i>Appendix 6 – Chapter 8 Supplementary Material.....</i>	<i>373</i>
11.6.1	Chapter 8 – Supplementary File 1: Discussion Guides.....	373
11.6.2	Chapter 8 – Supplementary File 2: Cards used in card sort activity	375
11.6.3	Chapter 8 – Supplementary File 3: Fieldwork photos.....	378
11.6.4	Chapter 8 – Supplementary File 4: NVIVO Coding Structure.....	381
11.6.5	Chapter 8 – Supplementary File 5: Data analysis and maps.....	386

List of Tables

Table 1: Publication status and contributions of co-authors	x
Table 2: Summary and location of third party copyright material in thesis	xxiii
Table 1: Overview of data collection and research methods by chapter.....	35
Table 1: Summary of protective and risk factors identified at individual, social, environmental level	51
Table 1: Sample characteristics of Aboriginal and Torres Strait Islander secondary school students 12- 17 years in 2005, 2008, 2011, 2014, 2017 by age, gender, location and SEIFA index.....	82
Table 2: Never smoking among students aged 12-17 years, by gender, age, SEIFA index, location, 2005-17	85
Table 3: Change in never, past month and past week smoking prevalence among students aged 12-17 years, 2005-17.....	87
Table 1: Proportion of current / ex daily smokers commencing daily smoking before age 18, Aboriginal respondents 18-24 years.....	110
Table 1: Number of secondary school students aged between 12 and 17 years surveyed across Australia in 2017, by Indigenous status, age, gender, location and SEIFA index; lifetime tobacco and other substance use experience.....	129
Table 2: Likelihood of past month tobacco, alcohol and cannabis use among students aged 12-17 in 2017 by Indigenous status, and significant interactions with SES and sex	131
Table 3: Association of demographic factors with past month tobacco use among Indigenous and non-Indigenous students aged 12-17 in 2017 by sex, age and residence	132
Table 4. Likelihood of past month tobacco use among Indigenous and non-Indigenous students 12-17 in 2017, by past month alcohol and cannabis use.....	133
Table 1: Sample characteristics for adolescents aged 12-17 years and their parents/carers with comparison to national data for Aboriginal and Torres Strait Islander peoples	154
Table 2: Summary of youth smoking behaviour and environmental exposure	155
Table 3: Relationship between individual factors and having never smoked regularly	156
Table 4: Relationship between social factors and having never smoked regularly	158
Table 5: Relationship between carer socio-demographic and environmental factors and having never smoked regularly	160
Table 1: Sample characteristics by yarning session.....	187
Table 2: Summary of all reasons for smoking/non-smoking by key themes.....	188
Table 3. Order of results under themes and sub-themes.....	193

List of Figures

Figure 1: Age structure of Australian population profile, by Indigenous status, Australia, 30 June 2016. ¹⁹	4
Figure 2: Smoking prevalence rates, people 15 years and over by Indigenous status and key tobacco control measures implemented in Australia since 1990. ²⁴	6
Figure 3: Relationship between being a non-smoker and selected social factors, Indigenous Australians 15 years and over 2014-15. ⁴⁹	10
Figure 4: Conceptual model of contributing factors to tobacco use by Aboriginal people. ⁵⁷	11
Figure 5: Theory of Triadic Influence. ⁶⁸	15
Figure 6: Modified Theory of Triadic Influences model for smoking uptake by Indigenous adolescents. Adapted from Tobacco in Australia. ⁷⁰	17
Figure 7: Overview of results chapters against research questions	21
Figure 1: Chapter 3 - Research Question Summary	38
Figure 1: Study selection process	49
Figure 2: Factors influencing smoking by number of studies coded	52
Figure 1: Chapter 4 - Research Question Summary	74
Figure 1: Smoking experience among Aboriginal and Torres Strait Islander and all students aged 12-17 years, ASSAD 2005-17	83
Figure 1: Long term smoking trends Aboriginal students, total ASSAD sample, 12-17 years, 1996-2017	99
Figure 1: Chapter 5 - Research Question Summary	100
Figure 1: Proportion of Aboriginal adolescents 15-24 years who smoked daily, 2002 to 2014-15	108
Figure 2: Proportion of Aboriginal adolescents 15-24 years who have never smoked, 2002 to 2014-15	109
Figure 1: VACCHO members research co-design workshop 2018	119
Figure 1: Chapter 6 - Research Question Summary	120
Figure 1: Problem Behaviour Theory and Indigenous adolescent tobacco use	124
Figure 1: Chapter 7 - Research Question Summary	146
Figure 1: Participant inclusion process	153
Figure 1: Chapter 8 - Research Question Summary	173
Figure 1: Map of card sorting activity	194

Third Party Copyright Material

Table 2: Summary and location of third party copyright material in thesis

Citation information for third party copyright material	Location in thesis	Permission granted Y/N
Figure 1: Age structure of Australian population profile, by Indigenous status, Australia, 30 June 2016 Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018. Cat. no. IHW 202. Canberra: AIHW; 2018. Figure 2.1.1: Age structure of the Australian population profile, by Indigenous status, Australia, 30 June 2016; p.12.[cited 14 Oct 2019]. Available from: https://www.aihw.gov.au/reports/indigenous-australians/atsi-adolescent-youth-health-wellbeing-2018/ This image is licensed under the Creative Commons Attribution 3.0 Australia (CC BY 3.0) licence	p.4	Y
Figure 2: Smoking prevalence rates, people 15 years and over by Indigenous status and key tobacco control measures implemented in Australia since 1990 Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017. Figure 2.15-6 Smoking prevalence rates, people 15 years and over by Indigenous status and key tobacco control measures implemented in Australia since 1990. p. 130.[cited 12 Dec 2019]. Available from: https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report. This image is licensed under the Creative Commons Attribution 3.0 Australia (CC BY 3.0) licence	p.6	Y
Figure 3: Relationship between being a non-smoker and selected social factors, Indigenous Australians 15 years and over 2014-15 Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017. Figure 2.15-4 Relationship between being a non-smoker and selected social factors, Indigenous Australians 15 years and over, 2014-15. p. 129.[cited 12 Dec 2019]. Available from: https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report. This image is licensed under the Creative Commons Attribution 3.0 Australia (CC BY 3.0) licence	p.10	Y
Figure 5: Theory of Triadic Influence Flay BR. Theory of Triadic Influence. 2004 [cited 11 Dec 2019]. In: Encyclopedia of Health and Behavior [Internet]. Thousand Oaks, California: SAGE Publications, Inc., [cited 11 Dec 2019]; [p. 716. Figure 1 The Theory of Triadic Influence]. Available from: http://sk.sagepub.com/reference/behavior. Permission granted for use 31 January 2020: Permission is granted for the life of the edition on a non-exclusive basis, in the English language, throughout the world in all formats provided full citation is made to the original SAGE publication. Permission does not include any third-party material found within the work (Rightslink/Copyright 600005216).	p.15	Y

Citation information for third party copyright material	Location in thesis	Permission granted Y/N
Figure 6: Modified Theory of Triadic Influence model for smoking uptake by Indigenous adolescents <i>Adapted from:</i> Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5.2 Factors influencing uptake by young people: overview. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2019. Figure 5.2.1 Influences on uptake of smoking [updated February 2019. cited 12 Dec 2019]. Available from: https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-2-factors-influencing-uptake-by-young-people-ove Permission granted to use content: The text may be freely reproduced and figures and graphs (except where reproduced from other sources) may be used, giving appropriate acknowledgement to Cancer Council Victoria https://www.tobaccoinaustralia.org.au/home.aspx	p.17	Y
Appendix 1 – Chapter 3 Publication – e-print Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. <i>Nicotine & Tobacco Research</i>. 2019; ntz219, https://doi.org/10.1093/ntr/ntz219 Permission for inclusion in thesis provided under Standard Licence with Society for Research on Nicotine and Tobacco whereby Authors retain: The right to include the article in full or in part in a thesis or dissertation, provided that this is not published commercially	p.289	Y
Appendix 2 – Chapter 4 Publication – e-print Heris CL, Guerin N, Thomas DP, Eades SJ, Chamberlain C, White V. The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy. <i>Australian & New Zealand Journal of Public Health</i>. 2020;44(5):397-403 https://doi.org/10.1111/1753-6405.13022 Permission for inclusion under licence Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0)	p.327	Y
Appendix 3 – Chapter 5 Publication – e-print Heris CL, Eades SJ, Lyons L, Chamberlain C, Thomas DP. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. <i>Public Health Res Pract</i>. 2020; 30(2), e29121906. https://doi.org/10.17061/phrp29121906 Permission for inclusion under licence Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)	p.345	Y
Appendix 4 – Chapter 6 Publication – e-print Heris CL, Guerin N, Thomas DP, Eades SJ, Chamberlain C, White V. Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017. <i>Drug & Alcohol Review</i>. 2020; https://doi.org/10.1111/dar.13130 Permission for inclusion in thesis provided under Standard Licence with	p.357	Y

Citation information for third party copyright material	Location in thesis	Permission granted Y/N
Australasian Professional Society on Alcohol and other Drugs whereby Contributors retain: The right to re-use the Final Published Version where authored by the contributor and makes up less than half of the total publication. And that under the Wiley Article Sharing Policy authors may share any version of their article in a thesis or doctorate. https://authorservices.wiley.com/author-resources/Journal-Authors/Promotion/article-sharing-policy.html		

Abbreviations

AATSIHS	Australian Aboriginal and Torres Strait Islander Health Survey
Aboriginal people	Aboriginal and/or Torres Strait Islander people
ABS	Australian Bureau of Statistics
ACCHS	Aboriginal Community Controlled Health Services
ACT	Australian Capital Territory
AHMAC	Australian Health Ministers Advisory Council
AHMRC	NSW Aboriginal Health and Medical Research Council
AIHW	Australian Institute of Health and Welfare
AMS	Aboriginal Medical Service
AOR	Adjusted Odds Ratio
ASGS	Australian Statistical Geographic Standard
ASSAD	Australian Secondary Students' Alcohol and Drug Survey
CATS	A Comprehensive Approach to Aboriginal and Torres Strait Islander Tobacco Control
CEO	Chief Executive Officer
CI	Confidence Interval
COAG	Council of Australian Governments
COPD	Chronic obstructive pulmonary disease
CTC	Communities that Care
CURFs	Confidentialised Unit Record Files
DALY	Disability adjusted life years
FCTC	Framework Convention on Tobacco Control
HREC	Human Research Ethics Committee
HT	Historical Trauma
Indigenous	Indigenous peoples collectively internationally unless otherwise specified
IRSD	SEIFA Index of Relative Socio-economic Disadvantage
LSIC	Longitudinal Study of Indigenous Children
NATSIHP	National Aboriginal and Torres Strait Islander Health Plan
NATSIHS	National Aboriginal and Torres Strait Islander Health Survey
NATSISS	National Aboriginal and Torres Strait Islander Social Survey
NDSHS	National Drug Strategy Household Survey
NHMRC	National Health and Medical Research Council
NHS	National Health Survey
NSW	New South Wales
NT	Northern Territory

NTS	National Tobacco Strategy
OR	Odds Ratio
PBT	Problem Behaviour Theory
PICF	Participant Information Consent Form
PR	Prevalence Ratio
RADL	ABS Remote Access Data Laboratory
RO	Research Officer
RivMed	Riverina Medical and Dental Aboriginal Corporation
SDQ	Strengths and Difficulties Questionnaire
SEARCH	Study of Environment on Aboriginal Resilience and Child Health
SEIFA	ABS Socio-economic Indexes for Areas
SES	Socio-economic status
SHS	Second-hand smoke
TAPPC	The Australian Prevention Partnership Centre
Tharawal	Tharawal Aboriginal Corporation Aboriginal Medical Service
The Department	Australian Government Department of Health
TIS	Tackling Indigenous Smoking program
TISHLP	Tackling Indigenous Smoking and Healthy Lifestyle Program
TTI	Theory of Triadic Influence
US	United States
VACCHO	Victorian Aboriginal Community Controlled Health Organisation
WA	Western Australia
WHO	World Health Organization

1 Background and Literature Review

1.1 Smoking and tobacco use in Australia

Tobacco use continues to be a major health issue in Australia and is the largest single risk factor contributing to the total burden of disease (9.3% of total DALYs in 2015 and an equivalent of 20,933 lives lost).¹ Tobacco related harms to the individual include cancers (primarily lung cancer), respiratory conditions (such as chronic obstructive pulmonary disease (COPD)) and cardiovascular diseases.¹ Tobacco use also harms others through second-hand smoke exposure with impacts such as low birth weight.¹

However, the burden from tobacco use has decreased over time, reduced by 24% from 21.6 to 16.4 age-standardised attributable DALYs between 2003 and 2015 and is predicted to continue to decrease into 2025.¹ This is due to the declining prevalence of tobacco smoking (smoking) in Australia over several decades. In 2016 the National Drug Strategy Household Survey (NDSHS) reported that the proportion of daily smokers aged 14 and over was 12%, half the rate it was in 1991 (24%), and that 62% had never smoked.² Similarly, the Australian Bureau of Statistics (ABS) National Health Survey (NHS) found that between 1995 and 2016-17 the prevalence of adult daily smokers (aged 18 and over) had declined from 24% to 14%.³

Despite the progress shown nationally, the burden of tobacco use remains comparatively high within some population groups. Smoking continues to be a major cause of preventable ill health for Aboriginal and/or Torres Strait Islander peoples (hereafter Aboriginal people¹). Smoking is the largest modifiable risk factor contributing to the gap in disease burden between Aboriginal and non-Aboriginal Australians (23% of the gap) and accounts for 12% of the total disease burden for Aboriginal people.⁴ Some of the possible causes of this high smoking prevalence are discussed later in this chapter.

¹ In this thesis, the term 'Indigenous' is used to refer to Indigenous communities worldwide collectively, and the term 'Aboriginal' to refer specifically to Aboriginal and Torres Strait Islander people in Australia. This is for ease of reading the thesis only and respectfully acknowledges the diversity and autonomy of Indigenous peoples within these inclusive terms.

The increased mortality and morbidity from smoking has a long lag time and past high exposure contributes to high current burden.⁴ However, substantial progress has been made to also reduce smoking prevalence among Aboriginal people.⁵ Analysis of ABS data between 2004-05 and 2014-15 found adult daily smoking decreased by 9% from 50% to 41%, with this reduction estimated to equate to 35,000 fewer daily smokers, avoiding thousands of preventable deaths.⁵ Longer term trends from the ABS showed that over a 20 year period current smoking among Aboriginal adults (aged 18 years and over) declined from 55% in 1994 to 45% in 2014-15.⁶

Both these analyses noted that these declines were similar to that for non-Aboriginal people⁶ and the total Australian population.⁵ So while significant progress has been made in reducing smoking rates for all, the disparity in prevalence remains. In the latest available data from the 2018-19 ABS National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), published December 2019⁷, adult (aged 18 years or over) daily smoking continues to be almost three times higher among Aboriginal people compared to the non-Aboriginal population (40% Aboriginal (2018-19 NATSIHS) cf 14% non-Aboriginal (2017-18 NHS)).⁸

This presents a public health challenge to accelerate declines in one population group relative to broader population changes. The drivers of the persisting, higher relative smoking prevalence among Aboriginal people are complex and relate to a combination of historical, social and economic factors. These include the introduction of commercial tobacco to Aboriginal people during settlement and the ongoing impacts of colonisation in the form of marginalisation and entrenched social disadvantage. This is discussed in more detail in 1.4 below.

1.2 Adolescence as a key life stage for smoking prevention

The definition of adolescence as a distinct life stage has evolved across the 20th century with acknowledgement of the widening age and timing from when young people experienced biological maturation (puberty) and major social role transitions (work, marriage, parenting).⁹ Historically, this has been a population group that has been overlooked in health research and policy.¹⁰ The period of adolescence presents a significant opportunity for tobacco prevention as a critical life phase during which adult health behaviours are established.^{11, 12}

In this thesis adolescents are defined as young people aged 10-24 years, a period encompassing the stages of early adolescence (10-14 years), late adolescence (15-19 years) and young adulthood (20-24 years).^{9, 11} Adolescence is increasingly seen as a life-course period that has the potential to bring about generational change in health outcomes and is described as delivering a 'triple dividend' of benefits to the current generation, their future health as adults and the next generation of their children.¹⁰

It is a key period for cognitive development for young people as they transition from focusing on the present and short term needs during early adolescence (10-14), to gaining increased capacity for reasoning, delayed gratification and long term planning later in young adulthood (20-24).¹¹ This relates to different parts of the brain developing at different stages that sees reward driven behaviours and pleasure seeking develop before executive function and rational decision making - and this is hypothesised to drive increased risk taking during this period.¹¹ Adolescents also experience significant social and emotional development during this period which includes the increasing influence of peers over family and challenges in relation to self-identity.¹¹

This period of biological and social change sets up the foundations for future health behaviour, it is when young people learn the skills and resources they will carry throughout their lives to be healthy adults and it is also when many risk behaviours are trialled and established longer term, such as smoking.¹⁰⁻¹² The vast majority of regular smoking begins during adolescence and young adulthood, with 99% of daily smokers starting before age 26, making it a critical period for tobacco prevention.¹³ Further, the earlier young people commence smoking, the lower the likelihood they will make a successful quit attempt and the more likely they are to become heavy smokers and develop tobacco related illnesses.¹³⁻¹⁵

There is no universal experience of adolescent smoking initiation, however one proposed model describes four different pathways where:

- 'early establishers' begin experimenting around age 12-13, progressing to regular smoking by age 17;
- 'late establishers' begin smoking around 15-16 years, with increased use into their early 20s;

- young ‘quitters’ who experimented very early (before age 11) and stopped by 16; and
- those who have never smoked regularly.¹³

However, evidence is building that young people may increasingly be initiating later in adolescence and early adulthood.^{16, 17}

While supporting existing adult smokers to quit will be important for the ongoing reduction in Aboriginal smoking prevalence, preventing youth uptake and focusing on the health of Aboriginal adolescents in particular is important for addressing health inequities in Australia.¹² The Aboriginal population has a younger age distribution (Figure 1). In the 2016 census, half (53%) of all Aboriginal people were under the age of 25, compared to a third (31%) for the non-Aboriginal population, and 30% were adolescents (aged 10-24 years), compared to 19% for the non-Aboriginal population.¹⁸

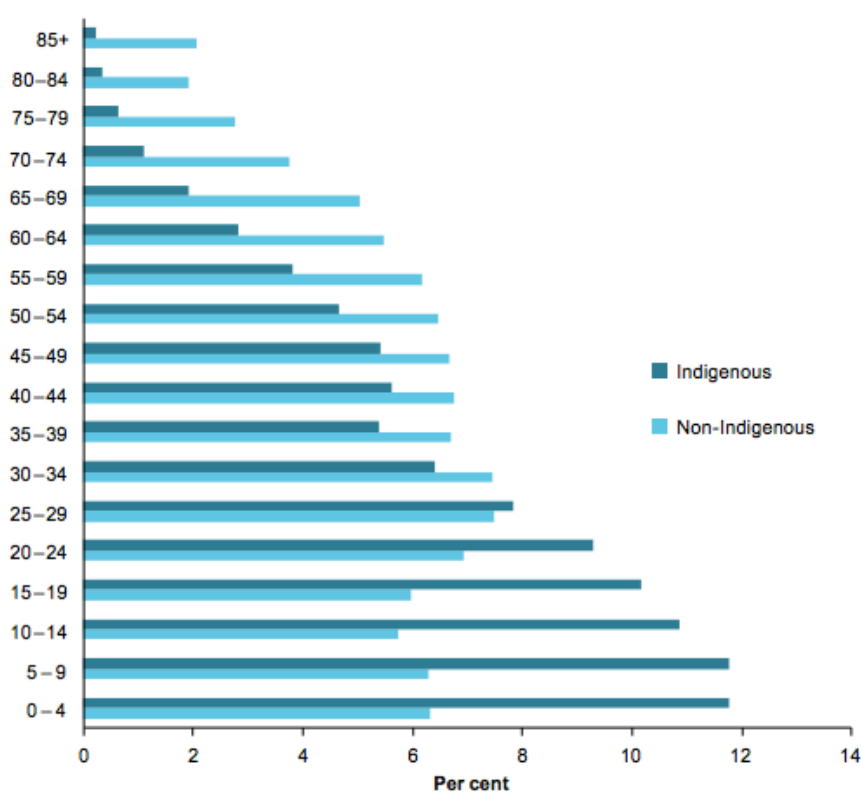


Figure 1: Age structure of Australian population profile, by Indigenous status, Australia, 30 June 2016.¹⁹
[Data source: AIHW 2018 analysis of ABS 2016 Census]

Promisingly, analysis of ABS data demonstrates that current smoking (daily or less than daily) among Aboriginal adolescents aged 18-24 declined between 1994 and 2014-15 from 55% to 41%, and from 30% to 17% among 15-17 year olds.⁶ Despite this progress, smoking rates continue to be high and there remains a substantial disparity, with current smoking prevalence 2.3 times that of non-Aboriginal adolescents.¹² The latest available data from the 2018-19 ABS NATSIHS shows further declines for both Aboriginal 15-17 year olds (13%) and 18-24 year olds (39%).⁷ But these rates remain higher than the same aged non-Aboriginal adolescents. In 2017-18, 16% of non-Aboriginal 18-24 year olds and 3% of 15-17 year olds currently smoked.³

The number of Aboriginal young people estimated to be current smokers in 2018-19 was 6,400 people aged 15-17, and a further 41,600 young people aged 18-24.⁷ This highlights that preventing uptake among Aboriginal adolescents is important, but so is supporting the substantial numbers who have already established regular smoking to quit. In 2018-19, over a third (39%) of 15-17 year old current smokers and more than half of all current smokers aged 18-24 years (60%) made a quit attempt in the previous year⁷, indicating a large proportion of young people are interested in cessation even if they have not yet been successful.

1.3 Tobacco control in Australia

The WHO Framework Convention on Tobacco Control (FCTC) is an evidence-based treaty to respond to the global tobacco epidemic that came into force in 2005²⁰, Australia is a signatory. The FCTC outlines comprehensive measures to reduce tobacco demand and supply that include pricing and taxation, protection from smoke exposure, regulation of product contents, labelling, packaging and advertising, education and cessation support, restrictions on sales to minors and illicit trade. The FCTC explicitly states in the preamble that the Parties to the Convention are “deeply concerned about the high levels of smoking and other forms of consumption by indigenous peoples”.²¹ Australia’s strong tobacco control policy environment has met the obligations under the FCTC, with several measures introduced prior to ratification over decades of comprehensive tobacco control activity which has included tobacco advertising bans, smoke-free spaces, graphic health warnings, tax increases as well as the National Tobacco Campaign and the introduction of plain packaging (see Figure 2).^{22, 23}

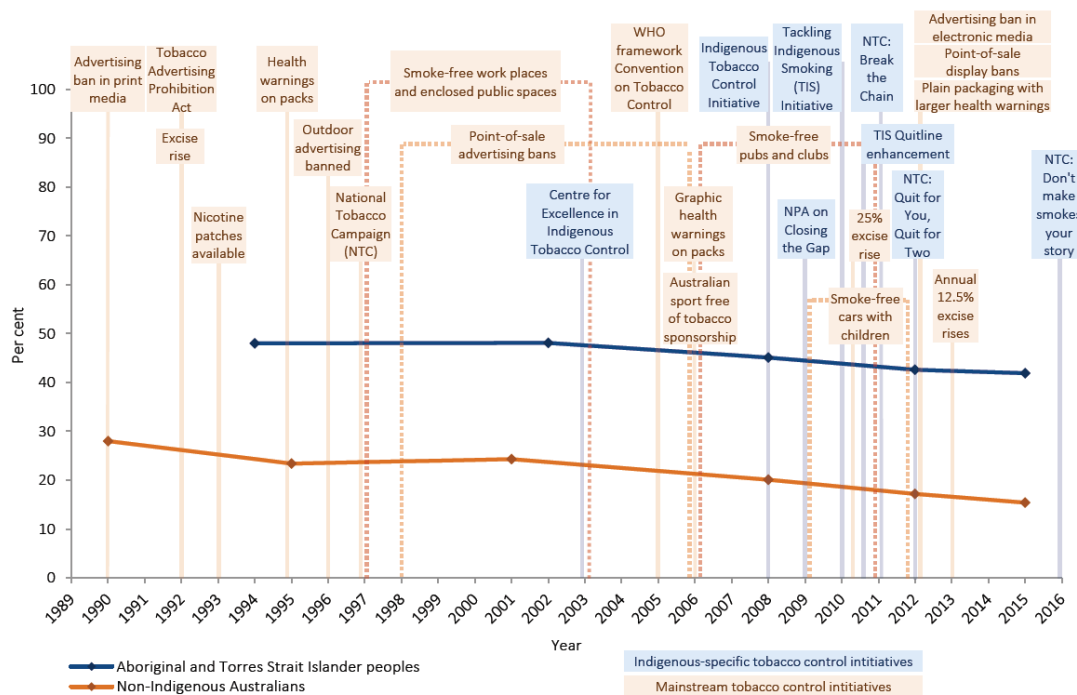


Figure 2: Smoking prevalence rates, people 15 years and over by Indigenous status and key tobacco control measures implemented in Australia since 1990.²⁴
 [Data source: AHMAC 2017 use of ABS NATSIHS and NATSISS]

However, Aboriginal tobacco control was not a core national policy priority until 2008 when targeted programs and social marketing campaigns were introduced.²³ This followed the 2007 publication of the first burden of disease report for Aboriginal people, which identified tobacco as the largest contributing risk factor to the total burden for the first time (10% in 2003).²⁵

In 2008, the Council of Australian Governments' (COAG) agreed to a National Healthcare Agreement performance benchmark to “halve the Indigenous smoking rate, over the 2009 baseline” by 2019.²⁶⁻²⁸ Under the National Tobacco Strategy 2012-2018, this was set as a target to halve the 2008 daily smoking rate of 47.7% among Aboriginal and Torres Strait Islander people by 2018.²⁷ Under the Closing the Gap in Health Outcomes Partnership Agreement, a further COAG agreement, \$199 million was committed to tackling smoking from 2009-2013, in recognition of the substantial contribution tobacco use makes to health inequities.²⁹⁻³¹

Following this funding commitment, the *Tackling Indigenous Smoking and Healthy Lifestyle Program* (TISHLP) was introduced in 2010, and after a 2014 review the revised

and current tobacco focused model of the *Tackling Indigenous Smoking* (TIS) program began in 2015.^{27, 32} National targeted social marketing campaigns were also launched: *Break the Chain* in 2011 and *Don't Make Smokes Your Story* in 2016.²³

Despite this commitment to Aboriginal tobacco control, there have been substantial funding cuts at the federal level to the TIS program and Aboriginal health services, and population wide prevention more broadly, through the closure of the Australian National Preventive Health Agency and an absence of national mainstream social marketing campaigns since 2012.³³⁻³⁸

The TIS program, which is currently funded to 2021-22, supports local TIS teams to deliver tobacco education, cessation and social marketing to their communities through regional tobacco control grants.^{32, 39} The previous program also encompassed nutrition and physical activity aspects to reduce other cardiovascular risk factors.⁴⁰ Evaluation of the current TIS program found it is on track to contribute to a reduction in smoking prevalence, however not all communities were currently covered by the program.³⁹

In support of 2008 COAG commitments and the specific targets in 2013, the National Aboriginal and Torres Strait Islander Health Plan 2013-2023 (NATSIHP) was released to provide a long term, evidence-based policy framework.⁴¹ Although the National Tobacco Strategy (NTS) goal to halve smoking rates by 2018 has not been met, the NATSIHP includes a number of more detailed goals to be achieved by 2023, with goals 9-11 specific to Aboriginal adolescents:⁴¹

- *Goal 3: Decrease the rate of Aboriginal and Torres Strait Islander women who smoke during pregnancy from 47% in 2012 to 37% by 2023*
- *Goal 9: Reduce the rate of Aboriginal and Torres Strait Islander youth aged 15-17 years who smoke from 19% in 2012-13 to 9% by 2023*
- *Goal 10: Increase the rate of Aboriginal and Torres Strait Islander youth aged 15-17 years who have never smoked from 77% in 2012-13 to 91% by 2023*
- *Goal 11: Increase the rate of Aboriginal and Torres Strait Islander youth aged 18-24 years who have never smoked from 42% in 2012-13 to 52% by 2023*
- *Goal 12: Reduce the smoking rate among Aboriginal and Torres Strait Islander people aged 18 plus from 44% in 2012-13 to 40% by 2023*

In 2019, it was reported that progress against these goals was on track.⁴²

This PhD is one component of a larger research project, *A Comprehensive Approach to Aboriginal and Torres Strait Islander Tobacco Control (CATS)*.⁴³ This project, led by Professor Sandra Eades and A/Professor Catherine Chamberlain, called for a more comprehensive approach to reducing smoking prevalence among Aboriginal people.⁴⁴ While it is promising to see smoking prevalence decline in parallel to the non-Aboriginal population, there is a need to accelerate these changes to reduce the disparity in smoking prevalence and related health inequities. The proposed approach involved enhancing current tobacco control measures in Australia under the NTS, and by extension the FCTC, with a CATS framework that harmonises key action areas of the NTS with key principles and priorities of the NATSIHP relevant to tobacco control.^{45, 46}

This means that in order to reduce smoking prevalence among Aboriginal people under the NTS the following actions are required:^{27, 45, 46}

- *Continue to reduce affordability of tobacco products*
- *Protect public health policy including tobacco control policies, from tobacco industry interference*
- *Consider further regulation of contents, product disclosure and supply of tobacco products and alternative nicotine delivery systems*
- *Strengthen mass media campaigns*
- *Provide greater access to a range of evidence-based cessation services to support smokers to quit*
- *Reduce exceptions to smoke-free workplaces, public places and other settings*
- *Eliminate remaining advertising, promotion and sponsorship of tobacco products*

Further, it is important that these efforts are underpinned by the following NATSIHP principles and priorities^{41, 45, 46}:

- *Principle 1: Equality and human rights approach*
- *Principle 2: Partnership*
- *Principle 3: Engagement*
- *Principle 4: Accountability*
- *Priority health enablers: Strength-based/ holistic/social and emotional wellbeing*
- *Priority health enablers: Cultural respect*
- *Priority health enablers: Evidence-based*
- *Priority health enablers: Human capability*
- *Priority: Whole of life approaches*

The importance of centring community partnerships and the inclusion of culture, social determinants and broader social and emotional wellbeing within comprehensive tobacco control approaches for Aboriginal people was a key aspect of the proposed CATS

framework.⁴⁵ A subsequent review of interventions categorised against the framework again emphasised this and the need for a comprehensive approach to Aboriginal tobacco control that incorporates both the key action areas of the NTS with the key principles of the NATSIHP, but noted that there was limited evidence available for Indigenous adolescents specifically.⁴⁶

However, under the 2015 NATSIHP Implementation Plan⁴⁷ four key strategies are described to meet the specified adolescent and youth health goals under the plan:

- *Young people have a voice in the development and implementation of programmes and policies that are affecting them.*
- *Young people are supported to be resilient and make informed and healthy choices about living, including being proud of identity and culture.*
- *Young people are able to access culturally appropriate and non-racist services that address health risk behaviours.*
- *Young people have good education and good employment prospects.*

The implementation plan emphasises a strong sense of identity and connection to culture as fundamental to youth wellbeing, education engagement and future aspirations and the importance of young people being involved in decision making.⁴⁷ The research for this PhD project has been conducted within this ideological framework.

1.4 What influences tobacco use and initiation

While the drivers of tobacco use are complex, they are understood to be related to the social determinants of health. The 2016 National Drug Strategy Health Survey reported that Australians living in the most disadvantaged areas were 2.7 times more likely to smoke daily than those living in the most advantaged areas; prevalence was twice as high in remote areas of Australia compared to major cities; and unemployed people were 1.8 times more likely to smoke compared to those currently employed.²

This is similar for Aboriginal people.^{23, 48} On several indicators of socio-economic advantage, Aboriginal people experiencing greater advantage are more likely to be non-smokers^{23, 48} (see Figure 3).

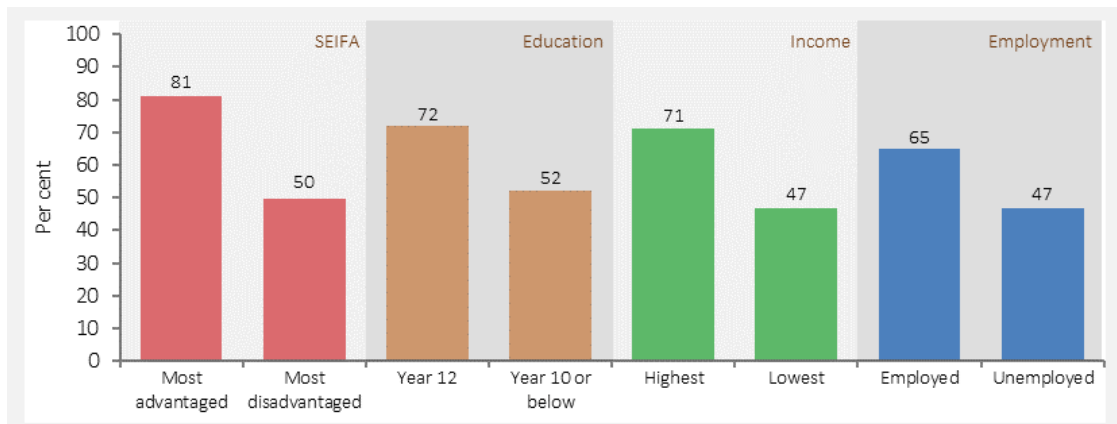


Figure 3: Relationship between being a non-smoker and selected social factors, Indigenous Australians 15 years and over 2014-15.⁴⁹

[Data source: AHMAC 2017 use of ABS NATSIHS and NATSISS]

While there have been significant declines in smoking prevalence for Aboriginal people in non-remote areas, there has been little change in remote areas where rates remain high.^{5, 7, 23} Similarly, for Aboriginal adolescents aged 15-24, current smoking is lower in non-remote areas compared to remote (rate ratio 0.7).¹² In 2018-19, 11% of 15-17 year olds currently smoked in non-remote areas compared to 24% in remote areas, and 35% of 18-24 year olds in non-remote areas compared to 65% in remote areas.⁷ Importantly, remoteness is related to area level measures of socio-economic advantage (SEIFA), particularly for Aboriginal people, with those living in remote areas also more likely to be living in areas of highest relative disadvantage, whereas there are higher income, employment and education levels in non-remote areas.⁵⁰

The higher smoking prevalence among Aboriginal people compared to non-Aboriginal people reflects not only the higher relative proportion of Aboriginal people living in remote areas, but also over representation in these key markers of disadvantage.^{51, 52} It is important to note that this disparity in smoking rates is also observed for other Indigenous peoples internationally that have a similar/shared history of colonisation where the settler population remains dominant, such as those in New Zealand, Canada and the United States (US).⁵²⁻⁵⁴ The ongoing impacts of colonisation have entrenched the disparity in social determinants that are associated with smoking, including the socio-economic factors described above; greater life stress from these conditions and poorer health outcomes; as well as experiences of discrimination, marginalisation, racism, incarceration and removals from family and homelands.⁵¹⁻⁵³ All contribute to the higher smoking prevalence and the normalisation of smoking.⁵²

Conversely, Aboriginal people are more likely to be non-smokers if they are employed, have higher household income, completed year 12, have good physical and mental health, live in non-remote and higher advantage areas, participate in organised sports, do not drink alcohol, and had not been removed from family or experienced incarceration.^{23, 48, 55, 56}

It is also important to recognise that although prior to White colonisation some smoking was introduced by Macassans to northern Australia and there was some chewing of native tobaccos in arid Australia, widespread commercial tobacco was introduced during White settlement through supply in rations and as a form of payment, and was used to manipulate and control Aboriginal people.^{45, 51, 52} Figure 4 is a conceptual model adapted from Colonna et al⁵⁷ of drivers of commercial tobacco use among Aboriginal people that highlights the role colonisation played and continues to play.

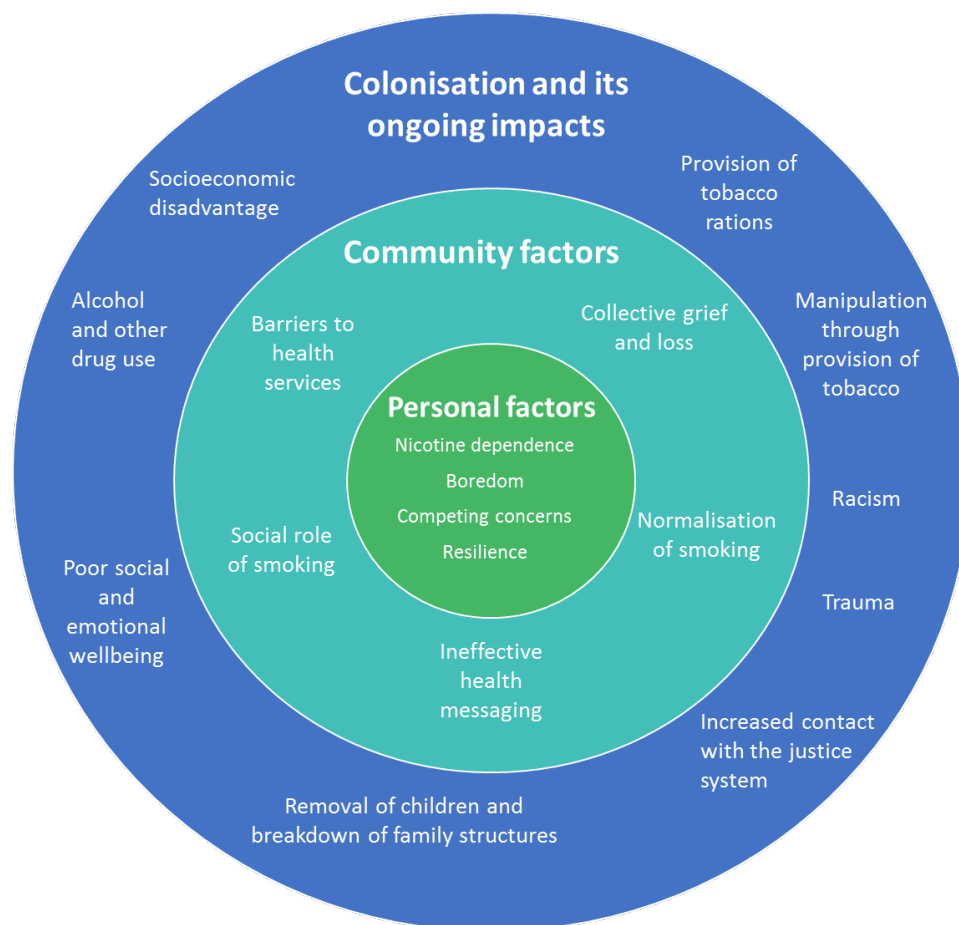


Figure 4: Conceptual model of contributing factors to tobacco use by Aboriginal people.⁵⁷

1.4.1 Factors influencing smoking uptake in adolescence

Smoking initiation among young Aboriginal people is a complex process influenced by interactions between personal, psychosocial, socio-demographic and broader environmental/contextual risk and protective factors. Many of these are common to all adolescents including the established socio-economic drivers of general smoking prevalence described above. These common factors include smoking behaviour and attitudes of family and peers; access and exposure such as smoking in the home; school attendance and engagement; social disadvantage, unemployment and financial stress; mental health including stress, anxiety and depression; and boredom.^{13, 58} However, as with adult smoking prevalence, the higher rates of smoking initiation among Aboriginal adolescents must be considered in the context of the unique social and cultural determinants of health for this group and the enduring impact of colonisation on health outcomes.

Chapter 3 provides a detailed systematic review of the literature examining factors that are related to smoking behaviour among Indigenous adolescents in Australia, New Zealand, Canada and the US. In order to provide a brief review of the Australian literature in this background introductory section the findings from the Australian studies have been summarised here.

There are a small number of studies that have been conducted in Australia exploring smoking among Aboriginal adolescents (eight captured in that review) with many common themes emerging around stress, boredom and social influences and the smoking behaviours and attitudes of others overriding high awareness of the harms of smoking.

In one qualitative study of Aboriginal adolescents living in urban South Australia, Cosh et al highlighted stress as a reason for smoking as well as the influence of smoking family members and peers.⁵⁹ The high number of smokers in their social circles contributed to the normalisation of smoking in their community and impeded quit attempts with young people feeling they were not supported socially to do so. External support was not well accepted with a perception that cessation support services such as the Quitline were not relevant and targeted at older, longer term smokers.⁵⁹ There was however an

awareness of the health impacts of smoking in relation to fitness/sporting ability, pregnancy and longer term health outcomes such as cancer.⁵⁹

Johnston et al, in a qualitative study with Aboriginal adolescents in Darwin and a remote Northern Territory community, also found strong evidence of family and peer influences both for smoking uptake and as protective factors against smoking.⁶⁰ The social aspect of smoking as an opportunity to talk and bond with friends and family reinforced the behaviour, even among those who may have had negative early smoking experiences, and the high prevalence environment increased the accessibility of cigarettes.⁶⁰ Protective against progressing from experimentation to regular smoking were smoke-free settings and the attitudes of family. Having little access to cigarettes, living in smoke-free homes, non-smoking role modelling and clear anti-smoking messages from family all contributed to young people not becoming regular smokers.⁶⁰ In relation to peer influence, some smoked with others as it facilitated bonding, particularly as smokers were increasingly isolated, whereas for others the strong views of their non-smoking peers reinforced decisions not to smoke.⁶⁰

Leavy et al⁶¹ also conducted a qualitative study with a range of young Australians, including Aboriginal adolescents in urban and regional Western Australia, and stress and stressful life events were again raised as a reason for smoking, along with boredom. Although there was an understanding of the health risks of long term smoking, this was not perceived as relevant to trialling.⁶¹ Compared to the mainstream population, the Aboriginal adolescents reported more overt pressure from friends to try smoking and the authors called for strategies to normalise non-smoking in their communities.⁶¹ In a cross-sectional survey of young people in juvenile detention in New South Wales, Indig et al⁶² found Aboriginal young people were more likely to be smokers, to have started earlier and to have smoking friends and parents.

Passey et al⁶³ conducted a qualitative study with young Aboriginal women in New South Wales who described how the high prevalence environment of their communities contributed to a perception that smoking was a part of their Aboriginal identity.⁶³ While these participants may have been non-smoking advocates when younger, they transitioned to smoking in high school, reinforced through the social interactions and a sense of belonging. Boredom and perceived little risk in trying (relative to future health)

were again raised as risk factors for initiation, with engagement with school and sport protective.⁶³ Several young women in this study also had children themselves and felt they would not be able to significantly influence whether their children took up smoking while they were smokers themselves.⁶³ However Johnston et al found a protective effect of non-smoking values expressed by parents in their study, even if they were current smokers.⁶⁰

1.4.2 Theories for understanding smoking initiation and uptake

There are many different health behaviour theories and theoretical models that have been used to explain smoking. While some focus on individual knowledges and attitudes, such as the health belief model and the transtheoretical model of behaviour change, ecological models such as Bandura's social cognitive theory, are important because they acknowledge the environmental and social influences that affect individual behaviour and how these can interact with each other.^{64, 65}

One comprehensive, integrated health behaviour theory, a 'meta-theory' that incorporates many existing behavioural theories, is the 'Theory of Triadic Influence' (TTI).^{66, 67} This model considers the complex relationship between ultimate, distal and proximal influences from personal, social and environmental streams.^{66, 67} In this model cultural and environmental factors are important for influencing knowledge and then attitudes; the social factors, including other people's behaviours and bonding, influences perceptions of social norms; individual factors, such as a sense of self, influence a person's self-efficacy and behavioural control. All of these factors are also thought to be interrelated in a complex system of feedback loops (Figure 5).

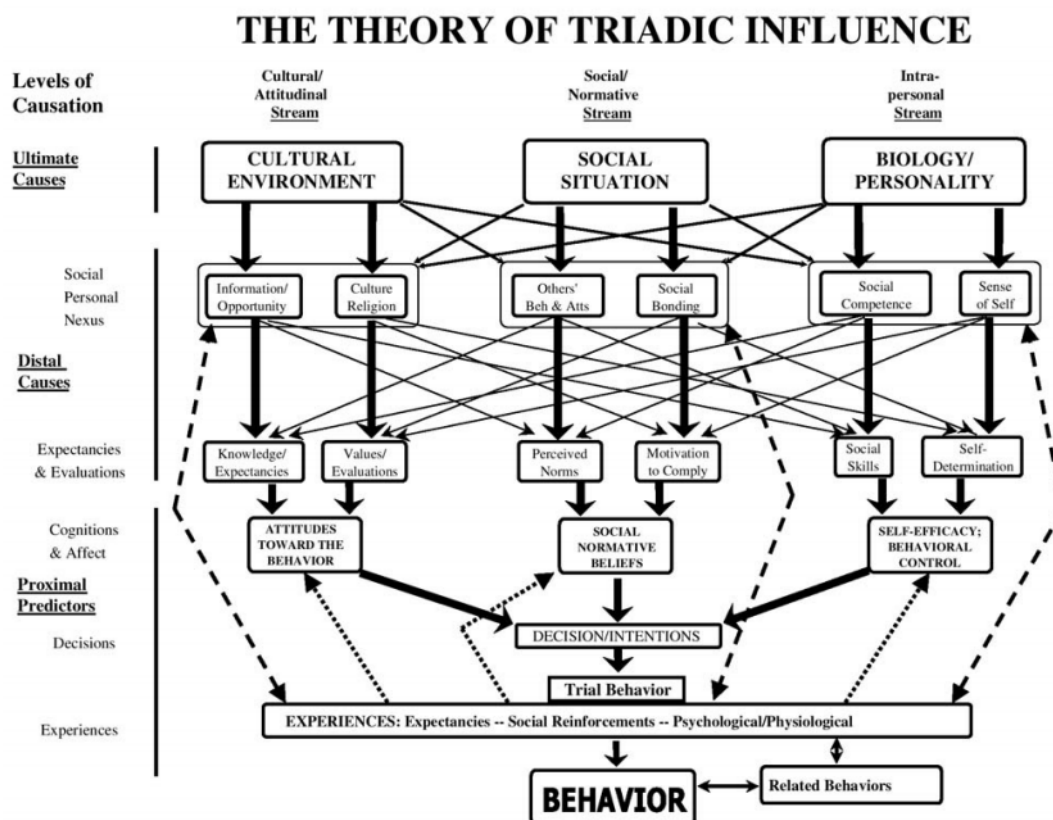


Figure 5: Theory of Triadic Influence.⁶⁸

TTI is the model that the US Surgeon General suggests captures the complexity of influences for smoking uptake.⁶⁹ Based on this theory, the Australian online resource *Tobacco in Australia*, published a modified TTI model to describe the influences for smoking uptake detailing the intrinsic, extrinsic and environmental influences that contribute to movement between the stages of experimentation, occasional or regular smoking and cessation.⁷⁰

Based on a review of the literature conducted for this thesis, it was identified that a number of important factors, including some relevant to Aboriginal adolescents specifically, are not currently listed in this model. Many of these have been detailed in the preceding sections including social and emotional wellbeing, stressful life events, experiences of discrimination, cultural identity and connectedness, traditional tobacco use, the historical role of tobacco in colonisation, and current tobacco control measures including plain packaging, graphic health warnings and social marketing campaigns.

A proposed adapted model is illustrated in Figure 6 with specific additional influences indicated (in black balloons).

By integrating the more indirect, historical and contextual factors that contribute to higher community smoking prevalence among Aboriginal people, TTI can provide a useful framework for understanding adolescent smoking behaviour. For the purposes of this thesis, the adapted model in Figure 6 and the overarching theory has been used as a guiding structure to identify likely important variables in statistical analysis and to organise and interpret results from each study, particularly the systematic review and the qualitative analysis.

An additional, related ecological model of how common determinants contribute to the trial of 'risk behaviours' is Problem Behaviour Theory (PBT).⁷¹ In this model the co-occurrence of risk behaviours is thought to be related to common factors across three systems of 1) behaviour ('conventional' and 'problem' behaviours; 2) personality (values, beliefs) and the environment (including social norms and socioeconomic determinants).^{71,72} This theory is referenced in Chapter 6 to explain the clustering or co-occurrence of multiple risk behaviours (tobacco, alcohol and cannabis use) in adolescence.

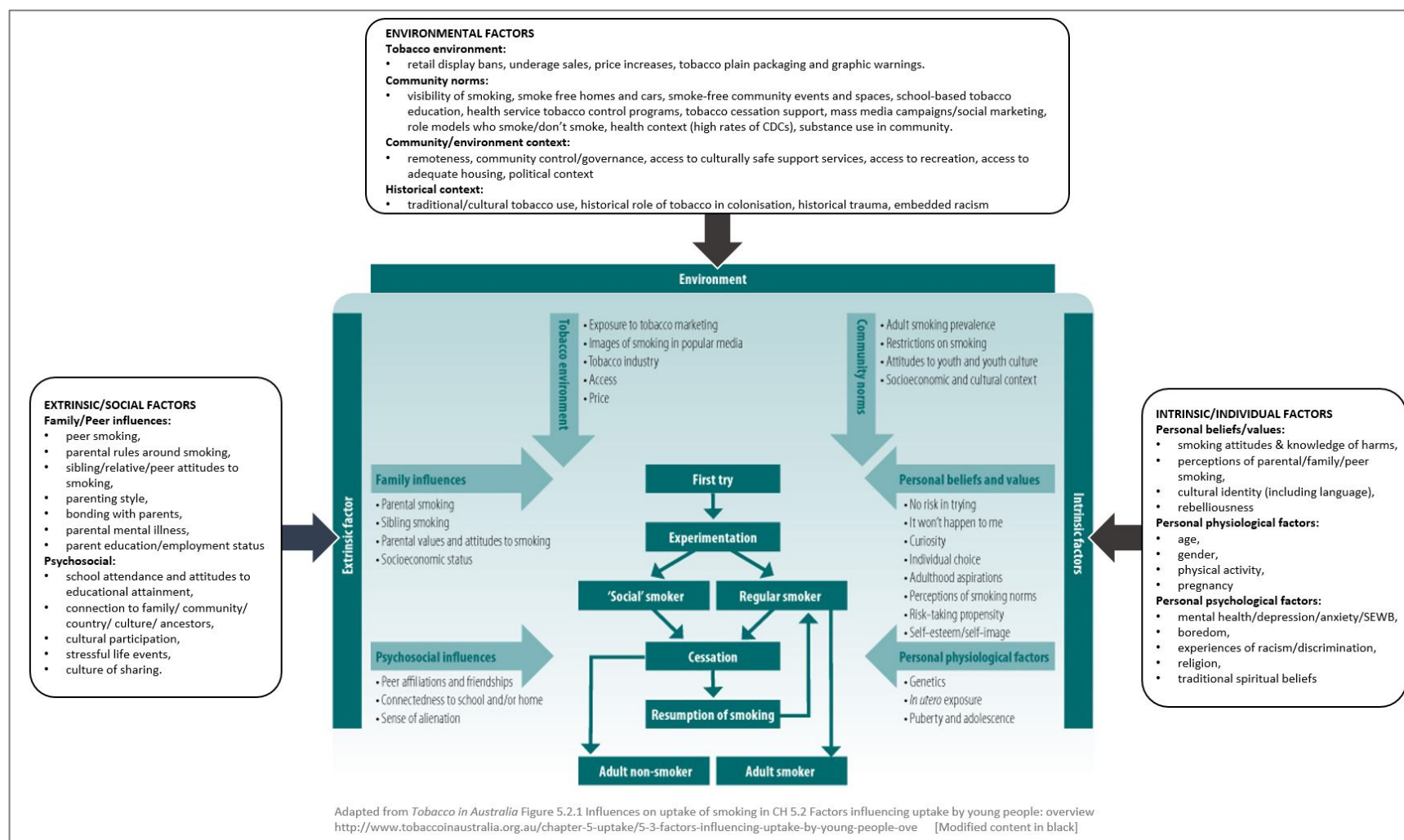


Figure 6: Modified Theory of Triadic Influences model for smoking uptake by Indigenous adolescents. Adapted from Tobacco in Australia.⁷⁰ Figure 6 shows additional factors (in black) that may influence uptake, including those specific to Indigenous adolescents, not included in the original published model by Tobacco in Australia (green content)

1.5 Research gaps and questions

A better understanding of contemporary youth smoking behaviours among Aboriginal adolescents will assist tobacco control programs to be more effective. However, the evidence to date has been limited.⁴⁶ A recent Cochrane review of Indigenous youth smoking prevention programs (globally) was inconclusive with just two trials meeting the study inclusion criteria, providing insufficient evidence for effectiveness.⁷³

At the time this PhD thesis was conceived there was very little available published data about the current smoking prevalence among Aboriginal adolescents, particularly younger age groups (less than 15 years), or how this varied by key predictors of smoking prevalence such as remoteness and social advantage. Exploring changes in smoking trends among Aboriginal adolescents, compared to the total population and/or non-Aboriginal adolescents, provides important evidence for whether tobacco control policies are having a universal impact for all young people and whether targeted measures may be additionally effective. This will be addressed in *Research Question 1: Are fewer Aboriginal adolescents becoming regular smokers and is the prevalence of never smoking increasing?*

Similarly, there was very little known about the age smoking commences. Some of the available published data were limited to smaller regionally specific studies (such as Northern Territory communities) or had been conducted decades prior to the introduction of more recent tobacco control policies.⁷⁴ This is a significant gap in knowledge that is important for informing the design of prevention programs, providing guidance on what key periods of adolescence should be targeted to prevent smoking uptake. This will be addressed in *Research Question 2: Is the incidence of regular smoking occurring later in adolescence?*

In general, it is acknowledged that there is a lack of health data for Aboriginal people, particularly adolescents and those living in non-remote areas, with much of what is collected or reported excluding discussion of the broader determinants of health or failing to use an Aboriginal concept of health and wellbeing (see Box 1).^{75, 76} Exploring these broader concepts are important for understanding the drivers of the uptake of smoking among Aboriginal adolescents, and what protects against it, and to what extent these factors are similar to non-Aboriginal adolescents. This will be addressed in

Research Question 3: Are there common factors that protect against uptake and increase the likelihood of being a never smoker?

Research questions

To recap, the three research questions explored in this thesis will be:

- 1. Are fewer Aboriginal adolescents becoming regular smokers and is the prevalence of never smoking increasing?**
- 2. Is the incidence of regular smoking occurring later in adolescence?**
- 3. Are there common factors that protect against uptake and increase the likelihood of being a never smoker?**

Box 1: Aboriginal Concepts of Health and Wellbeing

For Aboriginal people good health is a broader, holistic concept that encompasses much more than simply an absence of illness but considers physical, social, emotional, cultural, spiritual and ecological wellbeing of the individual and their community.⁵⁵ Aboriginal Health as defined by the National Aboriginal Community Controlled Health Organisation (NACCHO) “means not just the physical well-being of an individual but refers to the social, emotional and cultural well-being of the whole Community in which each individual is able to achieve their full potential as a human being thereby bringing about the total well-being of their Community.”⁷⁷ The ABS has a reporting framework⁷⁸ for measuring Aboriginal Wellbeing which includes the following domains, of which ‘Health’ is just one:

- *Culture, Heritage and Leisure*
- *Family, Kinship and Community*
- *Health*
- *Education, Learning and Skills*
- *Customary, Voluntary and Paid Work*
- *Income and Economic Resources*
- *Housing, Infrastructure and Services*
- *Law and Justice*
- *Citizenship and Governance*

1.6 Thesis overview

Chapter 1 has described the broad background outlining the importance of the research questions with reference to some conceptual frameworks, behavioural theory and a summary of what contributes to tobacco use in general and for Aboriginal adults and adolescents specifically.

Chapter 2 is a brief methods chapter. This thesis including published works has been written with each results chapter forming a standalone publication. As such, the detailed methods for each study are included in the individual results chapters, but for convenience are summarised in a table within Chapter 2. Chapter 2 also provides background to the researcher and the choice of this thesis topic, as well as a discussion of approaches to Aboriginal health research, and the strengths of this multi-methods thesis.

Chapter 3 is the first results chapter and is a systematic review of international literature. The published paper, *Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review*, outlines the range of risk and protective factors identified as being related to smoking among Indigenous adolescents globally.

Chapter 4 includes the published paper, *The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy*, an analysis of the Australian Secondary Students' Alcohol and Drug Survey (ASSAD). It demonstrates significant increases in never smoking and commensurate decreases in current smoking and smoking intensity for Aboriginal students aged 12-17 over the period 2005-2017.

Chapter 5 includes the published paper, *Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002-2015*, which using five ABS surveys also demonstrates significant increases in never smoking and declines in current smoking among Aboriginal adolescents aged 15-24. It also describes the widening age range for smoking initiation as an increasing proportion of young people commence regular smoking after the age of 18 years.

Chapter 6 includes the published paper, *Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017*. This further analysis of the ASSAD survey provides a cross-sectional comparison of the smoking prevalence between Aboriginal and non-Aboriginal students and how this relates to alcohol and cannabis use.

Chapter 7 includes the paper, *Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)*, which has been accepted for publication. Using cross-sectional analysis of the baseline Phase 1 survey data from the SEARCH study, this work identifies a range of individual, social and environmental factors associated with a greater likelihood of being a non-smoker among Aboriginal adolescents aged 12-17.

Chapter 8 includes the in-progress paper, *Don't follow the smoke: listening to the tobacco experiences of urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)*. This qualitative study extends the work described in Chapter 7 and through yarning circles with SEARCH study participants explored the attitudes to smoking and experiences of young people. Through this discussion it sought to understand how the factors identified in Chapters 3 and 7 influence youth smoking and how this can inform community prevention programs.

To conclude, Chapter 9 provides a discussion of key findings from each preceding results chapter, and the implications for policy, practice and future research.

How each results chapter relates to the research questions is summarised in Figure 7 below:

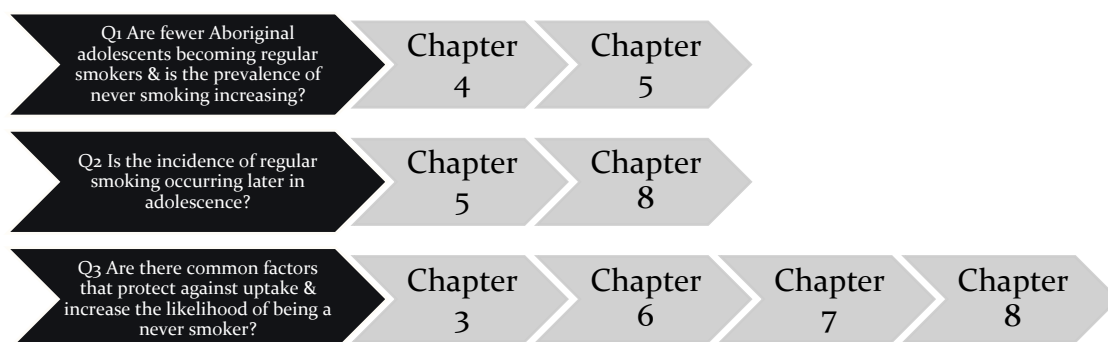


Figure 7: Overview of results chapters against research questions

REFERENCES

1. Australian Institute of Health and Welfare. Burden of tobacco use in Australia: Australian Burden of Disease Study 2015. Cat. no. BOD 20. Canberra: AIHW; 2019 [cited 1 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/burden-of-disease/burden-of-tobacco-use-in-australia>
2. Australian Institute of Health and Welfare. National Drug Strategy Household Survey 2016: detailed findings. Drug Statistics Series no. 31. Cat. no. PHE 214. Canberra: AIHW; 2017 [cited 28 May 2019]. Available from: www.aihw.gov.au/reports/illicit-use-of-drugs/2016-ndshs-detailed
3. Australian Bureau of Statistics. 4364.0.55.001 - National Health Survey: First Results, 2017-18 Canberra: ABS; 2019 [cited 25 Nov 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.001~2017-18~Main%20Features~Smoking~85>
4. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Australian Burden of Disease Study series no. 6. Cat. no. BOD 7 Canberra: AIHW; 2016 [cited 28 May 2019]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
5. Lovett R, Thurber K, Wright A, Maddox R, Banks E. Deadly progress: changes in Australian Aboriginal and Torres Strait Islander adult daily smoking, 2004-2015. *Public Health Research & Practice*. 2017;27(5):e2751742.
6. Australian Bureau of Statistics. 4737.0 - Aboriginal and Torres Strait Islander Peoples: Smoking Trends, Australia, 1994 to 2014-15. Canberra: ABS; 2017 [cited 28 May 2019]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4737.0
7. Australian Bureau of Statistics. 4715.0 - National Aboriginal and Torres Strait Islander Health Survey, 2018-19 Canberra: ABS; 2019 [cited 11 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4715.0>
8. Australian Bureau of Statistics. 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2014-15 Canberra: ABS; 2016. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0
9. Sawyer SM, Azzopardi PS, Wickremarathne D, Patton GC. The age of adolescence. *The Lancet Child & Adolescent Health*. 2018;2(3):223-8.
10. Patton GC, Sawyer SM, Santelli JS, et al. Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*. 2016;387(10036):2423-78.

11. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: a foundation for future health. *The Lancet*. 2012;379(9826):1630-40.
12. Azzopardi PS, Sawyer SM, Carlin JB, et al. Health and wellbeing of Indigenous adolescents in Australia: a systematic synthesis of population data. *The Lancet*. 2018;391(10122):766-82.
13. US Department of Health and Human Services. Preventing tobacco use among young people: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012 Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
14. Breslau N, Peterson EL. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *Am J Public Health*. 1996;86(2):214-20.
15. Greenhalgh E, Stillman S, Ford C. Chapter 7.7 Factors that predict success or failure in quit attempts. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2016. Available from: www.tobaccoinaustralia.org.au/chapter-7-cessation/7-7-personal-factors-associated-with-quitting
16. Edwards R, Carter K, Peace J, Blakely T. An examination of smoking initiation rates by age: results from a large longitudinal study in New Zealand. *Aust N Z J Public Health*. 2013;37(6):516-9.
17. Thompson AB, Mowery PD, Tebes JK, McKee SA. Time Trends in Smoking Onset by Sex and Race/Ethnicity Among Adolescents and Young Adults: Findings From the 2006–2013 National Survey on Drug Use and Health. *Nicotine & Tobacco Research*. 2017;20(3):312-20.
18. Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018. Cat. no. IHW 202. Canberra: AIHW; 2018 [cited 26 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/indigenous-australians/atsi-adolescent-youth-health-wellbeing-2018/>
19. Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018. Cat. no. IHW 202. Canberra: AIHW; 2018. Figure 2.1.1: Age structure of the Australian population profile, by Indigenous status, Australia, 30 June 2016; p.12.[cited 14 Oct 2019]. Available from: <https://www.aihw.gov.au/reports/indigenous-australians/atsi-adolescent-youth-health-wellbeing-2018/>.

20. WHO Framework Convention on Tobacco Control. WHO FCTC 2019 [cited 26 Nov 2019]. Available from: <https://www.who.int/fctc>
21. World Health Organization. WHO Framework Convention on Tobacco Control. Geneva, Switzerland: WHO Document Production Services; 2003.
22. Australian Government Department of Health. Tobacco control timeline. 2018 [cited 3 June 2019]. Available from: <https://www.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc~timeline>
23. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017 [cited 28 May 2019]. Available from: <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
24. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017. Figure 2.15-6 Smoking prevalence rates, people 15 years and over by Indigenous status and key tobacco control measures implemented in Australia since 1990. p. 130.[cited 12 Dec 2019]. Available from: <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
25. Vos T, Barker B, Stanley L, Lopez A. The burden of disease and injury in Aboriginal and Torres Strait Islander peoples 2003. Brisbane: School of Population Health, The University of Queensland; 2007.
26. Council of Australian Governments (COAG). National Healthcare Agreement 2012. Council on Federal Financial Relations; 2012. Available from: http://federalfinancialrelations.gov.au/content/national_agreements.aspx
27. Intergovernmental Committee on Drugs (IGCD) Standing Committee on Tobacco. National Tobacco Strategy 2012-2018. Canberra: Commonwealth of Australia; 2012.
28. Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. Drug statistics series no. 30. Cat. no. PHE 210 Canberra: AIHW; 2016 [cited 28 May 2019]. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
29. Council of Australian Governments (COAG). National Partnership Agreement on Closing the Gap in Indigenous Health Outcomes. Council on Federal Financial Relations;

2009. Available from:

http://federalfinancialrelations.gov.au/content/npa/health/_archive/ctg-health-outcomes/national_partnership.pdf

30. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Chapter 8.13 Policies for advancing tobacco control programs among Aboriginal and Torres Strait Islander peoples. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2019 [cited 26 Nov 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-8-apsi/8-13-policy-recommendations-for-advancing-tobacco->
31. Australian Government Department of Prime Minister and Cabinet. Closing the Gap Report 2019. Canberra: Commonwealth of Australia; 2019. [cited 30 Oct 2019]. Available from: <https://ctgreport.niaa.gov.au/>
32. Tackling Indigenous Smoking. About the TIS program. 2019 [cited 30 August 2019]. Available from: <http://tacklingsmoking.org.au/about-the-tis-program/>
33. Australian Government Department of Health. The history of the national tobacco campaign. 2019 [updated 10 May 2018. Cited 30 August 2019]. Available from: <https://webarchive.nla.gov.au/awa/20190208165138/http://www.health.gov.au/internet/main/publishing.nsf/Content/tobacco-educat>
34. Australian Government Department of Health. National Tobacco Campaign - More Targeted Approach & Break the Chain: Campaign Evaluation 2014. 2019 [cited 30 August 2019]. Available from: <https://webarchive.nla.gov.au/awa/20180412042530/http://www.quitnow.gov.au/internet/quitnow/publishing.nsf/Content/research-reports>
35. Haughton J. Indigenous affairs: health and wellbeing. Canberra, ACT: Parliament of Australia; 2017 [cited 30 August 2019]. Available from: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201718/IndigenousHealth
36. Public Health Association of Australia. Public Health Association of Australia submission to the Close the Gap Refresh. Canberra ACT: PHAA; 2018 [cited 30 August 2019]. Available from: <https://www.phaa.net.au/documents/item/2762>
37. Public Health Association of Australia. Federal Budget 2019-20 - Pre-Budget Submission. Canberra ACT: PHAA; 2019 [cited 30 August 2019]. Available from: <https://www.phaa.net.au/documents/item/3292>

38. Daube M. Tobacco in Australia: Time to get back to basics. MJA InSight. 2018 [cited 3 June 2019]. Available from: <https://insightplus.mja.com.au/2018/16/tobacco-in-australia-time-to-get-back-to-basics/>
39. Mitchell E, Bandara P, Smith V. Tackling Indigenous Smoking program – final evaluation report. 2018 [cited 3 June 2019]. Available from: <https://beta.health.gov.au/resources/publications/tackling-indigenous-smoking-program-final-evaluation-report>
40. Upton P, Davey R, Evans M, Mikhailovich K, Simpson L, Hacklin D. Tackling Indigenous Smoking and Healthy Lifestyle Programme Review. Canberra, ACT: University of Canberra; 2014. Available from: <https://www.health.gov.au/resources/publications/tackling-indigenous-smoking-and-healthy-lifestyle-programme-review-2014>
41. Australian Government Department of Health. National Aboriginal and Torres Strait Islander Health Plan 2013–2023. Canberra, ACT: Australian Government; 2013.
42. Australian Institute of Health and Welfare. Tracking progress against the Implementation Plan goals for the Aboriginal and Torres Strait Islander Health Plan 2013–2023 [Internet]. Canberra: Australian Institute of Health and Welfare; 2019 [cited 2 Dec 2019]. Available from: <https://www.aihw.gov.au/reports/indigenous-australians/tracking-progress-against-ipg-2013-2023>
43. The Australian Prevention Partnership Centre. Informing a national approach to Aboriginal tobacco control. 2019 [cited 2 Dec 2019]. Available from: <https://preventioncentre.org.au/our-work/research-projects/informing-a-national-approach-to-aboriginal-tobacco-control/>
44. Eades SJ, Chamberlain C. Seeking a comprehensive approach to tobacco control for Aboriginal and Torres Strait Islander people. Med J Aust. 2015;202(10):511-2.
45. Chamberlain C, Perlan S, Rychetnik L, et al. A comprehensive approach to Aboriginal and Torres Strait Islander tobacco control (CATS). 2016.
46. Chamberlain C, Perlen S, Brennan S, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. Systematic Reviews. 2017;6(1):135.
47. Australian Government Department of Health. Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013–2023. Canberra, ACT: Australian Government; 2015.

48. Thomas DP, Briggs V, Anderson IPS, Cunningham J. The social determinants of being an Indigenous non-smoker. *Aust N Z J Public Health*. 2008;32(2):110-6.
49. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017. Figure 2.15-4 Relationship between being a non-smoker and selected social factors, Indigenous Australians 15 years and over, 2014-15. p. 129.[cited 12 Dec 2019]. Available from: <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
50. Australian Bureau of Statistics. 2076.o - Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2016. Canberra: ABS; 2018 [cited 3 June 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2076.o>
51. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control*. 2003;12(suppl 2):ii5-ii8.
52. van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2016 [cited 14 Oct 2019]. Available from: www.tobaccoinaustralia.org.au/chapter-8-aptsi
53. Maddox R, Waa A, Lee K, et al. Commercial tobacco and Indigenous peoples: a stock take on Framework Convention on Tobacco Control progress. *Tob Control*. 2019;28(5):574-81.
54. King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. *The Lancet*. 2009;374(9683):76-85.
55. Australian Institute of Health and Welfare. *Australia's Health 2018*. Cat. no. AUS 221. Canberra: AIHW; 2018 [cited 1 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/australias-health/australias-health-2018>
56. Australian Bureau of Statistics. 4704.o - The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010. Canberra: ABS; 2012. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/4704.o>
57. Colonna E, et al. Review of tobacco use among Aboriginal and Torres Strait Islander people. *HealthInfoNet*. In Press.
58. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors].

- Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2014.
Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
59. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Australian Journal of Primary Health*. 2015;21(3):334-41.
 60. Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health*. 2012;12(1):963.
 61. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr*. 2010;21(3):208-14.
 62. Indig D, Haysom L. Smoking behaviours among young people in custody in New South Wales, Australia. *Drug and Alcohol Review*. 2012;31(5):631-7.
 63. Passey ME, Gale JT, Sanson-Fisher RW. "It's almost expected": rural Australian Aboriginal women's reflections on smoking initiation and maintenance: a qualitative study. *BMC Womens Health*. 2011;11:55.
 64. Bandura A. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ, US: Prentice-Hall, Inc; 1986. xiii, 617.
 65. Bandura A. Social cognitive theory: An agentic perspective. *Asian journal of social psychology*. 1999;2(1):21-41.
 66. Flay BR, Petraitis J. A new theory of health behavior with implications for preventive interventions. *Adv Med Sociol*. 1994;4:19-44.
 67. Flay BR. Theory of Triadic Influence. 2004 [cited 11 Dec 2019]. In: *Encyclopedia of Health and Behavior* [Internet]. Thousand Oaks, California: SAGE Publications, Inc.; [p. 715-8]. Available from: <http://sk.sagepub.com/reference/behavior>
 68. Flay BR. Theory of Triadic Influence. 2004 [cited 11 Dec 2019]. In: *Encyclopedia of Health and Behavior* [Internet]. Thousand Oaks, California: SAGE Publications, Inc.; [p. 716. Figure 1 The Theory of Triadic Influence]. Available from: <http://sk.sagepub.com/reference/behavior>
 69. US Department of Health and Human Services. Chapter 4. Social, Environmental, Cognitive, and Genetic Influences on the Use of Tobacco Among Youth. In *Preventing tobacco use among young people: A report of the Surgeon General* Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention,

- National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from:
www.cdc.gov/tobacco/data_statistics/sgr/2012/
70. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5.2 Factors influencing uptake by young people: overview. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2019. Figure 5.2.1 Influences on uptake of smoking [updated February 2019. cited 12 Dec 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-2-factors-influencing-uptake-by-young-people-ove>
 71. Jessor R, Costa FM. Problem-Behavior Theory - A Brief Overview n.d. [cited 11 Dec 2019]. Available from: https://ibs.colorado.edu/jessor/pb_theory.html
 72. Jessor R, Donovan JE, Costa FM. Beyond adolescence: Problem behaviour and young adult development: Cambridge University Press; 1994.
 73. Carson KV, Brinn MP, Labiszewski NA, et al. Interventions for tobacco use prevention in Indigenous youth. Cochrane Database Syst Rev. 2012(8):Cd009325.
 74. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Chapter 8.4 Smoking among Aboriginal and Torres Strait Islander children and teenagers. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2016 [updated August 2016. cited 12 Dec 2019]. Available from: <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-4-smoking-among-aboriginal-and-torres-strait-isl>
 75. Laycock A, Walker D, Harrison N, Brands J. Part A: Indigenous Health Research in Context. Researching Indigenous Health: A Practical Guide for Researchers. Melbourne: The Lowitja Institute; 2011.
 76. Thomas DP, Bainbridge R, Tsey K. Changing discourses in Aboriginal and Torres Strait Islander health research, 1914-2014. Med J Aust. 2014;201(S1):S15-S8.
 77. National Aboriginal Community Controlled Health Organisation. Definitions. 2019 [cited 2 Dec 2019]. Available from: <https://www.naccho.org.au/about/aboriginal-health/definitions/>
 78. Australian Bureau of Statistics. 4703.0 - Framework for Measuring Wellbeing: Aboriginal and Torres Strait Islander Peoples, 2010. Canberra: ABS; 2010 [updated 15 June 2012. cited 2 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/4703.0>

2 Methods

2.1 About the researcher: who am I and why did I choose this research topic?

As a non-Aboriginal non-smoker who until very recently was not a researcher (and left adolescence a decade ago), how did I come to be doing a PhD in Aboriginal youth tobacco prevention? My professional background is in science and health communications, most recently managing market research projects for social marketing campaigns at the Australian Government Department of Health (the Department). I had completed a Bachelor of Science in Media and Communications, followed by a Graduate Diploma in Science Communication. During high school I took a keen interest in the National Tobacco Campaign during its 1990s peak, cutting out the ads from magazines. However, I was not yet aware of what social marketing was, or even public health, or how to get there.

After a handful of more public relations focused communications roles I found myself working at the Department on national health campaigns across a wide range of topic areas including tobacco. Working in this area was my first introduction to communications campaigns that were underpinned by behaviour change theory and my first exposure to research that sought to understand people's experiences, attitudes and beliefs and how they related to health behaviours and outcomes.

At this time the Department supported me to complete a Master of Public Health through which I focused on Aboriginal health (as well as tobacco and social marketing electives) and the more I learnt about the social determinants of health the more I started to feel that working on campaigns was not the most useful that I could be. They still had a role to play but they were limited in what change they could affect. I continued work as part of the team developing a new tobacco campaign targeting Aboriginal people who smoke, which became *Don't Make Smokes Your Story*. After seeing the impact that the large *Talking About the Smokes* research project had on shaping the messaging and strategy of our campaign and other tobacco control activity and policy, I began to consider academic research as a way to have more meaningful impact.

By the time I had started my PhD I understood the importance of tobacco control and why it is critical to reducing the disparities in health outcomes between Aboriginal and non-Aboriginal people, but all my work to date had focused on adults and supporting them to quit. Where young people were considered it was in relation to whole of population measures to denormalise smoking and make access harder. There seemed to be an accepted wisdom that getting existing smokers to quit would have the most impact and youth smoking would continue to reduce in the background. While that may be true in a general sense, as I began to understand adolescence as the most significant period for establishing smoking, and that half of the Aboriginal population are under 25, it became clear that focusing on preventing uptake in this section of the population would have substantial future health benefits, and as highlighted in the *A Comprehensive Approach to Aboriginal and Torres Strait Islander Tobacco Control (CATS)* review¹, there was limited research for Aboriginal adolescents specifically, presenting a clear research gap.

2.2 Methodology and research approach

Aboriginal people understandably have a difficult relationship with research, and are thought to be one the most researched populations in the world but have largely seen little benefit from this.^{2,3} Historically, Aboriginal people have been the subjects of research, exploited, de-humanised and ‘othered’ by those in a position of power and privilege in studies conducted with a European/Western worldview that often perpetuated racial stereotypes.⁴ Historical and some contemporary research processes are also perceived to have taken traditional knowledges without any benefit to those being studied.⁴ As much existing research has been conducted by non-Aboriginal people, Aboriginal people’s views, voice and understanding of health and wellbeing have not been represented.^{4,5}

In Australia, there has been an important shift in recent years with the introduction of key national ethical guidelines for conducting research with Aboriginal people.² Research projects must now embody the ethical principles of reciprocity, benefit and empowerment with the expectation that any research project will privilege Aboriginal views, be owned and led by Aboriginal people, and can be transferred into practice to benefit Aboriginal people.⁴ Further, health related research should consider the social and economic factors that impact health, not just describe differences in health outcomes between Aboriginal and non-Aboriginal people.^{4,5}

‘Deficit discourse’ focuses on differences in health outcomes and positions this as a deficiency or a failure of one population group.^{5,6} Much research with Aboriginal people has been framed in this way and it has been shown that the pervasiveness of this discourse can itself have an impact on health.^{5,6} Whereas a ‘strengths-based’ approach can not only counter negative stereotypes but also identify alternative approaches for enhancing good health and wellbeing.⁶ In relation to research and reporting, this can involve focusing on the social determinants and ecological models of health, as well as the identification of protective factors, and exploring resilience, empowerment and cultural appropriateness.^{5,6}

This PhD project has been guided by Aboriginal leadership and shaped by community priorities from the outset, sitting within the broader *Comprehensive Approach to Aboriginal and Torres Strait Islander Tobacco Control* (CATS) research led by Sandra Eades and Catherine Chamberlain. Further, the individual projects within this thesis have also responded to an identified need for research by Aboriginal people, and have maximised community participation and control, and opportunities for capacity building. Approval from dedicated Aboriginal ethics committees was sought where possible.

Analysis of the ABS data (Chapter 5) was conducted in response to a research question raised by the Victorian Aboriginal Community Controlled Health Organisation (VACCHO). The analysis was undertaken in partnership with VACCHO and was disseminated directly to their member services, informing funding proposals for further research and future interventions.

Chapters 7 and 8 in this thesis relate to work under SEARCH, the Study of Environment on Aboriginal Resilience and Child Health, a community-controlled partnership study. This study of Aboriginal children and adolescents was developed in response to a community identified research need, and included tobacco as a key priority area. All data collection was conducted by Aboriginal people and analysis/reporting completed in consultation with the partner Aboriginal Community Controlled Health Services (ACCHS), who provided approval along with the NSW Aboriginal Health and Medical Research Council (AHMRC). There is strong Aboriginal representation within the authorship group for these projects (at least half). The qualitative component has also

provided an opportunity for SEARCH Aboriginal Research Officers to build their qualitative research skills.

Where possible the research projects in this thesis have used existing data to minimise the research burden to Aboriginal communities, making use of established cross-sectional and cohort studies and the large amounts of data that are routinely collected but not reported. This includes a systematic review of published studies and secondary analysis of previously collected survey data. Primary data collection was in the form of a qualitative research project which sought to triangulate and validate the other findings with Aboriginal community members. This process sought to not only privilege the voices of Aboriginal people in the research but young Aboriginal people in particular. The Aboriginal leadership that oversaw these projects ensured that even when conducting secondary analysis with existing data, the approach to the research and interpretation of findings was undertaken with an Aboriginal lens and a view to maximise the benefit to communities.⁵

Mixed and multi methods studies are increasingly recognised as a valuable research approach, including for tobacco control research with adolescents.⁷ Using a combination of both quantitative and qualitative data collection allows for greater understanding of the phenomena under investigation than would be possible using either qualitative or quantitative research alone.⁷ A review of tobacco related mixed methods research conducted with adolescents highlighted the value of this approach in one study where the quantitative analysis sought to measure attitudes to smoking and then exploratory qualitative research was used to provide a more nuanced understanding.⁷ This is similar to the methods utilised in Chapters 7-8, a sequential Quan-Qual design⁸ from the SEARCH study. However, Chapter 8 (SEARCH qualitative study) was also informed by, and extends, the findings of Chapters 3-6.

This thesis includes published works, an increasingly preferred approach to PhDs. By actively writing for publication throughout the candidature this ensured findings were disseminated as widely and quickly as possible to maximise the relevance, impact and benefit from the work. This approach is particularly important in public health research that is constantly evolving in response to a range of political, social and other factors.

This involved not just publishing in academic journals but also evidence briefs and presentations for policy makers, community newsletters and reports.

In general, the results presented in this thesis have avoided making comparisons between Aboriginal vs non-Aboriginal adolescents as a starting point to minimise the risk of deficit discourse and instead focus on achievements among young Aboriginal people, such as increased numbers of never smokers or reporting protective factors associated with non-smoking.⁵ Where comparisons have been made, this is to fill a knowledge gap, highlighting the need for Aboriginal adolescent tobacco control to remain a significant public health priority. However, this is always framed within the context of the broader determinants for differences in smoking outcomes, not as a deficiency of Aboriginal adolescents, and proposes community strengths to address it.⁵

2.3 Overview of ethics, data collection and analysis methods

Detailed descriptions of data collection and analysis methods are included in each results chapter (or published paper). To avoid repetition these have been briefly summarised in Table 1 below, with the relevant ethics approvals noted. The full publication status and relevant citation for each chapter is detailed in the Thesis Preface and in the introduction to each chapter.

Table 1: Overview of data collection and research methods by chapter

Chapter	Method/Data Type	Data Source	Analysis type	Ethics	Status
3	Systematic Review	- Original research from Australia, New Zealand, Canada, United States - With Indigenous adolescents aged 10-24 - Published 2006-2016 - Medline, Embase, Psychinfo 55 included studies	- Narrative synthesis - Data extracted to a modified Theory of Triadic Influence - Overall confidence assessed using adapted ROB tool. All studies started with an assessment of 'high' confidence and were downgraded one level for 'serious concerns' (moderate) or two levels (low) for 'very serious concerns' regarding participant selection (including Indigenous identification), measurement, confounding and follow-up	N/A	Published
5	Quantitative: Repeated population surveys	- ABS NATSISS 2002, 2008, 2014-15 - ABS NATSIHS 2004-05 - ABS AATSIHS 2012-13 - Face-to-face PAPI or CAI interviews conducted in private dwellings of Aboriginal & Torres Strait Islander people aged 15 years and over - Participants were usual residents of a private dwelling and excluded visitors, people in short stay accommodation and non-private dwellings - Two separate random samples of Community & non-Community locations. 73 Aboriginal & Torres Strait Islander Communities randomly selected, with up to 48 dwellings then randomly selected. - In non-community areas, dwellings were randomly selected using a stratified multistage area sample to identify households with one Aboriginal & Torres Strait Islander usual resident. - Response rates: 2002 – 80%; 2004-05 – 81%; 2008 – 82%; 2012-13 -80%; 2014-15 – 80%.	- Secondary analysis - Estimates of prevalence and age smoking commenced in ABS Remote Access Data Lab. - Statistical analysis of differences between proportions in excel for changes from 2002	Menzies School of Health Research & NT Government Top End HREC Indigenous sub-committee	Published
4, 6	Quantitative: Repeated population surveys	- ASSAD Survey 2005, 2008, 2011, 2014, 2017 - Nationally representative, triennial, paper-based, self-report survey of secondary school students' substance use. - Schools randomly selected in a stratified two-stage probability sampling process. - Aboriginal & Torres Strait Islander students comprise	- Statistical analysis in Stata MP 14.2 - Logistic regression (reporting odds ratios) to determine changes in prevalence from 2005, annual average rate of change 2005-17, cross sectional comparison to non-Aboriginal students 2017 and associations to other substance use.	Cancer Council Victoria HREC (HREC1013) University of Melbourne HREC (1953771)	Published

		4-6% of total study sample. School response rates have declined from 63% in 2005 to 17% in 2017, but has not impacted proportion of Aboriginal & Torres Strait Islander students.			
7	Quantitative: Baseline cohort study survey	- SEARCH baseline data collected from four NSW urban and regional ACCHSs 2008-12 - Participants recruited at ACCHS when attending an appointment. - Paper-based questionnaire completed by adolescents and matched to caregiver survey. - No response rate recorded. 106 adolescents with valid smoking data.	- Cross-sectional statistical analysis in Stata (within the SURE environment) using Poisson Regression methods (reporting prevalence ratios) - Calculate relationship between never smoking and individual, social and environmental factors.	- NSW AHMRC (568/06) - University of Melbourne HREC (1953833.1) - CEO approval RivMed, Tharawal	Accepted for publication
8	Qualitative: Interviews	12 individual and group yarns across one regional and one urban location in NSW in early-mid 2019 - Convenience sample of existing SEARCH participants who completed the adolescent survey in either Wave 1 or Wave 2, recruited by ACCHS staff. - Yarns facilitated by SEARCH Aboriginal Research Officer.	- Recorded, transcribed and NVIVO coding - Inductive and deductive coding - Thematic analysis	- NSW AHMRC (568/06) - University of Melbourne HREC (1953833.1) - CEO approval RivMed, Tharawal	In progress

REFERENCES

1. Chamberlain C, Perlen S, Brennan S, Rychetnik L, Thomas D, Maddox R, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Syst Rev.* 2017. 6 (1):135.
2. National Health and Medical Research Council (NHMRC). Ethical guidelines for research with Aboriginal and Torres Strait Islander Peoples. 2019. Available from: <https://www.nhmrc.gov.au/research-policy/ethics/ethical-guidelines-research-aboriginal-and-torres-strait-islander-peoples>
3. Thomas DP, Bainbridge R, Tsey K. Changing discourses in Aboriginal and Torres Strait Islander health research, 1914-2014. *Med J Aust.* 2014. 201 (S1):S15-S8.
4. Laycock A, Walker D, Harrison N, Brands J. Part A: Indigenous Health Research in Context. *Researching Indigenous Health: A Practical Guide for Researchers.* Melbourne: The Lowitja Institute; 2011.
5. Walter M, Andersen C. Indigenous statistics: A quantitative research methodology: Left Coast Press; 2013.
6. Fogarty W, Lovell M, Langenberg J, Heron M-J. Deficit Discourse and Strengths-based Approaches: Changing the Narrative of Aboriginal and Torres Strait Islander Health and Wellbeing. Melbourne: The Lowitja Institute; 2018.
7. Fryer CS, Seaman EL, Clark RS, Clark VLP. Mixed methods research in tobacco control with youth and young adults: A methodological review of current strategies. *PLoS One.* 2017. 12 (8):e0183471.
8. Ivankova NV, Creswell JW, Stick SL. Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice. *Field Methods.* 2006. 18 (1):3-20.

3 Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: a systematic review

3.1 Introduction

As smoking initiation primarily occurs during adolescence, identifying risk and protective factors for smoking behaviour among Aboriginal adolescents and young adults is important to design targeted and whole of population tobacco control measures to reduce the disparities in smoking prevalence between Aboriginal and non-Aboriginal people. However, as highlighted in Chapter 1, there is a significant gap in the evidence base in the understanding of the influences for smoking initiation and uptake among Aboriginal adolescents.

Chapter 3 responds to that gap by systematically identifying protective factors against initiation and the individual, social, environmental and cultural determinants of smoking. Given the limited available Australian evidence and that the higher smoking prevalence among Aboriginal people in Australia compared to non-Aboriginal people is similar to the pattern observed for other colonised Indigenous peoples in high-income countries such as New Zealand, Canada and the United States, these populations form part of the review. This chapter contributes to Research Question 3.

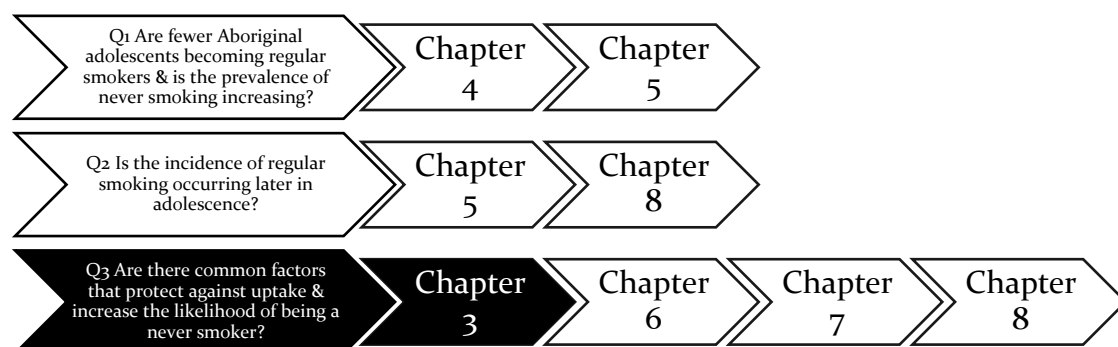


Figure 1: Chapter 3 - Research Question Summary

This systematic review has been published as a paper available at the following citation:

Christina L Heris, Catherine Chamberlain, Lina Gubhaju, David P Thomas, Sandra J Eades, Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review, *Nicotine & Tobacco Research*, 2019 ntz219, <https://doi.org/10.1093/ntr/ntz219>

The accepted manuscript is included in Chapter 3. The copy edited, published e-print is included at 11.1 Appendix 1, along with supplementary materials referenced in the chapter:

E-print of published paper at Chapter 3 (11.1.1 pg 289)

Chapter 3 - Supplementary File 1: Search terms (11.1.2 pg 301)

Chapter 3 - Supplementary File 2: NVIVO coding structure (11.1.3 pg 303)

Chapter 3 - Supplementary File 3: Adapted Risk of Bias Assessment Tool (11.1.4 pg 306)

Chapter 3 - Supplementary File 4: Characteristics of Included Studies (11.1.5 pg 308)

Chapter 3 - Supplementary File 5: Assessment of Confidence (11.1.6 pg 316)

Chapter 3 - Supplementary File 6: Starburst Chart Large Reproduction (11.1.7 pg 323)

Notes on language: in this chapter terminology is used as published. Within the review the term 'Aboriginal' refers to Aboriginal and Torres Strait Islander peoples of Australia and 'Indigenous' refers to global populations of First Nations people collectively.

Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review

Christina L. Heris MPH¹, Catherine Chamberlain PhD², Lina Gubhaju PhD¹, David P. Thomas PhD³, Sandra J. Eades PhD¹

¹Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria, Australia; ²Judith Lumley Centre, La Trobe University, Melbourne, Victoria, Australia; ³Wellbeing and Preventable Chronic Diseases Division, Menzies School of Health Research, Darwin, Northern Territory, Australia.

Corresponding author: christina.heris@unimelb.edu.au

ABSTRACT

Introduction

Smoking rates are higher among Indigenous populations in most high-income countries with initiation primarily occurring in adolescence for all population groups. This review aims to identify protective and risk factors for smoking behaviour among Indigenous adolescents and young adults.

Methods

We searched Medline, Embase and Psychinfo for all original research published between January 2006 and December 2016 that reported influences on smoking for Indigenous adolescents or young adults aged 10-24 living in Australia, New Zealand, Canada and the United States (US). Extracted data was coded to individual, social and environmental level categories using a modified Theory of Triadic Influence framework.

Results

A total of 55 studies were included, 41 were descriptive quantitative and 14 qualitative, and 26 included Indigenous participants only. The majority were from the US (32). Frequently reported influences were at the individual and social levels such as increasing age; attitudes and knowledge; substance use; peer and family relationships; smoking norms; mental health; physical activity. At the environmental level, smoke-free spaces; second-hand smoke exposure; high community level prevalence; and social marketing campaigns were also frequently reported. Some studies referenced price, access and traditional tobacco use. Few reported historical and cultural factors.

Conclusions

Young Indigenous people experience similar influences to other populations such as smoking among family and friends. Greater youth smoking is related to broader community level prevalence, but few studies explore the distal or historical contributing factors such as traditional tobacco use, colonisation, experiences of intergenerational trauma and discrimination, or the role of cultural connection.

IMPLICATIONS

This review identified a range of factors that influence Indigenous youth smoking and contributes to an understanding of what prevention measures may be effective. Youth tobacco use occurs alongside other substance use and may also serve as an indicator of mental health. Comprehensive community-based programs that work more broadly to address the risk factors related to tobacco, including improving youth mental health, will be important for other behaviours as well. This research highlights the importance of social influence and need for ongoing denormalisation of smoking. Future Indigenous led and community owned research is needed to identify likely protective cultural factors.

INTRODUCTION

Tobacco use continues to be a major contributor to health problems globally with one in two smokers expected to die from a tobacco related illness.¹ Although the burden is highest in low- and middle-income countries, smoking is still a problem in high income countries such as Australia, New Zealand, Canada and the United States (US) where tobacco use remains a leading cause of preventable illness and death despite comparatively lower and declining smoking rates. The 2016 World Health Organization (WHO) estimates of current cigarette smoking for people aged 15 years and over were 12% in Australia, 14% Canada, 15% New Zealand and 18% US.² These declining rates in the general population reflect the introduction over recent decades of tobacco control policies and programs under the WHO Framework Convention on Tobacco Control.

Despite the overall decline in general population smoking rates, these have not been uniform and smoking prevalence remains high among some population groups. In Australia this includes those experiencing greater social disadvantage and those living in remote areas, particularly Aboriginal and Torres Strait Islander people (hereafter referred to as Aboriginal people).³ While there have been promising and significant decreases in daily smoking rates for Aboriginal people in recent years (from 49% in 2002 to 39% in 2014-15) they remain 2.8 times higher than the non-Aboriginal population.⁴ There are parallels with other colonised populations internationally, where Indigenous people are more likely to smoke than other population groups.⁵ (We use the term 'Indigenous' to refer to Indigenous communities worldwide collectively, and the term 'Aboriginal' to refer specifically to Aboriginal and Torres Strait Islander people in Australia. This is for ease of reading the paper only and we respectfully acknowledge the diversity and autonomy of Indigenous peoples within these inclusive terms.)

In New Zealand, daily adult Maori smoking rates have declined from 39% in 2006-07 to 31% in 2017-18, but similar to Australia remain 2.8 times higher than the non-Maori population.⁶ In Canada there have also been declines in daily smoking among First Nations adults to 40% in 2015-16 from 43% in 2008-10.⁷ In the US current smoking (daily/most days) among American Indian/Alaska Native adults was 32% in 2016, with little change from 2006 (32%).^{8,9}

Social disadvantage and remoteness do not account for the full disparity in smoking rates between Aboriginal and non-Aboriginal people in Australia. Previous analysis of national Australian data has found that within the highest socio-economic quintile smoking rates were higher among Aboriginal people than those from the non-Aboriginal population and similar findings were reported for other indicators of household income, employment and educational attainment.⁵ Exposure to higher prevalence environments and the normalisation of smoking in their communities may contribute to the ongoing higher rates.^{3, 5}

The enduring impact of colonisation, intergenerational trauma, previous and current government policies including forced removals from family and lands, stressful life events including frequent cycles of grief, and experiencing embedded and explicit racism and discrimination are likely risk factors for smoking and contribute to disparities in education, employment, self-determination and equitable access to health.^{5, 10}

Traditional tobacco use as practiced by Indigenous peoples of North America, and parts of Australia, may also contribute to higher reported rates in prevalence studies where a distinction between cultural and recreational use is not clear. Smoking may also be normalised by creating a positive association with cultural activities, particularly where commercial tobacco is substituted for ceremonial use, as well as from tobacco industry tactics using culturally targeted marketing.^{11, 12}

A crucial component of reducing adult smoking prevalence is preventing uptake among young people as most regular smokers commence during adolescence and young adulthood,¹³ with this latter period increasingly recognised as a key stage for smoking initiation.^{14, 15}

Similar to the adult smoking rates in Australia, Aboriginal adolescents are more than twice as likely to smoke occasionally or regularly than their non-Aboriginal counterparts¹⁶, but the proportion of young Aboriginal people identifying as never smokers has increased significantly.¹⁷ Similarly there have also been significant declines in smoking among First Nations youth in Canada with most identifying as never smokers.⁷ Surveys of high students in both New Zealand and the US found daily smoking

rates to be more than five times higher among Maori and American Indian/Alaska Native students, respectively, but overall rates have declined over time.^{18, 19}

There are a number of recognised protective and risk factors for general population (and Indigenous) youth smoking in the social and physical environment including the smoking behaviour and attitudes of family and peers; access and exposure to cigarettes including whether smoking occurs in the home; school attendance and engagement; social disadvantage; psychological factors including stress, boredom and mental health; unemployment and financial stress.^{5, 20, 21}

Mainstream youth prevention measures include school education programs about the harms of tobacco use and social influence skills, interventions delivered by family and primary health care providers, as well as legislative measures such as the restriction of tobacco sales to minors.^{21, 22} General population strategies such as plain packaging and graphic warnings, social marketing campaigns and price increases can all influence youth smoking along with a reduction in environmental exposure in public spaces, homes and cars.²¹ While youth prevention efforts traditionally focus on reducing smoking uptake, some young people do establish regular smoking early and programs may also aim to reduce the number of current smokers becoming long term established adult smokers.

Traditional cessation support targeting adults, such as intensive one-on-one programs, may not be appropriate for adolescents at their stage of cognitive development or their level of nicotine dependence and youth specific programs are more likely to be effective.²² However, evidence for effectiveness of interventions specifically with Indigenous young people is limited.²³ A Cochrane review of tobacco prevention studies with Indigenous youth was inconclusive as only two intervention trials met the inclusion criteria and the review found insufficient evidence of effectiveness.²⁴

While there is a growing body of evidence about smoking among Indigenous adults as well as some population subgroups such as pregnant women, there is less research that focuses specifically on smoking among Indigenous adolescents and young adults. In particular, few reviews explore the social and cultural determinants of smoking among Indigenous adolescents and the protective factors against smoking uptake. A greater understanding of the factors influencing smoking and non-smoking behaviour among

young Indigenous people is needed to shape smoking prevention programs and provide the cessation support to ensure declines in smoking rates among Indigenous people continue, and where possible are accelerated.²³

The purpose of this review was to inform tobacco control policies and programs for Indigenous adolescents in Australia, Canada, New Zealand and the US. The specific aim of this review is to identify what types of protective and risk factors have been shown to influence smoking behaviour among Indigenous adolescents and young adults between the ages of 10 and 24 years.

METHODS

The protocol for this systematic review was registered on PROSPERO (CRD42017077220) and we have followed the PRISMA guidelines for systematic review reporting.²⁵

Eligibility criteria:

Participants

Participants were Indigenous adolescents and young people aged 10-24 in Australia, New Zealand, Canada or the US. Studies were excluded if the population group included children under 10 years or adults over 24 years or where they included a range of ages beyond 10-24 years but participants within this range were not reported separately. This age range is based on the definitions of early adolescence (10-14 years), late adolescence (15-19) and young adulthood (20-24).²⁶

Studies that did not report results separately for the Indigenous adolescent sub-group or they did not make up greater than 50% of the total sample were also excluded. The rationale for restricting the search to Australia, New Zealand, Canada and the US was that the experiences of Indigenous adolescents and young adults will be most similar in high income countries with common histories of colonisation, where the settler population remains dominant and the countries are at similar stages of the tobacco epidemic.²⁷

Study Design

Included study designs were any original quantitative or qualitative research (descriptive, observational, or intervention studies) published in peer reviewed journals. Grey literature, reviews, books, editorials and letters were excluded. Conference abstracts and PhD theses were included only where relevant findings had not been published separately in journal articles. Only English language publications were reviewed.

Outcomes

Outcomes were any protective and risk factors identified as influences for youth smoking uptake, including quantitative measures of association, mediators or moderators of smoking; qualitative data examining factors associated with smoking experience; and knowledge, attitudes and intentions in relation to smoking and non-smoking behaviour. This included smoking of commercial cigarettes and tobacco, traditional/ceremonial tobacco use as well as e-cigarettes. Studies were excluded where smoking was not reported in isolation but grouped collectively as 'substance use'; where it was an exposure or mediator for another outcome; or where biological processes associated with nicotine dependence were being investigated.

Search and selection of studies:

We searched MEDLINE, EMBASE and PsycINFO with the search terms first developed using MEDLINE MeSH terms and key words (see Supplementary File 1) and then adapted for the other databases. The search was completed 6 March 2017 for studies published between 1 January 2006 and 31 December 2016. The ten-year period was due to the rapid developments in tobacco control with the adolescent smoking experiences or exposure prior to 2006 likely very different to today. A two-stage screening process was undertaken. An initial review of titles and abstracts was conducted in EndNote by one Reviewer (CH) to identify potentially relevant studies against the inclusion criteria using an over-inclusive approach. The second stage involved review of the full text against inclusion criteria using a screening tool. The full text of studies that did not clearly meet the inclusion or exclusion criteria were reviewed by a second reviewer (CC).

Data extraction and synthesis:

Data extraction and coding was completed in NVivo by one reviewer (CH). Data were extracted to a framework of study characteristics including population (age, gender, Indigenous group, country); study type, methodology, aims, timeframes, recruitment, outcome measurement, generalisability, quality, and key findings. All text from results and discussion sections of included articles were coded line-by-line for reported influences on smoking under environmental, social and individual level factors based on items included in an adapted model of the Theory of Triadic Influence.²¹ This was further tailored to include relevant factors for Indigenous youth and updated iteratively throughout data extraction. The full final coding framework is available in Supplementary File 2. Narrative synthesis was undertaken of the key findings in line with the framework. Quantitative measures of association were not extracted or combined in a meta-analysis due to the heterogeneity of study designs and measures used.

Overall assessment of confidence in study findings:

We adapted an appraisal process from existing tools for assessing risk of bias in non-randomised studies. This is summarised below and the specific criteria are described in Supplementary File 3. A summary overall assessment of confidence within each study was conducted and included in the table of study characteristics (Supplementary File 4). All studies started with an assessment of 'high' confidence and were downgraded one level for 'serious concerns' (moderate) or two levels (low) for 'very serious concerns' regarding participant selection (including Indigenous identification), measurement, confounding and follow-up (Supplementary File 5). Overall confidence across study findings (e.g. consistency and publication bias) was not assessed in this review.

RESULTS

The titles and abstracts of 997 articles were screened (after duplicates removed) with 170 identified as potentially relevant for full text review. Fifty-five studies (65 articles) were included (see Figure 1). Excluded studies are available on request from the primary author.

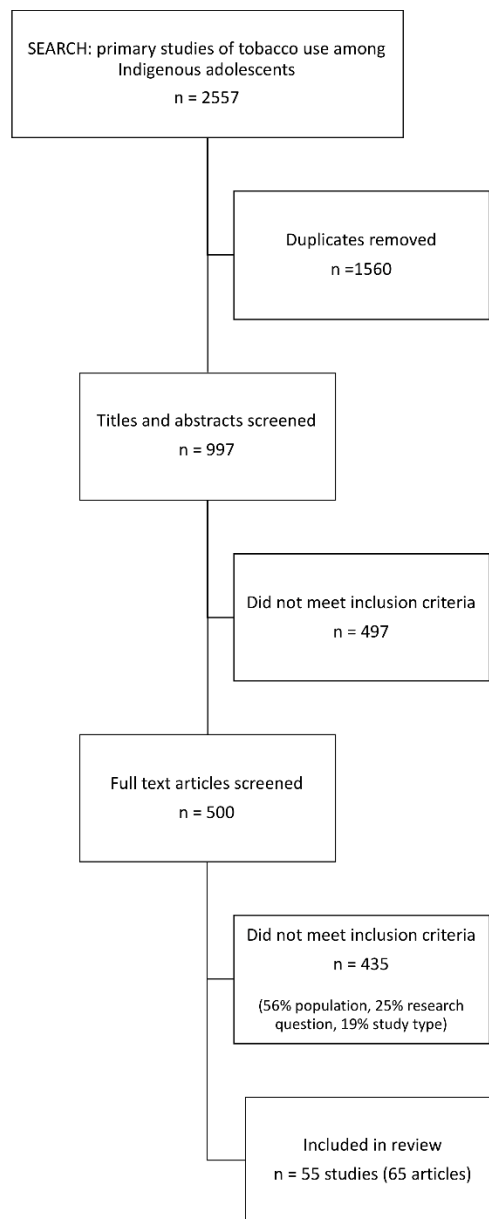


Figure 1: Study selection process

Description of included studies:

The majority of studies were conducted in the US (n=32) followed by New Zealand (n=11), Australia (n=8) and Canada (n=5), with one that included Indigenous participants from both the US and Canada. Studies were descriptive quantitative (n=41) or qualitative (n=14). Less than 50% of studies included Indigenous peoples exclusively (n=26), and the remaining included both Indigenous and non-Indigenous participants. See Supplementary File 4 for a summary of characteristics of included studies.

The level of confidence within study findings was assessed as high for most included studies taking into account risk of bias assessments. The most regularly described limitation of the quantitative studies was a cross-sectional study design and self-reported smoking outcomes that may be representative of their region or group but not more broadly. Most measures for tobacco use were standard but the cultural identity/participation/connection measures and classification of Indigenous status were not. (We use the term 'Indigenous status' to refer to the identification of Indigenous participants in the included studies whereas 'cultural identity/participation' refers to a connection to traditional culture and Indigenous community.) Indigenous status was primarily determined by self-identification. In large studies broad categories were used (Aboriginal and Torres Strait Islander, American Indian/Alaska Native) whereas some smaller studies identified the individual tribal groups and Indigenous communities that participated. One study defined Indigenous Australians as participants who identified as Aboriginal, Torres Strait Islander, South East Asian or Pacific Islander (overall confidence in findings was downgraded).²⁸ One study designated Native Hawaiian participants as either 'Primary Hawaiian' or 'Part Hawaiian' in an exploration of strength of cultural identity.²⁹ There was significant variation in the measure of cultural identity in the quantitative studies. Some used specific tools such as the 12-item Multigroup Ethnic Identity Measure (MEIM) whereas others asked questions about participation in specific traditional or cultural activities (such as sweat lodge, hunting). Authors note that null findings related to cultural identity may be due to these tools not sufficiently measuring culture and spirituality and that the types of activities identified may not be relevant expressions of culture for all participants.

No studies reported a tobacco industry conflict of interest.

Overall main findings:

Across all included studies the most commonly reported influences on smoking or non-smoking behaviour were at the individual (n=50 studies) and social (n=44) levels with fewer measuring environmental level factors (n=35)(Figure 2). There was a mix of risk and protective factors with some influences reported as both in different studies depending on the context (Table 1). The main findings are outlined below, in Table 1 and discussed later.

Table 1: Summary of protective and risk factors identified at individual, social, environmental level

PROTECTIVE FACTORS	RISK FACTORS
INDIVIDUAL LEVEL	
Physical fitness Pregnancy Knowledge of harms Positive attitudes to quitting and regrets about past smoking Negative attitudes to smoking experiences Perceptions of non-smoking norms	Increasing age Gender (female) Withdrawal/addiction Perception of little short-term risk Perceived benefits of smoking Positive intentions/future susceptibility Perceptions of smoking norms Identity Mental health factors Boredom Habitual use Racism Other substance use Risk taking behaviours Personality types
SOCIAL LEVEL	
Family non-smoking values/rules Positive family relationships Close parenting style Original parent family structure Higher socio-economic advantage Non-smoking peers Positive social relationships Academic engagement and performance Relationships with non-parental adults Non-smoking role models (and desire to be a role model) Connection to culture/cultural participation	Family smoking Disconnection from family Low monitoring parenting style Large or broken family structures Greater socio-economic disadvantage Access to finances Peer smoking Bullying Culture of smoking at school Greater social disadvantage of school Role models who smoke Connection to culture/cultural participation
ENVIRONMENTAL LEVEL	
Smoke-free homes and other spaces Tobacco prevention/cessation activities Social marketing campaigns Graphic health warnings/packaging Increasing price Reduced access and availability Access to sport and recreation	Community smoking norms High visibility of smoking adults Second-hand smoke exposure Culture of sharing Tobacco marketing Popular culture Tobacco industry influence Access to tobacco products Social disadvantage Housing Remoteness Traditional/cultural tobacco use Historical/intergenerational trauma Colonisation/urbanisation



Figure 2: Factors influencing smoking by number of studies coded
 (This chart is a visual representation of the number of studies coded to each category and sub-category within the Individual, Social and Environment levels. The width of segment reflects the number of studies referencing the topic, not times coded)

Individual level factors:

Twenty-four studies reported age related factors and the likelihood of smoking increasing with age²⁹⁻⁵⁷ and 20 where there were gender differences with several identifying a need for female specific interventions.^{29-34, 36, 38-43, 47, 51-56, 58-62} Eighteen made comparisons between different cultural groups with many identifying higher prevalence for the Indigenous sub-group.^{29, 32, 33, 37, 39, 42, 47-50, 58, 60, 62-68} Nine studies noted physical health factors,^{31, 43-45, 50, 65, 69-71} with impaired breathing or decreased fitness as motivation to stop smoking or not to start. Experiences of addiction and withdrawal were major barriers to quitting even among those motivated to quit.^{45, 69, 72-74} Pregnancy was explored in five studies,^{30, 48, 49, 70, 75} both as a motivator for quitting for some adolescent mothers and a relationship between maternal tobacco use and subsequent adolescent use.

Twenty-four studies discussed both positive and negative attitudes and beliefs^{29, 32, 33, 36-38, 40, 44, 45, 55, 56, 58, 64, 69-80} with variable levels of knowledge of the range of harms from smoking.^{38, 40, 45, 55, 69-72, 74, 75, 77, 80} This knowledge was often a reason for staying smoke-free and for some existing smokers to quit, stating they wished they had had greater knowledge prior to initiation.^{45, 69, 72, 74, 77} However some studies found no difference in knowledge levels between smokers and non-smokers.^{40, 55} Others felt the warnings did not reflect the experience of smokers around them, that there was little short-term risk, or rationalised that there are many risks in life and they would still die.^{38, 44, 55, 69-73, 77, 80} There were several perceived benefits of smoking including as an appetite suppressant, looking 'cool', appearing older, as a social or stress-management aid and as a cultural display of respect.^{29, 38, 44, 69, 73, 74, 80} Intentions/susceptibility to future smoking were explored and some studies found a proportion of non-smokers to be at risk of initiation^{32, 33, 37, 38, 56, 58, 64, 76} Many smokers experienced regrets about past smoking and had positive attitudes to quitting and supporting others to quit.^{36, 44, 45, 69, 71, 72, 74, 79} Negative attitudes to smoking reinforced smoke-free intentions but could be overcome by social or environmental reinforcement.^{38, 44, 55, 72}

Sixteen studies reported perceptions of smoking norms as a key influence on smoking initiation and maintenance.^{28, 34, 37, 38, 40, 44, 45, 69, 70, 72, 73, 75, 79-82} Fifteen studies included references to identity^{28, 29, 35, 36, 38, 40, 42, 44, 45, 62, 72-74, 77, 83}, this included the inconclusive role of cultural/ethnic identity in smoking (discussed further later)^{28, 29, 35, 36, 42, 44, 62, 83} whereas

low self-esteem, self-image and adulthood aspirations were attributed to smoking behaviour.^{38, 40, 44, 45, 72-74, 77}

Twenty-four studies^{29, 36, 37, 39, 40, 44, 45, 47, 52-54, 56, 61-63, 69-74, 76, 77, 80, 83, 84} discussed psychological factors. These were primarily mental health related with eight specifically referring to experiences of greater life stress or using smoking as a tool for stress relief, anger management and mindfulness.^{40, 54, 69, 70, 72-74, 83} Depression^{36, 40, 52, 53, 56, 61}, suicidal ideation or attempts^{40, 47} and poorer mental health in general^{36, 37, 40, 52, 62, 63} were identified as increasing the likelihood of youth smoking. Boredom^{44, 45, 69, 71, 73} and unconscious habitual use^{69, 70, 72, 73, 77} were mentioned as a reason for initiation and maintenance. Few referenced spirituality^{76, 80} or racism.^{56, 63, 84} One study reported experiences of discrimination increased the risk of smoking.⁸⁴ Fourteen studies included discussion of other substance use^{37-40, 47, 50, 51, 54, 56, 61-63, 69, 73, 85}, predominantly alcohol and cannabis, with a strong relationship to smoking reported and co-occurrence of use. Some discussed other risk or self-destructive behaviours^{39, 44, 47, 56, 69, 73, 74, 85} and impulsive, sensation seeking and rebellious personality types as factors for smoking initiation.^{29, 44, 61, 74}

Social level factors:

At the social level the largest contributing theme was family with 37 studies discussing family related factors^{29-31, 34, 36-42, 44, 45, 48, 52, 54-56, 59, 60, 62, 63, 65, 67, 69-76, 79-82, 86-88} including the strong influence of family smoking^{29, 30, 34, 36-38, 40, 41, 44, 45, 55, 59, 60, 69-75, 79, 81, 82, 88}, as well as the protective effect of non-smoking values and rules.^{34, 38, 41, 44, 45, 60, 63, 65, 71, 72, 74, 76, 79, 81, 88} Several studies explored the role of family relationships^{29, 31, 36, 38-41, 44, 52, 54, 56, 63, 65, 67, 69, 71-74, 80, 81, 87, 88} including parenting style^{31, 38, 40, 41, 44, 52, 63, 65, 74, 81, 88}, family structure^{29, 31, 39, 41, 44, 52, 56, 67, 81} and bonding/quality of relationship.^{36, 38, 40, 44, 54, 56, 71, 87} Positive family relationships, close parenting style and living in two-parent households were described as protective. Socio-economic status^{29, 31, 39-42, 48, 55, 56, 60, 62, 67, 81, 86} which included parents' education/employment^{31, 39, 40, 42, 62, 67, 81}, family income^{31, 41, 42, 56, 86} and the adolescent's own finances^{55, 60, 86} were explored in many studies with greater social-advantage generally found to be protective, although greater access to money was related to increased youth smoking in some studies.

Twenty-eight studies^{29, 31, 34, 36-40, 43-45, 47, 52, 54-56, 60, 65, 69-77, 79, 88} addressed the influence of peers, particularly smoking peers in increasing the likelihood of smoking initiation and

maintenance, through overt pressure as well as a social function facilitating bonding.^{29, 34, 36-40, 44, 45, 52, 54-56, 60, 69-75, 79, 88} Positive non-smoking attitudes of peers can reinforce smoke-free intentions and support quit attempts.^{38, 43, 45, 71-73, 76, 77} Some studies reported greater likelihood of smoking in relation to bullying, fights and deviant relationships.^{31, 36, 38-40, 44, 47, 54, 65, 69, 72-74, 79} School was also a major theme in 15 studies.^{29, 31, 34, 38, 39, 43, 44, 50, 55, 56, 67, 71, 75, 79, 81} Academic engagement and performance^{29, 31, 39, 43, 44, 50, 55, 56, 81} and supportive relationships with staff^{31, 71} were found to be protective against smoking. Whereas lower socio-economic status of the school^{29, 67} and a culture of smoking increased risk.^{34, 38, 44, 75, 79} Thirteen studies mentioned the potential for both positive and negative influences of role models^{31, 34, 38, 39, 41, 44, 45, 54, 69, 71, 72, 79, 80} with two also reporting the desire to be a role model as a reason not to smoke.^{45, 69} Ten studies discussed cultural factors such as connection to culture and cultural participation.^{28, 29, 35, 36, 44, 54, 62, 76, 80, 83} Overall this relationship was inconclusive across different studies (discussed further below).

Environmental level factors:

Twenty-five studies reported factors related to the tobacco environment.^{33-36, 38, 40, 44-46, 50, 55, 60, 64, 69-72, 74, 77-82, 88-91} Community smoking norms was a major theme^{33, 34, 36, 38, 40, 44-46, 50, 55, 60, 64, 69-72, 74, 77, 79-81, 88, 90, 91} particularly visibility of smoking in the community^{34, 38, 44, 45, 60, 69, 72, 74, 79-81}, second-hand smoke exposure^{33, 34, 36, 38, 44, 55, 60, 80, 88} and smoke-free spaces such as homes.^{34, 36, 38, 40, 44, 45, 50, 55, 60, 71, 74, 79, 80, 88, 90} Greater exposure increased risk of youth smoking and a perception of being surrounded by smokers influenced initiation and was a barrier to quitting, whereas non-smoking norms supported decisions to be smoke-free. A culture of sharing was related to smoking where the sharing of tobacco facilitated social cohesion and a sense of belonging.^{38, 44, 69} A number of tobacco prevention and cessation activities were described^{33, 36, 38, 45, 46, 64, 69-72, 74, 91} including social marketing and packaging.^{38, 45, 69, 71, 72, 74, 91} Advertising and graphic health warnings were a key source of knowledge of harms. There were mixed responses from smokers to accessing counselling or nicotine replacement therapies.

Other key tobacco environment themes were access^{34, 38, 40, 60, 71, 78-80, 82} and price^{34, 38, 45, 60, 69-71, 74} with several studies identifying cost as a motivator for quitting and easy access facilitating smoking. Few discussed tobacco industry marketing^{35, 55, 74, 80} or influence.⁷⁸ One study found smokers to be more receptive to tobacco marketing⁵⁵ but cultural appropriation in Indigenous targeted marketing was negatively received.⁸⁰ Two studies

explored a relationship between smoking and popular culture^{81, 89} with one finding viewing R-rated movies to be associated with youth smoking.

Fifteen studies addressed the community context^{38, 39, 42-44, 50, 56, 62, 65, 67, 71, 81, 83, 85, 86} including access to sport and recreation^{38, 43, 44, 50, 65, 71, 81}, social disadvantage^{42, 62, 67, 81, 83, 86}, housing^{38, 39, 42, 62, 86} and geographic variation.^{38, 56, 67, 86} Some studies found greater isolation, disadvantage and poor housing to be related to youth smoking while participation in extracurricular activities such as sport reduced risk. Few (6) studies included the historical context^{34, 35, 74, 80, 83, 88} with five referencing traditional or cultural tobacco use^{34, 74, 80, 83, 88}, one historical or intergenerational trauma⁸³ and one impacts of colonisation/urbanisation in increasing use.³⁵ This is discussed in more detail below.

Factors specific to Indigenous identities, cultural practices and history:

In the US, Henderson et al suggested a finding of decreasing age of smoking initiation was related to the increasing urbanisation and integration into broader culture and the resulting erosion of tribal identity, language and participation.³⁵ Soto et al explored the relationship between historical trauma, ethnic identity, stressful life events and tobacco use.⁸³ Smoking was correlated to both stressful life events and historical trauma (HT).⁸³ Ethnic identity was found to be protective against smoking, but this effect was mediated by HT.⁸³ Cultural participation was indirectly related to smoking through the relationship to HT as there were higher levels of this amongst young people who participated in cultural activities.⁸³ The authors emphasise that cultural participation is important for healing, wellbeing and resilience and participation itself did not predict smoking (despite traditional tobacco use).⁸³ Rather, cultural participation may increase an adolescent's understanding of the impact of historical events on their communities and there is a need to support young people to cope with this as they develop their identities.⁸³

Traditional tobacco use was discussed in four other US studies with American Indian adolescents^{34, 74, 80, 88} and some acknowledged the complex relationship to tobacco as a sacred plant, integral to ceremonial practices, but as it is difficult to come by, commercial cigarettes were regularly substituted and a means by which children are introduced to smoking.³⁴ Unger noted that some young people perceived traditional tobacco to be less harmful than commercial tobacco and many felt that smoking was

expected in ceremonial use as a sign of respect, while others reported that they felt it was acceptable to participate and offer the tobacco without smoking or inhaling.³⁴

DISCUSSION

Summary of main findings:

We found 55 studies addressing the influences on smoking and non-smoking behaviour of Indigenous adolescents in Australia, New Zealand, the US and Canada. At the individual level these influences included increasing age, mental health, physical activity, attitudes to smoking and knowledge of risks and other substance use. At the social level, family was a frequently reported influence including smoking and non-smoking behaviours and attitudes of family, quality of relationships and socio-economic status. At the environmental level, second-hand smoke exposure, smoke-free spaces, high visibility of smoking, campaigns and health warnings were frequently reported. Some studies included references to price, access and cultural tobacco use.

Comparisons with other reviews:

These findings are consistent with other evidence summaries for Indigenous youth and youth smoking in general, particularly in relation to the role of psychological factors, school engagement, family and peer smoking and relationships, smoke-free environments and socio-economic factors.^{5, 20, 21} The importance of peer and family influences was also emphasised by other published reviews^{92, 93} along with attending public school and educational engagement.⁹⁴ The range of risk and protective factors for other health outcomes described in the review by Henson et al⁹⁴ is instructive as many of those were also identified in our review as being influences for smoking uptake (mental health, depression, suicide, stressful life events, alcohol and other substance use) or protective against smoking (family, peer and other non-familial relationships/role models, school engagement and cultural connectedness). This work highlights that there are many common risk factors for a range of health outcomes including tobacco use with potential efficiency gains in addressing the broader determinants of smoking, which will likely result in positive outcomes for other behaviours as well.

Few studies in our review examined factors specific to Indigenous youth. Those that did highlighted the complexity of the relationship between Indigenous identity, cultural

participation (including traditional use) and youth smoking. The US Surgeon General's report has previously discussed this complexity in relation to other ethnic/minority groups (namely African American and Hispanic youth) and noted that while strength and resilience from cultural connectedness can be protective against smoking for some populations there are risks associated with increased exposure to racism.²⁰ The report noted that this relationship is further complicated for American Indian and Alaska Native youth where traditional tobacco use forms an important part of cultural practice.²⁰ Baker et al in a broader review of population sub-groups with high smoking prevalence in Australia highlighted the impact of colonisation and the role tobacco played, the enduring resulting social disadvantage and inadequate access to culturally safe health services as contributing to tobacco use.⁹⁵ Importantly, Henson et al⁹⁴ found that cultural connectedness was associated with resilience and academic success and was protective against mental health difficulties, suicide, alcohol use and other behaviours. These findings are likely very relevant to tobacco control programs.

Key issues:

Overall most of the identified influences for Indigenous youth smoking were common to other population groups. Although smoking prevalence may be higher among Indigenous adolescents and young adults, some studies which had both Indigenous and non-Indigenous participants demonstrated no significant difference in this when accounting for social disadvantage and the greater number of smoking friends and family. While acknowledging that smoking amongst friends, families and communities is a key common influence, most studies do not describe the drivers of a greater community level prevalence that contributes to higher rates of Indigenous youth smoking.

Two-thirds of the included studies reported some aspect related to family factors. These ranged from positive, protective influences through strong non-smoking attitudes, role-modelling and good relationships, to enablers such as smoking in the home, norms and access. This demonstrates the range of competing factors in the family environment and it is unclear which has the strongest influence on youth smoking uptake. Both the Cosh et al⁷⁰ and Johnston et al³⁸ studies illustrated that while smoking among family members and peers are key influences, even in high prevalence environments strong anti-smoking sentiments within immediate social networks can be protective. Family in this context

can also be a much broader concept encompassing extended family throughout the community, a strength that may be leveraged. Gazis et al²⁸ suggest that stronger social and community connectedness in a high prevalence environment may increase the risk of smoking. Then it may also be true that young Indigenous people may be more responsive to community level support for non-smoking attitudes and smoke-free spaces.

Limitations:

Many studies in the initial search which may have relevant findings were excluded because the results for Indigenous youth were not reported separately. Information from some qualitative studies which had wider age ranges were restricted to the quotes where it specifically identified an adolescent or group in the target age range.

This review sought to describe and understand the range of factors that may influence smoking and as such results have not been pooled. While the comparative high frequency of reporting of some factors over many studies may indicate their likely importance, this does not necessarily equate to most important or most common factors influencing smoking. It reflects what factors were of interest to the original researchers, particularly for quantitative studies with pre-determined measures. Thus there may be important influences for smoking among Indigenous adolescents that have not been captured, such as self-efficacy and cultural factors.

Overall the literature has a deficit focus with few studies framing the question around non-smoking (such as those by Beebe³¹ and Kulis⁷⁶) and there are comparatively few protective factors identified. Deficit discourse is a product of dominant western perspectives that can marginalise Indigenous people, their knowledges and worldviews and frame Indigenous people as responsible for poorer health outcomes.⁹⁶ This focus and the general nature of the influences identified reflects that most of the studies included non-Indigenous participants, or were sub-analyses of general population surveys. More work is needed to identify protective factors for Indigenous adolescents, particularly building on cultural strengths, rather than simply an absence of known risk factors. Those studies that did include Indigenous specific measures acknowledge the limitations in questions around identity and cultural participation. It is not that the distal factors are not having an impact but that they are harder to measure than the proximal factors

(such as the number of friends or family who smoke) and have not been applied consistently. Other reviews have identified a need to better understand these relationships^{93, 97} and Henson et al called for better definitions and measures of cultural factors emphasising the importance of research partnerships with Indigenous communities who can provide this knowledge.⁹⁴ This approach will also help to ensure that future studies adopt a strengths-based focus on protective factors for Indigenous wellbeing.

Implications for policy, practice and research:

There are several relevant findings for those working in health services and clinical practice. While this research focuses on prevention of smoking uptake some young people have established regular smoking at an early age and need cessation support. Several studies noted that young people were interested in quitting but health professionals are less likely to raise it, there are perceptions that support services are for adults, and that addiction needs to be addressed in an age/life-stage relevant way. This is true also for programs targeting initiation prevention, which increasingly must continue over a wide age range into early adulthood, and the relative importance of particular smoking influences may change over this period.¹⁵

Youth tobacco use occurs alongside other substance use (particularly alcohol and cannabis) and may also serve as an indicator for increased mental health risk. Although many of the included studies either qualitatively described smoking as a stress management strategy or showed a cross-sectional relationship with poorer mental health, causality cannot be assumed. Evidence suggests the relationship may be bidirectional with smoking both predicting and an outcome of poorer mental health.⁹⁸ Health professionals who see young smokers may consider also assessing other substance use and mental health, or similarly those presenting with mental health challenges may be at risk of tobacco and other substance use.

There are also opportunities for programs to work more broadly to holistically address smoking, poorer mental health and other behaviours through improving self-efficacy and building skills for healthy relationships and stress management. If Aboriginal youth are more likely to experience stressful life events⁹⁹, broader interventions to reduce the

frequency of those events are needed along with programs that support ways to manage stress without substance use.

Our review has again found the importance of social influence for smoking uptake. Continuing the efforts to de-normalise smoking through harm reduction measures such as creating more smoke-free environments and homes and encouraging parents to quit smoking will likely support young people to stay smoke-free. A commitment to provide funding certainty for tobacco control programs and cessation support services is required. However, the wider policy considerations are to acknowledge that the high prevalence of smoking is linked to a history of marginalisation of Indigenous peoples resulting in greater levels of social and economic disadvantage. Addressing the socioeconomic challenges, including education and employment opportunities, and promoting self-determination will go some way to addressing the determinants of smoking. But this process must also recognise the broader context of the enduring impacts of colonisation in the form of experiences of racism, discrimination and historical trauma.

Several studies included in this review called for culturally targeted interventions not only to reach the at-risk population but to draw on the unique strengths of their communities highlighting that cultural identity is a source of empowerment for young people. This has implications for future research as it was noted by a number of authors that the relationship between cultural connection, identity and participation and risk behaviours such as smoking is complex and not well understood. Further research in how to best leverage the likely protective cultural factors is needed but must be Indigenous led and community owned to ensure the right questions are asked.

Conclusions:

This review has identified a range of factors that influence youth smoking behaviour and will contribute to an understanding of what measures may be effective in reducing adolescent smoking. Young Indigenous people have similar influences for smoking initiation to other populations including parental smoking, social disadvantage, boredom, peer influence and the normalisation of smoking in high prevalence populations.

However, they may experience additional risk factors for smoking including high rates of stress, poor mental health, and the effects of intergenerational trauma. Similarly, young Indigenous people may also benefit from unique protective factors including cultural connectedness in addition to those demonstrated in other populations such as smoke-free homes, school attendance, strong relationships, and physical activity participation. Given there are a range of shared influences for multiple risk behaviours targeting these through comprehensive community-based wellbeing programs will be important for other behaviours as well as reducing tobacco use.

FUNDING

This work was supported by the Australian Prevention Partnership Centre in the form of a PhD scholarship to CH funded through the National Health and Medical Research Council partnership centre grant scheme (Grant ID: GNT9100001).

DECLARATION OF INTERESTS

The authors declare they have no conflicts of interest.

REFERENCES

1. World Health Organization. Tobacco Fact Sheet. 2018 [cited June 7 2018]. Available from: <http://www.who.int/news-room/fact-sheets/detail/tobacco>
2. World Health Organization. WHO global report on trends in prevalence of tobacco smoking 2000-2025, second edition. Geneva: World Health Organization; 2018 [cited Jul 31 2019]. Available from: <https://www.who.int/tobacco/publications/surveillance/trends-tobacco-smoking-second-edition/en/>
3. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017. Available from: https://www.pmc.gov.au/sites/default/files/publications/2017-health-performance-framework-report_1.pdf
4. Australian Bureau of Statistics. 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2014-15 Canberra: ABS; 2016. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0
5. van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2016. Available from: www.tobaccoinaustralia.org.au/chapter-8-apts
6. Ministry of Health. Annual Update of Key Results 2017/18: New Zealand Health Survey. 2019 [cited Jul 31 2019]. Available from: <https://www.health.govt.nz/publication/annual-update-key-results-2017-18-new-zealand-health-survey>
7. First Nations Information Governance Centre. National Report of the First Nations Regional Health Survey Phase 3: Volume One. Ottawa: FNIGC; 2018. Available from: https://fnigc.ca/sites/default/files/docs/fnigc_rhs_phase_3_national_report_vol_1_en_final_sm_1.pdf
8. Jamal A, Phillips E, Gentzke AS, et al. Current cigarette smoking among adults—United States, 2016. MMWR Morb Mortal Wkly Rep. 2018;67(2):53-9.
9. Centers for Disease Control Prevention. Cigarette smoking among adults--United States, 2006. MMWR Morb Mortal Wkly Rep. 2007;56(44):1157-61.
10. King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. The Lancet. 2009;374(9683):76-85.

11. US Department of Health and Human Services. Chapter 4. Factors That Influence Tobacco Use Among Four Racial/Ethnic Minority Groups. In Tobacco Use Among U.S. Racial/Ethnic Minority Groups —African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A report of the Surgeon General Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1998. Available from: www.cdc.gov/tobacco/data_statistics/sgr/1998
12. Odani S, Armour BS, Graffunder CM, Garrett BE, Agaku IT. Prevalence and Disparities in Tobacco Product Use Among American Indians/Alaska Natives—United States, 2010–2015. *MMWR Morb Mortal Wkly Rep.* 2017;66(50):1374-8.
13. US Department of Health and Human Services. Chapter 3 The Epidemiology of Tobacco Use Among Young People in the United States and Worldwide. In Preventing tobacco use among young people: A report of the Surgeon General Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
14. Edwards R, Carter K, Peace J, Blakely T. An examination of smoking initiation rates by age: results from a large longitudinal study in New Zealand. *Aust N Z J Public Health.* 2013;37(6):516-9.
15. Heris C, Eades S, Lyons L, Chamberlain C, Thomas D. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Research & Practice.* 2019 (Online early publication).
16. Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. Canberra: AIHW; 2016. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
17. Australian Bureau of Statistics. 4727.0.55.006 - Australian Aboriginal and Torres Strait Islander Health Survey: Updated Results, 2012–13. Canberra: ABS; 2014 [cited 20 May 2019]. Available from: <https://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4727.0.55.006>
18. ASH – Action for Smokefree 2025. 2018 ASH Year 10 Snapshot [cited Jan 31 2019]. Available from: https://www.ash.org.nz/ash_year_10

19. Centers for Disease Control Prevention (CDC). 1991-2017 High School Youth Risk Behavior Survey Data [cited Jan 31 2019]. Available from:
<http://nccd.cdc.gov/youthonline/>
20. US Department of Health and Human Services. Chapter 4 Social, Environmental, Cognitive, and Genetic Influences on the Use of Tobacco Among Youth. In Preventing tobacco use among young people: A report of the Surgeon General Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from:
www.cdc.gov/tobacco/data_statistics/sgr/2012/
21. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2014. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
22. US Department of Health and Human Services. Preventing tobacco use among young people: A report of the Surgeon General Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
23. Chamberlain C, Perlen S, Brennan S, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Systematic Reviews*. 2017;6(1):135.
24. Carson KV, Brinn MP, Labiszewski NA, et al. Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database Syst Rev*. 2012(8):Cd009325.
25. Heris C, Chamberlain C, Eades S. Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review: PROSPERO: International prospective register of systematic reviews; 2017 [CRD42017077220]. Available from:
https://www.crd.york.ac.uk/prospERO/display_record.php?RecordID=77220
26. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: a foundation for future health. *The Lancet*. 2012;379(9826):1630-40.
27. Thun M, Peto R, Boreham J, Lopez AD. Stages of the cigarette epidemic on entering its second century. *Tob Control*. 2012;21(2):96-101.

28. Gazis N, Connor JP, Ho R. Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents. *J Early Adolesc.* 2010;30(3):345-68.
29. Glanz K, Mau M, Steffen A, Maskarinec G, Arriola KJ. Tobacco use among Native Hawaiian middle school students: its prevalence, correlates and implications. *Ethn Health.* 2007;12(3):227-44.
30. Angstman S, Patten CA, Renner CC, et al. Tobacco and other substance use among Alaska Native youth in western Alaska. *Am J Health Behav.* 2007;31(3):249-60.
31. Beebe LA, Vesely SK, Oman RF, Tolma E, Aspy CB, Rodine S. Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma. *Maternal and Child Health Journal.* 2008;12(Suppl1):S82-S90.
32. Caraballo RS, Yee SL, Gfroerer JC, Pechacek TF, Henson R. Tobacco use among racial and ethnic population subgroups of adolescents in the United States. *Prev Chronic Dis.* 2006;3(2):A39.
33. Elton-Marshall T, Leatherdale ST, Burkhalter R. Tobacco, alcohol and illicit drug use among Aboriginal youth living off-reserve: results from the Youth Smoking Survey. *Can Med Assoc J.* 2011;183(8):E480-6.
34. Forster JL, Brokenleg I, Rhodes KL, Lamont GR, Poupart J. Cigarette smoking among American Indian youth in Minneapolis-St. Paul. *Am J Prev Med.* 2008;35(6 Suppl):S449-56.
35. Henderson PN, Kanekar S, Wen Y, et al. Patterns of cigarette smoking initiation in two culturally distinct American Indian tribes. *Am J Public Health.* 2009;99(11):2020-5.
36. Hutchinson PJ, Richardson CG, Bottorff JL. Emergent cigarette smoking, correlations with depression and interest in cessation among Aboriginal adolescents in British Columbia. *Can J Public Health.* 2008;99(5):418-22.
37. Indig D, Haysom L. Smoking behaviours among young people in custody in New South Wales, Australia. *Drug and Alcohol Review.* 2012;31(5):631-7.
38. Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health.* 2012;12:963.
39. Kulis SS, Jager J, Ayers SL, Lateef H, Kiehne E. Substance Use Profiles of Urban American Indian Adolescents: A Latent Class Analysis. *Subst Use Misuse.* 2016;51(9):1159-73.

40. Lemstra M, Rogers M, Thompson A, Moraros J, Tempier R. Prevalence and risk indicators of smoking among on-reserve First Nations youth. *Paediatr Child Health*. 2011;16(10):e71-e7.
41. Lonczak HS, Fernandez A, Austin L, Marlatt G, Donovan DM. Family structure and substance use among American Indian youth: A preliminary study. *Families, Systems, & Health*. 2007;25(1):10-22.
42. Marie D, Fergusson DM, Boden JM. Does socioeconomic inequality explain ethnic differences in nicotine dependence? Evidence from a New Zealand birth cohort. *Aust N Z J Psychiatry*. 2010;44(4):378-83.
43. Osilla KC, Lonczak HS, Mail PD, Larimer ME, Marlatt GA. Regular tobacco use among American Indian and Alaska native adolescents. *J Ethn Subst Abuse*. 2008;6(3-4):143-53.
44. Passey ME, Gale JT, Sanson-Fisher RW. "It's almost expected": rural Australian Aboriginal women's reflections on smoking initiation and maintenance: a qualitative study. *BMC Womens Health*. 2011;11:55.
45. Patten CA, Enoch C, Renner CC, et al. Focus groups of Alaska Native adolescent tobacco users: preferences for tobacco cessation interventions and barriers to participation. *Health Educ Behav*. 2009;36(4):711-23.
46. Thomas DP, Bennet PT, Briggs VL, et al. Smoking cessation advice and non-pharmacological support in a national sample of Aboriginal and Torres Strait Islander smokers and ex-smokers. *Med J Aust*. 2015;202(10):S73-7.
47. Thomas JL, Renner CC, Patten CA, Decker PA, Utermohle CJ, Ebbert JO. Prevalence and correlates of tobacco use among middle and high school students in western Alaska. *Int J Circumpolar Health*. 2010;69(2):168-80.
48. Thrift AP, Nancarrow H, Bauman AE. Maternal smoking during pregnancy among Aboriginal women in New South Wales is linked to social gradient. *Aust N Z J Public Health*. 2011;35(4):337-42.
49. Tong VT, Dietz PM, England LJ, et al. Age and racial/ethnic disparities in prepregnancy smoking among women who delivered live births. *Prev Chronic Dis*. 2011;8(6):A121.
50. Ward BW, Ridolfo H. Alcohol, tobacco, and illicit drug use among Native American college students: an exploratory quantitative analysis. *Subst Use Misuse*. 2011;46(11):1410-9.

51. Whitbeck LB, Armenta BE. Patterns of substance use initiation among Indigenous adolescents. *Addict Behav.* 2015;45:172-9.
52. Whitbeck LB, Hartshorn KJ, McQuillan J, Crawford DM. Factors Associated with Growth in Daily Smoking among Indigenous Adolescents. *J Res Adolesc.* 2012;22(4):768-81.
53. Whitbeck LB, Yu M, McChargue DE, Crawford DM. Depressive symptoms, gender, and growth in cigarette smoking among indigenous adolescents. *Addict Behav.* 2009;34(5):421-6.
54. Whitesell NR, Asdigian NL, Kaufman CE, et al. Trajectories of substance use among young American Indian adolescents: Patterns and predictors. *J Youth Adolesc.* 2014;43(3):437-53.
55. Yu M. Tobacco use among American Indian or Alaska Native middle- and high-school students in the United States. *Nicotine Tob. Res.* 2011;13(3):173-81.
56. Yu M, Whitbeck LB. A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents. *Addict Behav.* 2016;58:35-41.
57. Whitesell NR, Kaufman CE, Keane EM, Crow CB, Shangreau C, Mitchell CM. Patterns of substance use initiation among young adolescents in a Northern Plains American Indian tribe. *Am J Drug Alcohol Abuse.* 2012;38(5):383-8.
58. Centers for Disease Control & Prevention. Racial/ethnic differences among youths in cigarette smoking and susceptibility to start smoking--United States, 2002-2004. *MMWR Morb Mortal Wkly Rep.* 2006;55(47):1275-7.
59. Scragg R, Glover M. Parental and adolescent smoking: does the association vary with gender and ethnicity? *N Z Med J.* 2007;120(1267):U2862.
60. Scragg R, Laugesen M. Influence of smoking by family and best friend on adolescent tobacco smoking: results from the 2002 New Zealand national survey of year 10 students. *Aust N Z J Public Health.* 2007;31(3):217-23.
61. Spillane NS, Muller CJ, Noonan C, Goins R, Mitchell CM, Manson S. Sensation-seeking predicts initiation of daily smoking behavior among American Indian high school students. *Addict Behav.* 2012;37(12):1303-6.
62. Van Bower V, Woodgate RL. Examining the correlates of current smoking among off-reserve First Nations, Metis and Inuit youth: Evidence from the 2012 Aboriginal Peoples Survey. *Addict Behav.* 2017;69:93-7.

63. Chavez GF, Sanchez DT. A clearer picture of multiracial substance use: Rates and correlates of alcohol and tobacco use in multiracial adolescents and adults. *Race and Social Problems*. 2010;2(1):1-18.
64. Elton-Marshall T, Leatherdale ST, Burkhalter R, Brown KS. Changes in tobacco use, susceptibility to future smoking, and quit attempts among Canadian youth over time: a comparison of off-reserve Aboriginal and non-Aboriginal youth. *Int J Environ Res Public Health*. 2013;10(2):729-41.
65. Guo H, Reeder AI, McGee R, Darling H. Adolescents' leisure activities, parental monitoring and cigarette smoking - a cross-sectional study. *Subst Abuse Treat Prev Policy*. 2011;6(1):12.
66. Rudatsikira E, Muula AS, Siziya S. Current cigarette smoking among in-school American youth: results from the 2004 National Youth Tobacco Survey. *Int J Equity Health*. 2009;8:10.
67. Wallace JM, Jr., Vaughn MG, Bachman JG, O'Malley PM, Johnston LD, Schulenberg JE. Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States. *Drug Alcohol Depend*. 2009;104(Suppl1):S42-S9.
68. Wills TA, Knight R, Sargent JD, Gibbons FX, Pagano I, Williams RJ. Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. *Tob Control*. 2017;26(1):34-9.
69. Anderson K. Tobacco use and cessation: What matters to Southeast Alaska Native young adults? [Thesis (PhD)]: University of Alaska Fairbanks; 2013.
70. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Aust J Prim Health*. 2015;21(3):334-41.
71. Marsh L, Dawson A, McGee R. What do young New Zealanders want in terms of smoking cessation? *Journal of Smoking Cessation*. 2014;9(2):98-108.
72. Gifford H, Tautolo el S, Erick S, Hoek J, Gray R, Edwards R. A qualitative analysis of Maori and Pacific smokers' views on informed choice and smoking. *BMJ Open*. 2016;6(5):e011415.
73. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again--qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr*. 2010;21(3):208-14.

74. Taulii M, Bush N, Bowen DJ, Forquera R. Adaptation of a smoking cessation and prevention website for urban American Indian/Alaska Native youth. *J Cancer Educ.* 2010;25(1):23-31.
75. Dennis MK, Momper SL. "It's bad around here now": tobacco, alcohol and other drug use among American Indians living on a rural reservation. *J Ethn Subst Abuse.* 2012;11(2):130-48.
76. Kulis S, Hodge DR, Ayers SL, Brown EF, Marsiglia FF. Spirituality and religion: Intertwined protective factors for substance use among urban American Indian youth. *Am J Drug Alcohol Abuse.* 2012;38(5):444-9.
77. McCool J, Hoek J, Edwards R, Thomson G, Gifford H. Crossing the smoking divide for young adults: expressions of stigma and identity among smokers and nonsmokers. *Nicotine & Tobacco Research.* 2013;15(2):552-6.
78. McCool J, Paynter J, Scragg R. A cross-sectional study of opinions related to the tobacco industry and their association with smoking status amongst 14-15 year old teenagers in New Zealand. *N Z Med J.* 2011;124(1338):34-43.
79. Mitschke DB, Matsunaga DS, Loebl K, Tatafu E, Jr., Robinett H. Multi-ethnic adolescents' attitudes toward smoking: a focus group analysis. *Am J Health Promot.* 2008;22(6):393-9.
80. Unger JB, Soto C, Baezconde-Garbanati L. Perceptions of ceremonial and nonceremonial uses of tobacco by American-Indian adolescents in California. *J Adolesc Health.* 2006;38(4):443.e9-16.
81. Davis KC, Nonnemaker JM, Asfaw HA, Vallone DM. Racial/ethnic differences in perceived smoking prevalence: evidence from a national survey of teens. *Int J Environ Res Public Health.* 2010;7(12):4152-68.
82. Maubach N, Hoek JA, Edwards R, Gifford H, Erick S, Newcombe R. 'The times are changing': New Zealand smokers' perceptions of the tobacco endgame. *Tob Control.* 2013;22(6):395-400.
83. Soto C, Baezconde-Garbanati L, Schwartz SJ, Unger JB. Stressful life events, ethnic identity, historical trauma, and participation in cultural activities: Associations with smoking behaviors among American Indian adolescents in California. *Addict Behav.* 2015;50:64-9.
84. Crengle S, Robinson E, Ameratunga S, Clark T, Raphael D. Ethnic discrimination prevalence and associations with health outcomes: data from a nationally representative

cross-sectional survey of secondary school students in New Zealand. *BMC Public Health*. 2012;12:45.

85. Kang J, Ciecierski CC, Malin EL, et al. A latent class analysis of cancer risk behaviors among U.S. college students. *Prev Med*. 2014;64:121-5.
86. Barnett R, Pearce J, Moon G. Community inequality and smoking cessation in New Zealand, 1981-2006. *Soc Sci Med*. 2009;68(5):876-84.
87. Scragg R, Reeder AI, Wong G, Glover M, Nosa V. Attachment to parents, parental tobacco smoking and smoking among Year 10 students in the 2005 New Zealand national survey. *Aust N Z J Public Health*. 2008;32(4):348-53.
88. Weaver H, Jackson K. Cancer risks and Native Americans: The 'Healthy Living in Two Worlds' study. *Health Educ J*. 2012;71(6):688-98.
89. Laugesen M, Scragg R, Wellman RJ, DiFranza JR. R-rated film viewing and adolescent smoking. *Prev Med*. 2007;45(6):454-9.
90. McIntire RK, Macy JT, Seo DC, Nelson AA, Kolbe LJ. Secondhand smoke exposure in cars and rooms: trend comparisons among subpopulations of nonsmoking U.S. middle and high school students. *Nicotine and Tobacco Research*. 2014;16(6):663-71.
91. Wolf DAPS, Tovar M, Thompson K, et al. Speaking out about physical harms from tobacco use: Response to graphic warning labels among American Indian/Alaska Native communities. *BMJ Open*. 2016;6 (3) (e008777).
92. Thomas DP, Glover M. Smoking and Aboriginal and Torres Strait Islander and Maori children. *J Paediatr Child Health*. 2010;46(9):516-20.
93. Liu DMKI, Alameda CK. Social determinants of health for Native Hawaiian children and adolescents. *Hawaii Med J*. 2011;70(11 Suppl 2):9-14.
94. Henson M, Sabo S, Trujillo A, Teufel-Shone N. Identifying Protective Factors to Promote Health in American Indian and Alaska Native Adolescents: A Literature Review. *J Prim Prev*. 2017;38(1-2):5-26.
95. Baker A, Ivers RG, Bowman J, et al. Where there's smoke, there's fire: High prevalence of smoking among some sub-populations and recommendations for intervention. *Drug and Alcohol Review*. 2006;25(1):85-96.
96. Fogarty W, Bulloch H, McDonnell S, Davis M. Deficit Discourse and Indigenous Health: How narrative framings of Aboriginal and Torres Strait Islander people are reproduced in policy. Melbourne: The Lowitja Institute; 2018.

97. Alexander LA, Trinidad DR, Sakuma KKK, et al. Why we must continue to investigate menthol's role in the African American smoking paradox. *Nicotine and Tobacco Research*. 2016;18:S91-S101.
98. Hockenberry JM, Timmons EJ, Vander Weg MW. Adolescent mental health as a risk factor for adolescent smoking onset. *Adolescent Health, Medicine, Therapeutics*. 2011;2:27.
99. Australian Bureau of Statistics. 4704.0 - The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010. Canberra: ABS; 2011. Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/lookup/4704.0Chapter430Oct+2010>
100. Wen M, Van Duker H, Olson LM. Social contexts of regular smoking in adolescence: Towards a multidimensional ecological model. *J Adolesc*. 2009;32(3):671-92.

3.2 Chapter summary

The systematic review in Chapter 3 responds to a gap in the evidence base by synthesising findings from a broad and inclusive search strategy, capturing a wide range of descriptive and observational studies that have previously been excluded in reviews of controlled studies. Through this review a range of factors that influence Indigenous youth smoking were identified, with many that were common to adolescents in general, such as social influences and the importance of ongoing denormalisation of smoking.

It notes that the relationship between smoking, other risk behaviours and youth mental health provides an opportunity for comprehensive community-based programs to broadly address the determinants of youth tobacco use and likely improve outcomes for mental health and other behaviours. It also highlights the limited evidence around cultural factors, as the majority of included studies used general population measures. As such it calls for more Indigenous-led and community-owned tobacco research to be able to identify what may be unique strengths that can be leveraged by communities designing tailored interventions to address higher smoking prevalence.

This review informed subsequent sections of this thesis, most notably identification of key variables for investigation and items for discussion in the two SEARCH studies.

See Appendix 1 for supplementary material and the e-print of the published journal article.

4 The decline of smoking initiation among Aboriginal and Torres Islander secondary students: implications for future policy

4.1 Introduction

Chapter 4 uses a large, representative, national dataset of secondary school students to identify trends in smoking prevalence among Aboriginal adolescents aged 12-17, relative to the total sample of high school students. It provides long term observations between 2005-2017, a period of significant tobacco control policy change, and identifies whether the changes that have been observed in the population more broadly are also occurring for Aboriginal adolescents. It is an important data source that allows not only for some examination of changes in demographic sub-groups, but also includes students aged 12-14 years that are excluded from other national datasets (e.g. ABS data). This study extends previously published analysis of this survey that compared smoking prevalence between Aboriginal and non-Aboriginal students from 1996 to 2005. Chapter 4 is the first of two chapters to use this dataset and contributes to Research Question 1.

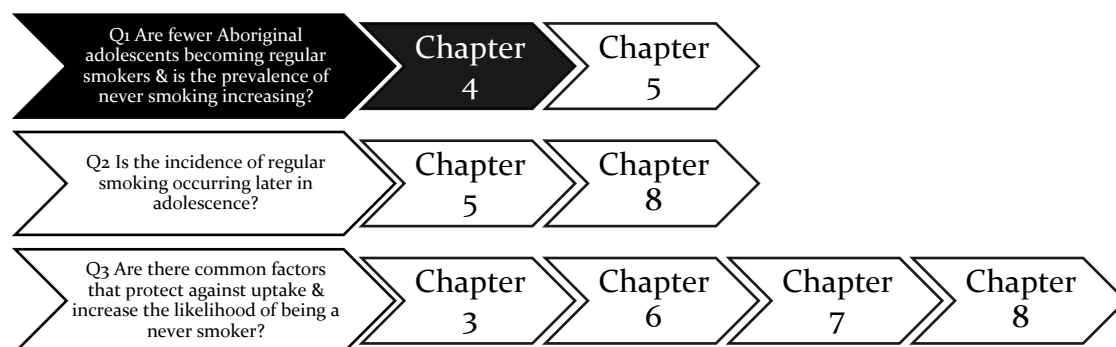


Figure 1: Chapter 4 - Research Question Summary

This chapter has been published as a paper available at the following citation:

Heris CL, Guerin N, Thomas DP, Eades SJ, Chamberlain C, White V. The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy. Australian & New Zealand Journal of Public Health. 2020;44(5):397-403 <https://doi.org/10.1111/1753-6405.13022>

The accepted manuscript is included here in Chapter 4. The copy edited, published e-print is included at 11.2 Appendix 2, along with supplementary materials referenced in the chapter:

E-print of published paper at Chapter 4 (11.2.1 pg 327)

Chapter 4 - Supplementary File 1: Figure 1 supporting data (11.2.2 pg 335)

Chapter 4 - Supplementary File 2: Additional data for never, past month and past week smoking and smoking intensity(11.2.3 pg 336)

Notes on language: in this chapter terminology is as submitted to ANZJPH in line with their style guidelines, as such 'Aboriginal and Torres Strait Islander people' is used throughout.

The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy

Christina Heris¹, Nicola Guerin², David Thomas³, Sandra Eades¹, Catherine Chamberlain⁴, Victoria White^{2,5}

¹School of Population and Global Health, the University of Melbourne, Victoria; ²Centre for Behavioural Research in Cancer, Cancer Council Victoria; ³Menzies School of Health Research, Northern Territory; ⁴Judith Lumley Centre, La Trobe University, Victoria; ⁵ School of Psychology, Deakin University, Victoria

Corresponding author: christina.haris@unimelb.edu.au

ABSTRACT

Objective

Smoking is a major cause of preventable illness for Aboriginal and Torres Strait Islander people, with most commencing in adolescence. Understanding trends in youth tobacco use can inform prevention policies and programs.

Methods

Logistic regression models examined smoking trends among Aboriginal and Torres Strait Islander and all students aged 12-17, in five nationally representative triennial surveys, 2005-2017. Outcomes measured lifetime, past month, past week tobacco use and number of cigarettes smoked daily (smoking intensity).

Results

Aboriginal and Torres Strait Islander students' never smoking increased (2005: 49%, 2017: 70%) with corresponding declines in past month and week smoking. Smoking intensity reduced among current smokers (low intensity increased 2005: 67%, 2017: 77%). Trends over time were similar for Aboriginal and Torres Strait Islander students as for all students (8-10% annual increase in never smoking).

Conclusions

Most Aboriginal and Torres Strait Islander students are now never smokers. Comparable declines indicate similar policy impact for Aboriginal and Torres Strait Islander and all students.

Implications for Public Health

Comprehensive population-based tobacco control policies can impact all students. Continued investment, including in communities, is needed to maintain and accelerate reductions among Aboriginal and Torres Strait Islander students to achieve equivalent prevalence rates and reduce health inequities.

INTRODUCTION

Tobacco use is the leading preventable cause of illness and death and the largest contributing risk factor to the gap in health outcomes between Aboriginal and Torres Strait Islander people and non-Indigenous Australians.¹ High smoking prevalence in Aboriginal and Torres Strait Islander people is an enduring legacy of colonisation which saw tobacco included in rations during settlement and social disadvantage entrenched through government policies.² Consequently, Aboriginal and Torres Strait Islander people are overrepresented in the socioeconomic groups with higher prevalence and a greater normalisation of smoking.³

The past five decades has seen Australia implement a comprehensive population level approach to tobacco control that includes price measures, standardised packaging with graphic health warnings, smoke-free legislation, advertising restrictions and social marketing campaigns.⁴ From the late 2000s tailored interventions for Aboriginal and Torres Strait Islander people have also been implemented including targeted social marketing and locally delivered community programs.⁵ It is in this context that substantial declines in daily smoking prevalence among Aboriginal and Torres Strait Islander adults have been observed (2004-05: 50%; 2018-19: 40%)^{6, 7} as well as significant increases in never smoking in 15-24 year olds (44% in 2002 to 56% in 2014-15).⁸

As half Aboriginal and Torres Strait Islander people aged 18-24 who smoke started smoking daily when aged 15-18, and a quarter before age 15⁸, further prevention of initiation and transition to established smoking is important to reducing tobacco related health inequities with non-Indigenous Australians. Understanding smoking trends in earlier adolescence is vital for tailoring prevention policies.

The Australian Secondary School Students' Alcohol and Drug Survey (ASSAD) is currently the only national data source on tobacco use among Aboriginal and Torres Strait Islander adolescents aged 12-14, and the largest sample of adolescents aged 12-17. Using standard methods and measures since 1984 ASSAD allows for analysis of smoking trends covering a period of substantial tobacco control policy change in Australia. Previous ASSAD analysis found smoking prevalence among Aboriginal and Torres Strait Islander students declined between 1996 and 2005, with current (past week) smoking decreasing from 27% to 17% in 12-15 year olds and from 44% to 33% in 16-17 year olds.⁹

We extend that work⁹ to first explore if smoking prevalence in Aboriginal and Torres Strait Islander secondary students 12-17 years has changed between 2005 and 2017; then to determine if any observed changes were steady over time; and if there were different effects for demographic sub-groups or in the total ASSAD sample.

METHODS

ASSAD study

ASSAD is a national, triennial (1984-2017) survey of self-reported tobacco, alcohol and other drug use among Australian secondary school students. Sampling and survey administration have been described previously.^{9, 10} Briefly, ASSAD surveys use stratified two-stage probability sampling to randomly select secondary schools in states and territories (excluding schools smaller than 100 students), stratified by education sector (government, independent, and Catholic), and then select students within schools. Separate school samples are drawn for years 7-10 and 11-12. Researchers work with participating schools to select approximately 80 students across year levels. From 2011, class-based sampling was used with participating schools identifying non-selective classes to participate. School response rates have declined from 63% in 2005 to 17% in 2017.^{9, 10}

Principals give permission for the survey to be conducted in schools. Passive parental consent was gained for student participation unless active consent was required by specific states or schools. Researchers administered the survey on school premises and students completed questionnaires anonymously. State and school policies determined teacher presence during survey administration, and this has not been found to meaningfully affect results.¹⁰

Ethics and approvals

Ethical approval was gained from the Cancer Council Victoria Human Research Ethics Committee (HREC1013) and registered with the University of Melbourne HREC (1953771).

Measures

Indigenous Status

Aboriginal and Torres Strait Islander students self-identified by answering 'yes' to the question "Are you of Aboriginal or Torres Strait Islander descent?" with options: No; Yes – Aboriginal descent; Yes – Torres Strait Islander descent; Yes – both Aboriginal and Torres Strait Islander descent.

Smoking Experience

We used binary measures of smoking experience: never smoking (not even a puff of a cigarette in their lifetime); past month smoking (any number of cigarettes smoked in the previous four weeks); current smoking (having smoked cigarettes in the previous seven days). Students with missing smoking data were excluded (1% of the total sample, 2% Aboriginal and Torres Strait Islander students).

Smoking Intensity

Students reported the number of cigarettes smoked on each of the preceding seven days, and average number smoked per day was calculated for current smokers. Due to substantial skewness in the data, this measure was categorised into three groups: 1-4 cigarettes, 5-9 cigarettes, 10 or more cigarettes per day based on definitions of light and heavy smoking for adolescents.^{11, 12}

Demographics

Demographic measures of age (12-15; 16-17; 18-17); sex (male, female); location (urban, non-urban based on school postcode and the 2016 ASGS classification); socio-economic status tertiles (low, middle, high; based on school postcode using SEIFA Index of Relative Socio-economic Disadvantage (IRSD) in the most recent year, 2005 – SEIFA 2001, 2008 – SEIFA 2006, 2011-2014 – SEIFA 2011, 2017 – SEIFA 2016).

Statistical analysis

We used data from the 2017, 2014, 2011, 2008, 2005 ASSAD surveys. Analyses were focused on the sample of Aboriginal and Torres Strait Islander students. We used logistic regression with unweighted data to compare smoking prevalence in 2005 with each subsequent survey year, and to model change in smoking prevalence between consecutive survey years. Models were repeated for each age, gender, location, and SES

sub-group. We ran similar models to examine trends for each smoking intensity category. The interaction between time (survey year as a linear variable) and location and SES group was evaluated for each smoking outcome to determine whether change over time was consistent across these groups. Models adjusted for covariates of education sector (government, Catholic, independent); state/territory, age (continuous), sex, remoteness (five category) and SES were included in all models. Simple categorical variables were used for sub-group analyses (such as the 12-15 and 16-17 age groups or urban/non-urban categories), however where possible continuous variables or more granular categorical variables were used as covariates in adjusted models to preserve information from the original data. We report adjusted odds ratios (ORs) and 95% CIs adjusted for within school clustering. We used STATA MP 14.2 for all analyses.

Using survey year as a continuous time measure the regression analyses were extrapolated to estimate annual change in likelihood of never, past month, and current smoking separately for the total ASSAD sample and the Aboriginal and Torres Strait Islander sub-sample. Finally, change in prevalence between 2005 and 2017 and this difference as a proportion of baseline prevalence (2005) was calculated to further compare rates of change over time. These 95% CIs were calculated manually using the sum of the standard errors (SE) of the 2005, 2017 estimates for the difference, and the relative risk SE formula for the relative change.

To provide context for the results, analyses were repeated for the total ASSAD sample of 12-17 year olds, which includes Aboriginal and Torres Strait Islander students. As the two samples are not independent, we did not make statistical comparisons.

RESULTS

Sample characteristics

Aboriginal and Torres Strait Islander students aged 12-17 accounted for 4% (n=887) of the 2005 ASSAD sample, 5% (n=1284) in 2008, 5% (n=1242) in 2011, and 6% (n=1225) in 2017. Characteristics of Aboriginal and Torres Strait Islander students surveyed are shown in Table 1. In 2017, 38% of Aboriginal and Torres Strait Islander students attended schools in urban locations, and 53% schools in areas of lower social advantage.

Table 1: Sample characteristics of Aboriginal and Torres Strait Islander secondary school students 12- 17 years in 2005, 2008, 2011, 2014, 2017 by age, gender, location and SEIFA index

	12 to 15 years					16 to 17 years					12 to 17 years				
	2005	2008	2011	2014	2017	2005	2008	2011	2014	2017	2005	2008	2011	2014	2017
Total ASSAD (n)	14,725	16,364	15,814	15,769	12,433	7,180	8,252	9,098	7,529	6,997	21,905	24,616	24,912	23,298	19,430
Indigenous (n)	673	1,023	898	1,037	899	214	261	344	314	326	887	1,284	1,242	1,351	1,225
% Males	47%	47%	52%	50%	44%	52%	61%	56%	54%	49%	49%	50%	53%	51%	46%
% Urban	47%	36%	42%	40%	33%	49%	52%	45%	42%	49%	48%	39%	43%	40%	38%
% Low SEIFA	39%	46%	43%	37%	56%	40%	52%	30%	41%	47%	39%	47%	39%	38%	53%
% Middle SEIFA	36%	36%	35%	37%	30%	28%	25%	41%	30%	35%	34%	34%	37%	35%	31%
% High SEIFA	25%	17%	23%	26%	14%	32%	23%	29%	30%	18%	26%	19%	24%	27%	15%

Smoking behaviour among Aboriginal and Torres Strait Islander students

Never smoking among Aboriginal and Torres Strait Islander students increased between 2005 and 2017 with corresponding declines in past month and current smoking (Table 2 and Supplementary File 2). In 2017, 70% of students aged 12-17 had never smoked (76% of younger students aged 12-15; 55% of older students aged 16-17), a significant increase from 49% in 2005 ($p<0.001$). Past month smoking decreased significantly ($p<0.001$) from 24% in 2005 to 14% in 2017, with similar reductions in current smoking (21% to 10%) (Figure 1, Supplementary File 1). In 2017, 18% of older students and 7% of younger students currently smoked (Supplementary File 2).

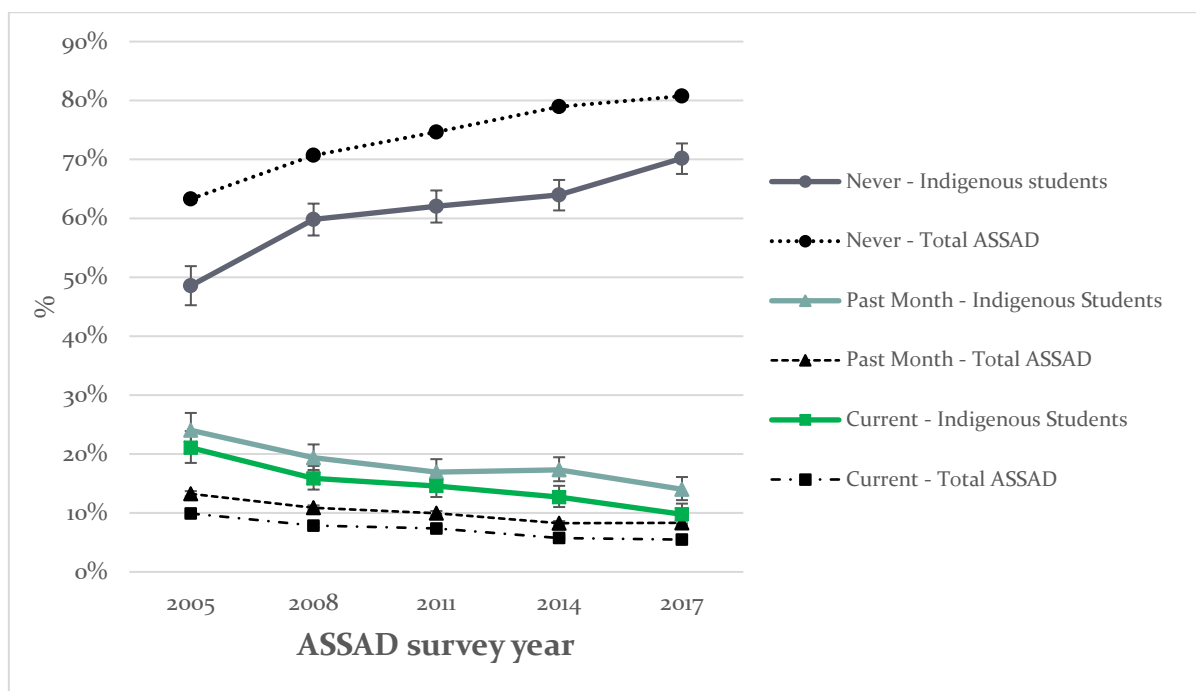


Figure 1: Smoking experience among Aboriginal and Torres Strait Islander and all students aged 12-17 years, ASSAD 2005-17

For Aboriginal and Torres Strait Islander students aged 12-17 the likelihood of never smoking was significantly higher in 2017 than in 2005 (OR 2.93 [2.40, 3.58] $p<0.001$) and at least 2.5 times higher odds ($p<0.001$) were found in each age, sex, location and SEIFA subgroup (Table 2). There was an overall trend of increased never smoking with each consecutive survey year for all sub-groups although the increase between 2011-2014 was not significant. The largest increase in the likelihood of never smoking for 12-17 year olds was between 2005 and 2008 (OR 1.54 [1.27, 1.87] $p<0.001$). The likelihood of past month and current smoking was significantly lower in 2017 than 2005 for 12-17 year olds overall (OR 0.45 [0.34, 0.60] $p<0.001$, OR 0.36 [0.27, 0.48] $p<0.001$, respectively) and across all

sub-groups, except for past month smoking among high SEIFA students (OR 0.68 [0.40, 1.16] $p=0.158$). However, the change between consecutive survey years was generally not significant for different sub-groups (Supplementary File 2). There was no significant interaction between location and time for any measure of smoking experience, indicating no changes were detected over time in never ($p=0.859$), past month ($p=0.345$) and current smoking ($p=0.427$) between urban and non-urban residential areas. Similarly, no changes over time were detected between SEIFA tertiles (never: $p=0.571$; past month: $p=0.594$; current: $p=0.614$). See also Supplementary File 2.

Smoking behaviour among the total ASSAD sample

The changes in smoking prevalence at the total ASSAD sample level was similar to the Aboriginal and Torres Strait Islander student sub-group. In the total sample aged 12-17, never smoking was significantly more common in 2017 (81%) than 2005 (63%) (OR 3.01 [2.76, 3.29] $p<0.001$) with significant decreases in past month (OR 0.52 [0.46, 0.58] $p<0.001$) and current smoking (OR 0.46 [0.40, 0.52] $p<0.001$) (Table 2 and Supplementary File 2).

Table 2: Never smoking among students aged 12-17 years, by gender, age, SEIFA index, location, 2005-17

NEVER SMOKING (% (n), OR (95% CI)) (adjusted for age, sex, state, school type, remoteness, SEIFA)											
2005			2008		2011		2014		2017		
% (n)	OR [ref]		% (n)	OR [2008 cf 05] (95% CI)	% (n)	OR [2011 cf 08] (95% CI)	% (n)	OR [2014 cf 11] (95% CI)	% (n)	OR [2017 cf 14] (95% CI)	OR [2017 cf 05] (95% CI)
OVERALL ASSAD STUDENT SAMPLE 12-17											
12-17	63% (13,772)	1	71% (17,265)	1.51*** (1.40, 1.62)	75% (18,404)	1.30*** (1.21, 1.41)	79% (18,225)	1.28*** (1.18, 1.40)	81% (15,497)	1.20*** (1.09, 1.32)	3.01*** (2.76, 3.29)
ABORIGINAL & TORRES STRAIT ISLANDER STUDENTS 12-17											
AGE GROUP											
12-17	49% (424)	1	60% (755)	1.54*** (1.27, 1.87)	62% (757)	1.25* (1.05, 1.48)	64% (847)	1.08 (0.91, 1.29)	70% (843)	1.41*** (1.17, 1.69)	2.93*** (2.40, 3.58)
12-15	53% (352)	1	64% (645)	1.62*** (1.30, 2.01)	69% (604)	1.27* (1.04, 1.54)	68% (695)	1.00 (0.82, 1.23)	76% (665)	1.51*** (1.22, 1.88)	3.12*** (2.49, 3.90)
16-17	34% (72)	1	43% (110)	1.33 (0.88, 2.02)	45% (153)	1.27 (0.88, 1.83)	49% (152)	1.26 (0.91, 1.73)	55% (178)	1.16 (0.85, 1.58)	2.46*** (1.68, 3.62)
SEX (12-17)											
Males	49% (208)	1	60% (377)	1.51** (1.16, 1.98)	63% (406)	1.25 (1.00, 1.55)	65% (435)	1.10 (0.87, 1.38)	71% (387)	1.45** (1.12, 1.87)	2.99*** (2.24, 3.99)
Females	48% (214)	1	60% (368)	1.53** (1.17, 2.01)	62% (347)	1.27 (0.98, 1.65)	63% (399)	1.08 (0.83, 1.40)	69% (434)	1.38* (1.06, 1.79)	2.89*** (2.20, 3.80)
SEIFA (12-17)											
Low	48% (156)	1	58% (324)	1.58** (1.15, 2.17)	62% (295)	1.07 (0.82, 1.39)	59% (296)	1.10 (0.82, 1.48)	72% (458)	1.75*** (1.30, 2.34)	3.23*** (2.32, 4.50)
Med	50% (143)	1	62% (251)	1.64** (1.20, 2.25)	64% (281)	1.35* (1.02, 1.79)	68% (318)	1.01 (0.77, 1.32)	69% (259)	1.12 (0.82, 1.54)	2.51*** (1.82, 3.47)
High	49% (108)	1	56% (122)	1.33 (0.87, 2.05)	61% (178)	1.49 (0.99, 2.25)	65% (233)	1.07 (0.72, 1.57)	67% (125)	1.33 (0.88, 2.00)	2.81*** (1.84, 4.30)
REGION (12-17)											
Urban	50% (207)	1	60% (293)	1.47* (1.09, 1.97)	62% (322)	1.23 (0.94, 1.61)	67% (356)	1.18 (0.88, 1.58)	69% (312)	1.30 (0.97, 1.74)	2.76*** (2.05, 3.72)
Non-Urban	48% (205)	1	59% (404)	1.58** (1.22, 2.04)	63% (432)	1.26* (1.01, 1.57)	62% (491)	1.01 (0.80, 1.28)	71% (530)	1.51** (1.18, 1.93)	3.04*** (2.31, 4.00)

Notes: ***p<0.001; **p<0.01; *p<0.05

Comparison in rate of change: total ASSAD and Aboriginal and Torres Strait Islander students

The average annual rate of change in prevalence of never smoking, past month smoking and current smoking was similar for the two groups (Table 3). Specifically, the odds of never smoking increased significantly by 8-10% with each year for both groups (Aboriginal and Torres Strait Islander students: OR 1.08 [1.07, 1.10] $p < 0.001$; total ASSAD: OR 1.10 [1.09, 1.10] $p < 0.001$), while the odds of past month and current smoking decreased significantly by 6-7% ($p < 0.001$) with each year (Table 3).

Between 2005 and 2017 the proportion of never smokers increased by 22% for the Aboriginal and Torres Strait Islander students and 17% in the total sample. The relative increase in never smoking was larger for Aboriginal and Torres Strait Islander students (45% vs 28%), due to the lower baseline prevalence of never smoking in 2005 in the total sample. While the absolute decline in prevalence of past month and current smoking was greater for Aboriginal and Torres Strait Islander students (10% past month, 11% current) than for the total ASSAD sample (5% past month, 4% current), when change was considered as a proportion of those smoking at 2005, the decrease was similar for both groups (Table 3).

Smoking intensity among Aboriginal and Torres Strait Islander students

Aboriginal and Torres Strait Islander current smokers aged 12-17 generally smoked at low intensity (1-4 cigarettes per day), and the proportion smoking at this level increased significantly between 2005 (67%) and 2017 (77%) (OR 1.96 [1.04, 3.68] $p = 0.036$). Correspondingly, smoking at higher intensities declined over the same period (5-9 cigarettes daily, 2005: 18%; 2017: 12%, OR 0.56 [0.27, 1.15] $p = 0.116$; 10 or more cigarettes daily, 2005: 15%; 2017: 12%, OR 0.55 [0.23, 1.32] $p = 0.178$), although this was not statistically significant likely due to the low numbers in these categories. These changes varied over time with the largest between 2011 and 2014 (1-4 cigarettes, OR 2.04 [1.19, 3.48] $p = 0.009$; 10 or more cigarettes, OR 0.45 [0.21, 0.99] $p = 0.048$).

Table 3: Change in never, past month and past week smoking prevalence among students aged 12-17 years, 2005-17

		Average annual change in likelihood of smoking (OR)	Total change in prevalence 2005-2017 (%)	Total relative change in prevalence 2005-2017, as a proportion of prevalence at 2005 (%)
NEVER SMOKING	Indigenous Students	1.08 (1.07, 1.10)	22% (17%, 26%)	45% (37%, 52%)
	Total ASSAD	1.10 (1.09, 1.10)	17% (17%, 18%)	28% (26%, 29%)
PAST MONTH	Indigenous Students	0.94 (0.93, 0.96)	-10% (-13%, -7%)	-42% (-60%, -23%)
	Total ASSAD	0.94 (0.94, 0.95)	-5% (-6%, -4%)	-37% (-43%, -31%)
CURRENT	Indigenous Students	0.93 (0.93, 0.95)	-11% (-14%, -8%)	-54% (-75%, -32%)
	Total ASSAD	0.94 (0.93, 0.95)	-4% (-5%, -4%)	-45% (-52%, -38%)

Average annual change calculated using logistic regression (adjusted for age, sex, state, school type, remoteness, SEIFA)

DISCUSSION

This first study to examine smoking trends among Aboriginal and Torres Strait Islander students aged 12-17 between 2005 and 2017 found it is increasingly likely these students have never smoked a cigarette and less likely to currently smoke. Taken with previous findings⁹, our results demonstrate continued decline in current (weekly) smoking over the past 20 years in both younger adolescents (aged 12-15, 1996: 27%; 2017: 7%) and older adolescents aged 16-17 (1996: 44%; 2017: 18%). Encouragingly these declines have been accompanied by substantial increases in the proportion who have never smoked in the same period for both age groups (aged 12-15, 39% to 76%; aged 16-17, 22% to 55%).

In extending previous work⁹ we demonstrate the ongoing declines in youth smoking in the context of more than two decades of comprehensive tobacco control in Australia including peak investment in national social marketing, graphic health warnings on packaging, increased smoke-free legislation, the introduction of tobacco plain packaging from 2012 and annual excise increases from 2013.^{4, 13-15} The period covered by the current study also encompasses the 2008 Council of Australian Governments' (COAG) *Closing the Gap Strategy* and the target to halve the daily smoking rate among Aboriginal and Torres Strait Islander adults by 2018, along with targeted social marketing campaigns, the introduction of the *Tackling Indigenous Smoking and Healthy Lifestyle Program* (TISHLP) in 2010 and its revised tobacco focused model in 2015, *Tackling Indigenous Smoking* (TIS).^{5, 13, 16} These measures introduced in recognition of tobacco's direct contribution to health inequities.¹⁷ Over this period local community level tobacco control has been prioritised through TISHLP and TIS⁸, an approach considered best practice.^{2, 19, 20} A 2018 evaluation of TIS suggests it will contribute to a reduction in smoking (although no empirical evidence of the impact of the program on prevalence is yet available).¹⁸

These investments and policy measures coincide with the significant increases in never smoking and declines in smoking prevalence we have reported among Aboriginal and Torres Strait Islander students. Our findings reflect other ASSAD analyses that showed substantial reduction in smoking for all secondary students in the total ASSAD sample (which includes Aboriginal and Torres Strait Islander students) between 1999 and 2008, and a slowing of progress in more recent years to 2017 as youth smoking overall reaches low levels.¹⁰ However, in our study smoking prevalence among Aboriginal and Torres

Strait Islander students aged 12-17 continued to decline over this period. Our results are also consistent with other studies with Aboriginal and Torres Strait Islander adolescents and adults and agree with the likely impact the comprehensive approach combining whole of population and targeted or community level strategies has had on young people in particular.^{6,8}

There have been substantial changes to tobacco control funding and programs over the study period. In addition to removing the broader healthy lifestyles elements from TISHLP to focus on tobacco in the TIS program, funding has been reduced for TIS and to Aboriginal health generally, the Australian National Preventive Health Agency closed, no national mainstream social marketing campaigns since 2012 and limited periods of targeted campaigns.²¹⁻²⁵ While funding for TIS has been committed to 2021-22, the 2018 evaluation noted that coverage was incomplete and recommended complementary measures to support local tobacco control, such as national campaigns.¹⁸ The fluctuations in adolescent smoking decline may reflect these changes, with limited national campaign activity representing a substantial lost opportunity to accelerate declining smoking trends.^{26, 27} Our results strengthen calls for increased investment in tobacco control to maintain progress⁶, particularly among socially disadvantaged high prevalence communities. Previous work has shown that intense periods of tobacco control decreased youth smoking prevalence consistently across all SES groups but during low investment periods smoking increased overall, particularly in the more socially disadvantaged students.²⁸

Importantly, between 2005 and 2017 trends in never, past month, and current smoking among Aboriginal and Torres Strait Islander students generally followed those of the total ASSAD sample. Although the increase in never smoking and smoking declines were greater for Aboriginal and Torres Strait Islander students, this reflects their different starting points. When considered as a proportion of baseline prevalence, the rate of change in smoking by year is similar for Aboriginal and Torres Strait Islander students and the total sample, suggesting current policies have been similarly effective for all students. While reducing smoking at a similar rate is positive, this outcome is not equitable and reflects a continuing gap in health outcomes. Specifically, never smoking prevalence remains lower among Aboriginal and Torres Strait Islander adolescents than in the broader population, and current smoking remains twice as high. This pattern is

also observed in other countries with a similar history of colonisation²⁹ and is related to how Aboriginal and Torres Strait Islander young people, and other First Nations adolescents globally, share similar influences for smoking uptake to the broader population, but are also more likely to be exposed to these including smoking among family and community, and life stressors.³⁰

As has been noted for the adult population in Australia, reducing the gap in disease burden requires maintaining and intensifying the most effective tobacco control measures to accelerate smoking declines among Aboriginal and Torres Strait Islander populations such that health outcomes are equivalent to the broader population.^{4, 6} While it is difficult to identify independently effective components from Australia's comprehensive tobacco control program, our results demonstrate that the current approach is having an impact and should be sustained.⁶ To achieve this goal, evidence from First Nations populations globally, including Australia, indicates that comprehensive population wide approaches, including price measures, smoke-free legislation and social marketing, are important alongside community-led, strengths-based programs as these are best placed to address the contextual factors influencing higher smoking prevalence.^{2, 19, 20, 30, 31}

Two findings from this study may inform future policy and program design as part of a comprehensive approach. These relate to price measures and the target age range and objectives for prevention interventions. Firstly, our study found the prevalence of heavier smoking started to decline in Aboriginal and Torres Strait Islander students around 2014. This period corresponds to the introduction of tax-driven changes in cigarette prices, measures shown to reduce smoking and prompt quit attempts, including among young people and socially disadvantaged sub-groups.^{32, 33} This period also saw a proliferation of actions by tobacco companies designed to counter increasing prices, including many that may have been aimed at young smokers (increased brands and variants, small pack and roll-your-own pack sizes).^{32, 34} The decline in smoking prevalence and smoking intensity found in our study post 2014 suggests that the actions taken by the tobacco industry did not completely mitigate impact of tax rises on smoking behaviours of Aboriginal and Torres Strait Islander adolescents.

Secondly, while the proportion of 12-17 year old Aboriginal and Torres Strait Islander students who had ever experimented with cigarettes in 2017 had reduced to 30% from 50% in 2005, this still represents a substantial proportion of students at risk of regular smoking. Further, the quarter of 12-15 year olds who had already tried smoking highlights the importance of the early secondary years for prevention. These findings reinforce the self-reported age of initiation of Aboriginal and Torres Strait Islander young adults, most of whom commenced regular smoking before age 18, and a quarter before 15 years⁸ and are in line with the early adolescence initiation recorded with Indigenous young people of North America.^{35, 36}

We found that in 2017 18% of 16-17 year olds were already smoking at least weekly. Youth prevention programs have a role to play in not only minimising transition to regular smoking, but also in providing age appropriate quit support. While some young Aboriginal and Torres Strait Islander people do not perceive traditional cessation supports to be relevant to them³⁷, ABS data shows an interest in quitting with more than a third of Aboriginal and Torres Strait Islander smokers aged 15-17 having made a quit attempt.^{7, 38} There may be opportunities to deliver relevant prevention programs in community and/or school settings. While the evidence for school-based interventions is mixed there are indications that programs that include a focus on developing self-efficacy skills are more likely to be effective than information only programs.^{39, 40}

Limitations

A potential limitation to generalising our results is the representativeness of the achieved ASSAD sample. Characteristics of the Aboriginal and Torres Strait Islander subsample are broadly consistent with national population data, including the proportion of 12-17 year olds identifying as Aboriginal or Torres Strait Islander in the 2006, 2011 and 2016 Censuses (4%, 5% and 5%, respectively)⁴¹⁻⁴³, and the higher proportions of students from areas of greater social disadvantage.⁵ However it was more urban than the national population distribution, with greater proportions of Aboriginal and Torres Strait Islander students participating from schools in major cities, 39% in 2008 ASSAD, 40% in 2014 and 38% in 2017, compared with 32% living in major cities in 2008, 35% on 2014-15 and 37% in 2016^{44, 45}, reflecting exclusion of smaller schools. There were no significant differences between urban and non-urban areas, however the higher smoking prevalence often

found for more remote areas might be missed in ASSAD data which may not include students attending some types of remote schools.⁴⁴

In addition, recruitment challenges led to substantially lower proportions of participants from the Northern Territory and South Australia in 2017 than in previous surveys. However, when these states were excluded from analyses, results were similar to those reported from the final models. While school response rates have declined over the study period there is no evidence that there is a meaningful difference in smoking behaviours between schools that do or do not participate.⁴⁶ Finally, ASSAD includes only adolescents currently attending school. As school attendance and engagement is associated with lower levels of smoking, our results might underestimate prevalence.⁴⁷

Conclusions & Implications for Public Health

Few national studies have examined smoking among Aboriginal and Torres Strait Islander people in early adolescence, a key period for smoking initiation. This study extends recent findings of increased never smoking and reduced smoking prevalence among Aboriginal and Torres Strait Islander adolescents and young adults, and the total ASSAD sample. Importantly the findings demonstrate increased never smoking for all demographic sub-groups including those living in non-urban areas and experiencing greater social disadvantage. Although similar trends were found for both the Aboriginal and Torres Strait Islander students and the total ASSAD sample, suggesting parallel policy impact across all students, current smoking remained substantially higher demonstrating a persisting gap in smoking outcomes. Along with slower progress during periods of lower intensity tobacco control, continuing higher prevalence of smoking highlights the need for sustained or greater investment to accelerate increases in never smoking and improve health equity. Resourcing strengths-based Aboriginal community-controlled programs should remain a priority as part of comprehensive, population wide strategies.

Acknowledgements

The ASSAD survey receives funding from the Australian Government Department of Health and State and Territory Governments of New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, the Northern Territory and the ACT; as

well as from Cancer Councils in Victoria, South Australia, Queensland, and Tasmania, Cancer Institute NSW and the South Australian Health and Medical Research Institute. The authors thank and acknowledge the government and non-government education authorities, school principals, teachers, and students who cooperated to make this study possible. We thank the research staff for assistance with data collection.

CH receives a PhD scholarship from the Australian Prevention Partnership Centre funded through the National Health and Medical Research Council (NHMRC) partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth. CC receives an NHMRC Career Development Fellowship (1161065).

REFERENCES

1. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Australian Burden of Disease Study series no. 6. Cat. no. BOD 7 Canberra: AIHW; 2016 [cited 12 Oct 2019]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
2. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control*. 2003;12(suppl 2):ii5-ii8.
3. van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2016 [cited 20 Apr 2020]. Available from: www.tobaccoinaustralia.org.au/chapter-8-aptsi
4. Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. *Drug statistics series no. 30*. Cat. no. PHE 210 Canberra: AIHW; 2016 [cited 28 May 2019]. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
5. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017 [cited 12 Dec 2019]. Available from: <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
6. Lovett R, Thurber K, Wright A, Maddox R, Banks E. Deadly progress: changes in Australian Aboriginal and Torres Strait Islander adult daily smoking, 2004–2015. *Public Health Research & Practice*. 2017;27(5):e2751742.
7. Australian Bureau of Statistics. 4715.0 - National Aboriginal and Torres Strait Islander Health Survey, 2018-19 Canberra: ABS; 2019 [cited 11 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4715.0>
8. Heris CL, Eades SJ, Lyons L, Chamberlain C, Thomas DP. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Research & Practice*. 2020;30(2):e29121906. First published 2 May 2019.
9. White V, Mason T, Briggs V. How do trends in smoking prevalence among Indigenous and non-Indigenous Australian secondary students between 1996 and 2005 compare? *Aust N Z J Public Health*. 2009;33(2):147-53.

10. Guerin N, White V. ASSAD 2017 Statistics & Trends: Australian Secondary Students' Use of Tobacco, Alcohol, Over-the-counter Drugs, and Illicit Substances. Cancer Council Victoria; 2018. Available from:
<https://beta.health.gov.au/resources/publications/secondary-school-students-use-of-tobacco-alcohol-and-other-drugs-in-2017>.
11. Husten CG. How should we define light or intermittent smoking? Does it matter? *Nicotine & Tobacco Research*. 2009;11(2):111-21.
12. US Department of Health and Human Services. Appendix 3.3 Measures of Cigarette Smoking. In *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from:
www.cdc.gov/tobacco/data_statistics/sgr/2012/.
13. Intergovernmental Committee on Drugs (IGCD) Standing Committee on Tobacco. *National Tobacco Strategy 2012-2018*. Canberra: Commonwealth of Australia; 2012.
14. Australian Government Department of Health. Tobacco control timeline. 2018 [cited 3 June 2019]. Available from:
<https://www.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc~timeline>
15. Wilkinson AL, Scollo M, Durkin SJ, et al. Indexation of Tobacco Excise and Customs Duty and Smoking Prevalence Among Australian Adults, 2001–2010: A Serial Cross-sectional Study. *Nicotine & Tobacco Research*. 2018;21(3):293-9.
16. Tackling Indigenous Smoking. About the TIS program 2019 [cited 30 August 2019]. Available from: <http://tacklingsmoking.org.au/about-the-tis-program/>
17. Australian Government Department of Prime Minister and Cabinet. *Closing the Gap Report 2019*. Canberra: Commonwealth of Australia; 2019 [cited 30 Oct 2019]. Available from: <https://ctgreport.niaa.gov.au/>.
18. Mitchell E, Bandara P, Smith V. *Tackling Indigenous Smoking program – final evaluation report*. 2018 [cited 3 June 2019]. Available from:
<https://beta.health.gov.au/resources/publications/tackling-indigenous-smoking-program-final-evaluation-report>

19. Minichiello A, Lefkowitz AR, Firestone M, Smylie JK, Schwartz R. Effective strategies to reduce commercial tobacco use in Indigenous communities globally: a systematic review. *BMC Public Health*. 2015;16(1):21.
20. Chamberlain C, Perlen S, Brennan S, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Systematic Reviews*. 2017;6(1):135.
21. Australian Government Department of Health. The history of the national tobacco campaign 2019 [cited 30 August 2019]. Available from: <https://webarchive.nla.gov.au/awa/20190208165138/http://www.health.gov.au/internet/main/publishing.nsf/Content/tobacco-educat>
22. Haughton J. Indigenous affairs: health and wellbeing Canberra ACT: Parliament of Australia; 2017 [cited 30 August 2019]. Available from: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201718/IndigenousHealth
23. Public Health Association of Australia. Public Health Association of Australia submission to the Close the Gap Refresh Canberra ACT: PHAA; 2018 [cited 5 Oct 2019]. Available from: <https://www.phaa.net.au/documents/item/2762>
24. Public Health Association of Australia. Federal Budget 2019-20 - Pre-Budget Submission Canberra ACT: PHAA; 2019 [cited 30 August 2019]. Available from: <https://www.phaa.net.au/documents/item/3292>
25. Daube M. Tobacco in Australia: Time to get back to basics. *MJA InSight*. 2018 [cited 3 June 2019]. Available from: <https://insightplus.mja.com.au/2018/16/tobacco-in-australia-time-to-get-back-to-basics/>
26. White VM, Durkin SJ, Coomber K, Wakefield MA. What is the role of tobacco control advertising intensity and duration in reducing adolescent smoking prevalence? Findings from 16 years of tobacco control mass media advertising in Australia. *Tob Control*. 2015;24(2):198-204.
27. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *The Lancet*. 2010;376(9748):1261-71.
28. White VM, Hayman J, Hill DJ. Can population-based tobacco-control policies change smoking behaviors of adolescents from all socio-economic groups? Findings from Australia: 1987-2005. *Cancer Causes Control*. 2008;19(6):631-40.
29. King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. *Lancet*. 2009;374(9683):76-85.

30. Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine & Tobacco Research*. 2019.
31. Nicholson AK, Borland R, Couzos S, Stevens M, Thomas DP. Smoking-related knowledge and health risk beliefs in a national sample of Aboriginal and Torres Strait Islander people. *Med J Aust*. 2015;202(S10):S45-S50.
32. Wilkinson AL, Scollo MM, Wakefield MA, Spittal MJ, Chaloupka FJ, Durkin SJ. Smoking prevalence following tobacco tax increases in Australia between 2001 and 2017: an interrupted time-series analysis. *The Lancet Public Health*. 2019;4(12):e618-e27.
33. Chaloupka FJ, Yurekli A, Fong GT. Tobacco taxes as a tobacco control strategy. *Tob Control*. 2012;21(2):172-80.
34. Bayly M, Freeman B, Scollo M. 10.8 Trends in products and packaging. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2017 [cited 30 Oct 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-10-tobacco-industry/10-8-trends-in-products-and-packaging>
35. Patten CA, Koller KR, Flanagan CA, et al. Age of initiation of cigarette smoking and smokeless tobacco use among western Alaska Native people: Secondary analysis of the WATCH study. *Addictive Behaviors Reports*. 2019;9:100143.
36. Hautala D, Sittner K, Walls M. Latent Trajectories and Profiles of Commercial Cigarette Smoking Frequency From Adolescence to Young Adulthood Among North American Indigenous People. *Nicotine & Tobacco Research*. 2020.
37. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Australian Journal of Primary Health*. 2015;21(3):334-41.
38. Azzopardi PS, Sawyer SM, Carlin JB, et al. Health and wellbeing of Indigenous adolescents in Australia: a systematic synthesis of population data. *The Lancet*. 2018;391(10122):766-82.
39. Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Evidence-Based Child Health: A Cochrane Review Journal*. 2013;8(5):1616-2040.
40. Stewart-Brown S. What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health

promoting schools approach? Copenhagen, WHO Regional Office for Europe (Health Evidence Network report). 2006 [cited 16 Oct 2019]. Available from:

http://www.euro.who.int/__data/assets/pdf_file/0007/74653/E88185.pdf

41. Australian Bureau of Statistics. 2002.o - 2006 Census Community Profile Series Canberra: ABS; 2007 [cited 26 August 2019]. Available from:

https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2006/communityprofile/o?opendocument

42. Australian Bureau of Statistics. 2002.o - 2011 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Canberra: ABS; 2012 [cited 26 August 2019]. Available from:

https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/o?opendocument

43. Australian Bureau of Statistics. 2002.o - 2016 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Profile Canberra: ABS; 2017 [cited 26 August 2019]. Available from:

https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/o36?opendocument

44. Australian Bureau of Statistics. 4714.o - National Aboriginal and Torres Strait Islander Social Survey, 2014-15 Canberra: ABS; 2016 [cited 14 Oct 2019]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.o

45. Australian Bureau of Statistics. 2076.o - Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2016 Canberra: ABS; 2018 [cited 3 June 2019]. Available from:

<https://www.abs.gov.au/ausstats/abs@.nsf/mf/2076.o>

46. White VM, Guerin N, Williams T, Wakefield MA. Long-term impact of plain packaging of cigarettes with larger graphic health warnings: findings from cross-sectional surveys of Australian adolescents between 2011 and 2017. *Tob Control*. 2019;28(e1):e77-e84.

47. Greenhalgh E, Winstanley M. 1.6 Prevalence of smoking—teenagers. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2019 [cited 9 Dec 2019]. Available from:

<https://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-6-prevalence-of-smoking-teenagers>

4.2 Chapter Summary

Chapter 4 analysed trends in smoking behaviour among Aboriginal secondary students between 2005 and 2017 and found significant increases in never smoking overall, and in every demographic subgroup, including those attending schools in non-urban regions of Australia and the most socially disadvantaged suburbs, proxy markers of social determinants commonly associated with higher smoking prevalence.

The combined findings from the analysis in Chapter 4 and the previously published analysis of data from 1996-2005 have been incorporated into the chart below (Figure 1). This clearly demonstrates the impact of two decades of comprehensive tobacco control policies for all students, including Aboriginal young people. However, it is evident from the long term trends that while substantial achievements have been made the disparity in smoking prevalence persists. Therefore, there is still more to be done and commitment to comprehensive tobacco control must be sustained.

See Appendix 2 for the supplementary material referenced in Chapter 4 and the e-print of the published journal article.

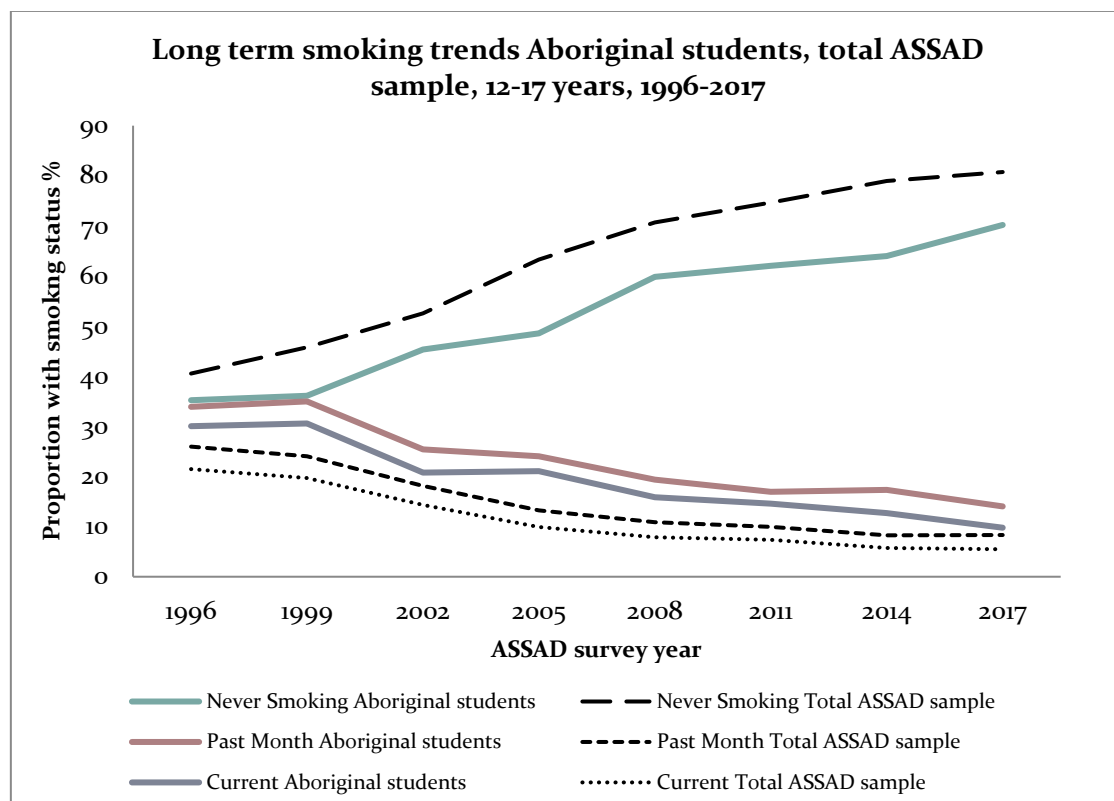


Figure 1: Long term smoking trends Aboriginal students, total ASSAD sample, 12-17 years, 1996-2017

5 Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002-2015

5.1 Introduction

As has been highlighted in preceding chapters, in acknowledging that historically most regular smokers established their smoking during adolescence, it important to understand the pattern of uptake, including the age of initiation, among young Aboriginal people, to inform contemporary tobacco prevention policies and programs. Importantly, the analysis presented here in Chapter 5 was undertaken in partnership with the Victorian Aboriginal Community Controlled Health Organisation (VACCHO) in response to a trend in later smoking initiation identified by their health services. This work sought to demonstrate whether this pattern was present at a national level. It uses previously unpublished ABS data to identify trends in smoking initiation and the stages of adolescence and young adulthood that prevention activities should target.

This chapter contributes to Research Questions 1 and 2.

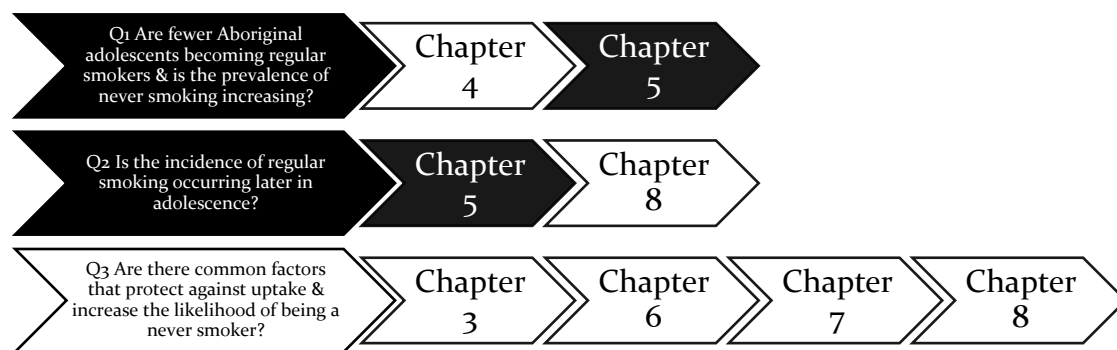


Figure 1: Chapter 5 - Research Question Summary

This research article has been published as a paper available at the following citation:

Heris CL, Eades SJ, Lyons L, Chamberlain C, Thomas DP. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Res Pract.* 2020; 30(2), e29121906.
<https://doi.org/10.17061/phrp29121906>

The accepted manuscript is included in Chapter 5. The copy edited, published e-print is included at 11.3 Appendix 3, along with supplementary materials referenced in the chapter:

E-print of published paper at Chapter 5 (11.3.1 pg 345)

Chapter 5 - Supplementary File 1: Summary of questionnaire wording 2002 – 2014-15
(11.3.2 pg 354)

Chapter 5 - Supplementary File 2: Additional analysis (11.3.3 pg 356)

Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002-2015

Christina L. Heris^a, Sandra J. Eades^a, Louise Lyons^b, Catherine Chamberlain^c and David P. Thomas^{d,e}

^a University of Melbourne, VIC, Australia; ^b Victorian Aboriginal Community Controlled Health Organisation, Melbourne, Australia; ^c La Trobe University, Melbourne, VIC, Australia; ^d Menzies School of Health Research, Darwin, NT, Australia;

^e Corresponding author: David.Thomas@menzies.edu.au

ABSTRACT

Objectives

Analyse trends in smoking initiation and prevalence among young Aboriginal and/or Torres Strait Islander people(s) (Aboriginal people) to identify stages of adolescence and young adulthood that prevention activities should target.

Methods

Secondary analysis of 'daily smoking' and 'never smoked' responses from Aboriginal people aged 15 years and over in five national Indigenous surveys from 2002 to 2014–15; and initiation age among those 18 years and older in 2004–05 and 2012–13.

Results

Smoking prevalence among 15–24 year olds declined significantly between 2002 and 2014–15, 14% (95% Confidence Interval (CI) 8, 21), from 45% to 31%. The greatest decline was among 18–19 year olds, 17% (95% CI 4, 29), from 48% to 31%. The proportion of 15–24 year olds that had never smoked increased significantly by 12% (95% CI 6, 18), from 44% in 2002 to 56% in 2014–15.

Between 2004–05 and 2012–13 there were significant declines in the proportion of 18–24 year olds commencing daily smoking before the age of 18, down 8% (95% CI 2, 15) from 84% to 76%. In 2012–13, 24% of people 18–24 commenced daily smoking after age 18, half (49%) started between 15–18 years, and around a quarter before age 15.

Conclusions

There have been significant declines in smoking prevalence among young Aboriginal people between 2002 and 2014–15 as fewer take up smoking. Smoking initiation occurs over a wide age range. The majority of daily smokers commenced before 18, however initiation may be delayed until early adulthood for an increasing number. The challenge for tobacco prevention is to reach young people in early adolescence and continue to reinforce smoke-free intentions into young adulthood.

INTRODUCTION

Tobacco use continues to be a major cause of preventable ill health for Aboriginal and/or Torres Strait Islander people(s) (Aboriginal people), contributing to deaths and disability from cancer, respiratory, and cardiovascular diseases. Smoking is the largest contributing risk factor (23%) to the gap in disease burden between Aboriginal people and non-Indigenous Australians¹, a legacy of the social and economic impacts of colonisation and a disparity shared with other populations with a similar historical context (New Zealand, Canada and the United States).²

While the most recent national data showed current smoking among Aboriginal people to be 2.7 times higher than the non-Indigenous population^{3,4}, there have been positive improvements over the past two decades with a significant decline in adult smoking rates between 1994 and 2014-15, from 55% to 45%.⁵

Reducing smoking prevalence involves supporting existing smokers to quit and preventing smoking initiation. Most regular smoking begins during adolescence and young adulthood (defined in this article as 10-24 years: early adolescence (10-14), late adolescence (15-19), young adulthood (20-24)⁶), with 99% of daily smokers starting before age 26.⁷ Promisingly, the greatest declines between 2002 and 2014-15 were recorded in the 15-17 and 18-24 age groups, down from 33% to 17% and 58% to 41%, respectively.⁴ With an increase in never smoking over the same period this indicated fewer young people are taking up smoking.^{3,4}

Smoking uptake involves transitioning through different stages that may occur over several years, beginning with the first try (a few puffs to a full cigarette), then repeated experimentation, before establishing regular smoking (consumed 100 cigarettes and/or at least daily smoking for more than one month).^{8,9} Smoking prevention can target any or all of these stages.¹⁰ Many young people do not progress beyond experimentation, and for those who do, the timing of these transitions is not uniform. One model of initiation describes four trajectories: 'early establishers' (trying cigarettes around 12-13 years progressing to daily use by age 17); 'late establishers' (beginning around 15-16 years with use peaking in the early 20s); 'quitters' (who experiment early, less than 11 years, and peak at less than daily use at age 16); and 'non-smokers'.⁷

Population health surveys measuring uptake differ in the stage reported: some record the age of the first full cigarette smoked, others the age daily smoking commenced. The 2016 National Drug Strategy Household Survey (NDSHS) found that the mean age of first smoking a full cigarette for all Australian youth has increased significantly over time from 14 years in 1995 to 16 years in 2016.¹¹ The most recent NDSHS data reporting the age of the first full cigarette for young Aboriginal people is from the 2013 NDSHS and showed no significant changes between 2010 and 2013, around 15 years.¹² However, the NDSHS does not record the age that regular smoking commenced, and includes few survey participants from remote areas: a significant limitation of this dataset as at the 2011 census 21% of Aboriginal people were recorded as living in remote regions¹³, where smoking prevalence is also known to be higher.^{3,14}

In contrast, the cross-sectional Australian Bureau of Statistics (ABS) National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS) and National Aboriginal and Torres Strait Islander Social Surveys (NATSISS) reflect the geographic distribution of the Aboriginal population, including remote areas. The health surveys also record the age that daily smoking commenced. Data from a recent analysis of smoking trends among Aboriginal people showed similar proportions of people aged 18 years or over commencing smoking before age 18 years over time, 70% in 2004–05 and 69% in 2012–13, amongst all who had ever smoked daily.⁵ This analysis also found an overall 13% decrease in current smoking among 15–17 year olds from 30% in 1994 to 17% in 2014–15, and an average annual relative decrease of 4%, indicating a reduction in smoking uptake.⁵

However, analysis of clinic data from Victorian Aboriginal Community Controlled Health Organisation (VACCHO) member services suggests higher smoking prevalence among 20–24 year olds than 15–19 year olds, which may indicate that the improvements in teenage smoking could be due to more young people delaying initiation until their 20s.

This paper extends previous national analyses of initiation trends by investigating smoking prevalence among 15–24 year olds, and the age 18–24 year old smokers and ex-smokers started to smoke. It is part of a broader project led by VACCHO.

METHODS

Data sources

The 2002, 2008 and 2014–15 NATSISS, the 2004–05 NATSIHS and 2012–13 AATSIHS, collected between August 2002–April 2003, August 2004–July 2005, August 2008–April 2009, April 2012–February 2013, and September 2014–June 2015. There were 9 359 (2002), 5 757 (2004–05), 7 823 (2008), 6 037 (2012–13) and 7 022 (2014–15) Aboriginal respondents aged 15 years and over (18 and over 2004–05 NATSIHS).

Data collection methods

Face-to-face interviews of a multi-stage random sample of Aboriginal people identified as usual household residents of private dwellings. Further details are available in the ABS technical user guides.^{15–19}

Data access

Through the ABS Remote Access Data Laboratory (RADL) for the 2002, 2008, 2014–15 NATSISS, 2004–05 NATSIHS and 2012–13 AATSIHS Confidentialised Unit Record Files (CURFs).

Outcome variables

Smoking status (daily and never smoking) from each survey from 2002 to 2014–15; age daily smoking commenced from the 2004–05 NATSIHS and 2012–13 AATSIHS. Daily smoking (and age it commenced) was defined as at least one cigarette a day. See Supplementary Table 1 for question variations. Never smokers were defined differently in the NATSISS (never smoked daily) and the NATSIHS/AATSIHS (less than 100 cigarettes in a lifetime or other tobacco products less than 20 times).

Predictor variables

Age, gender, state or territory jurisdiction and remote/non remote location.

Data analysis: estimates of smoking prevalence and never smoked status were obtained from all surveys using Stata 10 (special edition), and the age daily smoking commenced from 2004–05, 2012–13. Weighted population estimates and standard errors were

calculated using reference weights as described by Donath²⁰ and the variances of the differences between estimates calculated from the sum of the variances of the estimates.

Results are for Aboriginal people nationally, with subgroup analyses by gender, remoteness, age group and jurisdiction (excluding Tasmania and the Australian Capital Territory (ACT) which are combined by the ABS in several surveys).

Comparisons in daily smoking and never smoked status are made between the 2002 NATSISS and subsequent surveys for groups within the 15-24 age range (18-24 in 2004-05 when smoking data was restricted to those 18 years or older).

Due to the age limits in 2004-05 comparisons between surveys in age of initiation are for those aged 18 or older. Comparisons were also made within and between the 2004-05 and 2012-13 surveys across 10-year age groups (20-29, 30-39, 40-49, 50 years and over) to determine whether any changes are due to a longer term cohort effect. The nearly 10-year gap between surveys means most current and ex-smokers would have moved into the next 10-year age group, for example, 40-49 year olds surveyed in 2012-13 would be from the same birth cohort as 30-39 year olds in 2004-05.

Ethics

Provided by Menzies School of Health Research and the Northern Territory Department of Health Top End Human Research Ethics Committee Indigenous sub-committee.

RESULTS

Changes in daily smoking prevalence: 2002 to 2014–15

Between 2002 and 2014–15, daily smoking prevalence declined significantly among young people aged 15–24, 31% down from 45%, a reduction of 14% (95% CI 8, 21) (see Figure 1). Within this age range there were also significant decreases among 18–24 year olds and all smaller age sub-groups of 15–17, 18–19 and 20–24 years. The greatest magnitude of change was for 18–19 year olds, a 17% decline between 2002 and 2014–15 (95% CI 4, 29), down to 31% from 48%.

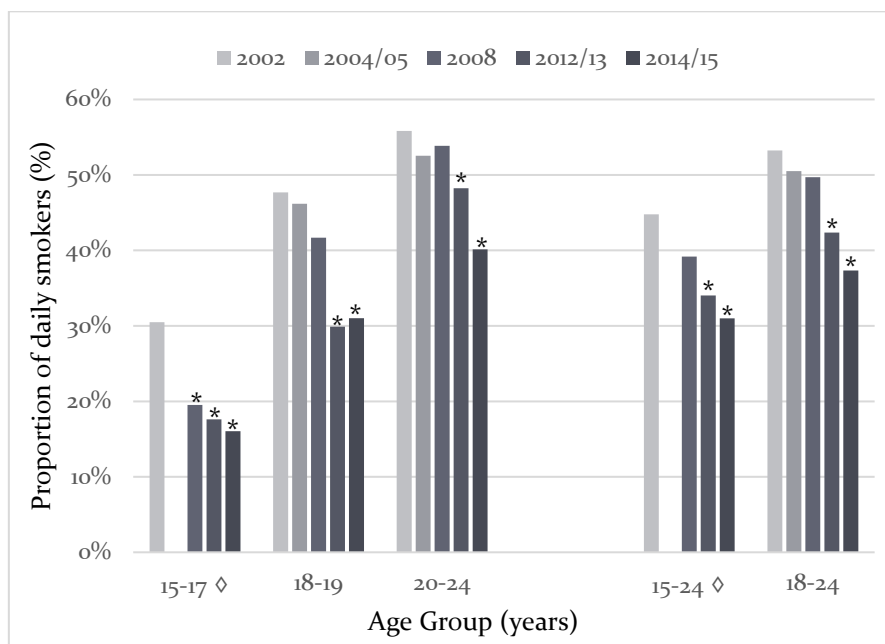


Figure 1: Proportion of Aboriginal adolescents 15–24 years who smoked daily, 2002 to 2014–15

Sources: 2002 NATSISS, 2004–05 NATSIHS, 2008 NATSISS, 2012–13 AATSIHS, 2014–15 NATSISS

* significantly different from 2002, $p < 0.05$

◇ Not available for 2004–05, question restricted to 18 years and over

The proportion of never smokers among 15–24 year olds increased significantly by 12% (95% CI 6, 18), from 44% in 2002 to 56% in 2014–15 (see Figure 2). As with daily smoking, there were significant changes for all smaller age sub-groups and the greatest change was among 18–19 year olds with a 20% increase (95% CI 7, 32) in never smoking from 40% in 2002 to 60% in 2014–15.

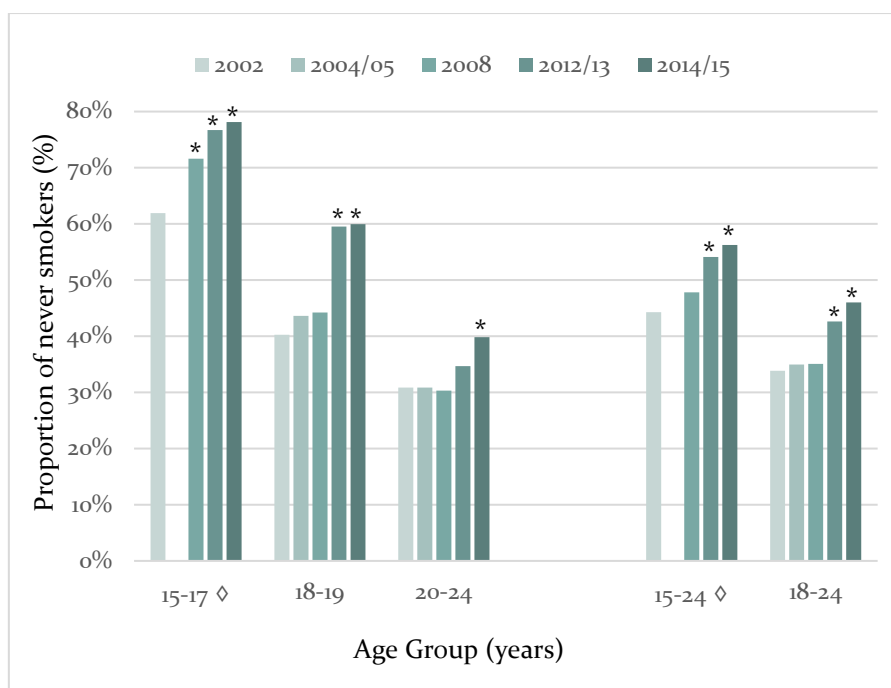


Figure 2: Proportion of Aboriginal adolescents 15-24 years who have never smoked, 2002 to 2014-15

Sources: 2002 NATSISS, 2004-05 NATSIHS, 2008 NATSISS, 2012-13 AATSIHS, 2014-15 NATSISS

* significantly different from 2002, $p < 0.05$

◇ Not available for 2004-05, question restricted to 18 years and over

Changes in the reported age daily smoking commenced: 2004-05 to 2012-13

For all respondents aged 18 years and over who have ever smoked daily, the age daily smoking commenced did not change between 2004-05 and 2012-13 with the majority (70%) starting before 18 years of age and around 30% before age 15.

To investigate trends among more recently established smokers we concentrated on 18-24 year olds and found significant declines between surveys among those commencing smoking before age 18: in 2004-05, 84% of young people 18-24 had started smoking daily before age 18, declining to 76% in 2012-13, an 8% difference (95% CI 2, 15) (see Table 1). There was a non significant decline in the proportion commencing before 15 years, 26% in 2012-13 down from 34% in 2004-05 (95% CI 0, 15).

Within the 18-24 age group there was a significant decrease of 9% (95% CI 1, 17) in the proportion of 20-24 year olds who started smoking before age 18. There was a non-significant decrease (4%; 95% CI -5, 13) among 18-19 year olds. Both Western Australia (WA) and Victoria had significant reductions in the proportion of 18-24 year olds starting before 18 years: a decline of 28% in Victoria (from 91% in 2004-05 to 63% in 2012-13); and

17% in WA (from 89% to 72%). There were also non-significant declines in almost all other categories.

Table 1: Proportion of current / ex daily smokers commencing daily smoking before age 18, Aboriginal respondents 18-24 years

	2004-05			2012-13		Difference 2004-05 to 2012-13	
	%	n		%	n	% difference (95% CI)	
Total 18-24 years	84	554		76	391	-8	(-15, -2)*
18-19 years	92	159		88	110	-4	(-13, 5)
20-24 years	81	395		72	281	-9	(-17, -1)*
Males	84	227		75	163	-10	(-20, 0)
Females	84	327		77	228	-7	(-15, 1)
Remote	78	178		65	149	-12	(-24, 0)
Non remote	86	376		79	242	-7	(-15, 0)
VIC	91	72		63	23	-28	(-48, -8)*
NSW	86	92		89	73	3	(-6, 13)
QLD	80	101		68	71	-12	(-28, 4)
SA	85	55		79	44	-6	(-27, 15)
WA	89	90		72	65	-17	(-30, -5)*
NT	75	70		64	68	-12	(-29, 5)

Sources: 2004-05 NATSIHS, 2012-13 AATSIHS

* statistically significant difference, $p < 0.05$

Of the current and ex daily smokers who commenced smoking daily before 18 years there were no consistent differences between the groups in each of the 10 year age/birth cohorts, both between and within survey waves, with one exception, the higher proportion of 20-29s who commenced smoking before 18 years than the 30-39 group (see Supplementary Table 2).

DISCUSSION

Our results demonstrate that fewer young Aboriginal people are taking up smoking; and of those who do, an increasing proportion are starting daily smoking later, after age 18. This appears to be a recent change.

These findings add to recent reports of the decline in smoking among Aboriginal people over the past 10-15 years^{3,5,21}, particularly young people, largely due to the increase in never smoking. This will have substantial health benefits for Aboriginal people as non-smokers live 10 years longer on average than smokers.²² With increases in lifelong never smokers alongside thousands of people who have quit, the burden from premature mortality and tobacco related illnesses will decline.^{5,21}

Sustaining and accelerating this progress requires continued commitment to the comprehensive tobacco control approach that has supported these improvements for young people in particular.^{5,21} It is not possible to determine if any individual component has been more effective but measures that are Aboriginal led and culturally tailored are identified as particularly important.^{21,23} A greater understanding of what works for young people of different ages is needed to design programs that continue to prevent smoking throughout adolescence and into adulthood.²³

Our results may indicate a trend towards delayed initiation with the largest increase in never smoking since 2002 among 18-19 year olds and more moderate changes for 20-24 year olds. Although, as shown previously for both Aboriginal and non-Indigenous people⁵, the majority of those who have ever smoked regularly continue to start before age 18, our analysis found an increasing number of people commencing after 18 years. This is similar to changes in the broader population with the average age the first full cigarette smoked in 2016 rising to 16 years from 14 years in 1995, and a significant increase in the proportion trying smoking for the first time after 18 years, 31% in 2016 up from 28% in 2013 (increasing steadily from 18% in 2004).¹¹ Our results suggest a more recent shift with no significant differences between age cohorts except the greater proportion of 20-29s commencing daily smoking before age 18, as expected for existing smokers in their 20s.

From the earlier initiation model, our results suggest a potential shift from 'early' to 'late establishers' or possibly an increase in age for all categories. There may be some relative positive health impacts of fewer smokers commencing in early adolescence as those who start earlier are less likely to make successful quit attempts^{24,25}, more likely to become heavy smokers and more likely to develop tobacco related diseases.⁷

Despite these relative benefits, preventing later uptake and progression to long term smoking is nonetheless important and must acknowledge that the risk and protective factors for smoking change throughout adolescence and young adulthood and the transition is a period of increased vulnerability and susceptibility to smoking uptake.¹⁰ New risk factors for smoking may be introduced and previously protective influences diminished as young people enter early adulthood: leaving school and home, starting work, study, households and families. Previously positive influences of smoke-free homes and cars, family attitudes to smoking, engagement with school and sport, and exposure to youth focused health promotion may be replaced by new smoking norms at home, work, and among friends, along with greater access to cigarettes (age, income).

There may also be some time specific factors. The changes reported here are for a group aged 18-24 years in 2012–13. That is, their smoking was established prior to, or during, the renewed national focus on tobacco control following a peak in the late 1990s to early 2000s. Funding for the Tackling Indigenous Smoking program began in 2010, the first Indigenous targeted social marketing campaign Break the Chain aired in 2011, mainstream campaign activity increased from 2012, tobacco plain packaging was introduced in 2012 along with annual excise increases from 2013.

Is it possible that this group progressed through adolescence with lower exposure to health promotion and social marketing, particularly Aboriginal led tobacco control, and were more susceptible to smoking uptake as they entered young adulthood? And/or that the effect of measures that prevented uptake during their teenage years was not sustained, contributing to later initiation and a re-normalisation of smoking in this age group? Increased understanding of the factors influencing smoking uptake for young Aboriginal people during the transition into adulthood and what measures are effective is required, including the unique determinants of smoking initiation for this population within the historical context of colonisation.²⁶ It is necessary to invest in, and where required adapt, health promotion programs and policies to ensure tobacco prevention and cessation supports are effective and culturally relevant for Aboriginal adolescents. Further, it is important to ensure smoke-free messages are reinforced and remain relevant across all stages of adolescence and young adulthood, continuing to reduce initiation, not just delay it.

Limitations

A strength of this work is the reporting of data not routinely published from a nationally representative sample of Aboriginal people, including in remote areas. However, there are some limitations. The surveys sample people living in private residences which excludes hospitals, correctional facilities, hostels, other short-stay accommodation and boarding schools. For some sub-groups the sample sizes and changes are insufficient to detect an important difference. While some outcomes are analysed by remoteness or jurisdiction, primarily the data is reported at a national level which does not allow for regional variation. There were minor changes in questions for smoking status and initiation between remote/non-remote areas and surveys. The definition of 'never smoking' differed between the NATSISS and the NATSIHS/AATSIHS, however is consistent in our comparisons between 2002 and 2014–15.

The analysis of the age daily smoking commenced includes only two time points. We used birth cohort comparisons to demonstrate that the detected differences in later uptake appear to be a recent change. While significant differences have been detected they should be interpreted with caution and the analysis repeated when a third wave of this ABS data is available to provide greater certainty. In the interim, qualitative research may facilitate an in depth exploration of the experiences leading to later smoking uptake and any relevant time-period factors.

CONCLUSION

Smoking prevalence among young Aboriginal people has been declining since 2002 with increasing numbers of never smokers. However, non-smoking adolescents entering young adulthood may still be susceptible to smoking and it cannot be assumed that a client previously presenting to a primary health care service as a never smoker in their late teens or early 20s will remain so. Nor can it be assumed that activities that have been effective in driving down youth smoking rates continue to be effective with young adults. Influences on smoking initiation change throughout adolescence and young adulthood. While our results show most daily smoking continues to be established before age 18, around a quarter commence before 15 years and a similar proportion after 18 (and may be increasing), with the remaining 50% between 15-17 years.

Commitment to the comprehensive tobacco control measures that have contributed to the reduction in youth smoking must be sustained and prioritise Aboriginal led prevention to ensure cultural relevance. Our results suggest that these interventions need to continue across the total period of adolescence, reinforcing tobacco prevention at very different life stages to ensure smoking uptake continues to decline and is not just delayed.

KEY POINTS

- Smoking prevalence among young Aboriginal people declined between 2002 and 2014–15.
- An increasing minority of young people may be commencing daily smoking after 18 years of age, while the majority still commence before 18 years.
- Smoking prevention must target the total period of adolescence from 10–24 years.

Acknowledgements

Funding provided to VACCHO by the Victorian Department of Health and Human Services. CH receives a PhD scholarship from the Australian Prevention Partnership Centre through an NHMRC partnership centre grant (Grant ID: BNT9100001).

REFERENCES

1. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Canberra: AIHW; 2016 [cited 5 Mar 2018]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
2. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Chapter 8.3 Prevalence of tobacco use among Aboriginal and Torres Strait Islander people. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2016 [cited 3 Aug 2018]. Available from: <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-3-prevalence-of-tobacco-use-among-aboriginal-peo>
3. Australian Bureau of Statistics. 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2014-15. Canberra: ABS; 2016 [cited 5 Mar 2018]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0.
4. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017 [cited 5 Mar 2018]. Available from: www.pmc.gov.au/sites/default/files/publications/2017-health-performance-framework-report.pdf
5. Australian Bureau of Statistics. 4737.0 - Aboriginal and Torres Strait Islander Peoples: Smoking Trends, Australia, 1994 to 2014-15. Canberra: ABS; 2017 [cited 5 Mar 2018]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4737.0
6. Sawyer SM, Afifi RA, Bearinger LH, Blakemore S-J, Dick B, Ezech AC, et al. Adolescence: a foundation for future health. The Lancet. 2012. 379 (9826):1630-40.
7. US Department of Health and Human Services. Preventing tobacco use among young people: A report of the Surgeon General Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012 [cited 4 Apr 2018]. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
8. Choi WS, Gilpin EA, Farkas AJ, Pierce JP. Determining the probability of future smoking among adolescents. Addiction. 2001. 96 (2):313-23.
9. Messer K, Pierce JP. Changes in age trajectories of smoking experimentation during the California Tobacco Control Program. American Journal of Public Health. 2010. 100 (7):1298-306.

10. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2014 [cited 5 Mar 2018]. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
11. Australian Institute of Health and Welfare. National Drug Strategy Household Survey 2016: detailed findings. Canberra: AIHW; 2017 [cited 5 Mar 2018]. Available from: www.aihw.gov.au/reports/illicit-use-of-drugs/2016-ndshs-detailed
12. Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. Canberra: AIHW; 2016 [cited 5 Mar 2018]. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
13. Australian Bureau of Statistics. Remoteness Structure. Canberra: ABS; 2018 [updated 15 March 2018; cited 23 Mar 2018]. Available from: <http://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure>
14. Australian Bureau of Statistics. 3238.o.55.001 - Estimates of Aboriginal and Torres Strait Islander Australians, June 2011. Canberra: ABS; 2013 [cited 5 Mar 2018]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/3238.o.55.001
15. Australian Bureau of Statistics. 4727.o.55.002 - Australian Aboriginal and Torres Strait Islander Health Survey: Users' Guide, 2012-13. Canberra: ABS; 2013 [cited 2018 Mar 5]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4727.o.55.002Main+Features12012-13.
16. Australian Bureau of Statistics. 4715.o.55.004 - National Aboriginal and Torres Strait Islander Health Survey: Users' Guide, 2004-05 Canberra: ABS; 2006 [cited 5 Mar 2018]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4715.o.55.0042004-05
17. Australian Bureau of Statistics. 4714.o - National Aboriginal and Torres Strait Islander Social Survey, 2002. Canberra: ABS; 2004 [cited 5 Mar 2018]. Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4714.o2002>
18. Australian Bureau of Statistics. 4720.o - National Aboriginal and Torres Strait Islander Social Survey: Users' Guide, 2008. Canberra: ABS; 2010 [cited 5 Mar 2018]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4720.oMain+Features12008

19. Australian Bureau of Statistics. 4720.0 - National Aboriginal and Torres Strait Islander Social Survey: User Guide, 2014-15. Canberra: ABS; 2016 [cited 5 Mar 2018]. Available from: www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4720.0
20. Donath SM. How to calculate standard errors for population estimates based on Australian National Health Survey data. *Aust N Z J Public Health*. 2005. 29 (6):565-71.
21. Lovett R, Thurber K, Wright A, Maddox R, Banks E. Deadly progress: changes in Australian Aboriginal and Torres Strait Islander adult daily smoking, 2004-2015. *Public Health Research & Practice*. 2017. 27(5):e2751742
22. Banks E, Joshy G, Weber MF, Liu B, Grenfell R, Egger S, et al. Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Medicine*. 2015. 13 (1):38.
23. Chamberlain C, Perlen S, Brennan S, Rychetnik L, Thomas D, Maddox R, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Systematic Reviews*. 2017. 6 (1):135.
24. Breslau N, Peterson EL. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *American Journal of Public Health*. 1996. 86 (2):214-20.
25. Greenhalgh EM, Stillman S, Ford C. Chapter 7.7 Factors that predict success or failure in quit attempts. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2016 [cited 5 Mar 2018]. Available from: www.tobaccoinaustralia.org.au/chapter-7-cessation/7-7-personal-factors-associated-with-quitting
26. Lovett R, Thurber KA, Maddox R. The Aboriginal and Torres Strait Islander smoking epidemic: what stage are we at, and what does it mean? *Public Health Research & Practice*. 2017. 27 (4)

5.2 Chapter summary

The important findings of the paper presented in Chapter 5 challenge previously held assumptions about youth smoking trajectories and show that smoking initiation occurs over a wide age range. While most people who do start smoking (of which the numbers are declining) continue to commence before age 18, initiation may be delayed until early adulthood for an increasing proportion. The policy implications are for tobacco prevention activities to reach young people in early adolescence and continue to reinforce smoke-free intentions throughout adolescence and early adulthood. While significant declines in youth smoking prevalence have been achieved, rates continue to be high, particularly among young adults, underlining the call for urgent and ongoing commitment to the comprehensive approach to tobacco control that has led to these gains.

Appendix 3 includes the supplementary material referenced in Chapter 5, and the e-print of the copy-edited published journal article.

As this research was conducted in partnership with VACCHO, responding to a community identified research need, substantial community engagement and research translation was undertaken, uncommon for routinely collected national data such as from the ABS Aboriginal health and social surveys. The analysis was presented at multiple VACCHO tobacco training workshops and Board meetings by co-author and Director of Public Health and Research (former), Louise Lyons. Meetings and visits with seven VACCHO members around Victoria were also completed to: Albury Wodonga Aboriginal Health Service (AWAHS), Ballarat and District Aboriginal Cooperative (BADAC), Lakes Entrance Aboriginal Health Association (LEAHA), Njernda Aboriginal Corporation, Winda-Mara Aboriginal Cooperative, Dhauwurd Wurrung Elderly & Community Health Service (DWECHS), and Mallee District Aboriginal Services (MDAS).

VACCHO subsequently hosted a two-day research co-design workshop with members from each of the ACCHSs to develop a proposal for a qualitative research project with young Aboriginal community members, with the intention to inform the design of an intervention to respond to the high smoking rates among young people.

Christina Heris was involved in all stages of this work, including the ACCHS visits, assisting with facilitating the co-design workshop, writing the ethics applications and contributing to the related funding proposals. However, while this project is ongoing it falls outside the scope of this thesis.



Figure 1: VACCHO members research co-design workshop 2018

6 Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017

6.1 Introduction

Chapter 6 is the second chapter to use the ASSAD data, which was also used in Chapter 4. In this chapter cross-sectional analysis of the 2017 survey is undertaken to compare the patterns of past month tobacco use between Aboriginal and non-Aboriginal students aged 12-17, across a range of demographic sub-groups. It also explores how tobacco use is related to alcohol and cannabis use, and whether there are differences in this relationship for the two population groups. Chapter 6 contributes to Research Question 3.

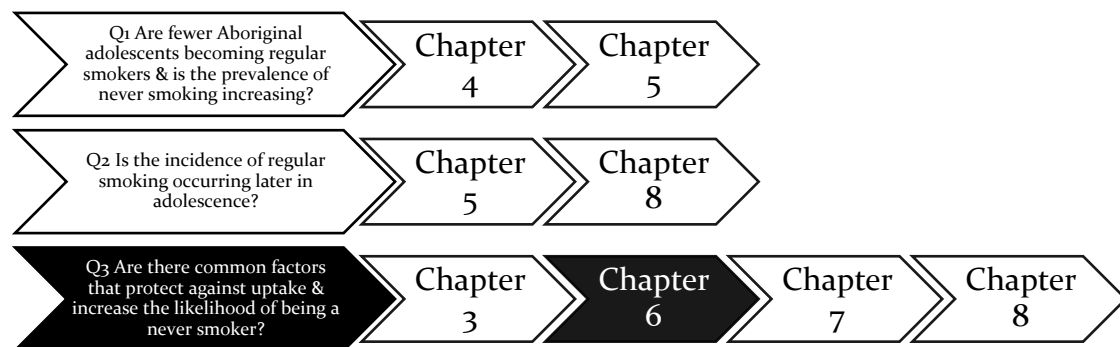


Figure 1: Chapter 6 – Research Question Summary

This chapter has been published as a paper available at the following citation:

Heris CL, Guerin N, Thomas DP, Eades SJ, Chamberlain C, White V. Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017. Drug & Alcohol Review. 2020; <https://doi.org/10.1111/dar.13130>

The accepted manuscript is included here in Chapter 6. The copy edited, published e-print is included at 11.4 Appendix 4 – Chapter 6 E-print (pg 357). There are no supplementary files for this chapter.

Notes on language: the manuscript presented here was drafted for an international audience and the term ‘Indigenous’ is used to refer to Aboriginal and Torres Strait Islander secondary students throughout.

Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017

Christina Heris¹, Nicola Guerin², David Thomas³, Catherine Chamberlain⁴, Sandra Eades¹, Victoria White^{2,5}

¹School of Population and Global Health, the University of Melbourne, Victoria; ²Centre for Behavioural Research in Cancer, Cancer Council Victoria; ³Menzies School of Health Research, Northern Territory; ⁴Judith Lumley Centre, La Trobe University, Victoria; ⁵ School of Psychology, Deakin University, Victoria

Corresponding author: christina.haris@unimelb.edu.au

ABSTRACT

Introduction and aims

Smoking is a major cause of preventable illness for Indigenous peoples. As most regular smoking is established during adolescence when other substances are often first used, effective tobacco prevention requires an understanding of the patterns of related substance use for Indigenous youth.

Design and methods

We reviewed smoking among Indigenous students through cross-sectional analyses of the 2017 Australian Secondary Students' Alcohol and Drug survey and compared findings to non-Indigenous participants. We used logistic regression to evaluate differences in prevalence of tobacco, alcohol and cannabis use, and how smoking and other substance use were related.

Results

Past month smoking was strongly associated with alcohol and cannabis use for both Indigenous and non-Indigenous students. The association between tobacco and cannabis use did not differ by Indigenous status, but the tobacco and alcohol use association was weaker for Indigenous students ($p=0.004$). However, the prevalence of tobacco (OR 1.91 [95% CI 1.55, 2.36]), alcohol (OR 1.44 [1.25, 1.66]), and cannabis (OR 1.97 [1.56, 2.48]) use in the past month was significantly higher in Indigenous than non-Indigenous students. Even within the most socially advantaged sub-group, Indigenous students were more likely to smoke than non-Indigenous students (OR 3.37 [2.23, 5.09]).

Discussion and conclusions

Cannabis and alcohol use are important predictors of smoking for all students. Tobacco policies and community programs must address common determinants of tobacco and other substance use, including resilience and social influence skills as well as broader family and community factors that may be different for Indigenous students.

KEY WORDS

Adolescent, Tobacco, Cannabis, Alcohol Consumption, Oceanic Ancestry Group

INTRODUCTION

Smoking continues to be a major cause of preventable ill health globally, with half of all smokers estimated to die from tobacco-related illnesses.¹ In Australia, smoking is the leading single cause of disease and death² and accounts for two thirds of deaths in current smokers.³ Australian adult daily smoking rates have declined from 24% in 1995 to 14% in 2017-18⁴, with current (weekly) smoking also declining markedly between 1996 and 2017 for adolescents aged 12-15 (17% to 3%) and 16-17 years (30% to 10%).⁵ Record low prevalence has been achieved through a range of tobacco control measures over recent decades.⁶

In Australia, smoking has also declined in populations with historically higher prevalence, including those experiencing greater social disadvantage, living outside major cities, and Aboriginal and Torres Strait Islander Peoples (hereafter, Indigenous people¹).² Daily smoking among Indigenous adults aged 18 and over declined between 2004-05 and 2018-19, from 50% to 40%, but remains almost three times more prevalent than in non-Indigenous Australians (14%).⁷ Smoking is the largest contributing risk factor to the gap in disease burden.⁸ This disparity in smoking rates and health outcomes is a legacy of colonisation that introduced commercial tobacco to Indigenous people in rations and entrenched social disadvantage through the enduring impact of government policies.⁹ As an ongoing process, colonisation contributes to experiences of life stress, discrimination and disconnection from family and culture, each related to higher smoking prevalence and normalisation.^{9, 10} This mirrors the experience of colonised Indigenous Peoples internationally where smoking rates are higher than the dominant settler population.¹⁰

Most smoking is established during adolescence, including for Indigenous Australians.¹¹
¹² Therefore, it is important to target this age group in prevention programs. The design of effective targeted and mainstream tobacco control interventions will be best supported by improved understanding of current patterns of tobacco use among Indigenous young people and how these differ from non-Indigenous adolescents. A key

¹ We use the term 'Indigenous' to refer to Aboriginal and Torres Strait Islander people in Australia and First Nations communities worldwide collectively. This is for ease of reading the paper only and we respectfully acknowledge the diversity and autonomy of Indigenous peoples within this inclusive term.

focus of the current research is the relationship between smoking and known risk factors such as alcohol and other drug use, often also initiated during adolescence.¹³

The relationship between smoking and alcohol consumption or illicit drug use has been widely demonstrated for adults and adolescents.^{11,14-17} Problem Behaviour Theory (PBT) explains the co-occurrence of these ‘problem behaviours’ in adolescence.¹⁸ This psychosocial model of health behaviour describes common determinants within three ‘systems’ and how these interact to increase or decrease risk of problem behaviour.^{18,19} The systems of 1) personality (such as self-esteem, values, beliefs); 2) perceived environment (including peer behaviours, parental monitoring); and 3) behaviour, conventional (such as academic achievement) and problem behaviours (including substance use), with each problem behaviour related to increased risk of others.^{18,19} Later iterations of PBT integrate the broader socio-demographic and socioeconomic environment, and present risk and protective factors in a more exhaustive, ecological model.^{18,19} PBT offers a model to understand differences in behaviour between population groups where there are different demographic/economic conditions, social norms and personality system assets (such as self-esteem) (Figure 1).

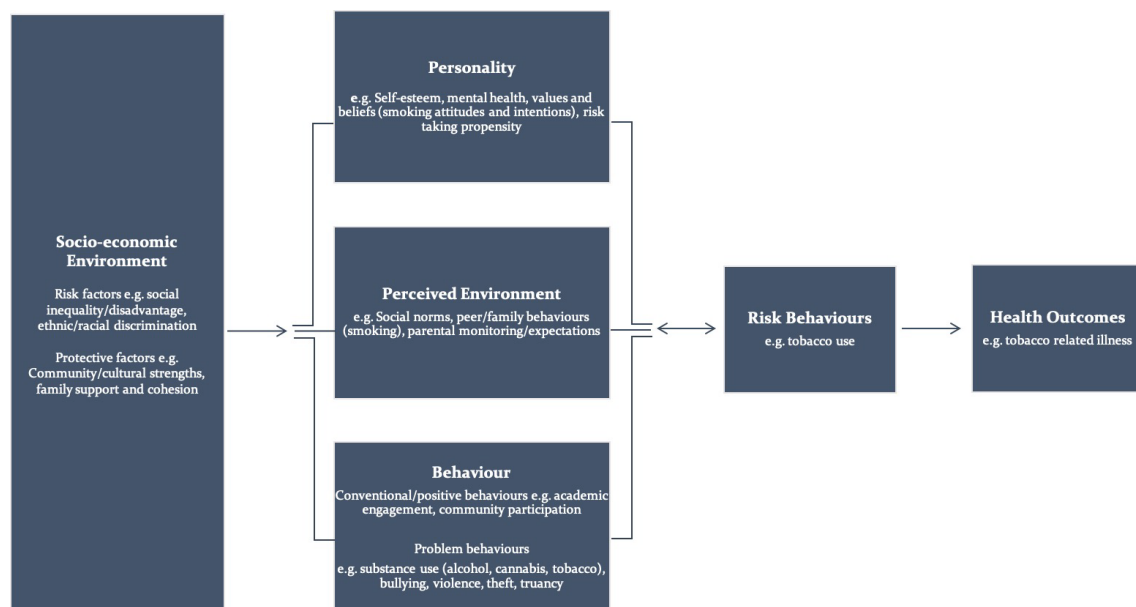


Figure 1: Problem Behaviour Theory and Indigenous adolescent tobacco use
Adapted from Jessor²⁰ and Yu²¹

A handful of studies have explored the relationship between smoking and other substance use for Indigenous adolescents. One systematic review described a strong relationship between smoking and other substance use (primarily alcohol and cannabis).²² A longitudinal study of North American Indigenous adolescents in that review used PBT as an analytical framework and found both alcohol and cannabis predicted smoking.²¹ Other key predictors were deviant behaviours (such as bullying, theft, violence), friends' smoking, intention to smoke, and depressive symptoms.²¹ However, few studies have explored the relationship between tobacco and substance use in Indigenous Australian adolescents and these have largely been qualitative.^{23, 24} One found smoking commonly occurred alongside alcohol and cannabis use in social settings, with alcohol providing the opportunity for young people to socialise, increasing access to cigarettes, and lowering inhibitions to smoking.²³

In the present study, we used data from the 2017 Australian Secondary Students' Alcohol and Drug Survey (ASSAD), a large, representative sample of students aged 12-17. Previous comparisons of regular (past week) and occasional (past month) smoking from the 2014 ASSAD showed higher prevalence among Indigenous than non-Indigenous students (2.6 and 2.4 times higher, respectively²⁵). However, these analyses did not explore variations by remoteness and area level socioeconomic advantage, nor the relationship between smoking and other substance use. We aimed to compare patterns of past month tobacco use among Indigenous and non-Indigenous adolescents aged 12-17 and evaluate any differences between these groups in associations between smoking and alcohol or cannabis use.

METHODS

ASSAD Survey

ASSAD is a national, triennial schools-based self-report survey of tobacco, alcohol, and other drug use among Australian secondary students. Sampling and survey administration have been described previously and briefly here.^{26, 27} ASSAD uses a stratified two-stage probability sampling method to randomly select two samples of secondary schools (years 7-10; and years 11-12) in each state and territory, stratified by education sector (government schools, independent schools, and Catholic schools), and randomly select representative classes of students within each participating school. Schools with fewer than 100 enrolled students were excluded. Research staff

administered the printed questionnaire to participants. All responses were anonymous and confidential.

Ethics and approvals

Principals gave permission to conduct the survey within their school and informed consent was gained from individual students and their parents using active or passive protocols as approved by education bodies. Approval for the current study was granted by the Cancer Council Victoria Human Research Ethics Committee (HREC1013) and the University of Melbourne HREC (1953771).

Current study

We used data collected during the 2017 school year and included participants aged 12-17 who reported their Indigenous status.

Measures

Substance use

Primary outcome variables for tobacco, alcohol, and cannabis use were calculated as binary measures of 'ever use' (ever had at least a few puffs of a cigarette/not; ever had even part of an alcoholic drink/not; ever smoked or used cannabis/not), and 'past month' use (used in the previous four weeks/not).

Indigenous Status

Students were asked "Are you of Aboriginal or Torres Strait Islander descent?" and responded: No; Yes – Aboriginal descent; Yes – Torres Strait Islander descent; Yes – both Aboriginal and Torres Strait Islander descent. Students who self-identified as Aboriginal and/or Torres Strait Islander were classified as 'Indigenous' and those who selected 'No' as 'non-Indigenous'. Those who did not indicate Indigenous status were excluded.

Demographics

Demographic variables included age (continuous and groups 12-15, 16-17); sex (male, female); state or territory; education sector (government, independent, Catholic); and school postcode. School postcode generated two measures of location: area level socio-economic advantage using the Australian Bureau of Statistics (ABS) 2016 SEIFA Index of

Relative Socio-economic Disadvantage (tertiles of most to least socially disadvantaged areas: 'Low', 'Mid', 'High' Advantage); and 'urban location' ('Urban': major cities; or 'Non-Urban': regional/remote) using the 2016 ASGS five-category remoteness classifications (major cities, inner regional, outer regional, remote, very remote).^{28, 29} This five-category remoteness variable was also used.

Statistical analysis

We used STATA MP 14.2 for all analyses. Descriptive statistics for sample characteristics are reported by Indigenous status and age-group (Table 1). Proportions for past month substance use are reported by Indigenous status (Tables 2-4). We used logistic regression to assess differences between Indigenous and non-Indigenous students in likelihood of past month tobacco, alcohol, and cannabis use, a significant effect indicated substance use differed between Indigenous and non-Indigenous students. We also evaluated interactions of Indigenous status and demographic variables. When the p-value of adding an interaction term was less than 0.10, we repeated the original analysis separately for the relevant sub-group (completed for area level socio-economic advantage, sex).

We used the same logistic regression approach to assess whether past month smoking was associated with past month alcohol use; past month cannabis use; or past month alcohol use and cannabis use considered together. Interaction terms (Indigenous status x alcohol use; Indigenous status x cannabis use) indicated differences by Indigenous status in the association between smoking and alcohol use or cannabis use. Unweighted data was used in all logistic regression models and adjusted for clustering within schools to calculate unadjusted odds ratios with 95% Confidence Intervals (95% CIs). All logistic regression models adjusted for education sector and state/territory, and finally sex, age (continuous), remoteness (five category) and area level advantage.

RESULTS

Sample characteristics are summarised in Table 1. ASSAD 2017 data included valid responses from 19,430 participants, with 1,225 participants self-identifying as Indigenous. We excluded responses from 114 participants (0.6% of the sample) who did not indicate Indigenous status. The proportion of Indigenous students in the sample (6.3%) closely approximated the 5% of Australians aged 12-17 that self-identified as being of Indigenous

origin in the 2016 Census.³⁰ Higher proportions of non-Indigenous students than Indigenous students attended schools in urban and more socially advantaged areas (Urban: 65.1% non-Indigenous cf 37.7% Indigenous ($p<0.001$); High social advantage: 39.0% cf 15.4% ($p<0.001$)). The majority were aged 12-15, and a greater proportion of Indigenous students (73.4%) than non-Indigenous (63.2%) in this age group.

Two thirds of all students aged 12-17 had ever used alcohol, while less than one third had ever used tobacco or cannabis (Table 1). Ever use of alcohol did not differ significantly by Indigenous status overall ($p=0.137$). Indigenous males were significantly more likely than non-Indigenous males to have ever consumed alcohol (OR 1.31 [1.04, 1.65]), and Indigenous students in urban (OR 1.39 [1.14, 1.69]) and most disadvantaged areas (OR 1.28 [1.03, 1.60]) were more likely than non-Indigenous students to have consumed alcohol. The likelihood of having ever used tobacco (OR 1.93 [1.65, 2.25]) or cannabis (OR 1.86 [1.54, 2.23]) was significantly higher for Indigenous than non-Indigenous students aged 12-17. Among those aged 12-15, Indigenous students were around twice as likely to have ever smoked (OR 2.24 [1.88, 2.66]) or used cannabis (OR 2.05 [1.61, 2.61]).

Table 1: Number of secondary school students aged between 12 and 17 years surveyed across Australia in 2017, by Indigenous status, age, gender, location and SEIFA index; lifetime tobacco and other substance use experience

	12 to 15 years		16 to 17 years		12 to 17 years	
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
Total (n)	899	11,441	326	6,650	1,225	18,091
% Males	45.5	48.0	50.2	43.9	46.8	46.5
% Urban	33.4	61.2	49.5	71.8	37.7	65.1
% Low advantage	55.6	29.7	47.1	26.0	53.4	28.4
% Mid advantage	30.0	33.1	34.8	31.9	31.3	32.6
% High advantage	14.4	37.2	18.2	42.1	15.4	39.0
% Ever use: Tobacco	24.3	11.2	44.9	31.2	29.8	18.6
% Ever use: Alcohol	64.6	59.7	86.5	83.0	70.4	68.2
% Ever use: Cannabis	18.8	9.5	42.3	29.8	25.2	17.2

Indigenous students were significantly more likely than non-Indigenous students to have used tobacco (OR 1.91 [1.55, 2.36]), alcohol (OR 1.44 [1.25, 1.66]), or cannabis (OR 1.97 [1.56, 2.48]) in the past month (Table 2). Odds of past month tobacco use continued to be significantly higher for Indigenous students compared to non-Indigenous students when also adjusting for alcohol use (OR 1.71 [1.36, 2.15]), cannabis use (OR 1.48 [1.12, 1.94]) or both (OR 1.45 [1.09, 1.93]).

For smoking, the effect of Indigenous status was greater in areas of higher social advantage (overall interaction test approached significance: $p=0.059$). Specifically, smoking among Indigenous students in areas of high social advantage was 19.4%, 6.7% non-Indigenous (OR 3.54 [2.12, 5.92]); 12.7% in areas of low social advantage cf 8.9% (OR 1.73 [1.28, 2.33]).

Patterns of past month tobacco use were similar for both Indigenous and non-Indigenous students (Table 3) with no significant difference in the likelihood of use by sex, urban/non-urban or social advantage of area. Older students (16-17 years) were significantly more likely to have used tobacco in the past month than younger students (12-15 years) (Indigenous OR 2.53 [1.72, 3.70]; non-Indigenous OR 3.79 [3.23, 4.34]).

Table 2: Likelihood of past month tobacco, alcohol and cannabis use among students aged 12-17 in 2017 by Indigenous status, and significant interactions with SES and sex

	% (n/total)	OR (95% CI)	AOR (95% CI)	P-value of interaction with Indigenous status
PAST MONTH TOBACCO USE				
Total 12-17				
Non-Indigenous	8.0 (1429/17947)	1	1	
Indigenous	14.0 (170/1212)	1.89 (1.55, 2.30)	1.91 (1.55, 2.36)	
Area level advantage				p=0.059
Low				
Non-Indigenous	8.9 (452/5085)	1	1	
Indigenous	12.7 (82/646)	1.49 (1.12, 1.98)	1.73 (1.28, 2.33)	
Mid				
Non-Indigenous	8.6 (504/5835)	1	1	
Indigenous	13.7 (52/379)	1.68 (1.24, 2.29)	1.70 (1.22, 2.38)	
High				
Non-Indigenous	6.7 (464/6979)	1	1	
Indigenous	19.4 (36/186)	3.37 (2.23, 5.09)	3.54 (2.12, 5.92)	
PAST MONTH ALCOHOL USE				
Total 12-17				-
Non-Indigenous	28.4 (5121/18014)	1	1	
Indigenous	34.1 (416/1221)	1.30 (1.11, 1.52)	1.44 (1.25, 1.66)	
PAST MONTH CANNABIS USE				
Total 12-17				
Non-Indigenous	8.6 (1343/15645)	1	1	
Indigenous	14.1 (145/1031)	1.74 (1.39, 2.8)	1.97 (1.56, 2.48)	
Sex				p=0.041
Male				
Non-Indigenous	9.6 (684/7143)	1	1	
Indigenous	14.2 (64/450)	1.57 (1.16, 2.11)	1.61 (1.18, 2.20)	
Female				
Non-Indigenous	7.6 (629/8277)	1	1	
Indigenous	14.0 (78/556)	1.98 (1.50, 2.62)	2.31 (1.73, 3.08)	

AOR: OR adjusted for school type, state, age, sex, school location, area level advantage

Table 3: Association of demographic factors with past month tobacco use among Indigenous and non-Indigenous students aged 12-17 in 2017 by sex, age and residence

Past month tobacco use			
Indigenous			
	% (n/total)	OR (95% CI)	AOR (95% CI)
Total	14.0 (170/1212)	-	
Sex			
Male	14.8 (81/547)	1	1
Female	13.3 (84/634)	0.88 (0.64, 1.20)	0.92 (0.67, 1.27)
Age			
12-15	10.6 (94/887)	1	1
16-17	23.4 (76/325)	2.57 (1.81, 3.66)	2.53 (1.72, 3.70)
School location			
Urban	14.5 (66/455)	1	1
Non-urban	13.8 (104/756)	0.94 (0.63, 1.40)	1.50 (0.93, 2.43)
Area level advantage			
Low advantage	12.7 (82/646)	1	1
Mid advantage	13.7 (52/379)	1.09 (0.70, 1.72)	1.11 (0.70, 1.74)
High advantage	19.4 (36/186)	1.65 (1.07, 2.55)	1.59 (0.94, 2.70)
Non-Indigenous			
	% (n/total)	OR (95% CI)	AOR (95% CI)
Total	8.0 (1429/17947)	-	
Sex			
Male	8.1 (660/8197)	1	1
Female	7.8 (736/9482)	0.96 (0.83, 1.12)	0.93 (0.81, 1.07)
Age			
12-15	4.3 (487/11328)	1	1
16-17	14.2 (942/6619)	3.69 (3.04, 4.48)	3.79 (3.23, 4.34)
School location			
Urban	7.6 (886/11648)	1	1
Non-urban	8.5 (534/6251)	1.13 (0.87, 1.48)	1.14 (0.91, 1.41)
Area level advantage			
Low advantage	8.9 (452/5085)	1	1
Mid advantage	8.6 (504/5835)	0.97 (0.71, 1.32)	0.92 (0.74, 1.15)
High advantage	6.7 (464/6979)	0.73 (0.52, 1.03)	0.94 (0.71, 1.26)

AOR: OR adjusted for school type, state, age, sex, school location, area level advantage

For both Indigenous and non-Indigenous students the likelihood of past month smoking increased significantly with past month alcohol and/or cannabis use (Table 4). Adjusting for use of the other substance (either cannabis or alcohol) reduced the associations between past month smoking and drinking or cannabis use substantially (by approximately half), but the relationship remained significant for both Indigenous and non-Indigenous students.

The relationship between cannabis and tobacco use did not vary significantly by Indigenous status (interaction $p=0.86$, Indigenous OR 18.17 [11.14, 29.62]; non-Indigenous OR 24.23 [20.56, 28.56]). There was however a significant interaction between Indigenous status and past month drinking ($p=0.004$) whereby the association of smoking and drinking was stronger among non-Indigenous students (OR 17.39 [14.51, 20.85]) than Indigenous students (OR 8.79 [5.73, 13.48]).

Table 4. Likelihood of past month tobacco use among Indigenous and non-Indigenous students 12-17 in 2017, by past month alcohol and cannabis use

Past month tobacco use					
	% (n/total)	OR (95% CI)	AOR ^a (95% CI) Adjusted for demographics	AOR ^b (95% CI) Adjusted for demographics and substance use	p-value of interaction with Indigenous status
Indigenous students					
Past month alcohol use					
No	4.2 (33/794)	1	1	1	0.004 ^a / 0.013 ^b
Yes	33.1 (137/414)	11.41 (7.93, 16.41)	8.79 (5.73, 13.48)	4.79 (2.89, 7.94)	
Past month cannabis use					
No	6.4 (56/880)	1	1	1	0.086 ^a / 0.282 ^b
Yes	57.9 (84/145)	20.26 (12.97, 31.65)	18.17 (11.14, 29.62)	11.57 (7.12, 18.79)	
Non-Indigenous students					
Past month alcohol use					
No	1.4 (178/12789)	1	1	1	-
Yes	24.4 (1242/5090)	22.87 (19.07, 27.42)	17.39 (14.51, 20.85)	9.31 (7.65, 11.31)	
Past month cannabis use					
No	3.7 (528/14224)	1	1	1	-
Yes	55.6 (741/1333)	32.47 (27.74, 38.00)	24.23 (20.56, 28.56)	12.07 (10.23, 14.23)	

^a Adjusted for all demographic variables (school type, state, age, sex, school location, area level advantage)

^b Adjusted for other substance use variable with all demographic variables (school type, state, age, sex, school location, area level advantage and alcohol or cannabis)

DISCUSSION

We examined smoking and other substance use among Australian secondary students in 2017 and found that regardless of Indigenous status smoking prevalence was higher among those who had used either alcohol or cannabis than for non-users. However, the association between alcohol and tobacco use was significantly weaker for Indigenous students. Overall, Indigenous students had higher prevalence of tobacco, alcohol, and cannabis use in the past month than non-Indigenous students. These findings for 2017 ASSAD data extend reported 2014 findings²⁵ and allow evaluation of the effects of the later Australian policy environment, which saw further increases in cigarette price and more legislation for smoke-free environments.^{6, 31}

Many studies have identified a cluster of risk behaviours for adolescent smoking, including alcohol and illicit drug use.^{11,14-17} These associations have been found among Indigenous adolescents of North America^{22, 32} and in qualitative work in Australia^{23, 24} with researchers noting the importance of social settings that promote sharing and experimentation with illicit substances. Our results suggest other substance use is an important risk factor for smoking for all young people.

Our finding of a significantly weaker association between alcohol and tobacco use for Indigenous than non-Indigenous students indicates a less uniquely important role of alcohol use for Indigenous students. One potential explanation is that smoking in non-Indigenous students more commonly occurs in social settings where students are trialling alcohol. In contrast, with higher community level smoking prevalence, Indigenous students are likely to have more frequent access and opportunities to experiment with tobacco, and consequently establish regular smoking. Indigenous adolescents are also more likely to experience other drivers of smoking. An Australian qualitative study reported that Indigenous and non-Indigenous Australian adolescents provided similar descriptions of concurrent social smoking and alcohol use, but Indigenous adolescents were more likely to say their smoking was related to stress and life problems.²⁴ Which may be related to a greater likelihood of experiencing such events.²² The stronger and consistent association between cannabis and tobacco use may reflect that cannabis is often mixed with tobacco when it is smoked.³³

The strong association between smoking, drinking, and cannabis use clearly suggests common determinants as explained by PBT. Adolescent smoking can also serve as an indicator of risk, with those who experiment or establish smoking in early high school more likely to adopt other problem behaviours, including substance use, later in high school and adolescence.^{32, 34} The call for coordinated health promotion programs to address multiple risk behaviours through common determinants has been made for both Indigenous adolescents^{21, 32, 35} and adolescents in general.^{15, 34} These determinants may include self-efficacy and other coping and refusal skills that can be applied to multiple behaviours, as well as important protective factors such as self-esteem, family relationships, and peer attitudes.^{15, 32} Additional protective factors identified specifically for Indigenous adolescents include cultural connectedness.^{21, 35}

Our results thus suggest that a coordinated and holistic approach to substance use prevention is likely to be most effective, and provide efficiencies in community programs and school curriculums. This is supported by reviews of school-based interventions, which have shown mixed results for tobacco prevention and recommend targeting broader determinants to protect against substance use, rather than focusing on information provision alone. Broader determinants include promoting social and emotional wellbeing, and skills development, such as self-efficacy and problem solving.^{36, 37} An Australian school-based cluster-randomised controlled trial of a program aiming to improve mental health and build resilience among students while reducing tobacco, alcohol, and illicit drug use, achieved reductions in regular smoking.³⁸ However, a second trial showed no effect on smoking, highlighting the need for a better understanding of individual, family, and community-level protective factors as well as additional risk factors, such as substance use among family and friends.³⁹

One approach focused on promoting protective factors in the social and community environment to reduce adolescent risk behaviours is *Communities That Care (CTC)*, a community-based intervention framework first developed in the United States and later applied in Australia.⁴⁰ Using a mix of evidence-based family, school, and community interventions, CTC localities saw significant and more rapid declines in adolescent tobacco, alcohol, and cannabis use than in the general population.⁴⁰ However, the evaluation did not report results specifically for Indigenous Australian adolescents, and

there continues to be limited evidence of the effectiveness of tobacco prevention interventions with Indigenous adolescents.^{41, 42}

While it is likely that some components of an intervention will be universally effective, tobacco prevention programs must also take into account the smoking context for Indigenous adolescents, including higher community prevalence and the influence of unique social, economic, cultural and historical factors. Our finding of greater past month tobacco use among Indigenous than non-Indigenous adolescents is consistent with international findings of higher smoking among other Indigenous populations, including Maori in New Zealand, and American Indian or Alaska Native secondary students in North America.^{43, 44} The drivers of this are complex and include the normalisation of smoking in high prevalence environments. As the ASSAD survey does not collect national information on family or peer smoking, a key predictor for youth smoking, it was not possible to consider this in our analysis.

Moreover, the higher prevalence of smoking in Indigenous communities is underpinned by a range of social and cultural determinants related to ongoing colonisation processes that manifest in persistent disparities in education, employment, and access to health services (including tobacco control activities), combined with forced disconnection from culture, limits on self-determination, effects of intergenerational trauma, and experiences of racial discrimination.^{10, 45}

In our study, the differences between Indigenous and non-Indigenous smoking prevalence were greater for those in more socio-economically advantaged areas than for those in more disadvantaged areas. That is, prevalence was more similar in students attending schools in more socio-economically disadvantaged areas (where there is a higher overall likelihood of smoking) reflecting the relationship between social determinants and smoking for all populations. Although relative advantage as determined by school location does not necessarily equate to individual household situation, our findings indicate that the difference in smoking prevalence in Indigenous and non-Indigenous students in more advantaged areas is not fully explained by socio-economic factors. Similar findings have been reported for Indigenous adults, where smoking differences by Indigenous status were greater among adults who were not experiencing socioeconomic disadvantage.⁴⁶ Again highlighting the additional risk

factors experienced by Indigenous people. Conversely, increasingly evidence shows the importance of Indigenous cultures for health and wellbeing and protective against adolescent smoking.^{35, 47, 48}

Strengths and limitations

A key strength of this study is the largely representative sample, with the proportion of Indigenous students corresponding to national census data.³⁰ Further, the proportion of Indigenous students from urban schools (38%) closely approximated the proportion of Indigenous people residing in urban areas (37% major cities) and the sample skewed towards areas of greater social disadvantage, in line with the national distribution of Indigenous people against the SEIFA index.⁴⁹ The Indigenous leadership in this study is also a key strength of the work and a self-determining research approach.

However, some limitations should be also be considered. ASSAD sampling excludes schools of fewer than 100 students, which might have reduced the representativeness as smaller schools are more likely to be in non-urban areas. Also, our analyses are cross-sectional and do not support causal conclusions. While teachers were frequently present when students completed the survey, it was administered by research staff and we found no evidence of under-reporting substance use with teacher presence. Finally, only adolescents currently attending school are included in the sample. Older adolescents might be underrepresented and, as school attendance is associated with non-smoking⁵, our findings might underestimate prevalence for students aged 16-17 generally and Indigenous adolescents specifically with lower proportions aged 16-17 in this sample (27% Indigenous cf 37% non-Indigenous) and lower comparative school attendance.⁵⁰ However, the large size and highly representative random sample of younger adolescents allowed us to evaluate key risk factors for adolescent smoking including age, remoteness, social disadvantage, and other substance use, while noting that both remoteness and social disadvantage are areas level indicators from school postcode, not individual residence, and as such some participants may be misclassified.

Implications for policy and practice

Our findings demonstrate the importance of considering underlying social and cultural determinants of smoking in developing tobacco control policy, as well as reducing the appeal and availability of tobacco products. Unlike school-based interventions,

community-driven programs also have the potential to reach young people not attending school and to leverage family and community protective factors, to holistically address related risk factors which also predict alcohol and cannabis use. Additional risk and protective factors likely to also be important for smoking among Indigenous adolescents include racism⁵¹, and the role of cultural strengths in promoting adolescent wellbeing.³⁵

⁵² While a significant evidence gap remains for the effectiveness of prevention interventions with Indigenous youth, comprehensive, resourced, strengths-based community-controlled programs are likely to be most effective and urgently needed.^{9, 41} Integrating and disseminating Indigenous-led program evaluation findings would benefit Indigenous communities globally. However, mainstream programs and population level policies to reduce tobacco and other substance use among both young people and adults remain vital to ensure community level interventions are reinforced in wider social and economic environments. Evaluation of the impact of these measures with Indigenous adolescents is also a priority.

ACKNOWLEDGEMENTS

The authors thank and acknowledge the government and non-government education authorities, the school principals, teachers, and students who cooperated to make this study possible. We thank the research staff for assistance with data collection.

The ASSAD survey receives funding from the Australian Government Department of Health and State and Territory Governments of New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, the Northern Territory and the ACT; as well as from Cancer Councils in Victoria, South Australia, Queensland and Tasmania, Cancer Institute NSW and the South Australian Health and Medical Research Institute. CH received a PhD scholarship from the Australian Prevention Partnership Centre funded through the NHMRC partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth. CC receives an NHMRC Career Development Fellowship (1161065).

REFERENCES

1. World Health Organization. Tobacco Fact Sheet 2019 [cited 14 Oct 2019]. Available from: <http://www.who.int/news-room/fact-sheets/detail/tobacco>
2. Australian Institute of Health and Welfare. Alcohol, tobacco & other drugs in Australia [Internet] Canberra: AIHW; 2019 [cited 14 Oct 2019]. Available from: <https://www.aihw.gov.au/reports/alcohol/alcohol-tobacco-other-drugs-australia>
3. Banks E, Joshy G, Weber MF, et al. Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Med.* 2015;13(1):38.
4. Australian Bureau of Statistics. 4364.0.55.001 - National Health Survey: First Results, 2017-18 Canberra: ABS; 2019 [cited 25 Nov 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.001~2017-18~Main%20Features~Smoking~85>
5. Greenhalgh E, Winstanley M. 1.6 Prevalence of smoking—teenagers. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2019 [cited 9 Dec 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-6-prevalence-of-smoking-teenagers>
6. Australian Government Department of Health. Tobacco control timeline. 2018 [cited 3 June 2019]. Available from: <https://www.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc~timeline>
7. Australian Bureau of Statistics. 4715.0 - National Aboriginal and Torres Strait Islander Health Survey, 2018-19 Canberra: ABS; 2019 [cited 11 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4715.0>
8. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Australian Burden of Disease Study series no. 6. Cat. no. BOD 7 Canberra: AIHW; 2016 [cited 12 Oct 2019]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
9. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control.* 2003;12(suppl 2):ii5-ii8.
10. van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and

Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2016 [cited 20 Apr 2020]. Available from: www.tobaccoinaustralia.org.au/chapter-8-apsi

11. US Department of Health and Human Services. Chapter 3. The Epidemiology of Tobacco Use Among Young People in the United States and Worldwide. In Preventing tobacco use among young people: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/.
12. Heris C, Eades S, Lyons L, Chamberlain C, Thomas D. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. Public Health Research & Practice. 2020;30:e29121906
13. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: a foundation for future health. Lancet. 2012;379(9826):1630–40.
14. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2014 [cited 5 Mar 2018]. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
15. Wiefferink CH, Peters L, Hoekstra F, Dam GT, Buijs GJ, Paulussen TGWM. Clustering of Health-Related Behaviors and Their Determinants: Possible Consequences for School Health Interventions. Prevention Science. 2006;7(2):127.
16. Meader N, King K, Moe-Byrne T, et al. A systematic review on the clustering and co-occurrence of multiple risk behaviours. BMC Public Health. 2016;16(1):657.
17. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: a critical review of the literature. Tob Control. 1998;7(4):409–20.
18. Jessor R, Costa FM. Problem-Behavior Theory - A Brief Overview n.d. [cited 11 Dec 2019]. Available from: https://ibs.colorado.edu/jessor/pb_theory.html
19. Jessor R, Donovan JE, Costa FM. Beyond adolescence: Problem behaviour and young adult development: Cambridge University Press; 1994.
20. Jessor R. The origins and development of Problem Behavior Theory. New York: Springer; 1994.
21. Yu M, Whitbeck LB. A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents. Addict Behav. 2016;58:35–41.

22. Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine & Tobacco Research*. 2019.
23. Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health*. 2012;12(1):963.
24. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr*. 2010;21(3):208-14.
25. Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. Drug statistics series no. 30. Cat. no. PHE 210 Canberra: AIHW; 2016 [cited 28 May 2019]. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
26. White V, Mason T, Briggs V. How do trends in smoking prevalence among Indigenous and non-Indigenous Australian secondary students between 1996 and 2005 compare? *Aust N Z J Public Health*. 2009;33(2):147-53.
27. Guerin N, White V. ASSAD 2017 Statistics & Trends: Australian Secondary Students' Use of Tobacco, Alcohol, Over-the-counter Drugs, and Illicit Substances. Cancer Council Victoria; 2018. Available from: <https://beta.health.gov.au/resources/publications/secondary-school-students-use-of-tobacco-alcohol-and-other-drugs-in-2017>.
28. Australian Bureau of Statistics. 1270.0.55.005 - Australian Statistical Geography Standard (ASGS): Volume 5 - Remoteness Structure, July 2016 Canberra: ABS; 2018 [cited 9 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/1270.0.55.005>
29. Australian Bureau of Statistics. 2033.0.55.001 - Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016 Canberra: ABS; 2018 [cited 9 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001>
30. Australian Bureau of Statistics. 2002.0 - 2016 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Profile Canberra: ABS; 2017 [cited 26 August 2019]. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument

31. Grace C. Chapter 15.7 Legislation to ban smoking in public places. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria; 2019 [cited 15 Oct 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-15-smokefree-environment/15-7-legislation>
32. Hautala D, Sittner K, Walls M. Onset, Comorbidity, and Predictors of Nicotine, Alcohol, and Marijuana Use Disorders Among North American Indigenous Adolescents. *J Abnorm Child Psychol.* 2019;47(6):1025-38.
33. Thomas DP, Davey ME, Panaretto KS, van der Sterren AE. Cannabis use among two national samples of Aboriginal and Torres Strait Islander tobacco smokers. *Drug & Alcohol Review.* 2018;37:S394-S403.
34. Ellickson PL, Tucker JS, Klein DJ. High-risk behaviors associated with early smoking: results from a 5-year follow-up. *J Adolesc Health.* 2001;28(6):465-73.
35. Henson M, Sabo S, Trujillo A, Teufel-Shone N. Identifying Protective Factors to Promote Health in American Indian and Alaska Native Adolescents: A Literature Review. *J Prim Prev.* 2017;38(1-2):5-26.
36. Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Evidence-Based Child Health: A Cochrane Review Journal.* 2013;8(5):1616-2040.
37. Stewart-Brown S. What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach? Copenhagen, WHO Regional Office for Europe (Health Evidence Network report). 2006 [cited 16 Oct 2019]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0007/74653/E88185.pdf
38. Bond L, Patton G, Glover S, et al. The Gatehouse Project: can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *J Epidemiol Community Health.* 2004;58(12):997-1003.
39. Hodder RK, Freund M, Bowman J, et al. Effectiveness of a pragmatic school-based universal resilience intervention in reducing tobacco, alcohol and illicit substance use in a population of adolescents: cluster-randomised controlled trial. *BMJ Open.* 2017;7(8):e016060.
40. Toumbourou JW, Rowland B, Williams J, Smith R, Patton GC. Community intervention to prevent adolescent health behavior problems: Evaluation of communities that care in Australia. *Health Psychol.* 2019;38(6):536.

41. Chamberlain C, Perlen S, Brennan S, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Systematic Reviews*. 2017;6(1):135.
42. Carson KV, Brinn MP, Labiszewski NA, et al. Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database Syst Rev*. 2012(8):Cdo09325.
43. ASH – Action for Smokefree 2025. 2018 ASH Year 10 Snapshot [cited Jan 31 2019]. Available from: https://www.ash.org.nz/ash_year_10
44. Centers for Disease Control Prevention (CDC). 1991-2017 High School Youth Risk Behavior Survey Data [cited 31 Jan 2019]. Available from: <http://nccd.cdc.gov/youthonline/>
45. King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. *Lancet*. 2009;374(9683):76-85.
46. Australian Bureau of Statistics. 4722.0.55.004 - Tobacco Smoking - Aboriginal and Torres Strait Islander people: A snapshot, 2004-05 Canberra: ABS; 2007 [cited 15 Oct 2019]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/productsbyCatalogue/Do3oA9BD9BF14Bo8CA25730E0021BCE1
47. Bourke S, Wright A, Guthrie J, Russell L, Dunbar T, Lovett R. Evidence Review of Indigenous Culture for Health and Wellbeing. *International Journal of Health, Wellness, and Society*. 2018;8(4).
48. Unger JB, Sussman S, Begay C, Moerner L, Soto C. Spirituality, Ethnic Identity, and Substance Use among American Indian/Alaska Native Adolescents in California. *Subst Use Misuse*. 2020;1-5.
49. Australian Bureau of Statistics. 2076.0 - Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2016 Canberra: ABS; 2018 [cited 3 June 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2076.0>
50. Australian Government Department of Prime Minister and Cabinet. Closing the Gap Report 2019. Canberra: Commonwealth of Australia; 2019.[cited 30 Oct 2019]. Available from: <https://ctgreport.niaa.gov.au/>.
51. Cave L, Cooper MN, Zubrick SR, Shepherd CC. Caregiver-perceived racial discrimination is associated with diverse mental health outcomes in Aboriginal and Torres Strait Islander children aged 7–12 years. *International Journal for Equity in Health*. 2019;18(1):142.

52. Department of Health. Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023. Canberra: ACT: Australian Government; 2015.

6.2 Chapter summary

Chapter 6 highlights a persisting disparity in past month tobacco use between Aboriginal and non-Aboriginal secondary students. This was consistent across a range of demographic factors, including when comparing between students attending schools in the most advantaged areas.

This work also examined the important role other substance use plays in predicting tobacco use. It demonstrates a strong relationship to alcohol and cannabis use for all students. While the relationship between cannabis and tobacco use did not differ by Indigenous status, demonstrating cannabis use is an important predictor of smoking for all students, the relationship to alcohol use was significantly weaker for the Aboriginal students.

This finding highlights the different environmental contexts and drivers of smoking Aboriginal students may experience beyond social influences and use with peers. However, the strong association between tobacco and other substance use for all students highlights the potential co-occurrence of use and clustering of risk behaviours, pointing to common determinants and a need for holistic prevention approaches. The greater likelihood of use of any of the three substances among the Aboriginal students compared to the non-Aboriginal students also emphasises the ongoing need to address the underlying social and cultural determinants of substance use, particularly through Community-controlled programs.

This is the first time this relationship has been reported for Aboriginal students with this data, and is the most rigorous exploration of this relationship in Australian research to date.

See Appendix 4 for the e-print of the published journal article. There is no other supplementary material for Chapter 6.

7 Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)

7.1 Introduction

Chapter 7 is the first of two chapters under the Study of Environment on Aboriginal Resilience and Child Health (SEARCH), a community-controlled partnership study. This first chapter uses the baseline Phase 1 survey data from the SEARCH cohort of Aboriginal adolescents living in urban and regional New South Wales (NSW), to explore the relationship between individual, social and environmental level factors and smoking. It is the first time this relationship has been described in an urban population of Aboriginal adolescents using quantitative methods. This analysis also takes a strengths-based approach to specifically identify protective factors against smoking and as such reports an outcome of never smoking. Chapter 7 contributes to Research Question 3.

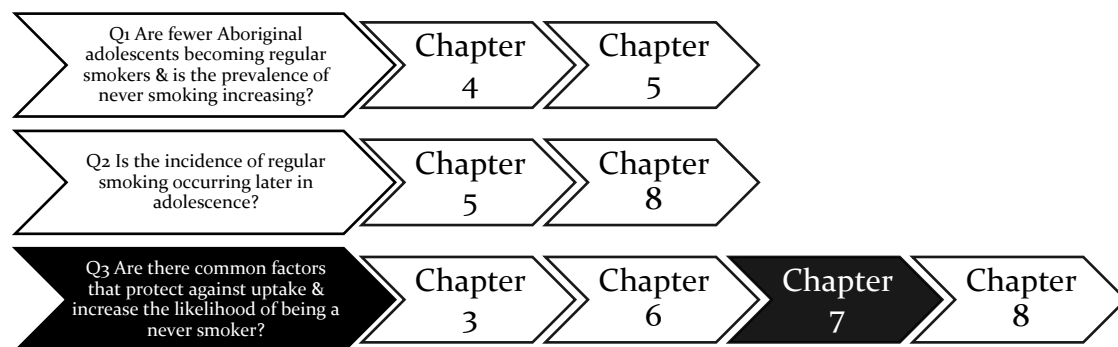


Figure 1: Chapter 7 – Research Question Summary

This chapter has been accepted for publication in the *Health Promotion Journal of Australia*. The accepted manuscript is presented here in Chapter 7.

11.5 Appendix 5 includes the supplementary material referenced in this chapter:

Chapter 7 - Supplementary File 1: Summary of survey questions used in analysis (11.5.1 pg 368)

Chapter 7 - Supplementary File 2: Comparison of key characteristics and exposures between those with and without complete smoking data (11.5.2 pg 372)

Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)

Christina Heris¹; Katie Thurber²; Darryl Wright³; David Thomas⁴; Catherine Chamberlain⁵; Lina Gubhaju¹; Simone Sherriff⁶; Bridgette McNamara¹; Emily Banks²; Natalie Smith⁶; Sandra Eades¹

¹University of Melbourne, Victoria; ²Australian National University, Canberra, ACT; ³Tharawal Aboriginal Corporation, Campbelltown, NSW; ⁴Menzies School of Health Research, Darwin, NT; ⁵La Trobe University, Melbourne, Victoria; ⁶Sax Institute, Sydney, NSW; ⁷Riverina Medical and Dental Aboriginal Corporation, Wagga Wagga, NSW.

Corresponding author: sandra.eades@unimelb.edu.au

ACKNOWLEDGEMENTS

We acknowledge Aboriginal and Torres Strait Islander peoples as the traditional custodians of Australia and pay our respects to Elders past, present and future. We thank the study participants, their communities and the staff at participating Aboriginal Community Controlled Health Services (ACCHSs). SEARCH is conducted in partnership with the Aboriginal Health and Medical Research Council and four ACCHSs across NSW: Awabakal Limited; Riverina Medical and Dental Aboriginal Corporation; Aboriginal Medical Service Western Sydney (former); and Tharawal Aboriginal Corporation. This work was supported through grants to the Study of Environment on Aboriginal Resilience and Child Health (SEARCH) from the National Health and Medical Research Council of Australia (NHMRC: grant numbers 358457, 512685, 1023998, and 1035378), the NSW Ministry of Health, Australian Primary Health Care Research Institute (APHCRI), beyondblue and the Rio Tinto Aboriginal Fund. CH receives a PhD scholarship from the Australian Prevention Partnership Centre funded through the NHMRC partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth.

CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflicts of interest beyond the financial disclosures made above. Individual author declarations have been made using the ICMJE Form for Disclosure of Potential Conflicts of Interest.

ABSTRACT

Issue addressed

To examine factors associated with preventing regular smoking among Aboriginal adolescents.

Methods

Cross-sectional analysis of data from 106 Aboriginal adolescents aged 12-17, and their caregivers, from four Aboriginal Community Controlled Health Services in urban New South Wales, 2008-12. The relation of individual, social, environmental and cultural factors to having 'never' smoked tobacco regularly was examined using Poisson regression.

Results

Overall, 83% of adolescents had never smoked regularly; 13 reported current and 5 past smoking. Most lived in smoke-free homes (60%) despite 75% reporting at least one current smoker caregiver. Participants were significantly more likely to have never smoked regularly if they had good mental health (PR=1.4, 95% CI:1.1-1.9), their mother as their primary caregiver (1.3, 1.0-1.6), good family relationships (1.2, 1.0-1.5), stable housing (1.3, 1.1-1.7), had never used alcohol (1.8, 1.3-2.4), were not sexually active (3.1, 1.3- 7.2) and had no criminal justice interactions (1.8, 1.2-2.8).

Conclusions

Most participants lived in smoke-free homes and the vast majority had never smoked regularly. Promoting good mental health and strengthening social connections may be protective against smoking as those experiencing less social disruption were more likely to have never smoked regularly. Smoking may be an indicator of psychosocial conditions and a prompt for screening and simultaneous treatment.

So what?

Organisations should be resourced to deliver holistic adolescent health promotion programs. Programs and policies should support positive family relationships and stable housing as this may protect against the uptake of regular smoking.

SUMMARY

Smoking is a major cause of poor health for Aboriginal peoples that mostly begins in adolescence. Understanding smoking among young people is important. This study of Aboriginal adolescents found the majority had never smoked regularly, particularly those with good mental health and stable social environments.

KEY WORDS

Smoking, Aboriginal and Torres Strait Islanders, adolescents

INTRODUCTION

Tobacco use continues to be a major cause of preventable ill health for all Australians, accounting for 9% of the total disease burden.¹ It is the largest contributing risk factor to the gap in disease burden between Aboriginal and Torres Strait Islander people (hereafter referred to as Aboriginal peoples¹) and non-Aboriginal Australians.² Between 2002 and 2014-15 there were significant declines in daily smoking prevalence among Aboriginal and Torres Strait Islander people 15 years and older, from 49% to 39%, with declines among 15-24 year olds in particular.³ International data indicate most smoking begins in adolescence⁴, thus preventing smoking initiation among young people is key to further reductions in smoking prevalence.

The likelihood of taking up smoking increases as individuals move through adolescence and is more common among females, those with mental health challenges, substance use, exposed to peer and family smoking and experiencing disadvantage.⁴⁻¹¹ It is less common among those engaged academically, in sport, with positive family relationships and awareness of smoking harms.^{5, 6, 9, 11, 12} Some studies with Indigenous populations internationally have identified the protective role of cultural identity and participation against smoking uptake, and the negative impact of discrimination and historical trauma.^{8, 11-14}

There is a small but developing evidence base from exploratory qualitative¹⁵⁻¹⁸ and quantitative¹⁹ studies conducted with Aboriginal adolescents. These have identified similar influences for smoking to other populations including family, peer and wider community smoking; increasing age and wishing to act older; stress and boredom.¹⁵⁻²⁰ Whereas knowledge of harms; negative smoking attitudes; concerns about decreased fitness; positive relationships; academic engagement; increased price; and pregnancy deterred smoking.^{16-18, 20} These findings are made in the broader context of the introduction of smoked tobacco to Aboriginal people, its provision in rations and commercial promotion; as well as the entrenched socio-economic disparities from ongoing colonisation processes and social policies.^{21, 22}

¹ In this paper, the term Aboriginal, rather than Aboriginal and Torres Strait Islander, is used (unless referring to specific data sources of both Aboriginal and Torres Strait Islander populations) as this is a NSW based study where this is the accepted terminology.

Understanding how risk and protective factors are related to smoking initiation is critical for designing contextually relevant tobacco control policies and local community prevention programs. The majority (81%) of Aboriginal and Torres Strait Islander people live in non-remote settings.²³ While some relevant work has been conducted¹⁵⁻²⁰ there is limited recent, detailed quantitative data for Aboriginal people living in urban and regional areas. The aim of this study was to identify individual, social, cultural and environmental factors that prevent regular smoking among urban Aboriginal adolescents to inform policies and programs.

METHODS

SEARCH study

A SEARCH study protocol has been published previously.²⁴ Briefly, SEARCH is a cohort study of children and young people aged 0-17 years, and their caregivers, living in the urban and regional NSW cities of Sydney, Wagga Wagga and Newcastle. It is the largest cohort study of urban Aboriginal children and has a focus on health priorities identified by Aboriginal community organisations.

Eligible adolescent participants and/or their caregivers were recruited from the four participating Aboriginal Community Controlled Health Services (ACCHSs): Tharawal Aboriginal Corporation, Awabakal Ltd, Riverina Medical and Dental Aboriginal Corporation and Aboriginal Medical Service Western Sydney when they attended for an appointment, either approached by a SEARCH Research Officer in the waiting room or informed about the study by their GP.²⁴ Caregivers provided consent for their participation and on behalf of their children. Data collection involves clinical measurements and self-report surveys covering health and social domains. Baseline survey data were collected between November 2008 and March 2012 using paper questionnaires.

Caregivers completed a questionnaire for themselves and a separate survey for each of their children (aged 4-17 years). Adolescents aged 12-17 years completed a separate survey with some questions (sexual activity, illicit drug use) restricted to those aged 16-17 years. Surveys completed by caregivers provided additional contextual data about the child and the home environment not included in the adolescent survey. The findings presented

here are a cross-sectional analysis of the baseline self-reported responses from adolescents and their caregivers.

Measures

Adolescent smoking behaviours and smoke exposure were measured according to self-reported response from the adolescent and their caregiver. The included questions, and how they were categorised, are detailed in Supplementary File 1. The primary outcome measure was regular youth smoking from the question “Have you ever smoked cigarettes regularly?” with those responding ‘no’ categorised as ‘never smoked regularly’, ‘yes’ as ‘ever smoked regularly’ and all other responses excluded. Potential exposure variables were identified using the Theory of Triadic Influence²⁵ framework. The selected variables are described briefly below, and further in Supplementary File 1.

1. Individual factors: age (12-15, 16-17 years); sex, substance use, physical activity, sexual activity, suicidal ideation, mental health (with good mental health defined as a Strengths and Difficulties Questionnaire (SDQ) total score of 0-13 ‘close to average’, compared with 14+ ‘elevated’), knowledge of Aboriginal culture and history.
2. Social factors: school attendance and attitudes, racial discrimination, justice system interactions, stressful life events (SLE) (for the study child or siblings). Two individual SLEs are also reported: school exclusion, upset by family arguments (as a measure of family relationships).
3. Socio-demographic and environmental factors: relationship to primary caregiver, current parent or caregiver smoking, maternal smoking during pregnancy, smoke-free homes, caregiver employment, qualifications and income, housing stability, sense of community, access to recreational activities.

Statistical analyses

A total of 120 adolescents aged 12-17 completed the questionnaire. The analyses were restricted to those with complete smoking data (n=106: Figure 1). Matched caregiver responses were available for 97-99 adolescents. For some analyses the sample size is smaller due to incomplete data for exposure variables and/or the question was only asked of a subset of the cohort. Characteristics of the 106 adolescents are presented as proportions by subgroups with 95% confidence intervals for binomial proportions.

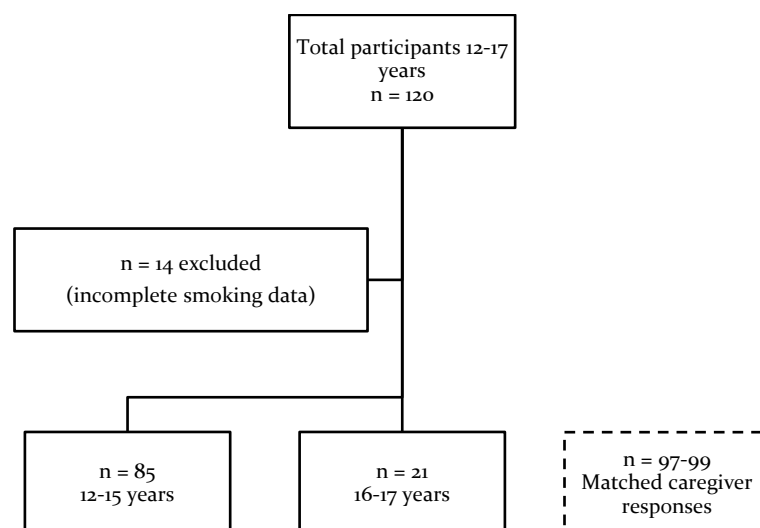


Figure 1: Participant inclusion process

Frequencies and percentages of having never smoked regularly are reported. Multi-level mixed effects Poisson regression was conducted to explore associations between exposures and having never smoked regularly, accounting for within-family clustering, and reported as Prevalence Ratios (PR), a preferred approach over Odds Ratios when the outcome of interest is common.^{26, 27} Estimates of PRs are reported for each exposure adjusted for age (continuous variable) and sex. Age and sex as individual exposures were adjusted for each other. Analyses for questions asked only of 16-17 year olds (sexual activity, illicit drug use) were not adjusted for age. The number of included co-variables was limited by the number of participants with the outcome of interest. To avoid over-fitting the models, adjustment for age and sex was prioritised. Models were restricted to those with data on the exposure of interest. Analyses were conducted in Stata 14.

Ethics

Approval for the overall study, this analysis and publication was granted by the Aboriginal Health and Medical Research Council (AHMRC) HREC (reference 568/o6). The findings were presented to the participating ACCHSs for assistance with interpretation and final approval.

RESULTS

Participant characteristics

The 106 adolescents were recruited from all four sites, 53% female, with mean age 14.5 years (Table 1). Caregivers were predominantly of Aboriginal and Torres Strait Islander descent (77%); engaged in employment/study (43%) or home duties (42%); held tertiary (non-school) qualifications (58%) and lived in households with a fortnightly income of \$800 or more (54%).

Table 1: Sample characteristics for adolescents aged 12-17 years and their parents/carers with comparison to national data for Aboriginal and Torres Strait Islander peoples

	% [95% CI] (n/total N=106)	2011 Census comparison Aboriginal & Torres Strait Islander people: Australia ⁴⁹ /NSW ⁵⁰
AMS		
Western Sydney	17.0 [10.4, 25.5] (18/106)	
Tharawal	14.2 [8.1, 22.3] (15/106)	
Awabakal	42.5 [32.9, 52.4] (45/106)	
Riverina	26.4 [18.3, 35.9] (28/106)	
Age		
12-15	80.2 [71.3, 87.3] (85/106)	
16-17	19.8 [12.7, 28.7] (21/106)	
Mean (SD)	14.5 (1.6)	
Sex		
Female	52.8 [42.9, 62.6] (56/106)	
Male	47.2 [37.4, 57.1] (50/106)	
Carer		
Mother	75.5 [66.2, 83.3] (80/106)	
Father	7.6 [3.3, 14.3] (8/106)	
Grandparent	6.6 [2.7, 13.1] (7/106)	
Other relative, step parent or foster carer	10.4 [5.3, 17.8] (11/106)	
Currently attend school		
Yes	85.7 [77.5, 91.8] (90/105)	
No	14.3 [8.2, 22.5] (15/105)	
Carer Aboriginality		
Aboriginal and/or Torres Strait Islander	77.3 [67.7, 85.2] (75/97)	
Non-Aboriginal	22.7 [14.8, 32.3] (22/97)	
Carer's Employment Status		
Employed/Studying	43.3 [33.3, 53.7] (42/97)	42%/43% of people 15 years and over employed
Home duties	42.3 [32.3, 52.7] (41/97)	
Unemployed/Unable to work due to health	14.4 [8.1, 23.0] (14/97)	
Fortnightly household income		
<\$400	9.0 [4.0, 16.9] (8/89)	Fortnightly household income <\$400: 4%/4%
\$400-\$799	37.1 [27.1, 48.0] (33/89)	\$400-\$799: 12%/13%
\$800 or more	53.9 [43.0, 64.6] (48/89)	\$800 or more: 84%/83%
Carer Highest Tertiary Qualifications		
None	41.8 [31.5, 52.6] (38/91)	24%/23% of people 15 years and over have a non-school qualification
Trade/Certificate/Diploma/Other	48.3 [37.7, 59.1] (44/91)	
Bachelor's Degree/Post-Graduate Degree	9.9 [4.6, 17.9] (9/91)	
Number of houses adolescent has lived in		
<4 houses	48.3 [35.2, 61.6] (29/60)	
4+ houses	51.7 [38.4, 64.8] (31/60)	

Smoking behaviour and environmental exposure

Most participants 12-17 years had never taken up regular smoking (81%, 86/106) with only 13 reporting that they were regular smokers at the time of interview, and five in the past (Table 2). There were higher proportions of having never smoked regularly among the younger sub-group (12-15 years) but little difference by gender. The median age of commencing regular smoking was 13 years. More than half of caregivers (60%) reported smoke-free homes and 52% were regular smokers at time of interview. A majority of adolescents (75%) reported that at least one of their parents smoked. Over half of caregivers (59%) reported that the adolescent had been exposed to smoke *in-utero*.

Table 2: Summary of youth smoking behaviour and environmental exposure

	% [95% CI] (n/total N)†	National Comparisons
Ever smoked regularly		
Yes	18.9 [11.9, 27.6] (20/106)	2005 (ever tried smoking)
No	81.1 [72.4, 88.1] (86/106)	12-15 47%, 16-17 66% ⁵¹
Current smoking status		
Current regular smoker	12.5 [6.8, 20.4] (13/104)	2008 current smoking
Former regular smoker	4.8 [1.6, 10.9] (5/104)	15-17 20% (non-remote) ²⁸
Never smoked regularly	82.7 [74.0, 89.4] (86/104)	
One or both parents smoke (youth report)		
Yes	74.8 [65.2, 82.8] (77/103)	2008 68% of people aged 15+
No	25.2 [17.2, 34.8] (26/103)	lived in a household with a current daily smoker ²⁹
Primary caregiver currently smokes regularly		
Yes	52.1 [41.6, 62.4] (50/96)	2008 47% of people aged 15+
No	47.9 [37.6, 58.4] (46/96)	currently smoked (45% daily) ^{29,52}
Mother smoked during pregnancy		
Yes	59.4 [46.4, 71.5] (38/64)	
No	40.6 [28.5, 53.6] (26/64)	
Smoking allowed in home		
Yes	40.5 [30.2, 51.4] (36/89)	2008 26% of people aged 15+
No	59.6 [48.6, 69.8] (53/89)	lived in a household where someone usually smoked inside ²⁹
Smoking characteristics of ever smokers		
Age started smoking (years) (n=17)		
Median [IQR] (Range)	13 [12-14] (2-15)	
<13 years	29.4 [10.3, 56.0] (5/17)	
13+ years	70.6 [44.0, 89.7] (12/17)	
Number of cigarettes smoked/day (n=16)		
Mean [SD] (Range)	6.4 [4.8] (1-20)	
1-4 cigarettes	43.8 [19.8, 70.1] (7/16)	
5-9 cigarettes	25.0 [7.3, 52.4] (4/16)	
10+ cigarettes	31.3 [11.0, 58.7] (5/16)	

Relationship between individual level factors and smoking status

Having never smoked regularly was significantly associated with having never drunk alcohol (PR 1.76, 95% CI 1.28, 2.41), never having had sex (PR 3.08, 95% CI 1.32, 7.18), and having good versus poor mental health (PR 1.44, 95% CI 1.12, 1.85) (Table 3). While the magnitude of the association between having never smoked regularly and cannabis use was large, it did not reach statistical significance (never versus ever used cannabis PR 2.43, 95% CI 0.86, 6.88).

Table 3: Relationship between individual factors and having never smoked regularly

	Adolescent smoking behaviour		
	Proportion never smoked % (n/total)	Prevalence Ratio (95% CI) of 'Never Smoked Regularly'	p-value
Age (continuous)‡		0.95 (0.89, 1.02)	0.131
12-15	84% (71/85)	1	
16-17	71% (15/21)	0.85 (0.64, 1.14)	0.274
Sex†			
Female	82% (46/56)	1	
Male	80% (40/50)	0.97 (0.80, 1.16)	0.719
Alcohol			
Ever	53% (17/32)	1	
Never	93% (67/72)	1.76 (1.28, 2.41)	<0.0001
Cannabis‡			
Ever	40% (2/5)	1	
Never	81% (13/16)	2.43 (0.86, 6.88)	0.095
Sexual activity‡			
Ever	33% (3/9)	1	
Never	92% (11/12)	3.08 (1.32, 7.18)	0.009
Physically active in last 7 days			
No	81% (17/21)	1	
Yes	80% (66/82)	1.00 (0.78, 1.27)	0.970
Suicidal thoughts			
Yes	64% (7/11)	1	
No	83% (74/89)	1.31 (0.82, 2.09)	0.266
SDQ score (continuous)		0.97 (0.96, 0.99)	0.007
Elevated (14+)	63% (22/35)	1	
Close to average (0-13)	90% (61/68)	1.44 (1.12, 1.85)	0.005
Knowledge of Aboriginal culture/history			
Nothing at all	75% (3/4)	1	
At least a little	82% (83/101)	1.11 (0.67, 1.86)	0.684

Prevalence Ratios of association with never having smoked regularly adjusted for age and sex. †Adjusted for age only. ‡Adjusted for sex only.

Relationship between social level factors and smoking status

A greater proportion (89%, 76/85) of those who had never smoked regularly currently attended school, compared to ever regular smokers (70%, 14/20). But we did not detect a significant association between never smoking regularly and school attendance (PR 1.35, 95% CI 0.83, 2.19), or school engagement in terms of stating it was very important to attend regularly (PR 1.74, 95% CI 0.90, 3.34) and get good marks (PR 1.20, 95% CI 0.80, 1.70) (Table 4).

Participants who had not interacted with the justice system (police, court or juvenile detention) were significantly more likely to have never smoked regularly (PR 1.78, 95% CI 1.15, 2.76) as were those without friends who had been in prison or juvenile detention (PR 1.55, 95% CI 1.14, 2.10).

We did not detect an association between smoking regularly and the total number of 'Stressful Life Events' in the previous year (PR 1.08, 95% CI 0.91, 1.29 for ≤ 2 versus 3 or more events), but there was a potential significant or approaching significant relationship between some individual events and smoking. Adolescents were more likely to have never smoked regularly if their caregiver reported none of their children had been upset by family arguments in the previous year (good family relationships) (PR 1.24, 95% CI 1.03, 1.49) or suspended or expelled from school (PR 1.29, 95% CI 0.98, 1.71).

Table 4: Relationship between social factors and having never smoked regularly

	Adolescent smoking behaviour		
	Proportion never smoked % (n/total)	PR (95% CI)	p-value
Currently attending school			
No	60% (9/15)	1	
Yes	84% (76/90)	1.35 (0.83, 2.19)	0.228
Consider school attendance important (continuous 5 pt scale)		1.12 (0.97, 1.28)	0.121
Not at all – a little	50% (5/10)	1	
Some – quite a lot	86% (30/35)	1.70 (0.91, 3.17)	0.095
Very much	87% (58/67)	1.74 (0.90, 3.34)	0.098
Consider school marks important (continuous 5 pt scale)		1.07 (0.97, 1.17)	0.165
Not at all – a little	71% (10/14)	1	
Some – quite a lot	84% (37/44)	1.16 (0.84, 1.59)	0.366
Very much	87% (27/31)	1.20 (0.85, 1.70)	0.307
Treated badly/refused service for being Aboriginal (6mths)			
Yes	80% (4/5)	1	
No	82% (72/88)	1.07 (0.69, 1.66)	0.767
Questioned by police (6mths)			
Yes	50% (11/22)	1	
No	89% (74/83)	1.76 (1.11, 2.79)	0.016
Any interaction with justice (police/court/detention)			
Any	50% (12/24)	1	
None	90% (74/82)	1.78 (1.15, 2.76)	0.010
Friends sentenced to prison/juvenile justice (ever)			
Yes	58% (18/31)	1	
No	92% (61/66)	1.55 (1.14, 2.10)	0.005
Stressful life events (12mths)			
Continuous (0-16)		1.01 (0.98, 1.03)	0.580
More than 2	80% (56/70)	1	
2 or fewer	88% (23/26)	1.08 (0.91, 1.29)	0.359
Child/ren upset by arguments			
Yes	73% (33/45)	1	
No	92% (46/50)	1.24 (1.03, 1.49)	0.026
Child/ren expelled or suspended from school			
Yes	67% (18/27)	1	
No	88% (60/68)	1.29 (0.98, 1.71)	0.070

Prevalence Ratios of association with never having smoked regularly adjusted for age and sex.

Relationship between carer socio-demographic and environmental level factors and smoking status

Adolescents whose primary caregiver was their mother (versus other family, step parents or foster carers) were significantly more likely to have never smoked regularly (PR 1.26 95% CI 1.02, 1.56) and if they had lived in fewer than four houses in their lifetime (versus four or more) (PR 1.33, 95% CI 1.09, 1.62) (Table 5).

We did not identify a significant association between adolescent smoking status and non-smoking carers (PR 1.16, 95% CI 0.97, 1.38), no smoke exposure in-utero (PR 1.09, 95% CI 0.91, 1.31) or having smoke-free homes (PR 1.10, 95% CI 0.88, 1.36). However, in all cases, the point estimate for the PR was greater than one, consistent with a protective effect of the exposure. Similarly, where the carer reported a strong sense of community where they lived, (PR 1.31, 95% CI 0.94, 1.82) and fortnightly household income of \$800 or more (compared to <\$800) (PR 1.21, 95% CI 1.00, 1.47).

Table 5: Relationship between carer socio-demographic and environmental factors and having never smoked regularly

	Adolescent smoking behaviour		
	Proportion never smoked % (n/total)	PR (95% CI)	p-value
Relationship to primary caregiver			
Other (Other family, step parent, foster)	69% (18/26)	1	
Mother	85% (68/80)	1.26 (1.02, 1.56)	0.036
Primary caregiver currently smokes			
Yes	76% (38/50)	1	
No	89% (41/46)	1.16 (0.97, 1.38)	0.113
Mother smoked during pregnancy			
Yes	82% (31/38)	1	
No	89% (23/26)	1.09 (0.91, 1.31)	0.359
Smoking allowed in home			
Yes	78% (28/36)	1	
No	85% (45/53)	1.10 (0.88, 1.36)	0.404
Caregiver employed			
No (unemployed, unable, home duties, student)	80% (44/55)	1	
Yes (full/part time, working and studying)	86% (36/42)	1.10 (0.91, 1.32)	0.328
Caregiver qualifications			
None	76% (29/38)	1	
Post-school qualifications	85% (45/53)	1.13 (0.91, 1.40)	0.266
Family income (fortnight)			
<\$800	76% (31/41)	1	
\$800 or more	92% (44/48)	1.21 (1.00, 1.47)	0.055
Neighbourhood has strong sense of community			
Strongly disagree/disagree	68% (13/19)	1	
Neutral/agree/strongly agree	88% (57/65)	1.31 (0.94, 1.82)	0.106
Lived in <4 houses in child's lifetime			
4 or more houses	74% (23/31)	1	
Less than 4 houses	100% (29/29)	1.33 (1.09, 1.62)	0.005
Satisfaction with leisure activities			
Very unhappy/little bit unhappy/neutral	85% (17/20)	1	
A little bit happy/very happy	79% (62/78)	0.92 (0.74, 1.14)	0.443

Prevalence Ratios of association with never having smoked regularly adjusted for age and sex

DISCUSSION

We found that the majority of SEARCH adolescents aged 12-17 had never smoked regularly at the time of survey. The analysis identified several protective factors that may be important for preventing uptake of regular smoking, ranging from having good mental health and a stable home environment to the absence of risk behaviours and justice interactions. Our study also identified other factors that viewed collectively may be important, although were not statistically significant here (at $p < 0.05$), likely due to the limitations of the sample size. These include cannabis use, school engagement, smoking status of caregivers, smoke-free homes, household income and community connection.

The prevalence of non-smoking in our study (81% had never smoked regularly), is broadly in line with national figures. The 2008 National Aboriginal and Torres Strait Islander Social Survey (NATSISS) found 80% of 15-17 year old Aboriginal adolescents living in non-remote areas were non-smokers (never and ex-smokers).²⁸ However, as this ABS measure is of 'current smoking' in 15-17 year olds, it is not directly comparable to SEARCH which estimates 'ever smoked regularly' in 12-17 year olds.

We found an association between having good mental health and having never smoked regularly. While we did not find a relationship between regular smoking and the survey measure of experiencing multiple 'stressful life events', a number of individual indicators of life stress had a significant or close to significant relationship including family arguments, housing instability, household income and interactions with the justice system. Although it used different smoking measures, the 2008 NATSISS also found that Aboriginal people aged 15 and over who reported being happy were less likely to be daily smokers and those who had experienced at least one stressor were more likely to be.²⁹ Stress is regularly reported as a reason for smoking initiation and maintenance among young people and the relationship between mental health (including stress, depression, anxiety and suicidal ideation) and youth smoking has been well documented.^{5, 9, 12, 15, 20, 30-}
³⁶ This could be targeted by including mental health promotion alongside school-based smoking programs³¹ and if prevention programs also screen for mental health symptoms and refer for simultaneous treatment.³⁶ ACCHSs may be particularly well placed to deliver these programs and reach adolescents in their communities, including those not in contact with mainstream schooling or health services.

Many studies have demonstrated that adolescent risk behaviours cluster and smoking may occur alongside drinking, cannabis use, becoming sexually active and misbehaviour.^{5, 7-9, 16, 30-35, 37} Our results support this with a significant relationship between smoking and alcohol use, sexual activity, and interactions with the justice system. Our findings were consistent with a potential association between smoking and cannabis use or if they/one of their siblings had been excluded from school, although these latter two did not reach statistical significance. While the cross-sectional nature of the analysis limits exploration of the direction of the relationship, it is likely that these risk behaviours have common determinants. As such, health promotion that builds social influence skills and addresses smoking alongside other substance use and sexual health will likely be more effective for individual level behaviours than health information/education focused school-based tobacco prevention programs, and with broader benefit.^{30, 38} However, these will need to be supported by interventions that address the systemic social and economic determinants that contribute to individual risk behaviours by reducing poverty, family violence, incarceration, racial discrimination and improving child safety.

This is supported by our study as factors within the family and home environment appeared to be important. Stable housing, good family relationships and being in the care of their mother were all significantly associated with having never smoked regularly. Positive family and community connections are an identified protective factor providing emotional strength and resilience, and the absence of these connections has been associated with smoking in other studies and with poor mental health in previous SEARCH analyses.^{5, 6, 9, 18, 30, 31, 39-41} In our study, a larger proportion of adolescents who had never smoked regularly lived in places their caregivers described as having a sense of community. Although this was not a statistically significant relationship, its likely importance is indicated by the existing literature and the related measure of housing stability.

School engagement is regularly cited as protective and educational attainment recognised as an important social determinant of health.^{9, 12, 30, 37, 42, 43} The 2008 NATSISS found those who completed Year 12 less likely to be daily smokers than those who had left by Year 9.²⁹ Although our results did not reach statistical significance, in line with the literature there was a greater proportion of adolescents who had never smoked

regularly for measures of current attendance, positive attitudes and no school exclusion in the family.

Evidence indicates that young people whose caregivers smoke, including in the home and during pregnancy, are more likely to become smokers themselves due to perceived norms, modelling, access and potential physiological changes when *in-utero*.^{16, 30, 38, 44} Importantly more than half of caregivers stated their homes were smoke-free. However, many SEARCH adolescents will have had some exposure to tobacco use, if not second-hand smoke, through caregiver smoking including during pregnancy and in the home.

While associations were not statistically significant, the direction of effect in our findings is consistent with greater likelihood of having ever smoked regularly among those exposed to tobacco smoke. Our analysis may have been underpowered or may reflect the limitations of using a 'regular smoking' measure with a young population. Smoking uptake increases with age and the transition from first experimenting with cigarettes to smoking regularly (or not) can occur over several years.^{4, 30, 45} As most of the sample were in the younger 12-15 age group and more likely to have never smoked regularly, comparisons to the SEARCH follow-up wave will be important to investigate uptake later in adolescence and whether this is mediated by reductions in adult smoking prevalence and more smoke-free homes.²⁸

Finally, there was no statistically significant relationship between regular smoking and cultural identity and participation or racial discrimination. While similar null findings have been reported for Aboriginal adults⁴¹, more nuanced cultural measures may be required. Further, this sample of existing clients of ACCHSs leading a Community-controlled study, may have a different sense of identity and participation to others not accessing this sector.

Strengths and Limitations

To our knowledge this is one of the only studies to quantitatively examine factors associated with regular smoking among adolescents in an urban NSW Aboriginal population and to include broader social and environmental factors such as the role of community and culture, and exposure of risk factors not just to the individual but their siblings and peers. The important findings reported here are limited by the cross-

sectional data. As such, causality cannot be inferred. But the findings may be validated in future SEARCH follow-up data and planned qualitative interviews which will provide greater context. Further, multiple hypotheses were tested, increasing the possibility of a significant association being observed by chance.⁴⁶ To reduce this risk the factors were predetermined based on existing literature and interpreted in this context.

The encouraging finding of few adolescent smokers overall, within a small total sample, limited statistical power and the number of control variables that could be included in the regression analysis, with possible impacts on precision. It is possible that some of the relationships identified in the current study may be confounded by socioeconomic status, and lack of adjustment for this potential confounder is a limitation.

This study also aggregated data from four urban communities in NSW using a small non-random sample. Although there are likely similarities, it cannot be assumed that the adolescent smoking experience will be uniform across NSW or other jurisdictions. As shown in Table 1, the caregivers in our sample included fewer on higher household incomes and more with post-school qualifications than the national and NSW Aboriginal and Torres Strait Islander populations. Therefore, the findings of this study may reflect the socioeconomic status of the sample and may not be generalisable to the Aboriginal and Torres Strait Islander population as a whole. However, evidence suggests that exposure-outcome relationships from non-representative samples can be generalisable to other study populations.⁴⁷ Further, substantial tobacco control measures have been introduced since baseline data collection and so the findings may not reflect the contemporary adolescent smoking experience. Future research through qualitative interviews and analysis of the follow-up survey will be important.

The main outcome was obtained via self-report. Although self-reported smoking status has been validated elsewhere, including with Aboriginal adults, it has limitations.⁴⁸ No definition was provided when adolescents were asked, “Have you ever smoked regularly?”; the ambiguous wording may have also impacted precision of measurement, under or overestimating actual smoking and is challenging to compare to other studies with clearer time-based definitions. The question has been amended in follow-up. Further, the participants completed the paper questionnaire at the ACCHS, possibly in the presence of their carer and/or the SEARCH research officer who may have assisted.

This setting, method and wording may have contributed to the 14 adolescents not answering the smoking question. Differences between those with and without complete smoking data is available (Supplementary File 2).

CONCLUSION

Most adolescents aged 12-17 in SEARCH had not taken up regular smoking at time of interview. Although smoking was common among caregivers, homes were more likely to be smoke-free.

Several factors were associated with having ever smoked regularly across individual, social and environmental levels with some common risk factors. Health promotion programs targeting young people may address smoking prevention alongside other substance use and sexual health and focus on promoting good mental health. For health professionals smoking may also serve as an indicator of mental health and prompt for screening and support. Our findings suggest that broader policies that address upstream determinants of risk behaviours are important, including those that support positive relationships and stable housing, as these may be protective against smoking uptake among Aboriginal adolescents, while likely to have further, wider benefits for families and communities.

Despite some limitations to the generalisability of these findings, they provide important guidance for communities, health services and policy makers about the range and complexity of influences for youth smoking that should be considered when designing adolescent health programs and the impact broader social and economic policies may have on individual risk behaviours. Program development should be undertaken in partnership with ACCHSs who if sufficiently resourced are particularly well-placed to reach this population and address the broader determinants of smoking through a self-determining approach.

REFERENCES

1. Australian Institute of Health and Welfare. Burden of tobacco use in Australia: Australian Burden of Disease Study 2015. Cat. no. BOD 20. Canberra: AIHW; 2019 [cited 1 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/burden-of-disease/burden-of-tobacco-use-in-australia>
2. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Australian Burden of Disease Study series no. 6. Cat. no. BOD 7 Canberra: AIHW; 2016 [cited 12 Oct 2019]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
3. Australian Bureau of Statistics. 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2014-15 Canberra: ABS; 2016 [cited 14 Oct 2019]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0
4. US Department of Health and Human Services. Chapter 3. The Epidemiology of Tobacco Use Among Young People in the United States and Worldwide. In Preventing tobacco use among young people: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
5. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: a critical review of the literature. *Tob Control*. 1998;7(4):409-20.
6. Wen M, Van Duker H, Olson LM. Social contexts of regular smoking in adolescence: Towards a multidimensional ecological model. *J Adolesc*. 2009;32(3):671-92.
7. Wu L-T, Swartz MS, Burchett B, Workgroup NA, Blazer DG. Tobacco use among Asian Americans, Native Hawaiians/Pacific Islanders, and mixed-race individuals: 2002–2010. *Drug Alcohol Depend*. 2013;132(1):87-94.
8. Yu M, Stiffman AR, Freedenthal S. Factors affecting American Indian adolescent tobacco use. *Addict Behav*. 2005;30(5):889-904.
9. Yu M, Whitbeck LB. A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents. *Addict Behav*. 2016;58:35-41.
10. Rudatsikira E, Muula AS, Siziya S. Current cigarette smoking among in-school American youth: results from the 2004 National Youth Tobacco Survey. *International Journal for Equity in Health*. 2009;8(1):10.

11. US Department of Health and Human Services. Chapter 4. Social, Environmental, Cognitive, and Genetic Influences on the Use of Tobacco Among Youth. In Preventing tobacco use among young people: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
12. LeMaster PL, Connell CM, Mitchell CM, Manson SM. Tobacco use among American Indian adolescents: Protective and risk factors. *J Adolesc Health*. 2002;30(6):426-32.
13. Crengle S, Robinson E, Ameratunga S, Clark T, Raphael D. Ethnic discrimination prevalence and associations with health outcomes: data from a nationally representative cross-sectional survey of secondary school students in New Zealand. *BMC Public Health*. 2012;12(1):45.
14. Soto C, Baezconde-Garbanati L, Schwartz SJ, Unger JB. Stressful life events, ethnic identity, historical trauma, and participation in cultural activities: Associations with smoking behaviors among American Indian adolescents in California. *Addict Behav*. 2015;50:64-9.
15. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr*. 2010;21(3):208-14.
16. Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health*. 2012;12(1):963.
17. Zuo Y, Minniecon S, Hua M. 'If you want your life to end bad, go ahead and smoke': a focus group study of Aboriginal and Torres Strait Islander young people's attitudes and knowledge towards smoking. *Health Promot J Austr*. 2004;15(1):82.
18. Luke J, Stewart P, Thorpe R, Anderson I. Victorian Aboriginal Health Service Young People's Project: A Study of the Health and Wellbeing of Koori Youth in Melbourne. Melbourne: The Lowitja Institute; 2011.
19. Gazis N, Connor JP, Ho R. Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents. *Journal of Early Adolescence*. 2010;30(3):345-68.
20. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking,

barriers to cessation and motivators for smoking cessation. *Australian Journal of Primary Health*. 2015;21(3):334-41.

21. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Chapter 8.2 History of tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2016 [cited 7 Sept 2020]. Available from: <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-2-history-of-tobacco-use-among-aboriginal-people>
22. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control*. 2003;12(suppl 2):ii5-ii8.
23. Australian Bureau of Statistics. 3238.o.55.001 - Estimates of Aboriginal and Torres Strait Islander Australians, June 2016 Canberra: ABS; 2018 [cited 13 Nov 2018]. Available from: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.o.55.001>
24. Investigators TS. The Study of Environment on Aboriginal Resilience and Child Health (SEARCH): study protocol. *BMC Public Health*. 2010;10(1):287.
25. Flay BR. Theory of Triadic Influence. 2004 [cited 11 Dec 2019]. In: *Encyclopedia of Health and Behavior* [Internet]. Thousand Oaks, California: SAGE Publications, Inc., [cited 11 Dec 2019]; [p. 715-8]. Available from: <http://sk.sagepub.com/reference/behavior>.
26. Davies HTO, Crombie IK, Tavakoli M. When can odds ratios mislead? *BMJ*. 1998;316(7136):989-91.
27. Coutinho L, Scazufca M, Menezes PR. Methods for estimating prevalence ratios in cross-sectional studies. *Rev Saude Publica*. 2008;42:992-8.
28. Australian Bureau of Statistics. 4737.o - Aboriginal and Torres Strait Islander Peoples: Smoking Trends, Australia, 1994 to 2014-15. Canberra: ABS; 2017 [cited 28 May 2019]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4737.o
29. Australian Bureau of Statistics. 4704.o - The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010 Canberra: ABS; 2012 [cited 8 Feb 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/4704.o>
30. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2014 [cited 5 Mar 2018]. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake

31. Lemstra M, Rogers M, Thompson A, Moraros J, Tempier R. Prevalence and risk indicators of smoking among on-reserve First Nations youth. *Paediatr Child Health*. 2011;16(10):e71-e7.
32. US Department of Health and Human Services. Chapter 2. The health consequences of tobacco use among young people. In *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
33. Neumark-Sztainer D, Story M, French S, Cassuto N, Jacobs Jr DR, Resnick MD. Patterns of health-compromising behaviors among Minnesota adolescents: sociodemographic variations. *Am J Public Health*. 1996;86(11):1599-606.
34. Potthoff SJ, Bearinger LH, Skay CL, Cassuto N, Blum RW, Resnick MD. Dimensions of risk behaviors among American Indian youth. *Arch Pediatr Adolesc Med*. 1998;152(2):157-63.
35. Thomas JL, Renner CC, Patten CA, Decker PA, Utermohle CJ, Ebbert JO. Prevalence and correlates of tobacco use among middle and high school students in western Alaska. *Int J Circumpolar Health*. 2010;69(2):168-80.
36. Whitbeck LB, Yu M, McChargue DE, Crawford DM. Depressive symptoms, gender, and growth in cigarette smoking among indigenous adolescents. *Addict Behav*. 2009;34(5):421-6.
37. Farrell AD, Danish SJ, Howard C. Relationship between drug use and other problem behaviors in urban adolescents. *J Consult Clin Psychol*. 1992;60(5):705.
38. US Department of Health and Human Services. Chapter 6. Efforts to Prevent and Reduce Tobacco Use Among Young People. In *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
39. Williamson A, D'Este C, Clapham K, et al. What are the factors associated with good mental health among Aboriginal children in urban New South Wales, Australia? Phase I findings from the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). *BMJ Open*. 2016;6(7).
40. Williamson AB, D'Este CA, Clapham KF, Eades SJ, Redman S, Raphael B. Psychological distress in carers of Aboriginal children in urban New South Wales: findings from SEARCH (phase one). *Med J Aust*. 2016;205(1):27-32.

41. Thomas DP, Briggs V, Anderson IPS, Cunningham J. The social determinants of being an Indigenous non-smoker. *Aust N Z J Public Health*. 2008;32(2):110-6.
42. Marmot M, Friel S, Bell R, Houweling TA, Taylor S, Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. *Lancet*. 2008;372(9650):1661-9.
43. Marmot M. Social determinants and the health of Indigenous Australians. *Med J Aust*. 2011;194(10):512-3.
44. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Chapter 8.4 Smoking among Aboriginal and Torres Strait Islander children and teenagers. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria; 2016 [cited 12 Dec 2019]. Available from: <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-4-smoking-among-aboriginal-and-torres-strait-isl>
45. Choi WS, Gilpin EA, Farkas AJ, Pierce JP. Determining the probability of future smoking among adolescents. *Addiction*. 2001;96(2):313-23.
46. Bland JM, Altman DG. Multiple significance tests: the Bonferroni method. *BMJ*. 1995;310(6973):170.
47. Mealing NM, Banks E, Jorm LR, Steel DG, Clements MS, Rogers KD. Investigation of relative risk estimates from studies of the same population with contrasting response rates and designs. *BMC Med Res Methodol*. 2010;10(1):26.
48. McDonald SP, Maguire GP, Hoy WE. Validation of self-reported cigarette smoking in a remote Australian Aboriginal community. *Aust N Z J Public Health*. 2003;27(1):57-60.
49. Australian Bureau of Statistics. 2002.o - 2011 Census of Population and Housing: Australia (o), Aboriginal and Torres Strait Islander Peoples (Indigenous) Profile Canberra: ABS; 2013 [updated 28 March 2013. cited 8 Sept 2020]. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/o?opendocument
50. Australian Bureau of Statistics. 2002.o - 2011 Census of Population and Housing: New South Wales (1), Aboriginal and Torres Strait Islander Peoples (Indigenous) Profile Canberra: ABS; 2013 [updated 28 March 2013. cited 8 Sept 2020]. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/1?opendocument

51. White V, Mason T, Briggs V. How do trends in smoking prevalence among Indigenous and non-Indigenous Australian secondary students between 1996 and 2005 compare? Aust N Z J Public Health. 2009;33(2):147-53.
52. Australian Bureau of Statistics. 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2008 Canberra: ABS; 2009 [cited 5 Mar 2018]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/Products/4714.0~2008~Main+Features~Introduction?OpenDocument>

7.2 Chapter summary

There are many important findings reported in Chapter 7, including that young Aboriginal people raised by their mother, with good mental health, stable home environments and positive social relationships were more likely to be never smokers. This has implications for the design of smoking prevention and health promotion programs both at the community level and more broadly.

A key strength of this work is that it uses previously unpublished data from an Aboriginal community-controlled partnership study, engaging health service staff in the interpretation of findings, and has been approved by the partner organisations (Tharawal and RivMed), and the Aboriginal Health & Medical Research Council of NSW.

It also has strong Aboriginal representation in the authorship group (5/11 authors), including those working directly on the study and within the partner organisations. The large authorship group on the submitted paper reflects the substantial collaboration and engagement with the community partners to complete this work in a way that maintains community control and self-determining research practices. Engagement with the SEARCH study participants was also undertaken and this forms Chapter 8.

Supplementary material referenced in Chapter 7 is available at Appendix 5.

8 Don't follow the smoke: listening to the tobacco experiences of urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)

8.1 Introduction

Chapter 8 is the second of two SEARCH studies and extends the analysis presented in Chapter 7 from the SEARCH baseline survey, but also the systematic review in Chapter 3 and the age of initiation findings from Chapter 5. This qualitative study was conceived as part of an engagement process for the paper in Chapter 7, to ensure the views and experiences of the adolescent study participants informed the interpretation and translation of the survey findings.

The yarning circles undertaken in this research sought to describe adolescent concepts of health and wellbeing and how this related to smoking and to hear personal experiences of tobacco use and related knowledge and attitudes. In a structured card-sorting activity participant perceptions, experiences and personal stories helped to explore the complex relationship between the risk and protective factors identified in the SEARCH survey analysis (Chapter 7) and the international literature (Chapter 3). From this, participants discussed their preferences for community programs targeting tobacco use and promoting wellbeing more generally. Chapter 8 primarily contributes to Research Question 3, but was also used to further understand Question 2.

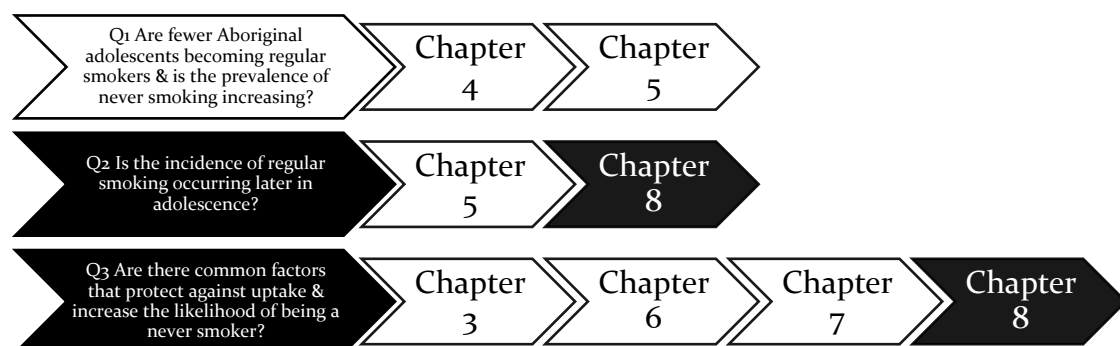


Figure 1: Chapter 8 – Research Question Summary

This chapter is presented as an in-progress paper. 11.6 Appendix 6 includes the range of supplementary material referenced in Chapter 8:

Chapter 8 – Supplementary File 1: Discussion Guides (11.6.1 pg 373)

Chapter 8 – Supplementary File 2: Cards used in card sort activity (11.6.2 pg 375)

Chapter 8 – Supplementary File 3: Fieldwork photos (11.6.3 pg 378)

Chapter 8 – Supplementary File 4: NVIVO Coding Structure (11.6.4 pg 381)

Chapter 8 – Supplementary File 5: Data analysis and maps (11.6.5 pg 386)

Don't follow the smoke – listening to the tobacco experiences and attitudes of urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH)

Proposed author list:

Christina Heris¹, Mandy Cutmore², Catherine Chamberlain³, Natalie Smith⁴, Victor Simpson⁴, Simone Sherriff², David Thomas⁵, Darryl Wright⁶, Kym Slater⁶, Sandra Eades¹

¹University of Melbourne, Victoria; ²Sax Institute, Sydney, NSW; ³La Trobe University, Melbourne, Victoria; ⁴Riverina Medical and Dental Aboriginal Corporation, Wagga Wagga, NSW, ⁵Menzies School of Health Research, Darwin, ⁶Tharawal Aboriginal Corporation

ABSTRACT

Issue Addressed

Tobacco use continues to be a major cause of preventable ill health for Aboriginal people. Preventing tobacco initiation among young people is necessary to reduce smoking rates. Analysis of the SEARCH baseline data collected 2008-12 identified multiple factors associated with adolescent smoking. This follow-up qualitative study presented the quantitative findings to a sample of SEARCH participants and explored their smoking knowledge, attitudes and beliefs with the aim to inform future community-based prevention programs.

Methods

Twelve yarning circles were conducted at two SEARCH research sites in NSW in 2019 with 32 existing SEARCH participants aged 12-28 (17 female, 15 male) and facilitated by Aboriginal research staff. Questions about tobacco knowledge, attitudes and experiences were followed by a card sort activity of 45 potential risk and protective factors drawn from SEARCH survey items and tobacco literature. Participants selected and discussed key risk and protective factors and made recommendations for prevention programs.

Results

Smoking experience, attitudes and beliefs varied by age. Older participants (aged over 20 years) had established smoking in early adolescence whereas most younger teenage participants had little to no personal experience either in trialling smoking themselves or exposure to the smoking of peers and family. This varied by school with some reporting high smoking visibility among their peers within and around school from year 7. Some adolescents noted increased social smoking around 18 years but personally resisted it. In the card sort activity most groups identified depression, anxiety and stress as primary causes of smoking initiation and maintenance and a strong connection to community and culture as a major promoter of non-smoking. Fitness, sport and smoke-free homes were also protective. Most identified cultural connection and family relationships as key strengths for being smoke-free. Four major themes were identified: Cultural and Community Strengths; Individual Empowerment and Engagement; Physical, Social and Emotional Wellbeing; and Influences in the Smoking Environment.

Conclusion

This qualitative study suggests a generational shift in youth smoking in this setting with few trialling and establishing in early adolescence in 2019. Early high school remains an important period for experimentation. Turning 18 and life changes at this transition age is a key initiation point. Programs promoting good mental health and strengthening cultural and community connections has been identified by community members as a priority for youth prevention.

INTRODUCTION

Tobacco use continues to be a major cause of preventable ill health for Aboriginal and Torres Strait Islander (Aboriginal¹) peoples and is the largest contributing modifiable risk factor to the gap in disease burden between Aboriginal and non-Aboriginal Australians.¹ Although smoking rates have declined significantly in recent years, daily smoking among Aboriginal people remains almost three times higher than the non-Aboriginal population.² Promisingly an increasing proportion of young Aboriginal people aged 15-24 identify as never smokers, 56% in 2014-15 from 44% in 2002.³ As most regular smokers commenced smoking during adolescence and young adulthood, preventing initiation among young people is necessary to further reduce smoking rates among Aboriginal people and reduce the gap in health outcomes.³⁻⁵ Understanding the factors related to smoking and non-smoking among young Aboriginal people is important for designing effective prevention programs.

Generally, the drivers for tobacco use among Aboriginal people, including initiation among young people, are similar as for other populations, such as exposure and normalisation through peer and family smoking, concurrent use alongside other substances such as alcohol and cannabis, as well as experiencing stress and poorer mental health.⁶ Smoking is also strongly related to the social determinants of health including experiencing social disadvantage, living in remote areas and reduced access to health care, as well as lower rates of engagement or opportunities for employment and education.^{4, 6-8} The enduring disparity in smoking rates between Aboriginal and non-Aboriginal people reflects the over representation of Aboriginal people in these key determinants, but also how through the process of colonisation and the resulting structural inequalities these factors have become entrenched.^{4, 9} As well as the compounding factors of experiences of racism and discrimination, intergenerational trauma, dislocation and disconnection and the historical manipulation of the Aboriginal population through provision of tobacco in rations raising population wide use of tobacco.^{6, 9} Positive cultural determinants of health are an important counterbalance promoting resilience and wellbeing.¹⁰ Tobacco prevention programs that are comprehensive and also address the structural inequalities and the underlying

¹ In this paper, the term Aboriginal, rather than Aboriginal and Torres Strait Islander, is used (unless referring to specific data sources of both Aboriginal and Torres Strait Islander populations) as this is a NSW based study where this is the accepted terminology.

determinants of smoking are thought to be most effective, particularly through Aboriginal Community Controlled Health Services (ACCHS).^{7, 9-11}

The Study of Environment on Aboriginal Resilience and Child Health (SEARCH study) is a community-controlled cohort study of the wellbeing of Aboriginal children living in urban areas. It involves children, young people and their carers from four participating Aboriginal Community Controlled Health Services (ACCHS) in New South Wales (NSW) and provides a unique insight into the individual, social, environmental and cultural factors associated with the smoking and non-smoking status of young Aboriginal people living in urban environments. Findings (unpublished under review¹², see Chapter 7) from cross-sectional analysis of self-reported responses collected at baseline (Phase 1) in 2008-12 from Aboriginal adolescents (12-17 years), and their carers, identified multiple factors that may be associated with adolescent tobacco use and have the potential to inform tobacco control policy and community level programs.

These findings include that most young people participating in SEARCH had avoided smoking initiation by age 12-17 years and lived in smoke-free homes despite high exposure to tobacco smoke through parental smoking. However, smoking in the home and parental smoking were not statistically significantly related to smoking among the SEARCH adolescents. Several factors were significantly associated with smoking/non-smoking across individual, social and environmental levels of influence. Never smoking was significantly more likely in participants with good mental health, their mother as their primary caregiver, good family relationships, stable housing, who had never used alcohol, were not sexually active and had no criminal justice interactions. Other factors that are likely to be important but did not show a statistically significant relationship were related to age, school engagement, environmental tobacco smoke exposure, cannabis use, and community connections. Other factors identified through a review of the literature¹³ that were anticipated to have some relationship to smoking but were unclear in this analysis related to participation in sport and recreation, cultural factors, experiences of racism, stressful life events, socioeconomic indicators and gender.

The purpose of this qualitative phenomenological study is to understand and explore the smoking and non-smoking experiences, attitudes and beliefs of Aboriginal adolescents aged 12 and above in urban and regional settings in NSW and triangulate the

quantitative findings from the SEARCH cross-sectional survey, ensuring the recommendations from this analysis are developed with community members and can be used to inform future, contextually relevant, community-based prevention programs. Specifically, this study sought to explore, interpret, confirm and explain the quantitative findings with two generations of adolescent SEARCH participants (Phase 1 and 2 participants) and through discussion identify key factors to be leveraged in future community-led tobacco prevention interventions.

METHODS

Qualitative approach and research paradigm

This qualitative study forms the second stage of an explanatory sequential mixed methods¹⁴ research project serving to validate and extend the initial cross-sectional survey findings¹², an approach particularly useful for understanding adolescent tobacco use.¹⁵ This mixed methods approach triangulates the initial survey findings to develop an understanding of the study participants' experiences, behaviours, attitudes, beliefs, and motivations.¹⁵ The study uses a phenomenological approach¹⁶ with a yarning methodology.¹⁷⁻¹⁹ Phenomenological methods such as interviews and group discussions are commonly used to understand, describe and interpret behaviours and the meanings attached to experiences and particularly useful for exploring perceptions, attitudes and beliefs.¹⁶ Group discussions also allow for observation of participant interactions and explore differences in responses.²⁰ This interaction becomes a valuable illustration of how experiences and meanings are shaped in a social context. For younger study participants in particular, small group discussions also have the advantage of allowing participants to respond to the experiences of others rather than having to draw on their experiences alone. In this project, individual and group discussions are used to provide an in-depth and flexible exploration of the issues identified in the SEARCH Phase 1 quantitative survey data.¹²

Our discussions were underpinned by a yarning methodology. Yarning is an Aboriginal qualitative research method related to interviewing and group discussions, but allows for culturally safe and more relaxed, interactive, collaborative, two-way conversation in Aboriginal settings, reducing the formality and power dynamics of traditional research interviews.¹⁷⁻¹⁹ This study integrated both social and research topic yarning.^{18,19} The Aboriginal Research Officer (MC) began with social yarning, sharing his background and

experiences, building familiarity and a relationship with participants over morning/afternoon tea prior to commencing the research topic yarns. The non-Aboriginal researcher (CH) also shared her background and experience and the participants introduced themselves. The research topic yarns were guided by the participants' stories and were two-way discussions with MC also sharing experiences and responding to questions himself.

Researcher characteristics and reflexivity

The lead researcher on this project (CH) is a graduate researcher in the final year of a PhD focused on smoking among Aboriginal adolescents and brings to this qualitative study an in-depth knowledge of the academic evidence for Indigenous tobacco use (globally), including through leading the quantitative analysis in the preceding stage of the study¹² (see Chapter 7) and an evidence review¹³ (see Chapter 3), and in a previous public sector tobacco control related role. Her work is framed in the historical context of colonisation and its enduring impact on the health and wellbeing of Aboriginal people and how this manifests in greater prevalence of risk factors such as tobacco use. CH believes that strengths-based, self-determining responses are needed to reduce tobacco use among Aboriginal people and that community-controlled health organisations are best placed to design and deliver such interventions when adequately resourced to do so. And that these measures must be reinforced by well-funded whole of population tobacco control activities including social marketing campaigns.

CH is supervised by two senior Aboriginal researchers (SE, CC) and a third non-Aboriginal researcher with extensive experience in community-controlled health organisations and Aboriginal health research. CH also works closely with Aboriginal adolescents through a volunteer support program for secondary students. However, in a project investigating smoking among Aboriginal adolescents as a non-smoking, non-Aboriginal researcher (Australian born of Greek-Irish heritage) over the age of 25, the researcher is an outsider in every sense and approaches this work from an etic (or outsider) perspective. CH acknowledged the power differential in this research process as a non-Aboriginal 'researcher'. To minimise this, the project was designed using participative, non-exploitative processes (described below).

In keeping with the Aboriginal community owned and led research practices of SEARCH, this project was conceived following engagement with the participating ACCHSs for interpretation of the quantitative findings, and the research proposal and methodology for this follow-up sub-study developed with one senior Aboriginal researcher (CC) experienced in qualitative research methods, and one SEARCH Aboriginal Research Officer (SS) familiar with the study, its partners and participants. The proposal was approved by the NSW Aboriginal Health and Medical Research Council (AHMRC) and the CEOs of the two ACCHS sites.

Aboriginal staff based at the participating ACCHSs coordinated recruitment of study participants and composition of groups based on their local understanding of relationships and dynamics that would best facilitate discussion. Interviews and group discussions were led by another SEARCH Aboriginal Research Officer (MC), co-facilitated by CH and in some sessions ACCHS staff. As an Aboriginal man with past smoking experience MC brought an emic (insider) perspective to the data collection and took the opportunity at the close of sessions to talk to the participants about the history of smoking in Australia, including the introduction of tobacco to Aboriginal people; and to congratulate the participants on speaking up and encouraged them to continue to contribute as future community leaders.

While CH completed the initial stages of the analysis, the identification of key themes, findings and recommendations was completed in collaboration with several Aboriginal members of the authorship group (CC, SE, MC, SS). CH also kept reflective notes during fieldwork as part of a personal journal.

Setting

Fieldwork was conducted at two ACCHS partner sites in New South Wales, one regional and one metropolitan. Local ACCHS staff identified suitable spaces within their organisation where participants would feel comfortable and safe. At both sites these were recreational community spaces separate from the dedicated health service buildings with an informal, relaxed atmosphere of lounge chairs arranged around a low coffee table, light refreshments were served.

Ethics

Ethical approval for this nested study was granted by amendment to the SEARCH study ethics with AHMRC (568/06) and registered with University of Melbourne HREC (1953833), including approval of the participant information and consent documentation, developed from AHMRC templates. CEO approval from both sites was also provided. Additional informed consent protocols were followed.

Sample and Recruitment

The sample for this nested study included 32 existing SEARCH study participants who were adolescents or young adults (aged 12-28 years) of any smoking status or experience. The objective of this study was to explore the key factors associated with smoking in Phase 1 findings and determine if these had changed for Phase 2 participants. Therefore, the ACCHS-based SEARCH Research Officers (RO) identified community members who had been aged between 12-17 years at the time they either participated in Phase 1 (between 2008-12) or Phase 2 (from 2014).

Participants were primarily recruited in small groups (3-4 participants) of friends or family within kinships groups to increase participant comfort and familiarity and facilitate discussion. Recruitment continued at the second site until saturation was reached and no new information was being shared.

All participants received a participant information sheet and consent form (PICF) outlining the study, confidentiality and privacy considerations. SEARCH ROs facilitated parental consent for participants 12-17 (verbal description of the study and provision of a participant information sheet and consent form), with the adolescents also receiving a copy to provide their own assent at the start of the discussions. MC and CH provided a verbal overview of the study process and reinforced key aspects of the PICF including that participants should feel safe to share and respect the confidentiality of others, they could choose not to answer any questions and ACCHS staff were available for support. Also that with permission they would be audio-recorded, but transcribed by an unrelated third-party. Transcripts would be deidentified and available for participants to correct or remove any information they no longer wished to be recorded.

All participants received a Rebel Gift Card (\$50 value) as a small thank you from the study team and partial reimbursement for their time. Rebel Gift Cards were selected on advice from ACCHS staff as they could not be used to purchase unhealthy food or drink and would likely be used to buy sports equipment that may also benefit other community members who did not have the opportunity to participate.

Data collection methods

Data collection occurred 18-21 March and 11-14 June 2019 with a total of 12 yarning circles (9 group and 3 individual yarns) conducted across the two sites. Each session was approximately 60 minutes. Each yarning session began with introductions and a brief discussion of the experience and background of the researchers and participants. A broad general discussion followed covering concepts of health and more specific open-ended questions around participants' tobacco knowledge, attitudes and experiences.

The second part of the interview involved an interactive card sort activity of 45 potential risk and protective factors drawn from the SEARCH survey items^{12, 21} and Australian and international tobacco literature.¹³ Participants were given a share of the cards and organised them in terms of protective and risk factors for smoking, highlighting those that were unexpected, did not fit, or could go both ways, followed by a detailed discussion of key factors.

Participants were encouraged to add counter opinions and reach agreement on the placement of the cards. The final stage was to discuss potential programs to prevent youth smoking with participants considering the objectives, audience, settings, timing and key components of a program they felt would best reduce tobacco use in their community. For Site 1 there was a final brief check of agreement/disagreement with key associations identified in the survey results to explicitly validate the survey findings. This was dropped for Site 2 as these items were part of the card sort activity and generally duplicated earlier discussion.

The primary purpose of the card sort activity was to validate¹⁵ the findings of the SEARCH Phase 1 survey with current study participants in an interactive way and have the opportunity for stories and experiences to be shared, explaining some of the associations identified in the statistical analysis and how common these were in their

communities generally.¹² Other relevant factors not in the SEARCH survey but identified in a systematic review of international literature exploring factors that may influence tobacco use among Aboriginal adolescents were also added. As such the card sort activity serves to triangulate both the quantitative stage of this research and the international evidence base.^{12, 13} However, using a method such as this is also an effective means of promoting discussion particularly among young people, vulnerable populations or discussing sensitive topics.²² It also makes the research process more engaging and dynamic.²² The purpose for our study was to allow participants to consider a range of potential risk and protective factors that may not have been shared spontaneously, and using the third-party projective technique²² of discussing those factors with reference to a hypothetical 'other' like them if they preferred. Less vocal, shy participants were able to contribute equally by adding their cards to the overall arrangement without needing to share their own personal experiences or explain their choices if they did not want to.

Instruments

A short discussion guide was used. The original and modified guides are included in Supplementary File 1, beginning with a general discussion of concepts of health and wellbeing and then how this related to smoking specifically with questions around individual experiences, exposure and attitudes to tobacco use. This section was followed by the card-sort activity and closed with a discussion of ideas for potential prevention programs (objectives, target audience, settings, key features and timing). All sessions were recorded using an Olympus digital audio recorder. MC read out the grouping of the cards for the recording. The cards are included in Supplementary File 2 and photos of their use during fieldwork within Supplementary File 3.

Data processing

CH, MC and SEARCH ROs debriefed at the end of each interview about what was heard, how it compared to earlier interviews, what needed further exploration and whether data saturation had been reached. Audio files were sent via secure file transfer to an independent third-party transcription contractor (Belinda Browne, Belcam Services) with no disclosed connection to the research participants to maintain anonymity and confidentiality. CH listened to the recordings multiple times including to check accuracy of transcriptions and redact any identifying information (names, places). Redacted transcripts were sent to MC and SEARCH ROs for checking and to offer to participants if

they wished to review. A multi-stage coding process was undertaken in NVivo 12. Initial coding was completed for Site 1 prior to fieldwork at Site 2.

Data analysis

A thematic analysis approach underpinned by a critical realist perspective was used as described by Braun and Clarke and Green et al.^{23, 24} Beginning with immersion in the data as described above followed by line-by-line coding of the transcripts in NVIVO (by CH) to key categories (open codes), then organised into clustered concepts (axial codes/sub-themes) and then broad overarching themes. Both inductive and deductive coding was used. Inductive was used for most codes developed directly from the data particularly the unprompted part of the discussion in relation to concepts of health and attitudes and experiences of tobacco use. The coding structure was updated iteratively and some sections reclassified/revised. Nodes for the topics listed on the cards were pre-set in the coding structure and actively sought in the data (deductive). However, care was taken to ensure the spontaneous discussion was captured separately from the prompted (card sort discussion). The final coding structure is at Supplementary File 4.

Taking into account the full unprompted and prompted discussions, CH mapped out relationships and groupings of the risk and protective factors as identified/described by participants (Supplementary File 5). These were then arranged into four broad overarching groups loosely guided by the Theory of Triadic Influence^{25, 26}, an ecological model of individual, social and cultural/environmental influences on risk behaviour. From this, key analytic themes were developed in collaboration with co-authors. CC reviewed a visual summary of risk and protective factors and independently organised them into similar themes. Concurrently, MC reviewed a full summary of the analysis with the major themes, sub-themes and illustrative participant quotes and by teleconference confirmed these themes reflected the content of the yarns. Finally, CH compared these agreed findings to those from the Phase 1 quantitative findings.

Member checking/validation of themes

A short summary of the major themes along with the visual maps will be presented to the ACCHS-based SEARCH ROs and key staff for feedback on interpretation of the findings. The research team will also hold a community barbeque at each site and invite study participants to provide feedback on the findings and confirm they accurately

reflect their input. Participants will also be offered a written summary. Feedback from the ACCHS staff and participants will be incorporated into the final analysis prior to this chapter being submitted for publication. No identifying information will be used in this process or in publication. The article will be reviewed by the AHMRC ethics committee and each ACCHS prior to submission for publication.

RESULTS

Overall 32 participants were recruited for twelve yarning sessions across the two sites with a diverse range of ages and smoking experiences (Table 1).

Table 1: Sample characteristics by yarning session

Interview	Sex	Age Group	Site	Smoking status	Size
1	Female	18+	1	Non-smoking	1
2	Female	18+	1	Smoking/ex	3
3	Male	12-15	1	Non-smoking/ex	3
4	Male	18+	1	Smoking	1
5	Male	18+	1	Non-smoking	1
6	Mixed	12-15	1	Non-smoking	3
7	Mixed	12-17	2	Non-smoking	3
8	Mixed	12-17	2	Non-smoking	3
9	Mixed	12-17	2	Non-smoking/ex	7
10	Female	12-18+	2	Mixed	2
11	Mixed	12-18+	2	Smoking	3
12	Female	12-17	2	Non-smoking	2
Overall	17 Female 15 Male	23 aged <18 9 aged 18+		7 Smokers 25 Non-smokers (ex, tried, never)	32

Four key themes emerged from analysis: drawing strength from culture and community; how the smoking environment shapes attitudes and intentions; non-smoking as a sign of good physical, social and emotional wellbeing; and the importance of individual empowerment and engagement for being smoke-free. Summarised in Table 2 below and then discussed in detail later.

In line with the order of the discussion guide we briefly discuss participants' general concepts of health and wellbeing, followed by their personal exposure and experiences of smoking/non-smoking specifically, then we detail the influences for tobacco use under the four key themes emerging from the analysis, from both the general discussion and card-sort activity as outlined in Table 2, concluding with participants' suggestions for the design of community prevention programs.

Table 2: Summary of all reasons for smoking/non-smoking by key themes

1. DRAWING STRENGTH FROM CULTURE & COMMUNITY		
Non-Smoking	Unclear/Both	Smoking
Strong community connection Community belonging Know about culture Connected to culture Strong community		
2. HOW THE SMOKING ENVIRONMENT SHAPES ATTITUDES & INTENTIONS		
Non-Smoking	Unclear/Both	Smoking
Smoke-free home* Cigarette cost* Smoking rules* Cigarette packaging* Anti-smoking ads* Role Models + <i>Legislation</i> + <i>Smoke-free cars</i> + <i>Generational change</i> Knowledge of smoking harms*		Family smoke* + <i>Bonding</i> + <i>Pro-smoking attitudes</i> Friends smoke* + <i>Try to fit in</i> + <i>Peer pressure</i> + <i>Smoking at school</i> + <i>Few consequences at school</i> + <i>Smoking teachers</i> Access to cigarettes* See smokers around* + <i>Smoking role models</i> Look good* Smoking in TV/Movies
3. NON-SMOKING AS A SIGN OF GOOD PHYSICAL, SOCIAL & EMOTIONAL WELLBEING		
Non-Smoking	Unclear/Both	Smoking
Fitness* Sport* Good mental health + <i>Pregnancy</i> + <i>Quality of social relationships</i>	Live with/raised by mum* Sick family* Friendships* Family relationships* Sex/gender*	Depression & Anxiety* Stress* + <i>Anger management</i> + <i>More smoking while excluded</i> Moved house a lot Alcohol* Yarndi* + <i>other drugs</i> Age* + <i>Acting older</i> + <i>Going out, going to parties</i> Sexually active Addicted* + <i>Habit & routine</i> + <i>Family violence</i> + <i>Males</i>
4. IMPORTANCE OF INDIVIDUAL EMPOWERMENT AND ENGAGEMENT FOR BEING SMOKE-FREE		
Non-Smoking	Unclear/Both	Smoking
Want good marks* Want to go to school* + <i>Future focus</i> + <i>Self-efficacy to say no</i> + <i>Confident advocacy against smoking</i>		Bullying Racism Curious* Bored* + <i>Personal choice</i> + <i>Rejection of harms</i> + <i>Short term focus</i> + <i>Fatalistic view</i> + <i>Low parental monitoring</i> Go to court Youth detention Questioned by police Suspended/expelled Going to school*

(*indicates card topic was first raised spontaneously, + *italicised topic indicates additional item raised*, all other items indicate prompted topics not raised spontaneously)

General concepts of health and wellbeing

Participants were informed during recruitment that the research related to smoking thus may have been primed to talk about tobacco use, however generally it was not top-of-mind for most in the opening discussion about healthy versus unhealthy. Smoking was spontaneously mentioned in half of all groups and almost exclusively by non-smokers often in a list of substances to avoid e.g. smoking, drinking, drugs.

Int 5

INT What's unhealthy? To you, what does it mean?

M1 Um obviously like smoking and that, drugs and stuff. I don't really like doing that stuff. Like, it's a turn off. When you see other people like out in the community, like sit there like doing it and that, it's a turn off to me.

For all groups 'healthy' was considered to be about diet and exercise. Fruit, vegetables and healthy food in general were examples of healthy eating, with fast food/take away and non-specific unhealthy food readily nominated as unhealthy choices. Social and emotional wellbeing, poor mental health and some specific diseases (diabetes, cancer) resulting from unhealthy lifestyles were also mentioned. Some also mentioned broader determinants of health such as education, employment, personal safety (including domestic violence), living in a hygienic environment, social and cultural connections and broader concepts of having a good life balance, motivation and agency to look after yourself and pursue the life you are interested in. When prompted, smoking was considered to be one of the unhealthiest behaviours (after 'hard' illicit drugs) but some noted that it was a lower priority in school education relative to mental health/bullying.

Key enablers of 'being healthy' were time, routine, healthy role models and access to health promoting services (such as the ACCHS, gyms, subsidised food programs). Some who described their own diet as unhealthy were very conscious of not passing that habit onto their children. One participant described a key barrier to be challenges accessing primary health care through the ACCHS such as long wait-times for appointments that could not be accommodated when managing work commitments and child care, driving them to use mainstream services despite feeling this was sacrificing a cultural connection. Other barriers to a healthy lifestyle described by participants included time, routine, juggling kids, lack of knowledge, poor influences and the widespread availability of cheap and convenient unhealthy food options. One participant discussed perceptions

of a lack of safety in the community which was a barrier to families being physically active outside or at the park.

Personal exposure and experiences of smoking/non-smoking

There were a range of smoking experiences across the yarning sessions including two groups of current regular smokers, two interviews that included occasional smokers (self-described as only 'smoking socially' when out drinking or at parties), several young people who had experimented with smoking and not continued to smoke and around half who were never smokers. All current regular or occasional smokers noted that they intended to quit in the future or were actively cutting down (one had relapsed after being smoke-free for nine years, one had cut down during their pregnancy).

Those who had tried smoking or took it up in their teenage years reported starting between 10-15 years, with friends or family (often cousins and siblings but occasionally parents or uncles) facilitating the first attempts. Some older participants only began smoking around age 18-21 when they started working, going out and drinking, and were legally able to buy cigarettes. (These experiences are described further in the major themes below.)

Some reported trying cigarettes once or twice and never again, some a handful of times and then discontinued. For the 'social smokers' this was dependent on when they were socialising/drinking and might be '1-2 cigarettes every second weekend'. For the current regular smokers, intensity varied depending on whether it was a 'bad' day. For some this would be 8-10 cigarettes per day, for others it was up to 30-40 cigarettes a day. One participant who was currently pregnant and actively trying to quit reported smoking at most a cigarette every second day depending on levels of nausea.

Int 12

INT Um, so you two do, have, have youse ever smoked or have youse tried cigarettes?

F1 I have.

INT Yeah? How old were you when

F1 Fifteen. But only one. Didn't like it.

INT And why was that? So, you didn't like it? How'd you feel after you first, after your first try?

F1 Like it. I don't know, like I felt different. It was just kind of like a peer pressure thing cos everyone around me was doing it.

INT Ok.

F1	So I ended up trying it. It affected me badly for one day. And a couple of days after.
INT	<i>Where was that, at school?</i>
F1	Yeah.
INT	<i>It was at school. Yeah?</i>
INT2	<i>What do you mean by affected you badly, did you feel sick?</i>
F1	Yeah. Like I felt like a bit light headed and everything. Got me really bad cos I never did it, but like everyone around me smoked, cos I didn't. It got me. Short breath. With running, definitely.
INT	<i>And have you had a cigarette after that?</i>
F1	No.
INT	<i>That's great, that's good. So, so just going through that stage of feeling very sick and very ill turned you off? Turned you off, turned you away from smoking.</i>
F1	Yeah, I try to convince my parents and siblings to like to stop it, from what happened but they, they didn't really get what I had. So.

All non-smokers were firm in their intentions not to start smoking in the future. The occasional smokers did not explicitly say they wanted to stop but that they acknowledged it was not good for them and should not smoke but rationalised that they did not do it often. Of the regular smokers, they were either actively trying to quit smoking or were receptive to the idea of quitting in the future, and although they were able to list a range of barriers to quitting at this point in time, were able to passionately describe in detail what types of cessation support programs they would value.

Int 11

INT	<i>Anything else you'd like to share? Any other stories? Any other thoughts on cigarettes? When you're going to give up?</i>
F2	One day.
F1	I go on and off. I think I only smoke due to my peace, that's like my peace. You know. My little getaway from my little one and partner and yeah. And I think I smoke.
F2	I really do, I just can't find myself to quit right now. When I become more stable, when I get my own house that I know I'm not going to get kicked out of. And when I get the kids settled, and like I can start focusing on my health again. I really want to quit, I just can't right now. I think once I get more stable, and it'd be easier for me to quit.
INT	<i>It's never easy. I'm a smoker, and yeah, it's the worst thing I started ever.</i>
F2	Yeah, I kind of regret starting but now that I've started I can't stop.
INT	<i>Yeah, I was eighteen, so a lot of my influences were from my cousins, but something I deeply regret. A lot of family have passed away, that I've lost through cigarettes, but yeah, the addiction. Yeah, I've tried four times to give up. Um, I'm not a big smoker these days, so just do what they call routine, or relaxing, smokes. So one in the morning and one at night, but yeah. I smoke a lot less than what I used to. Yeah. But I encourage youse to try and make some changes, cos obviously you know the</i>

consequences as you get older. And especially you, bud, at your age. Try to, try to start saying no to it, yeah? Cos yeah. There's a lot of things I struggle with now, and I'm only, you know, I'm only forty years old, and I'm struggling because of cigarettes. Twenty two years of my life, and I always kept saying I will stop one day, I'll stop one day, but yeah the older I get the worse it is for me. Like, I struggle to walk two hundred metres up the road, and play with my kids. So, yeah, a lot of lifestyle changes need to happen for me.

F2 Yeah, I struggle walking down the mail box.

INT *At a young age, you just keep going, and "one day I'll stop".*

F2 So I've got half my lungs, half my lungs filled with asthma and the other half's filled with smoke.

INT *Yeah, so it's starting to scare the shit out of me. Yeah. So um, yeah, two a day, at, at, when I look back three years ago, two a day for me is really, really, is really really good. But I know there's still too much. So I would encourage the three of youse, even just as a family, to sit down and start talking about bout when, when do we stop.*

Key smoking/non-smoking themes

The four key overarching themes as summarised in Table 2 above, are described in greater detail below, with the order of this discussion outlined in Table 3 below. The relationship between the factors under these themes is illustrated in the concept map on the following page (and larger reproduction at Appendix D).

Table 3. Order of results under themes and sub-themes

Theme 1	Drawing strength from culture and community
1.1	<i>Community, cultural connections and role models</i>
Theme 2	How the smoking environment shapes attitudes and intentions
2.1	<i>Role models</i>
2.2	<i>Friends who smoke and smoking at school</i>
2.3	<i>Smoking among family members</i>
2.4	<i>Smoke-free homes and second-hand smoke exposure</i>
2.5	<i>Knowledge of harms and impacts from smoking</i>
2.6	<i>Historical knowledge and awareness of policy or legislation change</i>
2.7	<i>Vaping</i>
Theme 3	Non-smoking as a sign of good physical, social and emotional wellbeing
3.1	<i>Substance use</i>
3.2	<i>Sport and fitness</i>
3.3	<i>Mental health and stress</i>
3.4	<i>Nicotine addiction</i>
3.5	<i>Family illness</i>
3.6	<i>Relationships</i>
Theme 4	Importance of individual empowerment and engagement for being smoke-free
4.1	<i>Disengagement, boredom and rejection of harms</i>
4.2	<i>Empowerment, engagement and self-efficacy</i>

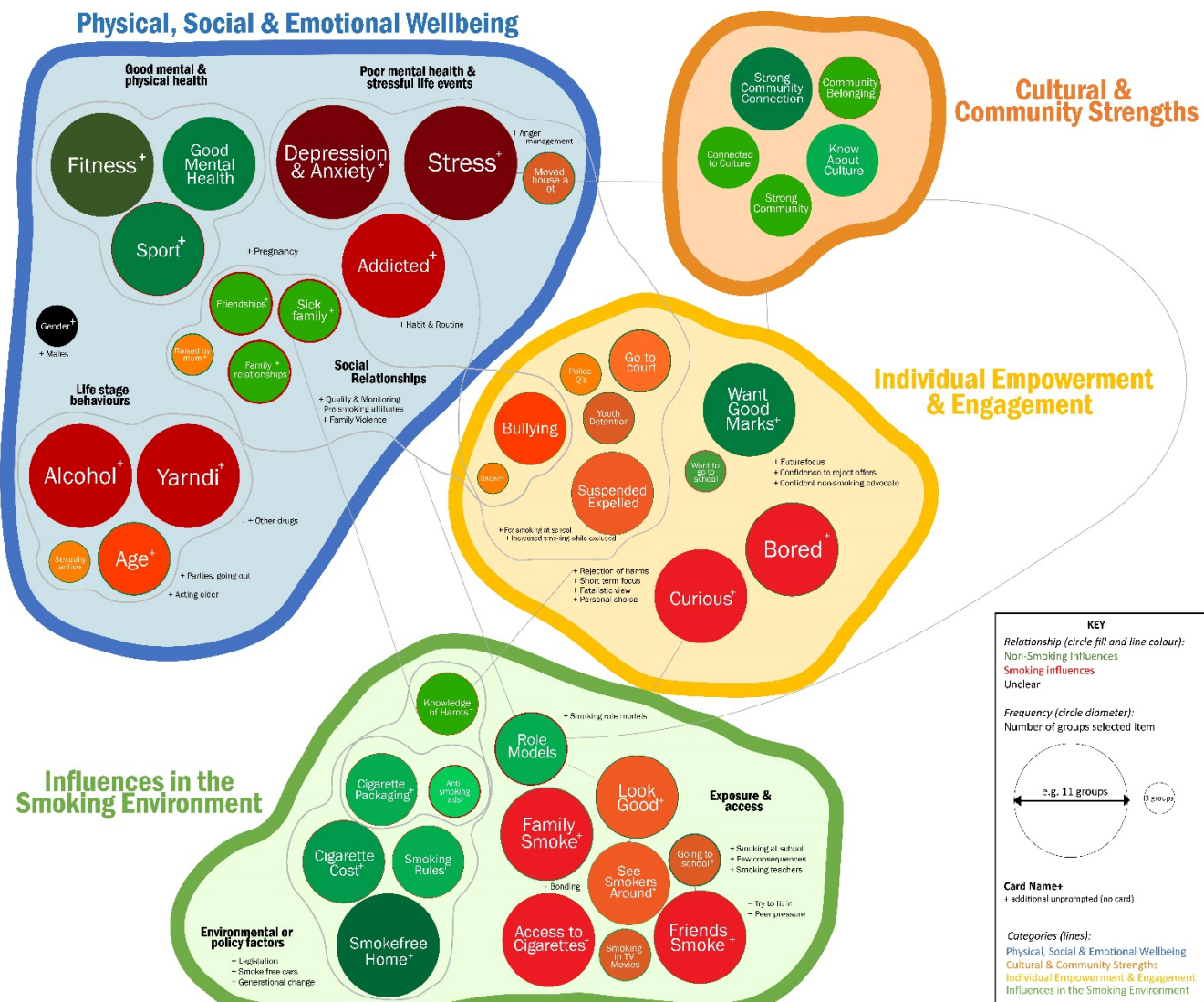


Figure 1: Map of card sorting activity

This figure provides a visual summary of the grouping of key factors by theme and in relation to whether they were non-smoking (green) influences or smoking (red). The size of the circle reflects the number of groups that selected the card.

Theme 1: Drawing strength from culture and community

1.1 Community, cultural connections and role models

Having **strong community** and **cultural connections** were important protective factors that were highlighted by all groups as central to supporting young people to stay-smoke free or quit smoking. Community belonging and the non-smoking values of the community were also seen to be important. Access to strong **role models** was also seen as related to **community connection** including the desire to be a good role model as part of contributing to the community as a leader. The smoking behaviour of **role models** is related to Theme 2 and discussed further there.

Int 11

- INT** *So while we're on this side I want to, why, why are these over this way? What, what's in, why is this important?*
- F2** *I reckon, just like if you're someone that's deeply connected with your culture, it gives you like um, I don't know, just like a sense of belonging, and it just makes you not want to smoke because you're more interested in, in your culture. But like, so could be either studying, it could be working with the community. It could be um, studying your culture. Like yeah, and just, I feel that being connected to your culture, it does um make you want to smoke less, just because of wanting to fit in with the, the rest of your community and stuff like that.*
- INT** *So, just having that just correct me if I'm, tell me if I'm wrong, but is it sort of being engaged, and being occupied during the day sort of just giving you like*
- F2** *Yeah, with other blackfellas, talking about your Aboriginal heritage and your culture and stuff. Yeah.*

Int 10

- F1** *Cos I think the um, you have to, to have a strong connection to my community, um, I have to like be a good role model for um, cos I work with families. So I have to be a good role model for them families. Um, I also work with children, so it's good to be a role model for the children.*
- INT** *I'm really glad you picked that up because it's something, it's a huge strength, that particularly places like [AMS] have, where you know, you've really got a strong community that should be built into every program.*
- F1** *Yeah, and I think if you do have them good role models, that's more likely to change people's opinions and, on certain, on certain issues.*

Int 4

- M1** *Role models. Just don't be a follower, be a leader. And then strong community, ah, connection to my community. So, keep everyone in the community strong, try and quit smoking. Be healthy. Yeah, live longer.*

Theme 2: How the smoking environment shapes attitudes and intentions

Participants attitudes to smoking and their own experiences were strongly shaped by the environment and the behaviours of those around them. **Normalisation of smoking** through the influence of having **friends** and **family who smoked**, which created **access to cigarettes**, as well as **seeing smokers around** the community or even **smoking in popular culture (TV shows/movies)** were all seen to contribute to smoking. Several of these sub-themes are discussed below.

2.1 Role models

As noted above in Theme 1, **strong role models** had the potential to be an important and positive influence but this was mediated by whether the role models themselves smoked.

Int 8

INT	<i>My hat goes off to youse that you continue to keep going to school there with all that happening. Um, [MALE TEACHER] would be a really good mentor at school?</i>
F2	Yeah. Yeah he is.
F1	He is to all the kids, like there's a couple of Aboriginal kids that don't smoke any more there now, cos of him.

Int 7

F1	Like role model, like it's in there, but I feel like it can kind of be wrong, cos if your role model smokes, you're going to kind of want to be like him.

2.2 Friends who smoke and smoking at school

Almost all smoking and non-smoking participants felt that smoking friends were a particularly important influence for initiation. Some current and former smokers reported experiencing overt peer pressure to trial smoking themselves or did so just as part of fitting in and belonging to their group. For others it was simply curiosity because those around them were smoking. Some reported social smoking as their starting point, at parties or on breaks at work, but that it evolved to regular smoking from there. The current regular smokers who started socially expressed regret that their lives had moved on from those connections but they were still smoking.

Int 2

- RO** *And what do you think the reason for that is?*
- P1** Cos their other mates were doing it.
- RO** Yep.
- P1** Yeah. They all do it, yeah.
- F2** I think it's also like peer pressure. I mean they see someone, so they say you want a draw now? And it's no you've got to do it. Yeah, you just kind of want to fit in kind of thing. Follow the leader.
- INT** *So you mention it becomes an struggle if you say no.*
- F2** Yeah, it's going through your mind "what are they going to think of me if I say no".

Int 10

- F1** Yeah, I've tried cigarettes but I don't smoke, occasionally. Like when I'm around parties and all that, it's kind of a social thing where you feel pressured to smoke, in front of everyone. And so obviously, I just usually do it at parties I think.
- INT** *So, at parties, majority of your friends?*
- F1** Oh, yeah. They're all smoking. Everyone's smoking.
- INT** *So that age group is around fifteen, sixteen? Yeah? No?*
- F1** Yep.

Int 10

- F1** Everyone round here I know smokes. Yeah. And they're kids our age, my age. Sixteen, seventeen.
- INT1** *How does that make you feel, like having a night out with cigarettes?*
- F1** I feel normal. It's gross. They are, they're gross... I don't do it all the time, you know, just mostly when I'm around people.
- INT1** *Ok. So just influences is the reason why?*
- F1** Influences. Yeah.
- INT2** *So you know how you said you feel the pressure to smoke, does anyone actually say anything to you, or is just kind of like, it just feels like everyone else is doing it, and like no one's actually saying "come on, have a cigarette", it's just kind of the general vibe?*
- F1** Um, no, sometimes, people, I'll have a friend sitting there and she'll you know, be sick of people telling her "oh, just have a smoke" never smoked before "have a smoke". And I'm like "no, don't". I'm a good friend I won't let her smoke. But she kind of smoked that day. Um, yeah, they, they pressure you sometimes.
- INT2** *Really?*
- F1** Yeah.
- INT2** *Why? If someone says that they don't want to?*
- F1** Oh, just stupid kids. "Oh, nobody's going to smoke with us", and silly. It is.
- INT2** *Did you ever get the, the pressure that [FY]'s talking about?*
- F2** Not so the "here have a smoke", but more so um, just letting you in sort of like a little circle, and everyone else is doing it, and you just sort of feel left out.
- INT2** *Yeah, kind of like a way to be part of the group.*
- F2** Yeah.

Int 2

RO *Do you think that your main reason for starting was just because of your friends? Yep?*

F1 And now I've got no friends I've only got me and my two kids

RO *Kids. Yep.*

F1 It's nothing to be proud about now.

Int 11

F2 But when I became an adult and started working and stuff, and started hanging round people that did smoke, I did end up picking it up. So I shouldn't even have started. I've only been smoking for about four or five years, but since I have been smoking, I've gotten pretty bad at it.

INT *Um, how'd you feel after your first cigarette?*

F2 I started choking a lot. Like, I couldn't really handle it, that was then, and then I started a lot. But um, yeah. I started smoking probably only socially. So I'd go and just have a yarn with the girls, I'd have a smoke. And then soon it started me going out by myself to smoke. And then I just started going again and again, and I just never stopped.

Most non-smokers had very low visibility of smoking among their immediate peers. Their close friends were also non-smokers and while some were not aware if other adolescents their age smoked, others knew or had seen some but perceived this negatively. Non-smokers held strongly negative attitudes to smoking. They felt smoking peers were doing so for their self-image: trying to be cool, act older and fit in. Other attitudes ranged from smoking being disgusting or 'gross' (particularly reinforced by those who had a bad personal experience trialling smoking); a bad habit and wrong (particularly if the smoker is young); silly or stupid; a waste of money; shameful, embarrassing and uncool.

Int 7

INT *When youse all see them smoking what do youse, what do youse*

F1 Everyone just thinks like they're wannabees. But then they think to themselves "oh, we're top shit" and all that.

INT *But across the board, no one likes it? Like within your age group?*

F1 Yeah, no one likes it.

M1 I think it's embarrassing. If I was looking at it and saw someone, I'd be embarrassed if I was them.

Int 7

INT2 *What's, why would you be trying to look cool by smoking? What would be the purpose of that?*

F1 I don't know, I just feel like they like want to be older than they are. You know.

INT *Yeah?*

F1 They think that they're like seventeen, but they're like twelve, fifteen

Int 9

- INT2** *Is that something we can do better? Do you think that there's not enough information, or they're not getting it?*
- F1** I just think most people do it to look cool. Like I don't think they really think through when they smoke, what it's actually doing to your body.
- INT** *So that awareness of it is really important, yeah? And that's, that's across the board? A lot of youse sort of see the same thing? That people try and do it cos they think it's cool?*
- M5** Trying to show off.
- F1** Yeah.
- M3** Yeah. Hmm.
- INT** *It's a show-off sort of factor, yeah.*
- INT2** *Is that like a rebellion type thing? Or?*
- M1** Yeah. Probably.

For some urban participants even among non-smokers there was very high visibility of smoking at their schools and they could easily identify key locations within school grounds where smokers congregate. One school had a very permissive smoking environment and participants estimated at least half of all students smoked and that there was little consequence of this, as some teachers also smoked in sight of students or were reportedly fearful of students. Awareness of students smoking in the toilets during class time was common.

Int 8

- F1** But most of them, most of the year sevens hang out with year twelves, so that they can buy smokes. Year twelves can buy smokes from there. So that's where they get the smokes from.
- F2** The teacher smokes, so
- F1** It can really put an influence on the kids
- M1** But the teachers go outside the school gate and, or some of them, or some of them waits until after school.
- INT2** *Yeah. Do you reckon the teachers feel like they can't really say much about it if they're smokers themselves?*
- F2** Yes.
- M1** Harsh. Nah!
- F1** Yeah, plus some of the teachers are scared of us students because most of them hit um, the teachers.
- INT** *Students do?*
- F2** Yeah.
- INT2** *Sounds hectic.*
- F1** It is. This school is one of the worst.
- M1** The most students that smoke.

F1	Because they can, I guess.
F2	Now it's just a bad school, bad environment to be like taught in.
INT2	<i>It sounds like smoking's the least of your worries. Because there's a whole lot of other stuff going on.</i>

Positive, reverse peer pressure was described by one participant who was worried about losing his friends or what they would think of him if he started smoking. Although pressure from peers to smoke was reported by many, some felt they could confidently say no and avoid personal exposure. Some also reported smoking directly impacted friendships creating tension when encouraging smoking friends to stop. These points also relate to self-efficacy and confidence under Theme 4.

Int 12

INT	<i>So, um, how does it make you feel though, when, when you sort of know the effects, and having that experience of having a cigarette, how does it make you feel knowing that they don't want to listen?</i>
F1	Oh, makes me a bit upset. You could like kind of take all that advice from someone and then try and give it to someone else, to try and prevent them from...stopping what they're doing, or their habits, negative habits such as smoking, or anything. Negative habits such as drugs, alcohol. But like I said, you can't really force them to stop, as much as you try, they're not going to listen to you regardless. So it does hurt a bit.
INT2	<i>Those conversations are hard, has it affected your friendships at all when you've had those conversations?</i>
F1	It has to a few, but you gotta learn to move on. You get over, you win some you lose some. Just gotta flow from that thing.

2.3 Smoking among family members

The majority of participants did have family members who smoked and this visibility was perceived to directly contribute to smoking initiation, through observation and curiosity or direct encouragement, as well as simply a normalisation of smoking. For the older participants, this normalisation created an environment where smoking was more a collective action and a behaviour that was transferred generationally, as opposed to an individual behavioural choice, with smoking taken up almost unconsciously in this social context. Two participants reported their mothers had first quit when they fell pregnant and continued to be smoke-free.

Int 11

F2 My mum's a big smoker too. She started smoking when she was about twelve. Same with my brother. His father, he started smoking when he was about twelve. And my sister, she started smoking at a young age too. But because I had health problems, I didn't start smoking till later in life.

Int 11

INT No. Ah, um, I briefly want to talk very quickly, with the response "live with Mum", yeah cos these could be, why would living with Mum make you more likely to smoke? What about if your mum was a non smoker?

F1 Like mine.

F2 My mum is a smoker, and her mother is a smoker, and so was her mother. So um, I don't know, it's just like

INT So it's a generational factor?

F2 I guess, yeah. Um,

INT Mum's always been a smoker?

F2 Yeah, Mum's always been a smoker, since a young age, and so was her mother, well now me and my brother and sisters smoke, and my brother's kids smoke. And it's just yeah. I don't know. It just, like I don't know I don't know why I put it in that pile.

Int 1

F1 But my son, he's only two, and his nan like came down from [Town2] and she just, she was staying at my house and she kept going out the back smoking. And after she left, he'd get up and be like "mum I want a moke". That's what he said.

INT1 Hmm,

INT2 Ohhh

F1 That's what he said. And I was like "what?" And then he's like "I want a moke". But see, cos he noticed her smoking. Cos like nobody else in the house smokes, but seeing her kept, keep going outside, and then he probably thought he'd be able to go outside if he smoked. Like that's, it shocked me when he said that.

Whether family members smoked or not did not automatically correspond to the adolescent's own smoking behaviours. One participant lived in a smoke-free household and reported sneaking out to smoke. For some, smoking family members was motivation for their own smoke-free choices, but others reflected with some irony that although they had been strong non-smoking advocates in their early years and had actively encouraged quitting, social influences had led to them taking it up themselves. These were occasional 'social' smokers who felt there was a difference between their smoking and their family's regular smoking.

Int 4

- INT** *What were your thoughts though when you seen your mum and that smoking?*
- M1** Oh, I thought well “like, why do you smoke? Don’t do that, I don’t want you to die” or something, you know what I mean?
- INT** *Oh, ok.*
- M1** And then now I’m doing it. Only when I drink though but still, I don’t reckon I should do it, cos, it’s not a healthy thing.

Int 10

- F1** Um, most of my family smokes, not any more. My Nan used to smoke, she got cancer from it. Um, I used to hide her smokes from her. She used to get really angry. It was really funny. You know, it was a good thing. I used to, cos she had cancer, she wasn’t supposed to smoke. So. Yeah.
- INT1** *So knowing that Nan had cancer, what made, what made you want to smoke?*
- F1** Mostly just people around me. I don’t do it all the time, you know, just mostly when I’m around people.

However, some non-smoking participants lived in households with very strong anti-smoking expectations which translated to their own smoke-free intentions.

Int 6

- INT** *How do you know that you would get “flogged”? Like, do you talk about it at home?*
- F1** Oh my parents told me
- INT** *So, what do they say?*
- F1** Oh, they go, “if you ever get home, or if I get a phone call to say you were smoking, you’re gonna get flogged.” I’m like ok.

2.4 Smoke-free homes and second-hand smoke exposure

Having a **smoke-free home** and **anti-smoking rules** (parents’ expectations or designated smoke-free spaces) were identified as key to preventing smoking.

Int 2

- INT** *How important’s this one [smokefree home], and why?*
- F1** It’s very important. Teach your kids not to smoke. Give them the healthy lifestyle.
- RO** *I think too, like the passive smoking. Like having a smoke free home, you don’t, you’re not exposing your kids to it as much as what you would if you were to be smoking inside.*
- F1** Yep.
- RO** *Cos they don’t really get a say. Yeah, you choose to smoke but your kids don’t choose to inhale it.*

No participants reported living in homes where smoking was allowed inside and many said visitors were respectful of this expectation and would ask permission to go outside

and smoke. Some also noted that ‘outside’ was understood by visitors to mean far away from the door out by the fence.

Int 9

INT	<i>What’s it like for you two at home?</i>
F1	Um, our dad smokes.
INT	<i>Your dad smokes?</i>
F1	Yeah. Most of his family does. Like um, grandma, poppy, and all that. Um, yeah.
INT	<i>And do they smoke inside the home?</i>
F1	Nah, outside.
INT	<i>When people come to visit your house, do they generally smoke outside as well?</i>
F1	Yeah.
INT	<i>And do they ask to smoke?</i>
F1	Um,
M1	Yeah.
F1	Yeah.
INT	<i>What, do they actually, like do they say is it ok to smoke outside?</i>
F1	Oh, yeah, they ask if they can have one and go outside.

While there have been important changes in the home environment reducing second-hand smoke (SHS) exposure outside the home was still a concern for some. One young mother felt that not all community members were aware or concerned about the harms of SHS and did not think to move away from a pram in public places but that she was unable to say anything. One young participant reported feeling upset by being involuntarily exposed to smoking by their peers.

Int 9

F2	Upset to be honest. Like, like if they’re smoking round me, like you said before, I didn’t ask for that to come onto me, no. Yeah. I don’t know, write up a school program or something.

2.5 Knowledge of harms and impacts from smoking

Knowledge of the harms of smoking was high among all participants. They described several physical health impacts to the smoker including death, cancer, damage to lungs or breathing problems as well as being unhealthy in general, impacts on fitness and more cosmetic impacts around teeth, smell and skin. Many had first-hand experience of smoking harms with family members who were sick or had passed away with smoking related illnesses including from second-hand smoke exposure.

The financial impacts from the high cigarette cost and loss of future opportunities or time with family were also mentioned. They also discussed SHS and burden on family as examples of harms to others. There was some perceived differentiation of levels of harm from lower smoking intensity among those who identified as social or occasional smokers, and they felt it was an important distinction.

Int 8

- INT** *Hey. And what it all comes down to is I suppose this is sort of a message from myself, is um, if we don't smoke cigarettes at all a lot of these factors go away. A lot of them go away.*
- F2** *So if youse don't smoke, you don't smoke. You're free of it.*
- F1** *You save a lot more money.*
- INT** *Yeah. You can sort of*
- F2** *Not even that. If you don't smoke, you're saving money, and you're saving yourself from like that mental, that unhealthy state of life. Yeah.*
- INT** *Yeah, cos there's a flow on effect, isn't there?*
- F1** *Yeah.*
- INT** *So as youse can see, all of this is sort of intertwined and all connected with each other. And if we don't smoke, so much of it goes away.*

Although knowledge of harms was high, sources of this information was often not clear or uncommon. Some groups reported learning about smoking harms at school but overall this seemed infrequent and a lower order issue behind mental health. Awareness of social marketing activity was fairly low with most reporting they had not seen many advertisements or posters in recent years but do recall seeing them in the past. However, some were able to recall and describe specific ads ('Terry', 'Everybody Knows', Nicorette) and the call-to-action (Call Quitline, get the app). Some noted there were usually posters up in the ACCHS. One participant said that the social marketing ads were the main reason they did not smoke. Many were able to refer to specific graphic health warnings on cigarette packets as sources of information (and to even describe the "Brian" execution).

Int 5

- M1** *I think that's the main reason I don't do it. Cos you know, you see ads and that on TV.*
- INT** *Yeah?*
- M1** *Um, yes. My biggest turnoff. Lung cancer and that's a big thing. Don't want to do it. Cos you put your family through a lot and that.*

Int 4

INT1 *Is that sort of the only awareness you see? Do you see anything with TVs and that?*

M1 Oh, ads and that. Yeah, I see ads and that, like quit smoking, call smoke line, or help line or whatever it is. I don't know what it is. I seen it on ads.

AHW *Do you see much though?*

M1 No I hardly see stuff about smoking to be honest. Only thing I see is all the stuff from the packets of people like dying and yeah. That stuff. That's the main thing I see on the smokes.

INT1 *What do you think when you see those?*

M1 It's horrible.

INT1 *Makes you not want to smoke.*

M1 Yeah, it does. It does. I don't want to end up like that. Know what I mean? I don't want anyone to end up like that.

AHW *Foot cut off and stuff.*

RO *Blood on the tongue.*

M1 Yeah, stuff like that. Lad was like a fit fella looking healthy, and then just skin and bones.

INT2 *That's 'Brian'*

M1 Yeah, Brian that's the one I'm talking about.

INT2 *The internet thinks he's not real but it's a real guy.*

M1 You knew who I was talking about, eh?

AHW *The one with the bald head? Yeah I think I've seen him.*

However, some questioned the impact of warning labels and campaigns as many people still smoked. This relates to a recurring sub-theme that knowledge of harms was not enough to prevent smoking, particularly when it facilitated bonding or social cohesion as part of sharing cigarettes and the shared experience of smoking together. This was not discussed as a positive perception of smoking but more as an explanation why participants had started or continue to smoke socially despite knowing the harms of smoking and holding negative views.

Int 11

INT *Yeah? Um, twelve years old, um, when you first started smoking, were you aware of what the consequences, or what smoking does to you?*

M1 Yeah.

INT *You were? And it still didn't turn you off smoking though?*

M1 Nah. No.

Int 11

- INT2** *Um, hey [M1], with your uncles, do you reckon if they knew what you knew, they would have been encouraging you? Or was it more like they just wanted to share and bond?*
- M1** *They wanted to share.*
- INT2** *Yeah. So they probably still had a bit of knowledge, but it's more about bringing you into the circle?*
- M1** *Yeah.*
- INT2** *Didn't want to make you feel left out?*
- M1** *Yeah.*
- INT** *Interesting. Interesting. And yeah, and, and none of that's your fault, bud. That happens everywhere. Like I was, that happened to me as well when I was very young. My uncle did that to me, but when I went straight inside and told my Nan, my Nan chased me with the broom. Um, but that was my first introduction to a smoke, at twelve years old. He was "come here and try this". And I coughed up and coughed up. I spewed everywhere, and my Nan said "what are you doing spewing out the back", and that's when I just spat it out. I can still see her running past the chickens going..... But yeah, so it does happen.*

2.6 Historical knowledge and awareness of policy or legislation change

Younger participants had low levels of awareness of the changes to the smoking environment over the past two decades of tobacco control and how the formerly pro-smoking environment had contributed to the long-term dependency they saw in their families. Older participants who were smokers were acutely aware of these changes over time and reflected that when they were first introduced to cigarettes it was common to be around smoking inside cars, homes, restaurants, pubs and clubs. They expressed regret at starting to smoke, noting that it was becoming harder to smoke with the increasingly high cost of cigarettes and smoking restrictions with a sense it was no longer worth it.

Int 11

- INT** *Yeah? And you wish you had ever, do you wish that you never ever took it up?*
- M1** *Yeah.*
- INT** *So if they were in place when you first started smoking, do you think you were more likely to smoke, or less likely to smoke?*
- F2** *I'd like to think less likely. But yeah. Cos of all the, like all the um, things in place now about being able to smoke here, there and everywhere, I probably would of, back then. You had more freedom back then. And the smokes were cheaper back then. They were cheaper and you were allowed to smoke in more places. You know, there weren't that many rules, but now there's so many rules around it, and they're so expensive, and it's just, it's starting to feel like it's not worth it anymore, but it's really hard to quit.*

In addition to low levels of awareness of tobacco control there was very little knowledge of the historical introduction of tobacco to Aboriginal people. MC provided some tobacco education as part of the yarning circles and this history of use in Australia was of particular interest to younger participants and provided an insight to how they might respond to this information in a formal tobacco education program that incorporated stories. One participant in particular asked multiple questions about MC's own personal and family history with tobacco use.

Int 9

F2 So, you know how you said smoking was all round you, how did you cope with it? Like what did you do?

INT *Um, well I don't know. It was hard. Like there was not much you can do. The laws were different back then, so laws, you were allowed to smoke in the house, you were allowed to smoke in the car. You're allowed to smoke in an office. You were allowed to smoke in a café. You were allowed to smoke in a pub.*

F2 Did you end up getting pressured a lot?

INT *No, so I smoke, I smoke. I started smoking when I was eighteen and that was through influence. But um, you know, this is twenty five years ago, so a lot of people, it was just everywhere. So it was very hard, um to say no to it really. Cos it was just, you'd go*

F2 Like to parties?

INT *Yeah, I think it was probably easier at a party. If you go to a party, there was always sectioned off, like there was smokers down near the, you know, the yarndi smokers there, the spirit drinkers there, the beer drinkers there. So at a party it was good, cos you didn't get around it. Um, but yeah, when I turned eighteen it was really hard cos I was where all the adults were, and yeah, it's something I don't, I don't encourage anyone else to do cos it is, this here is what it becomes, is this here. It becomes addictive, yeah. So even though my personal story, there's been four occasions where I've tried to give up, um, these days it's a lot easier because people, a lot of people don't talk about smoking, and the advertising's not around as much. And obviously, like I said, the new laws that have all changed. You know, you can go to smoke free environments now everywhere. So it's very easy to,*

F2 So, the laws we have now and that, do you, like wish they were there when you were little?

INT *Yeah, definitely. Yes I do, yeah. That's a good question. You should be a reporter.*

INT2 *That was an excellent question.*

INT *Yeah, yeah it is. But these are things that I sit back actually, and think on, if all these things that are part of your generation now, the laws, and restrictions, if that was in place when I was younger, then yeah. Cos, you know, when I look back on it now, um, majority of my elders have all passed away from cancer, from cigarettes. So, very preventable diseases. Um, if the laws had changed many, many years ago, then a lot of my elders would still be alive today. I know that for sure. And the fact that cigarettes and alcohol was an introduced thing to our people you know, makes it even,*

um, makes it more upsetting in a way. There was no need for our people to have these influences given to us.

F1 So, when you're um, when you're like, your uncles pass away from smoking, cancer or something, did you look on that and try quitting? Once?

INT *Yeah, yeah. Definitely. Um, yeah, all my uncles, the majority of my mum's sisters, they all smoke except for one. All my mum's uncles smoke. On my dad's side of the family, there's only two siblings that smoke. But, you go back to the generation before that, all my grandparents and all their siblings, they all smoke, and drink. So slowly it's sort of changing, within my sibling groups, there's only myself and my younger brother that smoke, and the others don't. But yeah, I just, if the laws had changed a lot back two generations ago, I know a lot of my family members would still be alive today. Still be alive today. Cos yeah, as I was saying earlier, with the campaigns back in the eighties and the nineties, were all about cigarettes, go and buy a cigarette. You know, there was a lot of actors, we had one famous actor, James Dean, he was always, he had a photo with a cigarette in his mouth. And James Dean was a real cool famous actor. But it's just during all that, during that sort of era...*

2.7 Vaping

Only four groups spontaneously mentioned vaping (e-cigarettes) and three had direct experience or exposure. One had observed vapers in public but generally dismissed it as embarrassing behaviour. One participant who asked if it was for quitting described a friend who switched from smoking to vaping and continues to use at a similar intensity.

A group of urban secondary students reported high levels of vaping among their peers, particularly using JUULs and vape pens that looked like USB sticks and pens. This group said these were brought to school and used in the classroom. They discussed the large clouds of vapor, the attempts to blow smoke rings and the range of different flavours. Generally, there was little or no knowledge of the contents or potential harms stating their peers believed there was no nicotine, just water or air, and that it was less harmful than smoking.

Int 6

F1 Vaping's stupid. What's the point of that? *[Mimes cloud of smoke]*
INT *Maybe they think they look like a magician or something.*
F1 Yeah, like, they reckon they're mad. They make themselves shame. So shame. Dumbest thing ever created.
INT *I think it's weird too. They've got the whole kit, and they unpack it.*
RO *And all the flavours. They have different flavours.*
INT *Um, do you see many people vaping in [TOWN]? I haven't seen anyone.*
M1 Nah.
RO *No, we never see it really.*
INT *I saw it at the shop, but*
F1 Every now and then but not all the time. I see someone what an idiot, how stupid is that. How stupid is it to just stand there, inhale some smoke and blow it out? "Oh because it tastes nice." It's so stupid.

Int 9

INT2 *I was interested to know about vaping.*
M2 Yeah, she's got a point there. Vaping. Lot of that around now.
INT2 *Really?*
F1 Can vaping cause cancer?
INT2 *We don't know yet. It's too new*
M4 And Shisha as well.
F2 There's a lot of that going around.
M4 A lot of people at night go do shisha.
M3 People bring that to school too
INT2 *They bring the vapes to school?*
F2 Yeah.
INT *It's a very unknown thing.*
M1 Especially when it blows up in your face.
INT *There's a lot of things. For me personally, I wouldn't do it, I wouldn't do it because there's still a lot of research around that area. Um, when it comes to things like these, especially this society, these days, this is just a craze. So unfortunately it's just going to hang around. So people will do their vaping craze and then they'll move on, but then there'll still be people um, come through later life and still do it, unfortunately. But yeah.*
INT2 *The ones that are bringing...*
INT *Well, how does it, how does it make, how does it make youse feel when you see people, what is it, vaping? They call it? How does it make youse feel?*
M3 I just laugh, I don't know.
INT *Yeah?*
INT2 *What are the devices that they have? Cos I know there are some that look like little USB sticks, and*
M3 Yeah, the JUULS.
INT2 *Yeah, is that what they have?*

M3	Yeah. Hmm. You can also get them, it looks like a pen.
INT2	<i>Oh, really?</i>
M3	It's called a vape pen. Yeah, they just, they just have the different flavour too eh.
M5	There's a strawberry one and a coffee one. You know, them drinks.
INT2	<i>That's how you get around the like, disgusting smell and taste, if they've got like</i>
M3	Yeah, yeah.
INT	<i>I've seen videos of them, but just yeah. Is it, does it happen a lot here? Vaping?</i>
M4	Yeah, they all try to blow circles.
M3	They even do it in class.
M2	The teacher will be writing on the board and they'll go and then put it in their bag. It's funny.
INT2	<i>What.</i>
INT	<i>So, do youse regard vaping as smoking?</i>
F2	Yeah.
INT	<i>You do?</i>
M5	Yeah.
INT	<i>Yeah?</i>
INT2	<i>Do you think that people think that it's, I know you asked the question about whether it was as harmful, do people have any idea about whether it's harmful or not?</i>
F2	Um, people who do vaping think it's less harmful than cigarettes.
M5	Yeah, they say it's just water vaping. Just water.
F2	Or just like air.
M5	No nicotine in them.
INT	<i>So yeah, that's the scary thing about it. It's just that there's a lot more research that's still being done about all that. Um, yeah.</i>

Theme 3: Non-smoking as a sign of good physical, social and emotional wellbeing

3.1 Substance use

There were a range of other health behaviours that were seen as being important for adolescent smoking initiation. **Alcohol and other drug use** were particularly important. Many reported only smoking when they drank, or that initiation occurs at the same time as drinking begins such as going to parties or going out to licensed venues, or for established smokers that their smoking increased when they drank. Mixing tobacco with cannabis was understood to be common practice which then contributed to nicotine addiction.

3.2 Sport and fitness

Participation in **sport and fitness** was seen as protective against smoking through more broadly keeping fit and active and maintaining a healthy mindset, not being bored and drifting into other activities (relates to Theme 4), as well as not wanting to risk impairing athletic performance.

Int 7

M1	And if you're, for sport, if you're in a rep team, or if you want to be big in a particular sport, sporting, ah, smoking
M2	Won't help you.
M1	Won't help you. It'll just make you go down track, and it'll just be bad for you, in anywhere you want to be.

For many, smoking was a symptom of greater concerns, beyond knowledge levels or number of smoking peers, and that good health and social and emotional wellbeing was important for being a non-smoker. One participant said he would think differently about formerly non-smoking friends who start for the first time and see it as an indicator of what else maybe be going on in their lives, and the underlying drivers at home or in their relationships.

Int 5

INT	So when someone starts smoking, it's not just about the smoking? You think about them in a different way.
M1	Yeah.
INT	What other things do you think about, is going on in their lives if they've started smoking?

M1	I could, like I'd worry about what's going on with their family and stuff. Start asking questions and that. Yeah.
INT	<i>I think that's where some of this is coming in.</i>
M1	Yeah, there's always a reason they're doing it. Starting smoking. There's always a reason.

3.3 Mental health and stress

Poor mental health and stress were seen as key drivers of smoking. Stress was discussed widely and while there were general descriptions of “stress” many specific factors were seen to contribute to stress which then increased the risk of smoking. These included having seriously ill family members and grief if they had passed away, moving houses frequently, experiences of bullying and being in trouble at school or with police and getting expelled or going to youth detention (which relates to Theme 4).

Int 8

F2	Most teens smoke in that school, but the main, the main focus around the school is like depression and that. Smoking's not really, but some teens smoke and drink and do drugs, thinking it's going to fix their life up. That's not going to.
INT2	<i>Do you think there's a, you can see a relationship there between the depression and the smoking?</i>
F2	Yeah, cos I go through bad depression myself. So I understand why they do it. I would never, I would never pick it, but I'll fight depression, but I won't go smoke and try and give my life up. That's just bad.
INT2	<i>What are the other ways that you manage your depression then? That people could learn from you. What are the different things that you do instead of smoking, when you're trying to make yourself feel a bit better, and?</i>
F2	I just forget about the bad and like focus on the good.

It was rare for smoking to be discussed positively in this research. The exception was in relation to using it as a stress management tool, a form of self-medication and an opportunity for time-out. Particularly for participants that had small children and made their homes smoke-free, this provided an opportunity to step outside and have a break as the kids knew to stay away when someone was smoking. It was also described like practicing a form of mindfulness, forcing them to slow down and focus on breathing.

Int 11

- INT2** *With the stress, is it, does it help with the stress? Or is it just kind of automatic, like is it a chance to have break, or does it make you feel more relaxed? Like, what is it that helps you with stress?*
- F2** A bit of both. Like I know the kids can't come near me if I'm having a smoke. Cos I go outside and smoke, like "you stay inside, I'm out here smoking, leave me alone".
- INT2** *Ah ha. Little private bubble.*
- F2** That's why, five minutes for me to sit down and what I've been told, to have a smoke, you literally physically have to calm down because if you're running, or if you're walking around, you can't smoke as well. Because your lungs are working to help you breathe. So, you've got to sit down, relax so then you can inhale the cigarette. It is forcing you to sit still and to relax, just so you can smoke a cigarette. That's, yeah, so to have a cigarette you need to relax yourself, and yeah. I use that a lot.
- INT** *I must admit, I've never seen someone running and smoking at the same time.*
- F1** That's true.

Int 11

- INT** *Right. um, anything else on this table in whatever spot they are that you'd like to talk about, and why? Like, the importance of them. Something else that sticks out?*
- F2** I think probably moving house a lot.
- F1** Oh, that was mine. I was sick of moving. Cos I always moved around a lot. My parents, my parents are strict parents. That's why I used to go hiding and do my smoking on the side Um, they still are strict. So I said once I turn eighteen, I was moving out. And then I did, and I just been, I was hopping house to house.
- INT2** *Moving is the worst. [INT] just moved on the weekend. So is it the stress of moving?*
- F1** Ah, no, it's just moving in general. Like having to pack your stuff.
- INT2** *The disruption.*
- F1** Just want something that's stable, which is where I'm at now.
- F2** I'm the same.
- INT** *So you'd smoke because just the worry of having to move to a new place, move everything, and packing and unpacking.*
- F1** Yeah.
- INT** *Ok.*
- F2** But sometimes it's also the thought of not knowing where you're moving to.
- INT** *Ok, yeah, yeah.*
- F2** And stuff like that. Cos I've moved houses quite a lot too, since I was about eighteen. And I felt like it did worry me sometimes cos I didn't know where I was go, so like her, I was couch hopping. I moved probably ten, fifteen times in the last couple of years. And right now, I'm in a transitional house, so I'm going to be moving again in a few weeks. Maybe, or it could be a month, or it could be two. I don't know.
- F2** So, it's always the, the fear of not knowing where I'm going to be able to set up a permanent house for me and the kids, yeah, cos we haven't had stability, we've moved, I've had the kids for about a year and a half now, and I've moved house three times.

<i>INT</i>	Wow, ok.
<i>F2</i>	And we've got to move again, and again, and it's just like, it stresses me out knowing that we can't unpack all our stuff, just because we know that we're going to be packing up again in a few months. And the kids, it's not fair for the kids. They don't get a chance to set up their rooms and they don't feel like they've got a stable home. Hmm. So that does stress me out as well.
<i>INT2</i>	<i>Are you feeling that stress too?</i>
<i>INT</i>	<i>Do you feel it [M1]?</i>
<i>M1</i>	Yeah.
<i>INT</i>	<i>Yeah, that obviously would be an every day stressor.</i>
<i>F2</i>	Well, I was basically homeless before I got guardianship of the kids. So I've had to find a stable house, I've had to rent private rental, pay an arm and a leg for a fricken week, just for rent. Just so I could get the kids, and then I've had to quit my job to look after the kids. And then I've had to move because I couldn't afford the rent. And I've had to move from that place to that place, and I'm just stressed.
<i>INT</i>	<i>That's a huge combination of things, yeah. Yeah. But yeah, so having them everyday stresses, and having the instability, not being stable?</i>
<i>F2</i>	Yeah.
<i>INT</i>	<i>And having the, not have a choice of where you're living, being transient, everything else, yeah that would</i>
<i>INT2</i>	<i>That undercurrent of uncertainty, it's just always sitting there. You don't know what's going to change, when.</i>
<i>INT</i>	<i>I hear your anger. I actually get a bit frustrated thinking about it. I hear you sis. Keep your head up.</i>
<i>F2</i>	It is.
<i>INT</i>	<i>It'll turn.</i>
<i>F2</i>	That's why I need my smokes.

3.4 Nicotine addiction

Many tied **nicotine addiction** to stress, in that smoking was used initially to manage stress and over time developed an addiction and the cycle continued.

Int 7

<i>M1</i>	Is there addiction in there?
<i>INT</i>	<i>Addiction. Addicted.</i>
<i>F1</i>	Yeah, that one.
<i>INT</i>	<i>So, why have you chosen addiction, or addicted, brother?</i>
<i>M1</i>	Um well, it comes under stress and, as well, because once you smoke, it, that's a way that it could make your stress go away. And once you have that, like
<i>M2</i>	Once you start smoking
<i>M1</i>	Yeah, you get heaps addicted to it because it takes away the stress.
<i>INT</i>	<i>Yeah, so once you start, it's hard to stop?</i>
<i>M1</i>	Yeah.

Int 9

M3 Mine would probably be stress and addicted. Because you know, some people will try it once out of stress, you know, just to get rid of all your stress, and then after one, you become addicted, and you just keep going and going.

Int 4

M1 I don't know. It could be like depressed. Like, feel like you harm yourself or whatever. And you need a smoke to calm you down or something. For example like yarndi. And then same thing, like if you're stressed out, like going through court, family members in hospital crook. Just want to smoke, try and relax yourself. And then addicted, since you started, you're just addicted. Ever since you started.

3.5 Family illness

While a **serious illness in the family** was seen as stressful that for some could be managed by smoking, if it was a smoking related illness non-smokers found the close observation of the impacts of smoking reinforced their decisions not to smoke. However, for some established smokers the stress outweighed the knowledge of harms (this relates to Theme 2).

Int 7

M1 If you have a family member that's sick and you see like, the pain and the stage that they're going through. You feel like upset because you don't want them to be like in that, in that stage, and it will help you not want to be like them, in the bed.

Int 11

INT *Um sick family. So if you had family that was sick, and dying and saying affected through cigarettes, do you think that would turn you off smoking, seeing them pass away with time, and cancerous, and?*

F2 See there, I'm torn. Like yes it would turn me off smoking, cos obviously all the bad stuff instilled into your body and stuff, but it would also make me want to smoke, just because of the stress factor involved. So, my family member's dying, like there's nothing I can do, it's just it's gotta stress me out and it's my family's all stressing. Like, we're going to bury somebody, they're dying. Um, it would just like put my stress levels right up. So I'd be smoking because of the stress, but I'd also be thinking like I need to quit because look what it's done. You know what I mean? But I'm a bit torn with that.

INT *So, smoking, at the time as a calmer for yourself? So you'd smoke just to calm yourself*

F2 Yeah

INT *Calm your stress?*

F2 Yep.

INT *But at the same time you know that*

F2	I know that it's doing more harm than good. Yeah. But just at that time, you feel like you just need to have a smoke just to catch your breath, catch your thoughts, just stop for a second.
INT	<i>Ok. So that's going to smoking harms. You know what the smoking does to you, but at the same time you, your own</i>
F2	At the same time, you're addicted and you can't just quit it like that.
INT	<i>It's your calmer.</i>
F2	Hmm.

3.6 Relationships

The role of family relationships and friendships was unclear. These relationships were perceived to be a potential source of strength for preventing smoking or supporting quitting but very much depended on the quality of the relationship and whether they were supportive of non-smoking (relates to Theme 2).

Int 7

F1	Yeah, cos it's like if you're stressing, you're always going to like have your family and friends there to support you, to not smoke and stuff.

Int 7

M2	Family relationships.
INT	<i>Yeah? And why do you, why do you say family relationships?</i>
M2	Um, just say if you feeling stressed your family can help you instead of smoking. Cos when people are stressed they smoke, or if other people are stressed, then their family can help them.

Int 9

M3	And on this side, mine would probably be fitness and family. Cos if you have a strong family, they're behind you, you know, make you quit. Or you have a bad family that doesn't give a shit, you know, they just keep lending you, and fitness is also good to stay healthy.

Theme 4: Importance of individual empowerment and engagement for being smoke-free

4.1 Disengagement, boredom and rejection of harms

While many believed there was no particular reason behind smoking and that it was simply **personal choice**, different experiences and attitudes informed those choices. Young people who were **bored and disengaged** (including getting in trouble at school or with police) were seen to be at higher risk of smoking, **short term focused** and interested in **cultivating the rebellious or ‘cool’ smoker image** while **rejecting the harms** by rationalising that they were only smoking a small amount, infrequently or just while they were young (these relate to Theme 2).

Int 9

F1	Um, mine would be that friends smoke. I think it's also to do with trying to look cool. Um, I think you shouldn't have to wreck your body to try and look cool.

Int 9

INT	<i>Would you, would you encourage more people at the school, that don't smoke to say more? Like to say "don't smoke". Know what I mean? Like to encourage those that do.</i>
F1	Even the people who do smoke, like ask them why. Why are you doing that?
M1	It's the quickest way to kill yourself because no way,
INT	<i>Why do you say that, bud?</i>
M1	Because some people will know that the cigarettes will actually kill them. Like eventually when they grow up.
INT	<i>Right, so you're not talking suicide, we're just talking about longevity.</i>
M2	Yeah, that's what they mean. They're all doing it because they think it won't happen to them, till like a couple of years.
INT2	<i>You saying that they're not really worried about the long term?</i>
M2	Yeah, they're not worried about the long term, they worry about short term.
INT2	<i>Do you think overall people do know that it's harmful?</i>
M2	Yeah.
INT2	<i>Ok. But they're just thinking it's ok for now?</i>
M2	Yeah, exactly, they're like you know, "I'll quit after school".
INT2	<i>Quit after school?</i>
M2	Hmm. When school finishes, they'll quit, but they just keep going.

4.2 Empowerment, engagement and self-efficacy

Young people who were more positively **engaged with their community and culture** (Theme 1), and future focused, including at school and thinking about their life post-school, were more **empowered to resist** smoking even when in high smoking environments (Theme 2). They displayed **the self-efficacy** to navigate smoking environments, and were very comfortable and confident to reject offers, remove themselves, publicly advocate against smoking and to advise others not to smoke. For them, their long term goals were tied directly to short-term smoking behaviours.

Int 12

- INT** Yeah? And do you, what, how do you think they started? Because of other people around them? So, influences. So just similarities to you, sis, where just being round the wrong crowd and that's sort of a tendency out this way.
- INT2** Hmm, you've never been, never felt like that, that someone's trying to get you to start? That's good. Do you feel like you'd be able to say "it's not for me"?
- F2** Yeah. I say no.
- INT** And you will always be a non smoker? Yep. And you'll be a non smoker?
- F1** Yeah, I got a future career I've got to focus on. Can't do that shit.

Int 5

- M1** At parties. Do it a lot at parties when they're drinking. They decide to smoke. I don't really like it. I just walk away from them. Cos I don't really like even seeing them doing that.
- INT1** And have they ever tried to
- M1** Yeah, they try to ask me but I don't do it.
- INT1** Right. Good.
- INT2** Do you feel ok about that?
- M1** Yep. I like being different. And I like, you have to be your own person, you don't have to follow other people. I'd rather be a leader than a follower.

Int 3

- INT** And what does it make you think? Like do you want to be like them and smoke? Would you want to smoke like them?
- M3** Stay away from them.
- INT** What turns you off then? What makes you think "oh, I don't want to do that"?
- M3** Just your future.
- M1** Ask them what their dreams are. And then if they say whatever, then you say you're not going to get it by smoking.

Int 7

- M1** If I was with my friends and they pulled out a ciggy and started smoking I would like, I wouldn't be their friend.
- M2** I'd pull them up straight away.
- INT** *Oh yeah? What would you say?*
- M2** I'd just go that's not good for you. You shouldn't be smoking at this age. Yeah. In the long run, it's going to affect you, not anyone else but yourself.

Int 12

- INT** *So they're still smoking now?*
- F1** They are, yeah. I tell them to stop but you can't really force somebody to stop if they're not willing to stop, or not willing to take your help, your advice.

Designing a prevention program

In the final stage of the discussion participants were asked for their thoughts on potential programs to reduce smoking in their communities in relation to core objectives, target audience, settings, key features and timing.

Objectives

Participants agreed there is a need for general smoking prevention that provides information and education to young people prior to initiation. It would also be important to not only encourage quit attempts but offer greater cessation support to young people who are already smoking regularly and have developed nicotine dependence. There was also a general acknowledgement of the value of broader healthy lifestyle and skills programs that may include a focus on nutrition, mental health and stress management, other substance use, managing peer pressure (for smoking and other behaviours) and promote a general positive life and future focus.

Int 11

- INT2** *Yep. Um, for the high school kids, [M1], would it be preventing or help to quit, or everything?*
- M1** Yeah, probably everything. Yeah.
- INT** *What would you rather? Would you rather help to quit,*
- M1** Yeah. Help to quit.
- INT** *Or would you rather an awareness one? Help to quit. Um, would you rather, would you prefer one at school, so that you can stay at school?*
- M1** Yeah. One there.
- INT** *So a program at school?*
- M1** Hmm.

Int 10

INT2	<i>Um, [FY], so your question was whether it was about preventing or getting people to stop. Do you think any of your friends are smoking enough that they're addicted, that they might need actual quit support? Like nicotine patches, or anything like that.</i>
FY	None of my friends, but there are some people at school who do smoke a lot. Like, even younger than me, they're in year ten, and they're smoking heaps of cigarettes. But you know, I think they just do it to look cool, cos they want to be cool type of people. Yeah.

Target audience

It was clear from the discussions that there is a need for tobacco prevention to reach young people across the total period of adolescence and young adulthood. A particularly important period for experimentation was the early teenage years/early high school (aged 12-13 years). However, as starting high school and going into Year 7 was a key time point some felt it was important for education to begin in primary school (students in year 5 or 6 and from age 8-10 years) so students were already primed with knowledge of smoking harms before they entered high school where access and exposure increases. Others noted that this needed to be sustained throughout the high school years as information provided at age 12 was likely forgotten by 16-17 years. Further, with turning 18 another key period for initiation it was thought that programs needed to continue to reach people into their 20s.

While some felt there was an opportunity for a whole of community program that reached smokers of all ages, others felt there had been a focus on supporting Elders to quit and it was now time to focus on the youth. If wide age ranges were included it was noted that this would need to be managed carefully as some young people would not want to speak or participate in front of adults (estimate to be aged 26 and over). Others felt it was important to allow the younger children join in as they can often feel excluded.

There was no real distinction made by sex or gender.

Settings

A range of settings and approaches were discussed. More advertising and social marketing was suggested including developing a TV show featuring young people talking about their own smoking experiences.

There was an expectation that health professionals would continue to raise quitting with patients, but greater follow-up may be needed. One regular smoker noted that although their doctor asks about their smoking each appointment and they say they are not there to talk about smoking, they felt the doctor could push back.

Int 2

RO	<i>What are some things that you would like to see for your engagement maybe? Like what would make you engage in trying to quit smoking?</i>
F2	Um, being able to go to the doctors. I know they say it to you now, but if you say no, I don't want to quit, or maybe I do feel like quitting. Maybe if they pushed it a bit more.
INT2	<i>Does your doctor ask you every time?</i>
F1	Hmm, hmm.
INT2	<i>That's good.</i>
INT1	<i>Do they follow up though? Cos I know my doctors, they ask me every couple of months</i>
RO	<i>So we did actually at [AMS] have a designated smoking worker, and she was following up, she was following up clients all the time, she was in the same office as us and she was ringing them at least once a week. But she actually left and it hasn't been filled since. But she was getting quite good success rates with that.</i>
INT2	<i>Do you appreciate that? When your doctor asks, and offers support, or is it "this is not what I'm coming here for, I've got other things I want to talk to you about".</i>
F2	Yeah, I usually say that, "I'm not here to talk about quitting. "
INT1	<i>Trying to push it aside.</i>

Schools were expected to be a place where students could learn about the harms of smoking and for those attending high prevalence schools, they strongly felt it was important to be addressed in that setting. Sporting clubs were also an avenue to offer advice/education. Aboriginal community spaces were also seen to be a key setting for any smoking prevention program, particularly those with a broader health and wellbeing focus.

Int 4

M1	Have a gala day on the oval or something, and like for people who smoke, like yarn up if you're depressed or stressing out. Just have a yarn, and try and give up the smokes. Don't put yourself in that situation to go down. You could, I don't know, your lungs collapse, whatever. Could be, could die. I don't know, just try to give it up and be strong.

Features

Younger participants were not supportive of any program that was delivered as a straight health education exercise. They felt attendance would need to be compulsory for such a program and unlikely to have an impact on existing smokers. For specific tobacco prevention, participants requested hands-on interactive learning (such as a model diseased lung they could handle) and personal stories from role models, Elders and cancer survivors who could share the realities of smoking. Overall it was important for the program to be fun and interesting.

Int 7

M2	Be like, if they can get something like chemicals here, like I don't know. Like show like how smoking works. Like you know how they have that one lung and the other lung, and how you press it and how slow the air released out of the smoked lung?
INT	<i>Yeah, yeah.</i>
M2	Maybe like take some science stuff into class and stuff and show them how the smoke digests into like your lungs and stuff.
INT	<i>So the harms of smoking, like a demonstration? Or comparison.</i>
M2	So the physical so that they actually understand.
INT2	<i>Yeah, quite practical like you touch it, yeah, not just information. You get to see what it's actually doing to you.</i>
M2	Some people just get bored listening to information, they'll just sit there, doze out.
F1	Yeah, they do. Probably better to
INT	<i>So, a hands on demonstration, yeah?</i>
M2	Yeah.

Int 9

M2	I reckon we should get some Elders that's like grew up smoking and quit.
F1	Yeah, that's been around
M2	Sit around and tell you how much, tell the young 'uns you know, how it ruined them, and how they felt to inspire the little kids not to do it
INT	<i>So, so personal stories from those that experienced</i>
M2	Smoking and grew up around it.

Int 8

F2	I think the thing is, yeah, like personal reasons and that. Like I don't get like why have a program for smoking. Like some people are that stupid they're going to, they're going to think if you have some, a group of people in a room, and like tell them, you can't just tell them "stop smoking, stop smoking", and they're going to do it. So like unless they actually see the future, like what society will end up being like, like then yeah, ok. So, I don't know. It's just like I wouldn't want to run any program about smoking, cos people need to find out what smoking does themselves.

INT2 *That's a really good point. So we need to think about how we target non smokers and help them stay non smokers.*

F2 Yeah.

INT2 *And you're saying talk to them about bigger picture and life in general.*

F2 So, if I was to run a program, I'd get

F1 You don't want to miss out on anything.

F2 I would literally get someone that's experienced for this. And I will, like I will make them know that smoking can like, have traumatic parts, it can do unhealthy things, and it can get you in the state where you don't want to be in trouble and all that. But other than that, I would not want to run any program about it. They will have to find it out themselves.

Some of the older participants who were now young mothers requested a women's group and were interested in opportunities to quit as a group while also making new friends, being supported socially and engaged in regular cultural activities (such as painting, cooking, jewellery making).

Int 11

INT2 *I like the idea of "quit together" though. Like if there was something where there was a challenge, and you made like a team, or a group, is it then*

F2 Yeah, that sounds really good. I'd actually do that, yeah.

INT2 *What if you got like the women's group back, and part of that was yeah, checking in weekly, "how are you going", and?*

F2 That will be cool. Because there are a lot of young mums around here, that smoke, well not just mums, single people too. Um, but yeah. Because there's been a bit of talk about wanting, I've asked a few girls about the women's group, and a lot of them want the women's group back. I do. I've been saying that for years.

Key incentives to promote attendance and participation were to provide good food and some Koori designed apparel (such as a t-shirt), potentially only available to program participants.

Int 11

INT2 *If there was like a structured program, where you guys moved around activities, but part of it was like a challenge to try and quit as a team, would that be appealing? Where you're doing it as a group big. You had different things that you were doing together as well, or?*

F2 Is there any initiative, like is there a T-shirt at the end of it or something?

INT2 *Oh, there's always a T-shirt, there's always merch.*

F2 Yeah, there, there has to be something I can get out of it, eh?

INT *Well tell us, what would you like, what would youse like at the end?*

F2	Well, like T-shirts are a very big deal around here. So if there was a deadily designed T-shirt at the end of it, that you get to keep, or maybe um, like a bag or something, that's covered in Koori designs, that'd, that'd be a real eye catcher.
INT2	<i>What if, as part of the Art Class, you guys did the design, and then it got made up into jumpers or T-shirts, or bags or something, and it was your design?</i>
F2	That'd be cool. Yeah. Cos I know they done a health workshop over at um, over at the health centre. As part of my TAFE class, we had to go do health checks all day. And as an initiative for the community members to do, just to do the health check, cos they had a barbeque and all that. Um, whoever done a health check gets a NSW Blues Indigenous jersey. Yeah, but I missed out, I was so fuming.
F1	Why would you want a shit team anyway?
F2	You be quiet. But yeah, Indigenous jerseys they're always eye catchers for people.
INT	<i>Ok, they're good suggestions, we haven't had those before.</i>
INT2	<i>Yeah, that's really good. And it'd be cool if you know</i>
INT	<i>So locally designed</i>
F2	Some local Koori design, yeah.
INT	<i>So locally designed shirt, jumper, bags, yeah something like that.</i>
INT2	<i>Something that was just yours. Something that only the people who got to do the program, no one else could get it.</i>
F2	Yeah.

A range of diversional activities were suggested that would help keep young people active and engaged with community and subsequently help protect against smoking and other risk behaviours (even if not explicitly included in the program). These included providing computer access, game nights, movie nights, discos, music festivals, sports and non-team based physical activities e.g. dancing, yoga, swimming. There was also demand for a large range of cultural activities: art classes, camps, cooking classes with traditional recipes, cultural awareness through dancing, games, music (including learning how to make and play a didge) and Aboriginal women's, men's, and youth groups. Overall there was a desire and an expectation that a key part of any program would be to help improve wellbeing through greater cultural and community connections.

Timing

Suggestions for timing varied by the type of program suggested. For regular youth diversion activities weekly/twice weekly was recommended. For quit support groups it was expected that this would run for at least nine months to allow people to relapse and re-join as needed and to be supported longer term to stay quit and build relationships.

For regular youth targeted community events that might include a small health messaging component it was also suggested this could occur at the end of each term.

Int 11

F2	I reckon long term would be better.
INT	<i>And how do you</i>
F2	You'd get better results.
INT	<i>How often would you have it?</i>
F2	I'd say weekly.
INT	<i>Weekly?</i>
F2	Yeah, once a week.
M1	Yeah, weekly.
F2	To run the program. I'd be up for that.
INT	<i>You'd agree with that, sis?</i>
F1	Yeah.
F2	Yeah, once a week. For a couple of months. I'd say about nine, maybe. A bit long?
INT2	<i>I don't know, because of the</i>
F2	If you want to go like a quit smoking program, it's going to take time, and
INT	<i>At least nine months, yeah?</i>
F2	At least nine, yeah. Cos if I want to quit smoking, I know my behaviour's going to change and I want to her there with me, cos if she's quitting too, she's going to want me, and it's just going to be like, we know we've got another couple of months to go together, and like. So by the time we full on quit, you know, it'd be good to make new friends too.
INT2	<i>Yeah.</i>
F2	Like there are other people who I don't really talk to, but I'm pretty sure if we like go through this program, and meet up, and we'll have something in common about quitting smoking. And it will be
INT2	<i>And you'll be non-smokers together.</i>
F2	Yeah.
INT2	<i>But yeah, I think the timeline is important, because if you stop and start, or you eventually becoming quit, you don't want to have like intensive program, and there's nothing to support you. You want, even if you do stop and start again, you're still in the program. You're still here. Keep coming.</i>
F2	Just something constant over the next few weeks that we know is going to be in place. So like I'm not going to go cold turkey and then start smoking in a month or two, you know what I mean?

DISCUSSION

Summary of main findings

In this qualitative study we found that smoking attitudes and experiences varied by age. Older regular smokers had established smoking in early adolescence whereas most younger teenage participants had little to no personal experience or exposure but this was dependent upon their school environments. Early high school was a key period for experimentation. 'Social smoking' increased around 16-18 years. Most had family members who smoked but none reported living in houses where smoking was allowed inside. Mental health, stress, addiction, other smokers and substance use were key risk factors. A strong connection to community and culture, physical and mental wellbeing, social relationships and non-smoking environments were protective. Hands-on, interactive, programs with personal stories and age-relevant cessation support were recommended, with broader diversional, community-based cultural activities. Young people who were strong anti-smoking advocates and were able to confidently reject offers of cigarettes even in high prevalence smoking environments were engaged in school, sport and socially, were well supported by family and future focused.

Four major themes were developed:

1. Drawing strength from culture and community;
2. How the smoking environment shapes attitudes and intentions;
3. Non-smoking as a sign of good physical, social and emotional wellbeing; and
4. The importance of individual empowerment and engagement for being smoke-free.

Comparison to SEARCH Survey

The discussions mostly confirmed the quantitative findings from the SEARCH baseline survey¹², in particular the association between smoking and poor mental health and alcohol use. Although young people who were very confident non-smokers stated they understood why those would be smoking triggers for some, they felt smoking could still be avoided. While criminal justice interactions (police, court, juvenile detention) showed a strong association in the quantitative analysis and participants broadly agreed particularly in relation to the stress this would create, they did not always make a direct connection and some younger non-smokers conceptualised this as avoiding smoking to

reduce the risk of being picked up by police. Others noted that you could not smoke in prison/detention so may be more likely to be non-smokers.

Participants were generally perplexed by the reported relationship between smoking and being sexually active, however some felt this related to a life-stage/ experimentation/ trying to be older theme. Good quality family relationships were important for non-smoking but were mediated by whether parents smoked. Participants generally agreed that frequently moving house would increase instability and life stressors and contribute to smoking. Having strong school engagement in terms of wanting to do well and get good marks as part of long term future aspirations were all considered to be protective but for those who are in a very pro-smoking school environment just wanting to go to school or currently attending school did not necessarily mean non-smoking.

There were a number of factors that were not significantly associated with smoking in the SEARCH survey but identified as important by participants. Smoking was thought to increase with age, but some noted smoking could still begin in very early years (those who were trying to act older). Having higher household income (not included in card sort as originally not a variable included in analysis) was inconclusive, some felt that this meant increased affordability of cigarettes whereas others said they would have the resources for other activities and avoid boredom and disengagement.

Yarndi use was not significant in the survey analysis, likely due to low numbers, but there was generally strong agreement in the qualitative discussion that this was a risk factor. However, while they acknowledged that not everyone who smoked tobacco used yarndi, participants knew plenty of yarndi users who mixed in tobacco and identified as non-smokers. The mixing with tobacco has been demonstrated elsewhere.²⁷ Non-smoking parents and smoke-free homes were identified by participants as strong non-smoking influences as it set expectations and reduced access, influence and interest in smoking (although not universally).

Although having a strong sense of community or knowledge of Aboriginal culture and history were not significantly associated with smoking/non-smoking in the survey results, factors related to community and cultural connection were identified as vital to supporting young people to be smoke-free and to make quit attempts (although not

initially raised spontaneously). The exception being where community members were smoking and encouraged uptake. Satisfaction with available leisure activities was thought to be important as many felt boredom was a key risk factor and keeping active and engaged was protective.

Stress was often the first reason given by participants for smoking despite the global measure of stressful life events (SLEs) in the survey was not significantly related. However, several individual SLE measures were and were also identified as important by participants. These included being in trouble at school, although this depended on whether the school was a permissive smoking environment and/or if suspended for smoking as this inadvertently facilitated smoking while excluded and could foster greater disengagement. Family arguments creating stressful home environments were seen to increase smoking. Similarly, having sick family members created stress that some managed with smoking but also had the potential to increase the salience of known smoking harms.

Comparison to international evidence (systematic review)

A systematic review¹³ of studies that identified influences for Indigenous adolescent tobacco use in Australia, New Zealand, Canada and the United States was also used to identify factors for the card sort activity. Our study has confirmed those key findings including smoking among family, friends and the broader environment as key risk factors for initiation; as was stress, poor mental health and boredom. Protective factors identified in this review included smoke-free homes, participation in physical activity and strong interpersonal relationships, all of which were regularly cited by our participants as important for supporting young people to stay smoke-free. Many studies in this review referenced academic engagement and performance as protective against smoking but school attendance was a risk factor if there was a culture of smoking at school. This was strongly confirmed by our participants particularly in the urban groups. The review also found that cultural connectedness had the potential to be protective, but the available evidence was very limited and included in very few studies. While many of our participants felt that cultural and community connection would be important for young people to stay smoke-free, this was not raised spontaneously and few stated that was their reason for being smoke-free and some felt that was an asset they would like to access.

Comparison to other qualitative studies

Many of the findings in our study reflect other qualitative work with Aboriginal adolescents and adults in other settings.²⁸⁻³² The normalisation of smoking in high prevalence family and community environments is a particularly strong theme that has been described in other studies.^{28-30, 32} Passey et al found that this contributed to an integration of smoking into Aboriginal identity, particularly in communities of south eastern Australia where connection to traditional Aboriginal culture has been disrupted.³⁰ Sharing as part of Aboriginal culture and its role in maintaining kinship bonds has previously been described in relation to smoking as a shared experience and the sharing of cigarettes facilitating bonding and family relationships^{28, 29}, this was also observed in our study.

Johnston and Thomas²⁸ also described the important influence of family and the intergenerational transfer of smoking, something also described by some of our older participants, where smoking is a behaviour modelled and passed down through family. However, and similar to the experiences of some of our younger participants, Johnston et al²⁸ found a protective effect of non-smoking values expressed by parents, even if they were current smokers, and the reinforcing effect of smoke-free environments. The very strong social influence of peers in particular was emphasised by the majority of our study participants and was also a key finding for multiple studies describing bonding and belonging in some cases, and overt peer pressure and a desire to be 'cool' in others, but that this could be counter-balanced by non-smoking peers.²⁹⁻³²

The high level of awareness of harms of smoking we found has also been reported in other studies, including that these harms were not perceived to be that relevant to short-term 'social smokers', who did not self-identify as real smokers^{31, 32}, despite evidence that 'lighter' levels of smoking are harmful.³³ Similar to the experience of a number of our study participants, Passey et al also observed the transition from young, non-smoking advocates to smokers when the behaviour was socially reinforced.³⁰ Both Johnston et al and Leavy et al noted the relationship to socialising with alcohol and cannabis.^{29, 31} Our major theme of stress was a recurring one in other studies.³⁰⁻³² Similar to what our participants described, Cosh et al also reported smoking being used to calm down, relax and cope with stressful events.³² The additional risk factors for initiation of boredom and curiosity were also described by Leavy et al and Passey et al.^{30,31}

In line with our program recommendations, Passey et al emphasised culture and identity as a source of empowerment, but the marginalisation of young Aboriginal people contributed to the short-term focus that led to smoking, this reflects our finding of future-focused aspirational non-smokers.³⁰ The recommendations made in that study were to maintain engagement with school and sport and to create other opportunities for social support and connection without smoking.³⁰ Cosh et al also emphasised the need to provide young people with the tools to manage stress without smoking and provide relevant supports to stop.³² A common theme across several studies was the need to continue to denormalise smoking in the adolescents' social environments and communities, a major theme of the present study.^{29, 31, 32}

Frameworks and qualitative themes

The structure for the analysis for the SEARCH baseline survey and the systematic review described above was adapted from the Theory of Triadic Influence (TTI).^{25, 26} Briefly, this is an ecological model of health behaviours that considers three streams or levels of influence: intrinsic/individual, extrinsic/social and culture/environment that contribute to whether a behaviour is trialled. While the individual factors in our initial analysis fit TTI, the final four themes extend this model further and are specific to Aboriginal people. Rather than including 'culture and community' (Theme 1) in the environmental stream our analysis finds that this is a significant standalone influence that spans all levels. TTI states that the environmental stream contributes to knowledge and attitudes towards a behaviour and within the social stream the behaviours of others relate to perceived social norms. In our model we have combined these into Theme 2, influences in the smoking environment, with both tobacco control policies and the behaviours of others grouped as any direct exposure to smoking/non-smoking influences. In line with Aboriginal concepts of health and wellbeing we have combined the social relationships with mental and physical health, along with other behaviours in Theme 3, combining some aspects of the TTI social stream with the individual. Finally, the TTI individual stream includes self-efficacy and self-determination which closely aligns with aspects of our Theme 4, individual engagement and enablement.

Recommendations for Programs

Any tobacco prevention program must have at its core an objective to build cultural and community connections as this was identified by community members as a priority and a significant protective factor for young people. This is supported not only by the findings of the systematic review¹³ that there were opportunities to draw on the unique strengths of Indigenous communities and that cultivating cultural identity had the potential to empower young people, but also the Australian Government's *My Life My Lead* report which states that connection to culture is essential for health and wellbeing and recognition of this must be at the centre of any health initiatives.¹⁰ The relationship between culture, empowerment and smoking prevention has also been outlined in the Australian Government's *Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023*.³⁴ Three out of four goals for adolescent and youth health relate to reducing tobacco use and key strategies underpinning these include ensuring young people are involved in the design of programs, that they are supported to make healthy choices and are proud of their cultural identity.

There is a significant opportunity for a program developed out of our work to be led by young community members and build on the key themes of cultural and community strengths and engagement and empowerment. There is potential for all control and decision making to be centralised in an independent committee of young people, supported by and embedded within existing community-controlled organisational structures, providing leadership opportunities, enhancing self-determination and ensuring a program meets the needs of its target audience. Many participants in our interviews demonstrated they were eager and ready for such an opportunity, clearly articulating what a program needed and how it could be implemented, and one had already given a talk at a school assembly about the harms of smoking.

Of the range of ideas that were discussed participants felt there was a need for specific education about the harms of tobacco use to be delivered in an interactive format with storytelling as well as opportunities for young people to access cessation support. It will be important to counter the perception of safer, 'light' levels of smoking among 'occasional' or 'social smokers' as even lower levels of cigarette consumption is associated with increased cardiovascular disease risk.³³ There was low knowledge of, but interest in, the history of tobacco use in Australia and the introduction and manipulation and

control of Aboriginal people with tobacco during settlement. This provides an important counter narrative to perceptions of smoking being a personal choice and also opportunities to discuss the generational transfer of smoking.

Young people also wanted access to programs and activities that reduced the underlying drivers of smoking, and other health risk behaviours, and may also have a role in reducing stress and promoting mental health and wellbeing more generally. The previous iteration of the *Tackling Indigenous Smoking* program included a *Healthy Lifestyles* component, with a focus on nutrition and physical activity.³⁵ While there were activities delivered under this measure by some organisations that were also suggested by our participants, such as sport and cultural games as well as cooking classes,³⁵ the range of program ideas proposed during our yarns were much broader and determinants based as opposed to addressing multiple chronic disease risk factors simultaneously. There is a policy opportunity for greater funding flexibility for community organisations to design tobacco control programs that have the capacity to modify determinants of youth smoking, including boredom, disengagement, stress and poor mental health through structured activities and supports that also build cultural and community connections.

However, community level activities must continue to be supported by strong national, mainstream tobacco control measures, including smoke-free legislation and social marketing campaigns, to continue the broader denormalisation of smoking. Our participants were confident to reject offers of cigarettes when they felt sure of their knowledge of the risks and non-smoking expectations of others. However, there was a strong perception that many young smokers were doing so to cultivate a 'cool' image. Social marketing campaigns can play a key role in this^{36, 37} and were identified as important for smoking prevention by participants, however they felt exposure was too low. Not only are these campaigns important for reinforcing the attitudes and intentions of young Aboriginal non-smokers, but they are important for continuing to drive down broader population prevalence. It was concerning to hear accounts of very permissive smoking environments within schools and it was clear that this would undermine and erode the effect of community level programs, reinforcing the need for sustained, national, comprehensive tobacco control.

Strengths and limitations

There are some limitations to this study. It includes Aboriginal participants from only two sites in regional and urban NSW and in acknowledgement of the diversity and heterogeneity of Aboriginal and Torres Strait Islander peoples may not reflect the experiences and views of people from other communities, particularly remote areas. There is possible sampling bias as participants were those engaged in a community-controlled study and available during business hours (or parents gave permission to attend during school time). This may have exaggerated the generational differences, however in some cases we were able to compare accounts from the same schools and same communities over time, so we are confident in this finding. Finally, all coding and initial analysis was completed by one researcher (CH), however MC who facilitated all sessions (with CH) reviewed the transcripts, codes and summaries and confirmed these reflected the yarns.

This study has a number of strengths. Through an exercise of engagement of young community members in the interpretation of the survey findings it has not only validated that analysis, but also the international evidence for influences on smoking uptake, and how these fit within existing theoretical frameworks. By privileging the voices of young Aboriginal people we have been able to identify key opportunities to design effective smoking prevention programs that will enhance adolescent health and wellbeing. A key strength of this research is the predominantly Aboriginal research team who have developed the major themes and recommendations in collaboration.

CONCLUSION

Through interactive engagement with young Aboriginal people this study has identified four key themes that can be understood as objectives for programs preventing youth smoking: continue to change the tobacco environment, promote good health and wellbeing more broadly, build on community and cultural strengths and support the empowerment and engagement of young people. These should be embedded into community level programs and led by young people themselves. But largescale comprehensive tobacco control measures are needed to ensure the ongoing denormalisation of smoking in the broader environment is sustained. Programs need to reach people from very early adolescence and into young adulthood to continue to

reinforce non-smoking intentions across key initiation periods of early high school, starting to drink and attend parties, turning 18 and starting work.

ACKNOWLEDGEMENTS

We acknowledge Aboriginal and Torres Strait Islander peoples as the traditional custodians of Australia and pay our respects to Elders past, present and future. We thank the study participants, their communities and the staff at participating Aboriginal Community Controlled Health Services (ACCHSs). SEARCH is conducted in partnership with the Aboriginal Health and Medical Research Council and four ACCHSs across NSW: Awabakal Limited; Riverina Medical and Dental Aboriginal Corporation; Aboriginal Medical Service Western Sydney (former); and Tharawal Aboriginal Corporation. This work was supported through grants to the Study of Environment on Aboriginal Resilience and Child Health (SEARCH) from the National Health and Medical Research Council of Australia (NHMRC: grant numbers 358457, 512685, 1023998, and 1035378), The NSW Ministry of Health, Australian Primary Care Research Institute (APHCRI), beyondblue and the Rio Tinto Aboriginal Fund.

CH received a PhD scholarship from the Australian Prevention Partnership Centre funded through the NHMRC partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003), with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth. Support for associated data collections costs was provided under the NHMRC funded Centre of Research Excellence in Aboriginal Child and Adolescent Health (CRE REACH, Grant ID: 1135273). CC receives an NHMRC Career Development Fellowship (1161065).

Conflict of Interest Statement: All authors declare that they have no conflicts of interest.

REFERENCES

1. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Australian Burden of Disease Study series no. 6. Cat. no. BOD 7. Canberra: AIHW; 2016 [cited 12 Oct 2019]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
2. Australian Bureau of Statistics. 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2014-15. Canberra: ABS; 2016 [cited 14 Oct 2019]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0
3. Heris C, Eades S, Lyons L, Chamberlain C, Thomas D. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. Public Health Res Pract. 2019 (Online early publication).
4. Australian Institute of Health and Welfare. Australia's health 2018. Cat. no. AUS 221. Canberra: AIHW; 2018 [cited 1 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/australias-health/australias-health-2018>
5. US Department of Health and Human Services. Preventing tobacco use among young people: A report of the Surgeon General Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012 [cited 5 Mar 2018]. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
6. van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and Issues. Melbourne: Cancer Council Victoria; 2016 [cited 14 Oct 2019]. Available from: www.tobaccoinaustralia.org.au/chapter-8-aptsi
7. Thomas DP, Briggs V, Anderson IPS, Cunningham J. The social determinants of being an Indigenous non-smoker. Aust N Z J Public Health. 2008. 32 (2):110-6.
8. Australian Institute of Health and Welfare. Burden of tobacco use in Australia: Australian Burden of Disease Study 2015. Cat. no. BOD 20. Canberra: AIHW; 2019 [cited 1 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/burden-of-disease/burden-of-tobacco-use-in-australia>
9. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. Tob Control. 2003. 12 (suppl 2):ii5-ii8.

10. Australian Government Department of Health. My Life My Lead - Opportunities for strengthening approaches to the social determinants and cultural determinants of Indigenous health: Report on the national consultations December 2017. Canberra: ACT. 2017.
11. Chamberlain C, Perlen S, Brennan S, Rychetnik L, Thomas D, Maddox R, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Syst Rev.* 2017. 6 (1):135.
12. Heris C, Thurber K, Wright D, Thomas D, Chamberlain C, Gubhaju L, et al. Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). Manuscript submitted for publication. 2019.
13. Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine & Tobacco Research.* 2019.
14. Ivankova NV, Creswell JW, Stick SL. Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice. *Field Methods.* 2006. 18 (1):3-20.
15. Fryer CS, Seaman EL, Clark RS, Clark VLP. Mixed methods research in tobacco control with youth and young adults: A methodological review of current strategies. *PLoS One.* 2017. 12 (8):e0183471.
16. Reeves S, Albert M, Kuper A, Hodges BD. Why use theories in qualitative research? *BMJ.* 2008. 337:a949.
17. Laycock A, Walker D, Harrison N, Brands J. Part A: Indigenous Health Research in Context. *Researching Indigenous Health: A Practical Guide for Researchers.* Melbourne: The Lowitja Institute. 2011.
18. Bessarab D, Ng'andu B. Yarning about yarning as a legitimate method in Indigenous research. *International Journal of Critical Indigenous Studies.* 2010;3(1):37-50.
19. Walker M, Fredericks B, Mills K, Anderson D. "Yarning" as a method for community-based health research with indigenous women: the indigenous women's wellness research program. *Health Care Women Int.* 2014;35(10):1216-26.
20. Kitzinger J. The methodology of Focus Groups: the importance of interaction between research participants. *Sociol Health Illn.* 1994. 16 (1):103-21.

21. The SEARCH Investigators. The Study of Environment on Aboriginal Resilience and Child Health (SEARCH): study protocol. *BMC Public Health*. 2010. 10 (1):287.
22. Colucci E. "Focus Groups Can Be Fun": The Use of Activity-Oriented Questions in Focus Group Discussions. *Qual Health Res*. 2007. 17 (10):1422-33.
23. Green J, Willis K, Hughes E, Small R, Welch N, Gibbs L, et al. Generating best evidence from qualitative research: the role of data analysis. *Aust N Z J Public Health*. 2007. 31 (6):545-50.
24. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006. 3 (2):77-101.
25. Flay BR. Theory of Triadic Influence. 2004 [cited 11 Dec 2019]. In: *Encyclopedia of Health and Behavior* [Internet]. Thousand Oaks, California: SAGE Publications, Inc., [cited 11 Dec 2019]; [p. 715-8]. Available from: <http://sk.sagepub.com/reference/behavior>.
26. Flay BR, Petraitis J. A new theory of health behavior with implications for preventive interventions. *Adv Med Sociol*. 1994. 4:19-44.
27. Thomas DP, Davey ME, Panaretto KS, van der Sterren AE. Cannabis use among two national samples of Aboriginal and Torres Strait Islander tobacco smokers. *Drug & Alcohol Review*. 2018. 37:S394-S403.
28. Johnston V, Thomas DP. Smoking behaviours in a remote Australian Indigenous community: the influence of family and other factors. *Soc Sci Med*. 2008. 67 (11):1708-16.
29. Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health*. 2012. 12 (1):963.
30. Passey ME, Gale JT, Sanson-Fisher RW. "It's almost expected": rural Australian Aboriginal women's reflections on smoking initiation and maintenance: a qualitative study. *BMC Womens Health*. 2011. 11:55.
31. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr*. 2010. 21 (3):208-14.
32. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Aust J Prim Health*. 2015. 21 (3):334-41.

33. Banks E, Joshy G, Korda RJ, Stavreski B, Soga K, Egger S, et al. Tobacco smoking and risk of 36 cardiovascular disease subtypes: fatal and non-fatal outcomes in a large prospective Australian study. *BMC Med.* 2019. 17 (1):128.
34. Australian Government Department of Health. Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023. Canberra: ACT. 2015.
35. Upton P, Davey R, Evans M, Mikhailovich K, Simpson L, Hacklin D. Tackling Indigenous Smoking and Healthy Lifestyle Programme Review. Canberra: ACT: University of Canberra; 2014.
36. White VM, Durkin SJ, Coomber K, Wakefield MA. What is the role of tobacco control advertising intensity and duration in reducing adolescent smoking prevalence? Findings from 16 years of tobacco control mass media advertising in Australia. *Tob Control.* 2015. 24 (2):198-204.
37. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *The Lancet.* 2010. 376 (9748):1261-71.

8.2 Chapter summary

The findings presented in Chapter 8 form part of an in-progress publication for which work is ongoing. The analysis has been conducted in collaboration with the research team and findings confirmed. The next stage of the project will be to return to the two participating ACCHSs, RivMed and Tharawal, and invite feedback from participants and staff.

The discussion and recommendations presented in the final paper draft will integrate these additional discussions. It is the aim of ongoing engagement with the partner ACCHSs to see these findings and recommendation translated into community programs and used as supporting evidence in funding proposals.

Although this work is ongoing, within the context of this thesis the findings from Chapter 8 provide rich and useful data to better understand the experiences of young Aboriginal people, how these explain the findings in earlier chapters and support recommendations. Importantly, in making any program recommendations this work privileges the voices of the target audience for any such program, the young Aboriginal people themselves.

The supplementary files for Chapter 8 can be found in 11.6 Appendix 6.

9 Discussion

9.1 Summary of findings by project

The following section will provide a summary of key findings from each of the four studies that formed the six results chapters: the Systematic Review, the Australian Secondary Students' Alcohol and Drug Survey (ASSAD), the Australian Bureau of Statistics (ABS) surveys and the Study of Environment on Aboriginal Resilience and Child Health (SEARCH).

Systematic Review – Chapter 3

The systematic review of international literature from Canada, the United States, New Zealand as well as Australia found that Indigenous adolescents globally have similar social influences for smoking initiation and establishing regular smoking to other youth populations generally, such as smoking among family, friends and the broader community. However, while higher prevalence of these social influences contributed to higher prevalence among Indigenous adolescents themselves, very few studies explored the underlying historical and socio-economic factors. Similarly, studies also acknowledged poor mental health, disengagement from school and social disadvantage as key risk factors for all youth, but rarely discussed the structural inequities and social context for why Indigenous young people are more likely to experience these risk factors. Very few studies explored whether cultural strengths shown to be effective in other age groups or for other health outcomes may also be protective against smoking when embedded in a smoking prevention program for Indigenous adolescents.

Australian Secondary Students' Alcohol and Drug Survey (ASSAD) – Chapter 4 and 6

In chapter 4 and 6 of this thesis, analysis of data from the ASSAD survey found that between 2005 and 2017 smoking prevalence among Aboriginal secondary students declined and most 12-17 year olds are now never smokers. Importantly these findings were seen in all subgroups including those attending schools in non-urban areas and areas of greater social disadvantage. The rate of increase in never smoking among Aboriginal adolescents was similar to that observed for the total sample of students in the ASSAD study (which includes both the Aboriginal and non-Aboriginal students) suggesting that Australia's comprehensive tobacco control measures are having an impact for all students. However, there remains a persisting disparity in smoking rates

between Aboriginal and non-Aboriginal students, including among the students attending schools in areas of higher socio-economic advantage (a proxy measure for individual SES). Accelerating the increases in never smoking and declines in current smoking for the Aboriginal students in particular is necessary for health equity.

The analysis in Chapter 6 also identified a strong relationship between other substance use and past month smoking for all students. Both Aboriginal and non-Aboriginal students were significantly more likely to have smoked tobacco in the previous four weeks if they had also used alcohol and/or cannabis in the previous month. However, the relationship to alcohol was significantly weaker for Aboriginal students compared to non-Aboriginal students, highlighting that while Aboriginal adolescents experience similar smoking risk factors to other young people such as other substance use, their smoking experience is different. Aboriginal adolescents likely have other underlying drivers of smoking, such as stressful life events, and with higher community level prevalence, different social environments within which they may access and smoke cigarettes, unrelated to alcohol or cannabis use. However, the clustering of these behaviours indicates the likely existence of common determinants and the importance of addressing these in a holistic way. The higher likelihood of any substance use among Aboriginal students also points to the need to address the underlying social, cultural and economic determinants that contribute to smoking and other substance use, particularly through Community-controlled programs.

Australian Bureau of Statistics (ABS) – Chapter 5

The analysis of the ABS data in Chapter 5 similarly showed that between 2002 and 2015 smoking prevalence declined significantly for Aboriginal young people aged 15-24, with significant related increases in never smoking. Noting however that despite these gains youth smoking prevalence, particularly among young adults, remains very high. This analysis also found that while fewer young people were taking up smoking overall, among those who do the age of initiation may be increasing. In 2012-13, most 18-24 year old regular smokers continued to report they started smoking daily before age 18, but compared to 2004-05, an increasing proportion had started after age 18. This presents a challenge for tobacco prevention, with young Aboriginal people at risk of establishing regular smoking from the early teenage years well into early adulthood, with 25% starting before age 15, 50% between 15-18, and the remaining quarter after 18 years. This means a long-term approach to tobacco prevention is required that will likely involve

multiple strategies to reach young people at different life stages. In practice, it is likely that a single approach to prevent uptake, such as participating in a tobacco education program in early high school, will not be sufficient to sustain smoke-free intentions in the longer term as young people move through adolescence and early adulthood.

The Study of Environment on Aboriginal Resilience and Child Health (SEARCH) – Chapter 7 and 8
Chapters 7 and 8 were related to the SEARCH study. In the first (Chapter 7), a cross-sectional analysis of Phase 1 baseline survey data found that most Aboriginal adolescents aged 12-17 had never smoked regularly, despite environmental tobacco smoke exposure and influences of others through parental smoking, smoking in the home or in-utero exposure. There were a number of other adolescent life stage behaviours associated with smoking such as alcohol use, cannabis use or being sexually active. Having had interactions with the criminal justice system was a major risk factor for smoking. Several protective factors were also identified. Aboriginal adolescents were more likely to be non-smokers if they had good social and emotional wellbeing, positive family relationships and a stable home environment. Although not all results were statistically significant, there were indications that engagement with school and community may also have the potential to be protective against smoking uptake.

The second SEARCH project (Chapter 8), involved qualitative follow-up yarns (interviews and focus groups) with participants who had completed either the Phase 1 or Phase 2 adolescent surveys. Few young adolescents were smoking in 2019 with early teenage initiation becoming less common compared to the young adult participants who reported they had established smoking early in their teenage years. However, there was increased risk of uptake from around age 18. In comparison, those older participants who had started smoking very early in their teenage years, often at home and at school, had continued to smoke into their 20s. Poor mental health and stress were reported as the most significant drivers of smoking, in addition to the influences of other smokers, particularly peers, but also family members and role models. Addiction was also a key factor and was felt to develop unexpectedly among those who had begun smoking only occasionally or socially. Strong connections to Aboriginal community and culture were thought to be key to staying smoke-free and supporting existing smokers to quit.

This qualitative study (Chapter 8) identified the four key themes of:

1. Drawing strength from culture and community;
2. How the smoking environment shapes attitudes and intentions;
3. Non-smoking as a sign of good physical, social and emotional wellbeing; and
4. The importance of individual empowerment and engagement for being smoke-free.

It then compared these to the Theory of Triadic Influence (TTI) framework, the overarching conceptual foundation of this thesis that hypothesises that adolescents experience individual, social and environmental levels of influence for smoking. This model was extended in this study specifically for Aboriginal people (see Chapter 8 Table 2 and Figure 1). It separates out the cultural and community factors from TTI's environmental stream as important standalone influences spanning individual, social and environmental levels. Further, in line with Aboriginal concepts of health and wellbeing, social relationships were combined with individual mental and physical health (Theme 3). The new model also collapses factors around smoking knowledge, attitudes, social norms and the broader tobacco policy environment from the three TTI levels into one group (Theme 2). In Theme 4, it maintains aspects of the TTI individual stream (self-efficacy and self-determination) highlighting the importance of individual empowerment and engagement.

9.2 Implications for policy and practice by research question

This section will outline key implications for policy and practice from this thesis against the three original research questions, followed by some additional, specific program recommendations to expand on the discussion here.

1. Are fewer Aboriginal adolescents becoming regular smokers and is the prevalence of never smoking increasing?

As demonstrated in several studies in this thesis, fewer young Aboriginal people are taking up smoking. This was confirmed in the 2019 NATSIHP report card¹ showing that changes are broadly on track to meet the youth smoking goals 9-11, based on data from the 2014-15 NATSISS (also used in Chapter 5):

- Smoking among 15-17 year olds was 17.2%, required trajectory point was 16.5%
- Never smoking among 15-17 year olds was 78%, required trajectory point was 80%
- Never smoking among 18-24 year olds was 46%, required trajectory point was 44%

Since publication of the paper in Chapter 5 and the NATSIHP report card, further declines have been reported in the latest ABS Aboriginal and Torres Strait Islander Health Survey 2018-19²: 13% of 15-17 year olds were current smokers and 85% identified as never smokers. Among 18-24 year olds 39% were current smokers, 50% never smokers.

This thesis has demonstrated the importance of, and urgent need for, a commitment to sustained investment in tobacco control to maintain the recent positive progress, as despite these gains, adolescent smoking prevalence remains too high. Sustained investment would ideally aim to accelerate declines and not reverse earlier gains. In periods of low intensity tobacco control smoking rates generally rebound, particularly for more disadvantaged population groups.³ While it is positive to see Aboriginal youth smoking prevalence decline at a similar rate to the total population in the ASSAD analysis, a persisting disparity remains and must be addressed to achieve health equity for Aboriginal people. Acknowledging that reducing broader community level prevalence contributes to declining youth initiation, it is important to continue to encourage successful quit attempts among current adolescent and adult smokers, continue to denormalise tobacco use and reduce access and opportunities to smoke by creating positive smoke-free environments.^{4, 5}

From a policy perspective, sustained commitment to comprehensive tobacco control measures and adequate resourcing is needed for measures such as social marketing campaigns and community tobacco programs (e.g. *Tackling Indigenous Smoking* (TIS)) to achieve their objectives.^{3, 4, 6-10} Community level programs like TIS can apply the comprehensive tobacco control approach in a local and culturally safe way, and the 2018 program review suggested TIS is likely to contribute to a reduction in tobacco use.^{11, 12}

However, as not all Aboriginal people have access to TIS, it recommended extending the reach with broader tobacco control measures, including national social marketing

campaigns.¹² These campaigns can prompt behaviour change, including for young people, and direct the audience to support services.^{6-9, 13} However, the current funding commitment to social marketing campaigns of \$25 million over four years is well below what is required to achieve changes in smoking prevalence and reduce smoking inequities, an investment estimated to be between \$20-40 million per year.^{8, 14-16}

It is also important for policy makers to consider the broader context associated with higher smoking prevalence in Aboriginal communities and by extension young Aboriginal people. We observed significantly greater rates of smoking among Aboriginal students compared to non-Aboriginal students in all demographic sub-groups including those attending schools in urban areas and the most advantaged postcodes, proxy measures of socioeconomic advantage. Smoking is strongly related to the social determinants of health, and in general higher prevalence is recorded among those experiencing greater social disadvantage or living in remote areas. However, our findings were that the disparity in prevalence persisted across different socioeconomic strata, even when controlling for multiple proxy markers of disadvantage.

While price increases are an important mechanism for reducing smoking prevalence, including among young people^{6, 17, 18}, and regular increases in Australia have prompted quit attempts and reduced smoking^{19, 20}, price increases may not be universally effective and absorbed by those who can afford to do so. Consideration must be given to other policy levers that might address why smoking rates continue to be significantly higher even among relatively advantaged young Aboriginal people. Some relevant factors are discussed at Research Question 3 below.

2. Is the incidence of regular smoking occurring later in adolescence?

It is clear from both the analysis of ABS data (Chapter 5) and the qualitative discussions (Chapter 8) that the widening age of smoking initiation presents a significant challenge for tobacco control. While fewer teens are experimenting and establishing regular smoking overall, entering Year 7 and the early high school years remains an important period for initiation prevention, as does the mid-late teenage years when young people start socialising, including with alcohol, in settings that can promote smoking. An important finding of this thesis was that the risk in this period extends from turning 18 and into the early 20s. This life stage is a period of significant change as some finish

school, start work or tertiary education, move into new living arrangements with friends or may start their own families. These experiences that mark entering adulthood are now occurring at a later age than in previous generations.²¹

With declining population smoking prevalence and increased policies around smoke-free spaces, it is likely that many more young people are experiencing reduced exposure in their teenage years and stronger non-smoking influences at home and at school, with reduced access to cigarettes or motivators to smoke up to age 18. However, they may then experience a significant increase in exposure from friends and colleagues when able to enter licensed venues where smoking is permitted, or workplaces and homes with a permissive smoking environment. The barriers to transitioning from occasional to regular smoking will also be reduced once they can legally purchase cigarettes, may have greater affordability to do so, and potentially increased likelihood of smoking as a strategy to manage multiple life-stage stressors, reinforced by social norms.

While previously it may have been assumed that a young person who had not established regular smoking by their 20s was unlikely to start in the future²², the challenge for tobacco prevention now is to reach young people in early adolescence and continue to reinforce smoke-free intentions into young adulthood, to ensure uptake is prevented not just delayed. For health professionals this means continuing to ask young people if they smoke well into adulthood, even if they have always been a never smoker.

Although this widening age of initiation is an important issue for prevention, priority must also be given to the substantial number of young people who have already established regular smoking patterns, including those as young as 12-15 years (Chapter 6), and likely already have some level of nicotine dependence. For these adolescents it is important to offer cessation support, not just advocate for smoking prevention. It was communicated in the qualitative yarns (Chapter 8) that young people would appreciate support to quit and some had stopped with the right support. As has been highlighted in analysis of the ABS data, many young Aboriginal people who currently smoke have already made a quit attempt, 39% of 15-17 year olds and 60% of 18-24s in 2018-19, highlighting they are well along the behaviour change process towards cessation.^{2, 23} This is discussed further in the program recommendations below.

3. Are there common factors that protect against uptake and increase the likelihood of being a never smoker?

The work presented in this thesis has identified common determinants for smoking experienced by both Aboriginal and non-Aboriginal adolescents as well as identifying some unique protective factors for young Aboriginal people. It has also described how these common determinants are often also related to other risk behaviours. The implications for policy and practice are summarised below.

In addressing the drivers of risk taking that are associated with smoking uptake, it is likely to also reduce the risk of other substance use and other poor health outcomes as well.^{4, 5, 24} There are opportunities to target multiple common social determinants for adolescent health in coordinated, holistic, determinants focused programs.²⁴ The two stages of the SEARCH study highlighted key opportunities to support this (Chapters 7 and 8). Findings from both the quantitative and qualitative analyses indicated that promoting good mental health and positive engagement with family, school and community are likely to be positive protective factors against smoking and other behaviours.

Findings included here from triangulating data from the systematic review at Chapter 3, and subsequent thesis chapters, are that there are multiple common risk factors for smoking specifically, shared by all adolescents, demonstrating that at least in relation to immediate influences for smoking the reasons why young Aboriginal people and non-Aboriginal adolescents smoke are similar. While young Aboriginal people do experience the same risk factors for smoking as other young people, it is important to address why they are more likely to experience these common determinants. These factors include poorer mental health outcomes and greater frequency of stressful life events, in addition to greater normalisation of smoking through higher prevalence among peers, family and community.^{10, 25} This can only be done with an acknowledgement of how the impacts of colonisation continue in contemporary Australia in the form of experiences of racism and discrimination, including within health services, enduring trauma from family removals and the disconnection from homelands, communities and culture, as well as the entrenched social disadvantage that increases the risk of poor health outcomes (including from smoking), which drives premature mortality and persistent cycles of grief and loss.^{10, 26-28}

While it is clearly an immense and ongoing challenge to address the structural inequities that underpin the higher smoking prevalence among Aboriginal people, there is also an immediate, urgent need to provide adequate supports to help existing young people who smoke to quit and prevent further uptake. Programs designed, owned and community controlled are important to achieve both aims.^{10, 29, 30} They ensure programs are delivered in a culturally safe and relevant way, provide capacity building and employment opportunities for community members and promote self-determination for the community as a whole, which contributes to individual wellbeing.^{10, 29-32} They also provide an opportunity to leverage unique strengths. In the qualitative yarns, participants identified programs that strengthen cultural and community connections as important for supporting young people to make quit attempts and stay smoke-free. These points are discussed further in the program recommendations below.

9.3 Program recommendations

As outlined in the literature review and the preceding discussion, comprehensive, broad, whole of population approaches that include smoke-free legislation, pricing and social marketing campaigns are all important measures for reducing smoking prevalence among young people overall.^{4, 5} Local programs delivered in school and community settings also have the potential to support broader strategies as part of a comprehensive approach.^{4, 5, 33}

There is little evidence however for what interventions are effective for preventing tobacco use among young Indigenous people specifically, particularly Aboriginal people of Australia, with much of the research conducted with Indigenous populations of north America.³⁴⁻³⁷ The one Cochrane review³⁴ of tobacco prevention interventions for Indigenous youth identified only two studies as eligible for inclusion and these were conducted with American Indian youth in studies published over 25 years ago. This review found no conclusive evidence for intervention effectiveness, and findings from these studies may not be applicable to Aboriginal adolescents in Australia's contemporary tobacco control environment.

While the evaluation and development of tobacco prevention programs was beyond the scope of this thesis some recommendations can be made to support the content for

school and community programs. These recommendations are drawn from the findings of this thesis and should not be adopted independently, but as part of a program following an evidence-based design.

Settings for comprehensive programs: school, family, community

School settings

The school setting is commonly used to reach young people for health programs aiming to reduce tobacco, alcohol and other drug use, with some potential efficiencies in addressing common risk factors for multiple behaviours.⁵ However, the results for school programs are variable.^{4, 5, 33, 38, 39}

What is clear is that programs that seek only to provide health information and education about risks and harms are less likely to be effective with young people than those that seek to build skills around social influence, social competence and self-efficacy, and are most successful when they are long term and part of a broader, comprehensive population wide approach.^{4, 5, 38} This includes enforcing smoke-free policies on school grounds, as well as broader population measures (such as social marketing), and for these school-based programs to target all young people.

Aboriginal young people comprise just 5% of the total Australian youth population⁴⁰ and anecdotal reports of high smoking prevalence at some schools (Chapter 8) highlights the need for ongoing whole of population efforts to reduce youth smoking. While specific or targeted programs may be useful in other settings it is critical that schools provide a strong, positive non-smoking environment to reduce visibility and opportunities for all young people to trial and establish smoking.

Family and community settings

The importance of family smoking and smoke-free homes, as well as positive family relationships is well demonstrated, with some evidence for the effectiveness of family-based interventions specifically.^{4, 33, 41-43} Complementary to school and family programs are community-based programs. There is some evidence for the effectiveness of multi-component community programs.^{5, 44} The integrated 'Communities that Care' model, which includes school, family and community components, has shown positive reductions in tobacco and other substance use among young people in Australia.⁴⁵ This is

important given the opportunities to address common determinants, as highlighted by the strong relationship between tobacco and alcohol/cannabis use demonstrated for all adolescents in Chapter 6.

Community-controlled tobacco programs are considered best practice for reducing smoking prevalence among Aboriginal people.^{10, 35, 36} These provide opportunities for communities to deliver holistic, strengths-based, culturally safe and relevant programs. Currently, the TIS program is the largest, coordinated example of this, with locally based TIS teams applying evidence-based, comprehensive tobacco control measures to their communities, including using social marketing, influencing smoke-free environments, providing cessation advice and support, and also running workshops at schools.^{11, 12}

Communicate harms of smoking in an engaging way and within a personal and historical context
Regardless of whether it is within school or as part of a community-based program, when the risks and harms of tobacco use are being communicated, young people in the SEARCH qualitative study (Chapter 8) requested that this be done in a hands-on, interactive and engaging way, building in personal stories from cancer survivors, particularly community Elders. This was seen by the participants to be an effective way to make healthy messages more salient and reinforces findings from elsewhere that personal stories are important in campaign messaging with Aboriginal adults.⁴⁶

In the study at Chapter 8, awareness of how commercial tobacco was introduced to Aboriginal people was low, but interest in this history was strong, and may provide an important motivator to avoid smoking among those who do not feel at immediate risk of the health harms. As reported in Chapter 8, and elsewhere^{47, 48}, there is generally quite high knowledge of the health risks of smoking among young people, but these are often rejected as not causing immediate harm.

Address addiction and support to quit

Many young people also had little awareness of how nicotine dependency can develop, with most 'social' or 'occasional' smokers perceiving themselves to be in control of their smoking and different to 'other' smokers. Other studies have also reported similar findings, and suggest that young people do not necessarily perceive cessation services,

such as the Quitline, to be relevant to them.^{47, 48} Helping young people to understand addiction, the experience of quitting, including the process of nicotine withdrawal and their triggers, may be valuable.⁴⁸ As discussed in Chapter 8, young people who have already developed a dependency know they should quit, and also want support to do so (confirmed by national data that shows many have made a quite attempt^{2, 23}). Health professionals, including those involved in delivering tobacco prevention programs such as TIS should seek to identify younger people who have established regular smoking and support them to stop.

Aim to improve resilience, mental health and stress management strategies

The importance of stress, mental health and peer influence for smoking initiation as identified in this thesis would support the case for building the capacity for young people to resist offers of cigarettes (and other substances) in social settings, and to improve social and emotional wellbeing and stress management strategies. Another study reporting the SEARCH data (as used in Chapter 7) found that low levels of stress and not being in foster care were key factors associated with good adolescent mental health.⁵⁰ A third further study reporting SEARCH data similarly identified key protective factors of supportive family and social environments and regular physical activity as associated with 'resilience' among Aboriginal adolescents (resilience defined in that particular sub-study as 'low risk' on the Strengths and Difficulties Questionnaire (SDQ)).⁴⁹ In the SEARCH study reported in this thesis (Chapter 7), a low risk SDQ score was associated with non-smoking and thus it is likely that the factors associated with 'good mental health', or 'resilience' as defined in the other SEARCH studies referenced above, will also protect against smoking.

However, two general population school-based trials with young people in Australia seeking to improve youth wellbeing and 'resilience' to reduce substance use have shown limited success.^{51, 52} The second intervention, which included additional intervention components and strategies specifically for Aboriginal students, pooled results and controlled for Aboriginality in the analysis, so the effectiveness with Aboriginal adolescents specifically is unclear.⁵² However, overall this study was unable to increase the protective 'resilience' factors that were anticipated to reduce substance use. But the study authors acknowledged the limitations of not addressing risk or protective factors at the family and community level as part of the intervention.⁵²

The importance of programs under Aboriginal Community Control

Aboriginal community-controlled organisations are best placed to develop and deliver the broader programs that can encompass the four key themes identified in Chapter 8 as important for supporting young people to be smoke-free, namely: positive non-smoking influences in the environment; promoting good overall wellbeing; empowering and engaging young people; and leveraging cultural and community strengths. Community level activities provide a further environment outside school and home where young Aboriginal people can observe strong anti-smoking norms. The expectations of community-leaders have previously been demonstrated to be important for prompting quit attempts among Aboriginal adults.⁵³

Community organisations are also well-positioned to offer a range of diversional activities and recreational opportunities to engage young people, supporting them to be healthy more broadly, and ensure that culture is at the centre of all activities. Culture was identified as priority by community members in Chapter 8, and pride in culture and engagement is a key strategy for reducing youth smoking in the NATSIHP Implementation Plan and recognised as fundamental to the future health of young people.⁵⁴

Programs run by young people

Finally, a key recommendation from this thesis is that youth wellbeing programs should be run by young people themselves (with adequate organisational support). It is recognised that it is important for adolescent health and wellbeing to give young people a voice²⁴ and to create agency and self-determination in decision making.⁵⁵ This is also emphasised within the NATSIHP Implementation Plan which states that key to achieving the plan's goals is young people having a voice in the design of any programs that affect them.⁵⁴ Within a broader tobacco program such as TIS, this may be ensuring youth focused activities are designed and delivered by peers. Not only would this ensure that a program is accepted and relevant to young people, but it provides opportunities for engagement, empowerment and leadership. Many young people who participated in the qualitative study at Chapter 8 were motivated to focus on their future and this contributed to their decisions to be smoke-free. Opportunities to demonstrate leadership in a youth wellbeing program would likely support further engagement and their long-term aspirations.

9.4 Implications for future research

There are opportunities to extend the work included in this thesis as more data becomes available. For example, repeating the SEARCH analysis (in Chapter 7) with the Phase 2 survey will be important to provide longitudinal examination of what factors identified at baseline continued to predict non-smoking at follow-up. With the recent release of the first results for the ABS 2018-19 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), there is an opportunity to repeat the analysis in Chapter 5 and examine whether the changes in the age of smoking initiation have been maintained.

One of the key gaps remains detailed remote area data. Figures from the 2018-19 NATSIHS and previous ABS trends analysis show long term declines in current youth smoking prevalence among 15-17 year olds in both remote and non-remote areas: 36% in 1994 to 24% in 2018-19 in remote areas, 27% down to 11% in non-remote areas.^{2, 56} However, for the older adolescents aged 18-24, the changes are less positive and only in non-remote areas: current smoking declined 50% to 35% between 2004-05, but increased (non-significantly) in remote areas from 61% to 65%.²

It is clear there is an urgent need for more work to understand patterns of tobacco use in remote areas and the data used in this thesis does not provide extensive detail of tobacco use among adolescents in these areas. The small participant numbers for adolescents in the ABS surveys limits analysis and thus the age of initiation changes reported in Chapter 5 were not significant when broken down by remoteness. The SEARCH study (Chapters 7-8) is regionally specific to urban/regional New South Wales so it is not possible to say whether the smoking related factors identified would be similar in other areas. The ASSAD surveys (used in Chapters 4 and 6) include few remote participants and as such it is difficult to report with confidence whether the changes in smoking prevalence observed for younger adolescents (including those under 15 years), or the relationship to substance use, has also been observed in very remote communities. However, the positive long-term trends for 15-17 year olds as reported by the ABS are a strong confirmation of the reductions in smoking prevalence outlined in Chapter 4.

There is a growing evidence base for the importance of culture as a positive determinant of health and wellbeing including reducing risk behaviours such as smoking.⁵⁷⁻⁵⁹ However, the strength of evidence in the academic literature is not strong, including for

a lack of reliable measures related to culture.⁵⁷ This was also identified as a gap in the systematic review in Chapter 3. Better measures of cultural domains including identity, participation, connection as well as experiences of racism and discrimination will be important for generating evidence for targeted smoking interventions.^{57, 58, 60} The relationship between Aboriginal culture and smoking was not clear in the SEARCH study (Chapter 7), however the survey included only one question “How much do you know about Aboriginal Culture and History”. And although the importance of culture and community for supporting young people to be smoke-free was identified in all yarning sessions within the SEARCH qualitative study (Chapter 8), this was generally an anticipated or expected impact.

There are some current studies with more detailed measures that present an opportunity for future research. *Footprints in Time: the Longitudinal Study of Indigenous Children (LSIC)*⁶¹, has many detailed and relevant measures around culture and participation, including traditional language use and access to homelands, as well as those related to experiences of racism and discrimination. As the participants in this long running cohort study are now entering their teenage years, an age when smoking initiation is more likely, this will be an important piece of future research. One study has already identified a relationship between smoking and racism from this dataset.⁶²

Two other studies led by senior Aboriginal academics, the *Next Generation Youth Wellbeing Study*⁶³ and *Mayi Kuwayu: the National Study of Aboriginal and Torres Strait Islander Wellbeing*⁶⁴, are likely to provide further evidence for a relationship between broader socio-cultural factors and health outcomes than is currently available. There are also opportunities to explore the relationship between smoking and some relevant cultural domains among older adolescents in the ABS NATSISS.

There continues to be a lack of intervention research to reduce Aboriginal youth smoking.^{34, 35} However, it is important to acknowledge that some types of research, such as randomised controlled trials are not always the most appropriate methods or feasible.^{35, 65-67} Aboriginal-led and community-owned research is needed to design and evaluate evidence-based prevention programs that build on cultural strengths and demonstrate how the multiple factors related to smoking, as described in this thesis, work in practice.^{10, 35, 58} There are opportunities for this work to be translated into

program design in both New South Wales through the SEARCH study, and in Victoria through the project developed with VACCHO members, and for these to be evaluated by the community organisations themselves, to contribute to this gap in the evidence base.

9.5 Strengths and limitations

The work presented in this thesis has some limitations. Secondary analysis of existing data is limited by the predetermined questions of survey instruments, and so it is not always possible to explore all relevant explanatory factors related to smoking among Aboriginal adolescents. This is most clearly demonstrated in the ASSAD cross-sectional comparisons in Chapter 6, where the disparity in smoking prevalence between Aboriginal and non-Aboriginal students remained even after controlling for a range of socio-economic factors. This suggests that a large proportion of this disparity is unexplained by social disadvantage and/or the deficiency of using area level measures based on school postcode as a proxy measure of individual SES. However, it is also a strength of this work that in conducting secondary analysis it has not unduly increased the research burden on Aboriginal people, and has sought to maximise use of the large volume of existing and valuable data.

Further, all the studies that used statistical analysis to explore associations between different factors and tobacco use are cross-sectional only. A particular limitation of cross-sectional studies is that where associations are present, the direction of causality is not clear, whereas in other designs such as prospective cohort studies the temporal sequence of exposure and outcome is clear. However, cross-sectional studies remain an important approach to fill gaps in the evidence base. Moreover, the ability to demonstrate consistent findings across multiple data sources, from different sample populations, using different methods, and supported and explained by the qualitative research, is a key strength of this thesis. As is the strong Aboriginal leadership and community engagement in the design and interpretation of the analyses.

The need for longitudinal research identified above highlights a key challenge for completion of a PhD, a process that is timebound and with limited resources. While there was an intention to include longitudinal data in this PhD from SEARCH Phase 2, the Next Generation Youth Wellbeing Study and LSIC, data collection was either not completed during this timeframe (SEARCH, Next Generation) or in the case of LSIC, too

few participants had any smoking experience for the necessary statistical power and it was agreed to wait for future survey waves as the cohort aged. When the data from these studies become available it will extend the work presented here.

Finally, the work is primarily descriptive. While there has not been an opportunity to implement the program recommendations described above within the PhD timeframe, research translation activities will continue to ensure the recommendations can be adopted by the community controlled health sector in New South Wales, Victoria and more broadly. The high level of Aboriginal community involvement and ownership of this research, particularly in relation to the SEARCH study, will be key to completing this successfully.

9.6 Concluding statements

The aim of this research was to develop a better understanding of behaviours associated with smoking initiation among Aboriginal adolescents and to inform the design of prevention programs by exploring changes in prevalence and age of initiation and identifying risk and protective factors for uptake. A key strength of this research was the strong community engagement and a focus on non-smoking youth.

The data presented in this thesis highlights the significant achievements in tobacco control over the past two decades as fewer and fewer young Aboriginal people take up smoking, and most now identify as never smokers. However, these changes have occurred in parallel with the broader population, with a persisting disparity in smoking prevalence. To address this, it will be important to accelerate those declines in uptake for Aboriginal adolescents in particular. This is key to closing the gap between Aboriginal and non-Aboriginal adult smoking rates, which will have significant health benefits and will be an important step towards achieving health equity.

Ongoing commitment to whole of population comprehensive tobacco control measures is also required to continue to drive broader societal and environmental changes in Australia and the denormalisation of tobacco use. Complementary targeted and community level tobacco prevention activities, such as the *Tackling Indigenous Smoking* program, can ensure Aboriginal people are reached in culturally relevant and safe ways. These programs will need to reach young people from their early teenage years and well

into their 20s, and be prepared to communicate not only prevention messages but offer cessation advice as well.

Finally, Aboriginal community-controlled health services are best placed to deliver broader, holistic, strengths-based wellbeing programs that can address the broader drivers of high smoking prevalence among Aboriginal adolescents, but must be adequately resourced to do so. Long term, funding commitment is needed to allow for capacity building and the opportunity for programs to have an impact and be evaluated. These programs should support young people to stay non-smokers by enhancing smoke-free environments, promoting good mental and physical wellbeing, providing opportunities for engagement and empowerment and embracing cultural strengths.

REFERENCES

1. Australian Government Department of Health. Report Card for the Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023. Canberra, ACT; 2019. Available from: <https://www.health.gov.au/internet/main/publishing.nsf/Content/indigenous-implementation-plan>
2. Australian Bureau of Statistics. 4715.0 - National Aboriginal and Torres Strait Islander Health Survey, 2018-19. Canberra, ACT: ABS; 2019 [cited 11 Dec 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4715.0>
3. White VM, Hayman J, Hill DJ. Can population-based tobacco-control policies change smoking behaviors of adolescents from all socio-economic groups? Findings from Australia: 1987-2005. *Cancer Causes Control*. 2008. 19 (6):631-40.
4. US Department of Health and Human Services. Chapter 6. Efforts to Prevent and Reduce Tobacco Use Among Young People. In *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012 [cited 17 Dec 2019]. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
5. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5.20 Approaches to youth smoking prevention. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Melbourne, VIC: Cancer Council Victoria; 2014 [updated Oct 2014; cited 17 Dec 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-20-approaches-to-youth-smoking-prevention#>
6. Wakefield MA, Durkin S, Spittal MJ, Siahpush M, Scollo M, Simpson JA, et al. Impact of tobacco control policies and mass media campaigns on monthly adult smoking prevalence. *Am J Public Health*. 2008. 98 (8):1443-50.
7. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *The Lancet*. 2010. 376 (9748):1261-71.
8. Bayly M, Cotter T, Carroll T. 14.4 Examining the effectiveness of public education campaigns. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Melbourne, VIC: Cancer Council Victoria; 2019 [updated Nov 2019; cited 17 Dec 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-14-social-marketing/14-4-examining-effectiveness-of-public-education-c>

9. White VM, Durkin SJ, Coomber K, Wakefield MA. What is the role of tobacco control advertising intensity and duration in reducing adolescent smoking prevalence? Findings from 16 years of tobacco control mass media advertising in Australia. *Tob Control*. 2015. 24 (2):198-204.
10. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control*. 2003. 12 (suppl 2):ii5-ii8.
11. Tackling Indigenous Smoking. About the TIS program. 2019 [cited 30 August 2019]. Available from: <http://tacklingsmoking.org.au/about-the-tis-program/>
12. Mitchell E, Bandara P, Smith V. Tackling Indigenous Smoking program – final evaluation report. 2018 [cited 3 June 2019]. Available from: <https://beta.health.gov.au/resources/publications/tackling-indigenous-smoking-program-final-evaluation-report>
13. Durkin S, Brennan E, Wakefield M. Mass media campaigns to promote smoking cessation among adults: an integrative review. *Tob Control*. 2012. 21 (2):127-38.
14. Durkin S. Designing and delivering mass media campaigns to enhance equity. Oceania Tobacco Control Conference; Sydney, Australia. 22-24 October 2019.
15. Public Health Association of Australia. Federal Budget 2019-20 - Pre-Budget Submission Canberra, ACT: PHAA; 2019 [cited 5 Oct 2019]. Available from: <https://www.phaa.net.au/documents/item/3292>
16. ACOSH. Leading health organisation calls for the reintroduction of major national TV-led public education campaign. ACOSH; 2019 [updated 25 July 2019; cited 18 Dec 2019]. Available from: <https://www.acosh.org/leading-health-organisation-calls-reintroduction-major-national-tv-led-public-education-campaign-2/>
17. Chaloupka FJ, Yurekli A, Fong GT. Tobacco taxes as a tobacco control strategy. *Tob Control*. 2012. 21 (2):172-80.
18. Greenhalgh E, Stillman S, Ford C. Chapter 7.7 Factors that predict success or failure in quit attempts. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Melbourne, VIC: Cancer Council Victoria; 2016 [cited 5 Mar 2018]. Available from: www.tobaccoinaustralia.org.au/chapter-7-cessation/7-7-personal-factors-associated-with-quitting
19. Wilkinson AL, Scollo MM, Wakefield MA, Spittal MJ, Chaloupka FJ, Durkin SJ. Smoking prevalence following tobacco tax increases in Australia between 2001 and 2017: an interrupted time-series analysis. *The Lancet Public Health*. 2019. 4 (12):e618-e27.

20. Scollo M, Bayly M. 13.5 Impact of price increases on tobacco consumption in Australia. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and Issues. Melbourne, VIC: Cancer Council Victoria; 2019 [updated Nov 2019; cited 17 Dec 2019]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-5-impact-of-price-increases-on-tobacco-consumpt>
21. Sawyer SM, Azzopardi PS, Wickremarathne D, Patton GC. The age of adolescence. *The Lancet Child & Adolescent Health*. 2018. 2 (3):223-8.
22. US Department of Health and Human Services. Chapter 3. The Epidemiology of Tobacco Use Among Young People in the United States and Worldwide. In Preventing tobacco use among young people: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012 [cited 15 Oct 2019]. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
23. Azzopardi PS, Sawyer SM, Carlin JB, Degenhardt L, Brown N, Brown AD, et al. Health and wellbeing of Indigenous adolescents in Australia: a systematic synthesis of population data. *The Lancet*. 2018. 391 (10122):766-82.
24. Sawyer SM, Afifi RA, Bearinger LH, Blakemore S-J, Dick B, Ezech AC, et al. Adolescence: a foundation for future health. *The Lancet*. 2012. 379 (9826):1630-40.
25. Australian Institute of Health and Welfare. Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018. Cat. no. IHW 202. Canberra, ACT: AIHW; 2018 [cited 26 Nov 2019]. Available from: <https://www.aihw.gov.au/reports/indigenous-australians/atsi-adolescent-youth-health-wellbeing-2018/>
26. Marmot M. Social determinants and the health of Indigenous Australians. *Med J Aust*. 2011. 194 (10):512-3.
27. Griffiths K, Coleman C, Lee V, Madden R. How colonisation determines social justice and Indigenous health—a review of the literature. *J Popul Res*. 2016. 33 (1):9-30.
28. Sherwood J. Colonisation – It's bad for your health: The context of Aboriginal health. *Contemp Nurse*. 2013. 46 (1):28-40.
29. Freeman T, Baum F, Mackean T, Ziersch A, Sherwood J, Edwards T, et al. Case study of a decolonising Aboriginal community controlled comprehensive primary health care response to alcohol-related harm. *Aust N Z J Public Health*. 2019.

30. Osborne K, Baum F, Brown L. What works? A review of actions addressing the social and economic determinants of Indigenous health. Issues paper no. 7. Produced for the Closing the Gap Clearinghouse. Canberra: Australian Institute of Health; and Welfare & Melbourne: Australian Institute of Family Studies. 2013.
31. Bulloch H, Fogarty W, Bellchambers K. Aboriginal Health and Wellbeing Services: Putting community-driven, strengths-based approaches into practice. Melbourne, VIC: The Lowitja Institute; 2019.
32. Australian Government Department of Health. National Aboriginal and Torres Strait Islander Health Plan 2013-2023. Canberra: ACT; 2013. Available from: <https://www1.health.gov.au/internet/main/publishing.nsf/Content/natsih-plan>
33. Loxley W, Toumbourou J, Stockwell T, Haines B, Scott K, Godfrey C, et al. The prevention of substance use, risk and harm in Australia: a review of the evidence. Commonwealth of Australia; 2004.
34. Carson KV, Brinn MP, Labiszewski NA, Peters M, Chang AB, Veale A, et al. Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database Syst Rev.* 2012. (8):Cdo09325.
35. Chamberlain C, Perlen S, Brennan S, Rychetnik L, Thomas D, Maddox R, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Syst Rev.* 2017. 6 (1):135.
36. Minichiello A, Lefkowitz AR, Firestone M, Smylie JK, Schwartz R. Effective strategies to reduce commercial tobacco use in Indigenous communities globally: a systematic review. *BMC Public Health.* 2015. 16 (1):21.
37. Kong G, Singh N, Krishnan-Sarin S. A review of culturally targeted/tailored tobacco prevention and cessation interventions for minority adolescents. *Nicotine Tob Res.* 2012. 14 (12):1394-406.
38. Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Evidence-Based Child Health: A Cochrane Review Journal.* 2013. 8 (5):1616-2040.
39. Hodder RK, Freund M, Wolfenden L, Bowman J, Nepal S, Dray J, et al. Systematic review of universal school-based 'resilience' interventions targeting adolescent tobacco, alcohol or illicit substance use: A meta-analysis. *Prev Med.* 2017. 100:248-68.
40. Australian Bureau of Statistics. 2002.0 - 2016 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Profile. Canberra, ACT: ABS; 2017 [cited 26

August 2019]. Available from:

https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument

41. Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and Issues. Melbourne, VIC: Cancer Council Victoria; 2014 [cited 5 Mar 2018]. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
42. Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine & Tobacco Research*. 2019.
43. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Chapter 8.4 Smoking among Aboriginal and Torres Strait Islander children and teenagers. In Scollo, MM and Winstanley, MH [editors]. Tobacco in Australia: Facts and Issues. Melbourne: Cancer Council Victoria; 2016 [updated August 2016; cited 12 Dec 2019]. Available from: <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-4-smoking-among-aboriginal-and-torres-strait-isl>
44. Carson KV, Brinn MP, Labiszewski NA, Esterman AJ, Chang AB, Smith BJ. Community interventions for preventing smoking in young people. *Cochrane Database Syst Rev*. 2011(7)
45. Toumbourou JW, Rowland B, Williams J, Smith R, Patton GC. Community intervention to prevent adolescent health behavior problems: Evaluation of communities that care in Australia. *Health Psychol*. 2019. 38 (6):536.
46. Stewart HS, Bowden JA, Bayly MC, Sharplin GR, Durkin SJ, Miller CL, et al. Potential effectiveness of specific anti-smoking mass media advertisements among Australian Indigenous smokers. *Health Educ Res*. 2011. 26 (6):961-75.
47. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Aust J Prim Health*. 2015. 21 (3):334-41.
48. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr*. 2010. 21 (3):208-14.

49. Young C, Craig JC, Clapham K, Banks S, Williamson A. The prevalence and protective factors for resilience in adolescent Aboriginal Australians living in urban areas: a cross-sectional study. *Aust N Z J Public Health*. 2019. 43 (1):8-14.
50. Williamson A, D'Este C, Clapham K, Redman S, Manton T, Eades S, et al. What are the factors associated with good mental health among Aboriginal children in urban New South Wales, Australia? Phase I findings from the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). *BMJ Open*. 2016. 6 (7)
51. Bond L, Patton G, Glover S, Carlin JB, Butler H, Thomas L, et al. The Gatehouse Project: can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *J Epidemiol Community Health*. 2004. 58 (12):997-1003.
52. Hodder RK, Freund M, Bowman J, Wolfenden L, Campbell E, Dray J, et al. Effectiveness of a pragmatic school-based universal resilience intervention in reducing tobacco, alcohol and illicit substance use in a population of adolescents: cluster-randomised controlled trial. *BMJ Open*. 2017. 7 (8):e016060.
53. Nicholson AK, Borland R, Davey ME, Stevens M, Thomas DP. Predictors of wanting to quit in a national sample of Aboriginal and Torres Strait Islander smokers. *Med J Aust*. 2015. 202 (S10):S26-S32.
54. Australian Government Department of Health. Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023. Canberra, ACT; 2015.
55. Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, et al. Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*. 2016. 387 (10036):2423-78.
56. Australian Bureau of Statistics. 4737.0 - Aboriginal and Torres Strait Islander Peoples: Smoking Trends, Australia, 1994 to 2014-15. Canberra: ABS; 2017 [cited 5 Mar 2018]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4737.0
57. Bourke S, Wright A, Guthrie J, Russell L, Dunbar T, Lovett R. Evidence Review of Indigenous Culture for Health and Wellbeing. *International Journal of Health, Wellness, and Society*. 2018. 8 (4)
58. Henson M, Sabo S, Trujillo A, Teufel-Shone N. Identifying Protective Factors to Promote Health in American Indian and Alaska Native Adolescents: A Literature Review. *J Prim Prev*. 2017. 38 (1-2):5-26.

59. Unger JB, Sussman S, Begay C, Moerner L, Soto C. Spirituality, Ethnic Identity, and Substance Use among American Indian/Alaska Native Adolescents in California. *Subst Use Misuse*. 2020.1-5.
60. Paradies Y. A systematic review of empirical research on self-reported racism and health. *Int J Epidemiol*. 2006. 35 (4):888-901.
61. Australian Government Department of Social Services. Footprints in Time - The Longitudinal Study of Indigenous Children (LSIC) 2019 [cited 19 Dec 2019]. Available from: <https://www.dss.gov.au/about-the-department/publications-articles/research-publications/longitudinal-data-initiatives/footprints-in-time-the-longitudinal-study-of-indigenous-children-lsic>.
62. Cave L, Cooper MN, Zubrick SR, Shepherd CC. Caregiver-perceived racial discrimination is associated with diverse mental health outcomes in Aboriginal and Torres Strait Islander children aged 7–12 years. *Int J Equity Health*. 2019. 18 (1):142.
63. Gubhaju L, Banks E, Ward J, D'Este C, Ivers R, Roseby R, et al. 'Next Generation Youth Well-being Study': understanding the health and social well-being trajectories of Australian Aboriginal adolescents aged 10–24 years: study protocol. *BMJ Open*. 2019. 9 (3):e028734.
64. Australian National University. Mayi Kuwayu National Study of Aboriginal and Torres Strait Islander Wellbeing Canberra: ANU; 2019 [cited 19 Dec 2019]. Available from: <https://mkstudy.com.au/>
65. Fagan P, Moolchan ET, Lawrence D, Fernander A, Ponder P. Identifying health disparities across the tobacco continuum. *Addiction*. 2007. 102:5-29.
66. Glover M, Kira A, Johnston V, Walker N, Thomas D, Chang AB, et al. A systematic review of barriers and facilitators to participation in randomized controlled trials by Indigenous people from New Zealand, Australia, Canada and the United States. *Global Health Promotion*. 2015. 22 (1):21-31.
67. Thomas DP, Anderson IP. Getting the most from Indigenous health research. *Med J Aust*. 2006. 184 (10):500.

10 Full Reference List

- ACOSH. (2019). Leading health organisation calls for the reintroduction of major national TV-led public education campaign. Retrieved from <https://www.acosh.org/leading-health-organisation-calls-reintroduction-major-national-tv-led-public-education-campaign-2/>
- Alexander, L. A., Trinidad, D. R., Sakuma, K. L. K., Pokhrel, P., Herzog, T. A., Clanton, M. S., . . . Fagan, P. (2016). Why we must continue to investigate menthol's role in the African American smoking paradox. *Nicotine and Tobacco Research*, 18, S91-S101.
- Anderson, K. J. (2013). Tobacco use and cessation: What matters to Southeast Alaska Native young adults? *Dissertation Abstracts International*, 75(5-B(E)).
- Angstman, S., Patten, C. A., Renner, C. C., Simon, A., Thomas, J. L., Hurt, R. D., . . . Offord, K. P. (2007). Tobacco and other substance use among Alaska Native youth in western Alaska. *American Journal of Health Behavior*, 31(3), 249-260.
- ASH – Action for Smokefree 2025. (2018). 2018 ASH Year 10 Snapshot Retrieved from https://www.ash.org.nz/ash_year_10
- Australian Bureau of Statistics. (2004). 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2002. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4714.02002>
- Australian Bureau of Statistics. (2006). 4715.0.55.004 - National Aboriginal and Torres Strait Islander Health Survey: Users' Guide, 2004-05. Retrieved from www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4715.0.55.0042004-05
- Australian Bureau of Statistics. (2007). 4722.0.55.004 - Tobacco Smoking - Aboriginal and Torres Strait Islander people: A snapshot, 2004-05. Retrieved from www.abs.gov.au/AUSSTATS/abs@.nsf/productsbyCatalogue/Do3oA9BD9BF14Bo8CA2573oEoo21BCE1
- Australian Bureau of Statistics. (2007). 2002.0 - 2006 Census Community Profile Series. Retrieved from https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2006/communityprofile/o?opendocument
- Australian Bureau of Statistics. (2009). 4714.0 - National Aboriginal and Torres Strait Islander Social Survey, 2008. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/Products/4714.0~2008~Main+Features~Introduction?OpenDocument>
- Australian Bureau of Statistics. (2010). 4720.0 - National Aboriginal and Torres Strait Islander Social Survey: Users' Guide, 2008. Retrieved from www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4720.0Main+Features12008

- Australian Bureau of Statistics. (2010). 4703.o - Framework for Measuring Wellbeing: Aboriginal and Torres Strait Islander Peoples, 2010. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/mf/4703.o>
- Australian Bureau of Statistics. (2012). 4704.o - The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/mf/4704.o>
- Australian Bureau of Statistics. (2012). 2076.o - Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2011. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/2076.oMain+Features12011?OpenDocument>
- Australian Bureau of Statistics. (2013, 28 March 2013). 2002.o - 2011 Census of Population and Housing: Australia (o), Aboriginal and Torres Strait Islander Peoples (Indigenous) Profile. Retrieved from https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/o?opendocument
- Australian Bureau of Statistics. (2013, 28 March 2013). 2002.o - 2011 Census of Population and Housing: New South Wales (1), Aboriginal and Torres Strait Islander Peoples (Indigenous) Profile. Retrieved from https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/1?opendocument
- Australian Bureau of Statistics. (2013). 4727.o.55.002 - Australian Aboriginal and Torres Strait Islander Health Survey: Users' Guide, 2012-13. Retrieved from www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4727.o.55.002Main+Features12012-13
- Australian Bureau of Statistics. (2013). 3238.o.55.001 - Estimates of Aboriginal and Torres Strait Islander Australians, June 2011. Retrieved from www.abs.gov.au/ausstats/abs@.nsf/mf/3238.o.55.001
- Australian Bureau of Statistics. (2014). 4727.o.55.006 - Australian Aboriginal and Torres Strait Islander Health Survey: Updated Results, 2012-13. Retrieved from <https://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4727.o.55.006>
- Australian Bureau of Statistics. (2016). 4714.o - National Aboriginal and Torres Strait Islander Social Survey, 2014-15. Retrieved from www.abs.gov.au/ausstats/abs@.nsf/mf/4714.o
- Australian Bureau of Statistics. (2016). 4720.o - National Aboriginal and Torres Strait Islander Social Survey: User Guide, 2014-15. Retrieved from www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4720.o
- Australian Bureau of Statistics. (2017). 4737.o - Aboriginal and Torres Strait Islander Peoples: Smoking Trends, Australia, 1994 to 2014-15. Retrieved from www.abs.gov.au/ausstats/abs@.nsf/mf/4737.o

- Australian Bureau of Statistics. (2017). 2002.o - 2016 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Profile. Retrieved from https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument
- Australian Bureau of Statistics. (2018). 1270.o.55.005 - Australian Statistical Geography Standard (ASGS): Volume 5 - Remoteness Structure, July 2016. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/mf/1270.o.55.005>
- Australian Bureau of Statistics. (2018). 3238.o.55.001 - Estimates of Aboriginal and Torres Strait Islander Australians, June 2016. Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3238.o.55.001>
- Australian Bureau of Statistics. (2018). 2076.o - Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2016. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2076.o>
- Australian Bureau of Statistics. (2018). 2033.o.55.001 - Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.o.55.001>
- Australian Bureau of Statistics. (2019). 4364.o.55.001 - National Health Survey: First Results, 2017-18. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.o.55.001~2017-18~Main%20Features~Smoking~85>
- Australian Bureau of Statistics. (2019). 4715.o - National Aboriginal and Torres Strait Islander Health Survey, 2018-19. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4715.o>
- Australian Government Department of Health. (2013). *National Aboriginal and Torres Strait Islander Health Plan 2013-2023*. Canberra, ACT: Commonwealth of Australia. Retrieved from <https://www1.health.gov.au/internet/main/publishing.nsf/Content/natsih-plan>.
- Australian Government Department of Health. (2014). National Tobacco Campaign - More Targeted Approach & Break the Chain: Campaign Evaluation. Retrieved from <https://webarchive.nla.gov.au/awa/20180412042530/http://www.quitnow.gov.au/internet/quitnow/publishing.nsf/Content/research-reports>
- Australian Government Department of Health. (2015). *Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023*. Canberra, ACT: Commonwealth of Australia.
- Australian Government Department of Health. (2017). *My Life My Lead - Opportunities for strengthening approaches to the social determinants and cultural determinants of Indigenous health: Report on the national consultations December 2017*. Canberra, ACT: Commonwealth of Australia.

- Australian Government Department of Health. (2018). Tobacco control timeline. Retrieved from <https://www.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc~timeline>
- Australian Government Department of Health. (2019). The history of the National Tobacco Campaign. Retrieved from <https://webarchive.nla.gov.au/awa/20190208165138/http://www.health.gov.au/internet/main/publishing.nsf/Content/tobacco-educat>
- Australian Government Department of Health. (2019). *Report Card for the Implementation Plan for the National Aboriginal and Torres Strait Islander Health Plan 2013-2023*. Canberra, ACT: Commonwealth of Australia. Retrieved from <https://www1.health.gov.au/internet/main/publishing.nsf/Content/indigenous-implementation-plan>.
- Australian Government Department of Prime Minister and Cabinet. (2019). *Closing the Gap Report 2019*. Canberra, ACT: Commonwealth of Australia. Retrieved from <https://ctgreport.niaa.gov.au/>
- Australian Government Department of Social Services. (2019). Footprints in Time - The Longitudinal Study of Indigenous Children (LSIC). Retrieved from <https://www.dss.gov.au/about-the-department/publications-articles/research-publications/longitudinal-data-initiatives/footprints-in-time-the-longitudinal-study-of-indigenous-children-lsic>
- Australian Health Ministers' Advisory Council. (2017). Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Retrieved from <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
- Australian Health Ministers' Advisory Council. (2017). Figure 2.15-4 Relationship between being a non-smoker and selected social factors, Indigenous Australians 15 years and over, 2014-15. p. 129. *Aboriginal and Torres Strait Islander Health Performance Framework 2017 report*. Canberra, ACT: AHMAC. Retrieved from <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
- Australian Health Ministers' Advisory Council. (2017). Figure 2.15-6 Smoking prevalence rates, people 15 years and over by Indigenous status and key tobacco control measures implemented in Australia since 1990. p. 130. *Aboriginal and Torres Strait Islander Health Performance Framework 2017 report*. Canberra, ACT: AHMAC. Retrieved from <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
- Australian Institute of Health and Welfare. (2016). Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. *Australian Burden of Disease Study series no. 6. Cat. no. BOD 7*. Retrieved from

- www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
- Australian Institute of Health and Welfare. (2016). Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. *Drug Statistics Series no. 30. Cat. no. PHE 210*. Retrieved from www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
- Australian Institute of Health and Welfare. (2017). National Drug Strategy Household Survey 2016: detailed findings. *Drug Statistics Series no. 31*. Retrieved from www.aihw.gov.au/reports/illicit-use-of-drugs/2016-ndshs-detailed
- Australian Institute of Health and Welfare. (2018). Australia's health 2018. Cat. no. AUS 221. Retrieved from <https://www.aihw.gov.au/reports/australias-health/australias-health-2018>
- Australian Institute of Health and Welfare. (2018). Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018. Cat. no. IHW 202. Retrieved from <https://www.aihw.gov.au/reports/indigenous-australians/atsi-adolescent-youth-health-wellbeing-2018/>
- Australian Institute of Health and Welfare. (2018). Figure 2.1.1: Age structure of the Australian population profile, by Indigenous status, Australia, 30 June 2016; p.12. *Aboriginal and Torres Strait Islander adolescent and youth health and wellbeing 2018. Cat. no. IHW 202*. Canberra, ACT: AIHW. Retrieved from <https://www.aihw.gov.au/reports/indigenous-australians/atsi-adolescent-youth-health-wellbeing-2018/>
- Australian Institute of Health and Welfare. (2019). Alcohol, tobacco & other drugs in Australia [Internet]. Retrieved from <https://www.aihw.gov.au/reports/alcohol/alcohol-tobacco-other-drugs-australia>
- Australian Institute of Health and Welfare. (2019). Burden of tobacco use in Australia: Australian Burden of Disease Study 2015. Cat. no. BOD 20. Retrieved from <https://www.aihw.gov.au/reports/burden-of-disease/burden-of-tobacco-use-in-australia>
- Australian Institute of Health and Welfare. (2019). Tracking progress against the Implementation Plan goals for the Aboriginal and Torres Strait Islander Health Plan 2013–2023 [Internet]. Retrieved from <https://www.aihw.gov.au/reports/indigenous-australians/tracking-progress-against-ipg-2013-2023>
- Australian National University. (2019). Mayi Kuwayu National Study of Aboriginal and Torres Strait Islander Wellbeing. Retrieved from <https://mkstudy.com.au/>
- Azzopardi, P. S., Sawyer, S. M., Carlin, J. B., Degenhardt, L., Brown, N., Brown, A. D., & Patton, G. C. (2018). Health and wellbeing of Indigenous adolescents in Australia: a systematic synthesis of population data. *The Lancet*, 391(10122), 766–782. doi:[https://doi.org/10.1016/S0140-6736\(17\)32141-4](https://doi.org/10.1016/S0140-6736(17)32141-4)
- Baker, A., Ivers, R. G., Bowman, J., Butler, T., Kay-Lambkin, F. J., Wye, P., . . . Wodak, A. (2006). Where there's smoke, there's fire: High prevalence of smoking among some sub-

- populations and recommendations for intervention. *Drug and Alcohol Review*, 25(1), 85-96.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ, US: Prentice-Hall, Inc.
- Bandura, A. (1999). Social cognitive theory: An agentic perspective. *Asian journal of social psychology*, 2(1), 21-41.
- Banks, E., Joshy, G., Korda, R. J., Stavreski, B., Soga, K., Egger, S., . . . Lopez, A. D. (2019). Tobacco smoking and risk of 36 cardiovascular disease subtypes: fatal and non-fatal outcomes in a large prospective Australian study. *BMC Medicine*, 17(1), 128.
- Banks, E., Joshy, G., Weber, M. F., Liu, B., Grenfell, R., Egger, S., . . . Beral, V. (2015). Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Medicine*, 13(1), 38.
doi:10.1186/s12916-015-0281-z
- Barnett, R., Pearce, J., & Moon, G. (2009). Community inequality and smoking cessation in New Zealand, 1981-2006. *Social Science and Medicine*, 68(5), 876-884.
- Bayly, M., Cotter, T., & Carroll, T. (2019). 14.4 Examining the effectiveness of public education campaigns. *Tobacco in Australia: Facts and Issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-14-social-marketing/14-4-examining-effectiveness-of-public-education-c>
- Bayly, M., Freeman, B., & Scollo, M. (2017). 10.8 Trends in products and packaging. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-10-tobacco-industry/10-8-trends-in-products-and-packaging>
- Beebe, L. A., Vesely, S. K., Oman, R. F., Tolma, E., Aspy, C. B., & Rodine, S. (2008). Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma. *Maternal and Child Health Journal*, 12(Suppl), S82-S90.
- Bessarab, D., & Ng'andu, B. (2010). Yarning about yarning as a legitimate method in Indigenous research. *International Journal of Critical Indigenous Studies*, 3(1), 37-50.
- Bland, J. M., & Altman, D. G. (1995). Multiple significance tests: the Bonferroni method. *BMJ*, 310(6973), 170. doi:10.1136/bmj.310.6973.170
- Bond, L., Patton, G., Glover, S., Carlin, J. B., Butler, H., Thomas, L., & Bowes, G. (2004). The Gatehouse Project: can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *Journal of Epidemiology and Community Health*, 58(12), 997-1003.
doi:10.1136/jech.2003.009449
- Bourke, S., Wright, A., Guthrie, J., Russell, L., Dunbar, T., & Lovett, R. (2018). Evidence Review of Indigenous Culture for Health and Wellbeing. *International Journal of Health, Wellness, and Society*, 8(4).

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Breslau, N., & Peterson, E. L. (1996). Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *American Journal of Public Health*, 86(2), 214-220.
- Briggs, V. L., Lindorff, K. J., & Ivers, R. G. (2003). Aboriginal and Torres Strait Islander Australians and tobacco. *Tobacco Control*, 12(suppl 2), ii5-ii8.
- Bulloch, H., Fogarty, W., & Bellchambers, K. (2019). *Aboriginal Health and Wellbeing Services: Putting community-driven, strengths-based approaches into practice*. Melbourne, VIC: The Lowitja Institute.
- Caraballo, R. S., Yee, S. L., Gfroerer, J. C., Pechacek, T. F., & Henson, R. (2006). Tobacco use among racial and ethnic population subgroups of adolescents in the United States. *Preventing Chronic Disease*, 3(2), A39.
- Carson, K. V., Brinn, M. P., Labiszewski, N. A., Esterman, A. J., Chang, A. B., & Smith, B. J. (2011). Community interventions for preventing smoking in young people. *Cochrane Database of Systematic Reviews*(7).
- Carson, K. V., Brinn, M. P., Labiszewski, N. A., Peters, M., Chang, A. B., Veale, A., . . . Smith, B. J. (2012). Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database of Systematic Reviews*(8), Cdo09325. doi:10.1002/14651858.CD009325.pub2
- Cave, L., Cooper, M. N., Zubrick, S. R., & Shepherd, C. C. (2019). Caregiver-perceived racial discrimination is associated with diverse mental health outcomes in Aboriginal and Torres Strait Islander children aged 7–12 years. *International Journal for Equity in Health*, 18(1), 142.
- Centers for Disease Control and Prevention (CDC). (2006). Racial/ethnic differences among youths in cigarette smoking and susceptibility to start smoking--United States, 2002-2004. *MMWR: Morbidity and Mortality Weekly Report*, 55(47), 1275-1277.
- Centers for Disease Control and Prevention (CDC). (2007). Cigarette smoking among adults--United States, 2006. *MMWR: Morbidity and Mortality Weekly Report*, 56(44), 1157-1161.
- Centers for Disease Control and Prevention (CDC). (N.D) 1991-2017 High School Youth Risk Behavior Survey Data. Retrieved from <http://nccd.cdc.gov/youthonline/>. Accessed on 31 Jan 2019.
- Chaloupka, F. J., Yurekli, A., & Fong, G. T. (2012). Tobacco taxes as a tobacco control strategy. *Tobacco Control*, 21(2), 172-180.
- Chamberlain, C., Perlan, S., Rychetnik, L., Cameron, H., Alam, N., Banks, E., . . . Eades, S. (2016). A comprehensive approach to Aboriginal and Torres Strait Islander tobacco control (CATS). Retrieved from <http://preventioncentre.org.au/wp-content/uploads/2015/01/Tobacco-framework-poster.pdf>

- Chamberlain, C., Perlen, S., Brennan, S., Rychetnik, L., Thomas, D., Maddox, R., . . . Eades, S. (2017). Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Systematic Reviews*, 6(1), 135. doi:10.1186/s13643-017-0520-9
- Chavez, G. F., & Sanchez, D. T. (2010). A clearer picture of multiracial substance use: Rates and correlates of alcohol and tobacco use in multiracial adolescents and adults. *Race and Social Problems*, 2(1), 1-18.
- Choi, W. S., Gilpin, E. A., Farkas, A. J., & Pierce, J. P. (2001). Determining the probability of future smoking among adolescents. *Addiction*, 96(2), 313-323.
- Colonna, E., et al. (In Press). Review of tobacco use among Aboriginal and Torres Strait Islander people. *HealthInfoNet*.
- Colucci, E. (2007). "Focus Groups Can Be Fun": The Use of Activity-Oriented Questions in Focus Group Discussions. *Qualitative Health Research*, 17(10), 1422-1433. doi:10.1177/1049732307308129
- Cosh, S., Hawkins, K., Skaczkowski, G., Copley, D., & Bowden, J. (2015). Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Australian Journal of Primary Health*, 21(3), 334-341.
- Council of Australian Governments (COAG). (2009). *National Partnership Agreement on Closing the Gap in Indigenous Health Outcomes*. Council on Federal Financial Relations. Retrieved from http://federalfinancialrelations.gov.au/content/npa/health/_archive/ctg-health-outcomes/national_partnership.pdf.
- Council of Australian Governments (COAG). (2012). *National Healthcare Agreement 2012*. Council on Federal Financial Relations. Retrieved from http://federalfinancialrelations.gov.au/content/national_agreements.aspx.
- Coutinho, L., Scazufca, M., & Menezes, P. R. (2008). Methods for estimating prevalence ratios in cross-sectional studies. *Revista de Saúde Pública*, 42, 992-998.
- Crengle, S., Robinson, E., Ameratunga, S., Clark, T., & Raphael, D. (2012). Ethnic discrimination prevalence and associations with health outcomes: data from a nationally representative cross-sectional survey of secondary school students in New Zealand. *BMC Public Health*, 12(1), 45.
- Daube, M. (2018). Tobacco in Australia: Time to get back to basics. MJA InSight. Retrieved from <https://insightplus.mja.com.au/2018/16/tobacco-in-australia-time-to-get-back-to-basics/>
- Davies, H. T. O., Crombie, I. K., & Tavakoli, M. (1998). When can odds ratios mislead? *BMJ*, 316(7136), 989-991. doi:10.1136/bmj.316.7136.989
- Davis, K. C., Nonnemaker, J. M., Asfaw, H. A., & Vallone, D. M. (2010). Racial/ethnic differences in perceived smoking prevalence: evidence from a national survey of teens. *International Journal of Environmental Research and Public Health*, 7(12), 4152-4168.

- Dennis, M. K., & Momper, S. L. (2012). "It's bad around here now": tobacco, alcohol and other drug use among American Indians living on a rural reservation. *Journal of Ethnicity in Substance Abuse*, 11(2), 130-148.
- Donath SM. (2005). How to calculate standard errors for population estimates based on Australian National Health Survey data. *Australian and New Zealand Journal of Public Health*, 29(6), 565-571.
- Durkin, S. (22-24 October, 2019). *Designing and delivering mass media campaigns to enhance equity*. Paper presented at the Oceania Tobacco Control Conference, Sydney, Australia.
- Durkin, S., Brennan, E., & Wakefield, M. (2012). Mass media campaigns to promote smoking cessation among adults: an integrative review. *Tobacco Control*, 21(2), 127-138.
doi:10.1136/tobaccocontrol-2011-050345
- Eades, S. J., & Chamberlain, C. (2015). Seeking a comprehensive approach to tobacco control for Aboriginal and Torres Strait Islander people. *Medical Journal of Australia*, 202(10), 511-512.
- Edwards, R., Carter, K., Peace, J., & Blakely, T. (2013). An examination of smoking initiation rates by age: results from a large longitudinal study in New Zealand. *Australian and New Zealand Journal of Public Health*, 37(6), 516-519.
- Ellickson, P. L., Tucker, J. S., & Klein, D. J. (2001). High-risk behaviors associated with early smoking: results from a 5-year follow-up. *Journal of Adolescent Health*, 28(6), 465-473.
doi:https://doi.org/10.1016/S1054-139X(00)00202-0
- Elton-Marshall, T., Leatherdale, S. T., & Burkhalter, R. (2011). Tobacco, alcohol and illicit drug use among Aboriginal youth living off-reserve: results from the Youth Smoking Survey. *Canadian Medical Association Journal*, 183(8), E480-486.
- Elton-Marshall, T., Leatherdale, S. T., Burkhalter, R., & Brown, K. S. (2013). Changes in tobacco use, susceptibility to future smoking, and quit attempts among Canadian youth over time: a comparison of off-reserve Aboriginal and non-Aboriginal youth. *International Journal of Environmental Research and Public Health*, 10(2), 729-741.
- Fagan, P., Moolchan, E. T., Lawrence, D., Fernander, A., & Ponder, P. (2007). Identifying health disparities across the tobacco continuum. *Addiction*, 102, 5-29.
- Farrell, A. D., Danish, S. J., & Howard, C. (1992). Relationship between drug use and other problem behaviors in urban adolescents. *Journal of Consulting and Clinical Psychology*, 60(5), 705.
- First Nations Information Governance Centre. (2018). *National Report of the First Nations Regional Health Survey Phase 3: Volume One*. Retrieved from Ottawa:
https://fnigc.ca/sites/default/files/docs/fnigc_rhs_phase_3_national_report_vol_1_en_final_sm_1.pdf
- Flay, B. R. (2004). Theory of Triadic Influence. In N. B. Anderson (Ed.), *Encyclopedia of Health and Behavior* (pp. p. 715-718). Thousand Oaks, California: SAGE Publications, Inc.
Retrieved from <http://sk.sagepub.com/reference/behavior>. doi:10.4135/9781412952576

- Flay, B. R. (2004). Theory of Triadic Influence. In N. B. Anderson (Ed.), *Encyclopedia of Health and Behavior* (pp. p. 716. Figure 711 The Theory of Triadic Influence). Thousand Oaks, California: SAGE Publications, Inc. Retrieved from <http://sk.sagepub.com/reference/behavior>. doi:10.4135/9781412952576
- Flay, B. R., & Petraitis, J. (1994). A new theory of health behavior with implications for preventive interventions. *Advances in Medical Sociology*, 4, 19-44.
- Fogarty, W., Bulloch, H., McDonnell, S., & Davis, M. (2018). *Deficit Discourse and Indigenous Health: How narrative framings of Aboriginal and Torres Strait Islander people are reproduced in policy*. Melbourne: Lowitja Institute.
- Fogarty, W., Lovell, M., Langenberg, J., & Heron, M.-J. (2018). *Deficit Discourse and Strengths-based Approaches: Changing the Narrative of Aboriginal and Torres Strait Islander Health and Wellbeing*. Melbourne: Lowitja Institute.
- Forster, J. L., Brokenleg, I., Rhodes, K. L., Lamont, G. R., & Poupart, J. (2008). Cigarette smoking among American Indian youth in Minneapolis-St. Paul. *American Journal of Preventive Medicine*, 35(6 Suppl), S449-456.
- Freeman, T., Baum, F., Mackean, T., Ziersch, A., Sherwood, J., Edwards, T., & Boffa, J. (2019). Case study of a decolonising Aboriginal community controlled comprehensive primary health care response to alcohol-related harm. *Australian and New Zealand Journal of Public Health*.
- Fryer, C. S., Seaman, E. L., Clark, R. S., & Clark, V. L. P. (2017). Mixed methods research in tobacco control with youth and young adults: A methodological review of current strategies. *PloS One*, 12(8), e0183471.
- Gazis, N., Connor, J. P., & Ho, R. (2010). Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents. *Journal of Early Adolescence*, 30(3), 345-368.
- Gifford, H., Tautolo el, S., Erick, S., Hoek, J., Gray, R., & Edwards, R. (2016). A qualitative analysis of Maori and Pacific smokers' views on informed choice and smoking. *BMJ Open*, 6(5), e011415.
- Glanz, K., Mau, M., Steffen, A., Maskarinec, G., & Arriola, K. J. (2007). Tobacco use among Native Hawaiian middle school students: its prevalence, correlates and implications. *Ethnicity and Health*, 12(3), 227-244.
- Glover, M., Kira, A., Johnston, V., Walker, N., Thomas, D., Chang, A. B., . . . Brown, N. (2015). A systematic review of barriers and facilitators to participation in randomized controlled trials by Indigenous people from New Zealand, Australia, Canada and the United States. *Global Health Promotion*, 22(1), 21-31.
- Grace, C. (2019). Chapter 15.7 Legislation to ban smoking in public places. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and issues*. *Tobacco in Australia:*

- Facts and issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-15-smokefree-environment/15-7-legislation>
- Green, J., Willis, K., Hughes, E., Small, R., Welch, N., Gibbs, L., & Daly, J. (2007). Generating best evidence from qualitative research: the role of data analysis. *Australian and New Zealand Journal of Public Health*, 31(6), 545-550.
- Greenhalgh, E., Stillman, S., & Ford, C. (2016). Chapter 7.7 Factors that predict success or failure in quit attempts. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from www.tobaccoinaustralia.org.au/chapter-7-cessation/7-7-personal-factors-associated-with-quitting
- Greenhalgh, E., & Winstanley, M. (2019, February 2019). 1.6 Prevalence of smoking—teenagers. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-6-prevalence-of-smoking-teenagers>
- Griffiths, K., Coleman, C., Lee, V., & Madden, R. (2016). How colonisation determines social justice and Indigenous health—a review of the literature. *Journal of Population Research*, 33(1), 9-30.
- Gubhaju, L., Banks, E., Ward, J., D'Este, C., Ivers, R., Roseby, R., . . . Liu, B. (2019). 'Next Generation Youth Well-being Study:' understanding the health and social well-being trajectories of Australian Aboriginal adolescents aged 10–24 years: study protocol. *BMJ Open*, 9(3), e028734.
- Guerin, N., & White, V. (2018). *ASSAD 2017 Statistics & Trends: Australian Secondary Students' Use of Tobacco, Alcohol, Over-the-counter Drugs, and Illicit Substances*. Melbourne, VIC: Cancer Council Victoria. Retrieved from <https://beta.health.gov.au/resources/publications/secondary-school-students-use-of-tobacco-alcohol-and-other-drugs-in-2017>
- Guo, H., Reeder, A. I., McGee, R., & Darling, H. (2011). Adolescents' leisure activities, parental monitoring and cigarette smoking - a cross-sectional study. *Substance Abuse Treatment, Prevention, and Policy*, 6(1), 12. doi:10.1186/1747-597x-6-12
- Haughton, J. (2017) *Indigenous affairs: health and wellbeing*. Canberra, ACT: Parliament of Australia. [cited 30 August 2019]. Available from: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201718/IndigenousHealth
- Hautala, D., Sittner, K., & Walls, M. (2019). Onset, Comorbidity, and Predictors of Nicotine, Alcohol, and Marijuana Use Disorders Among North American Indigenous Adolescents. *Journal of Abnormal Child Psychology*, 47(6), 1025-1038. doi:10.1007/s10802-018-0500-0
- Hautala, D., Sittner, K., & Walls, M. (2020). Latent Trajectories and Profiles of Commercial Cigarette Smoking Frequency From Adolescence to Young Adulthood Among North American Indigenous People. *Nicotine & Tobacco Research*. doi:10.1093/ntr/ntaa063

- Henderson, P. N., Kanekar, S., Wen, Y., Buchwald, D., Goldberg, J., Choi, W., . . . Henderson, J. A. (2009). Patterns of cigarette smoking initiation in two culturally distinct American Indian tribes. *American Journal of Public Health*, 99(11), 2020-2025.
- Henson, M., Sabo, S., Trujillo, A., & Teufel-Shone, N. (2017). Identifying Protective Factors to Promote Health in American Indian and Alaska Native Adolescents: A Literature Review. *Journal of Primary Prevention*, 38(1-2), 5-26.
- Heris, C., Chamberlain, C., & Eades, S. (2017). Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. Retrieved from https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=77220
- Heris, C., Eades, S., Lyons, L., Chamberlain, C., & Thomas, D. (2020). Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Research & Practice*. 30(2), e29121906. doi.org/10.17061/phrp29121906
- Heris, C., Guerin, N., Thomas, D., Chamberlain, C., Eades, S., & White, V. M. Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017. *Drug and Alcohol Review*. (2020). doi:10.1111/dar.13130
- Heris, C., Thurber, K., Wright, D., Thomas, D., Chamberlain, C., Gubhaju, L., . . . Eades, S. (2019). Staying smoke-free: factors associated with non-smoking among urban Aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). *Manuscript accepted for publication in the Health Promotion Journal of Australia* (4 Oct 2020).
- Heris, C. L., Chamberlain, C., Gubhaju, L., Thomas, D. P., & Eades, S. J. (2019). Factors influencing smoking among Indigenous adolescents aged 10-24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine & Tobacco Research*. doi:10.1093/ntr/ntz219
- Heris, C. L., Guerin, N., Thomas, D. P., Eades, S. J., Chamberlain, C., & White, V. M. (2020). The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy. *Australian and New Zealand Journal of Public Health*, 44(5):397-403. doi:10.1111/1753-6405.13022
- Hockenberry, J. M., Timmons, E. J., & Vander Weg, M. W. (2011). Adolescent mental health as a risk factor for adolescent smoking onset. *Adolescent health, medicine, therapeutics*, 2, 27.
- Hodder, R. K., Freund, M., Bowman, J., Wolfenden, L., Campbell, E., Dray, J., . . . Wiggers, J. (2017). Effectiveness of a pragmatic school-based universal resilience intervention in reducing tobacco, alcohol and illicit substance use in a population of adolescents: cluster-randomised controlled trial. *BMJ Open*, 7(8), e016060.
- Hodder, R. K., Freund, M., Wolfenden, L., Bowman, J., Nepal, S., Dray, J., . . . Wiggers, J. (2017). Systematic review of universal school-based 'resilience' interventions targeting adolescent

- tobacco, alcohol or illicit substance use: A meta-analysis. *Preventive Medicine*, 100, 248-268. doi:<https://doi.org/10.1016/j.ypmed.2017.04.003>
- Husten, C. G. (2009). How should we define light or intermittent smoking? Does it matter? *Nicotine & Tobacco Research*, 11(2), 111-121. doi:10.1093/ntr/ntp010
- Hutchinson, P. J., Richardson, C. G., & Bottorff, J. L. (2008). Emergent cigarette smoking, correlations with depression and interest in cessation among Aboriginal adolescents in British Columbia. *Canadian Journal of Public Health*, 99(5), 418-422.
- Indig, D., & Haysom, L. (2012). Smoking behaviours among young people in custody in New South Wales, Australia. *Drug and Alcohol Review*, 31(5), 631-637.
- Intergovernmental Committee on Drugs (IGCD) Standing Committee on Tobacco. (2012). *National Tobacco Strategy 2012-2018*. Canberra: Commonwealth of Australia. Retrieved from <http://www.health.gov.au/internet/main/publishing.nsf/Content/tobacco-strategy>
- Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice. *Field Methods*, 18(1), 3-20. doi:10.1177/1525822X05282260
- Jamal, A., Phillips, E., Gentzke, A. S., Homa, D. M., Babb, S. D., King, B. A., & Neff, L. J. (2018). Current cigarette smoking among adults—United States, 2016. *MMWR: Morbidity and Mortality Weekly Report*, 67(2), 53-59. doi:<http://dx.doi.org/10.15585/mmwr.mm6702a1>
- Jessor, R. (1994). The origins of Problem Behavior Theory. New York: Springer.
- Jessor, R., & Costa, F. M. (n.d.). Problem-Behavior Theory - A Brief Overview. Retrieved from https://ibs.colorado.edu/jessor/pb_theory.html
- Jessor, R., Donovan, J. E., & Costa, F. M. (1994). *Beyond adolescence: Problem behaviour and young adult development*: Cambridge University Press.
- Johnston, V., & Thomas, D. P. (2008). Smoking behaviours in a remote Australian Indigenous community: the influence of family and other factors. *Social Science and Medicine*, 67(11), 1708-1716.
- Johnston, V., Westphal, D. W., Earnshaw, C., & Thomas, D. P. (2012). Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health*, 12(1), 963.
- Kang, J., Ciecierski, C. C., Malin, E. L., Carroll, A. J., Gidea, M., Craft, L. L., . . . Hitsman, B. (2014). A latent class analysis of cancer risk behaviors among U.S. college students. *Preventive Medicine*, 64, 121-125.
- King, M., Smith, A., & Gracey, M. (2009). Indigenous health part 2: the underlying causes of the health gap. *The Lancet*, 374(9683), 76-85. doi:[https://doi.org/10.1016/S0140-6736\(09\)60827-8](https://doi.org/10.1016/S0140-6736(09)60827-8)
- Kitzinger, J. (1994). The methodology of Focus Groups: the importance of interaction between research participants. *Sociology of Health and Illness*, 16(1), 103-121. doi:10.1111/1467-9566.ep11347023

- Kong, G., Singh, N., & Krishnan-Sarin, S. (2012). A review of culturally targeted/tailored tobacco prevention and cessation interventions for minority adolescents. *Nicotine and Tobacco Research*, 14(12), 1394-1406.
- Kulis, S., Hodge, D. R., Ayers, S. L., Brown, E. F., & Marsiglia, F. F. (2012). Spirituality and religion: Intertwined protective factors for substance use among urban American Indian youth. *American Journal of Drug and Alcohol Abuse*, 38(5), 444-449.
- Kulis, S. S., Jager, J., Ayers, S. L., Lateef, H., & Kiehne, E. (2016). Substance Use Profiles of Urban American Indian Adolescents: A Latent Class Analysis. *Substance Use and Misuse*, 51(9), 1159-1173.
- Laugesen, M., Scragg, R., Wellman, R. J., & DiFranza, J. R. (2007). R-rated film viewing and adolescent smoking. *Preventive Medicine*, 45(6), 454-459.
- Laycock, A., Walker, D., Harrison, N., & Brands, J. (2011). Part A: Indigenous Health Research in Context. In *Researching Indigenous Health: A Practical Guide for Researchers*. Melbourne: The Lowitja Institute.
- Leavy, J., Wood, L., Phillips, F., & Rosenberg, M. (2010). Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promotion Journal of Australia*, 21(3), 208-214.
- LeMaster, P. L., Connell, C. M., Mitchell, C. M., & Manson, S. M. (2002). Tobacco use among American Indian adolescents: Protective and risk factors. *Journal of Adolescent Health*, 30(6), 426-432.
- Lemstra, M., Rogers, M., Thompson, A., Moraros, J., & Tempier, R. (2011). Prevalence and risk indicators of smoking among on-reserve First Nations youth. *Paediatrics & Child Health*, 16(10), e71-e77.
- Liu, D. M., & Alameda, C. K. (2011). Social determinants of health for Native Hawaiian children and adolescents. *Hawaii Medical Journal*, 70(11 Suppl 2), 9-14.
- Lonczak, H. S., Fernandez, A., Austin, L., Marlatt, G., & Donovan, D. M. (2007). Family structure and substance use among American Indian youth: A preliminary study. *Families, Systems, & Health*, 25(1), 10-22.
- Lovett, R., Thurber, K., Wright, A., Maddox, R., & Banks, E. (2017). Deadly progress: changes in Australian Aboriginal and Torres Strait Islander adult daily smoking, 2004–2015. *Public Health Research & Practice*, 27(5):e2751742.
- Lovett, R., Thurber, K. A., & Maddox, R. (2017). The Aboriginal and Torres Strait Islander smoking epidemic: what stage are we at, and what does it mean? *Public Health Research & Practice*, 27(4).
- Loxley W, Toumbourou J, Stockwell T, Haines B, Scott K, Godfrey C, . . . J, M. (2004.). *The prevention of substance use, risk and harm in Australia: a review of the evidence*. Commonwealth of Australia.

- Luke, J., Stewart, P., Thorpe, R., & Anderson, I. (2011). *Victorian Aboriginal Health Service Young People's Project: A Study of the Health and Wellbeing of Koori Youth in Melbourne*. Melbourne, VIC: The Lowitja Institute.
- Maddox, R., Waa, A., Lee, K., Nez Henderson, P., Blais, G., Reading, J., & Lovett, R. (2019). Commercial tobacco and indigenous peoples: a stock take on Framework Convention on Tobacco Control progress. *Tobacco Control*, 28(5), 574-581. doi:10.1136/tobaccocontrol-2018-054508
- Marie, D., Fergusson, D. M., & Boden, J. M. (2010). Does socioeconomic inequality explain ethnic differences in nicotine dependence? Evidence from a New Zealand birth cohort. *Australian and New Zealand Journal of Psychiatry*, 44(4), 378-383.
- Marmot, M. (2011). Social determinants and the health of Indigenous Australians. *Medical Journal of Australia*, 194(10), 512-513.
- Marmot, M., Friel, S., Bell, R., Houweling, T. A., Taylor, S., & Commission on Social Determinants of Health. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. *Lancet*, 372(9650), 1661-1669.
- Marsh, L., Dawson, A., & McGee, R. (2014). What do young New Zealanders want in terms of smoking cessation? *Journal of Smoking Cessation*, 9(2), 98-108.
- Maubach, N., Hoek, J. A., Edwards, R., Gifford, H., Erick, S., & Newcombe, R. (2013). 'The times are changing': New Zealand smokers' perceptions of the tobacco endgame. *Tobacco Control*, 22(6), 395-400.
- McCool, J., Hoek, J., Edwards, R., Thomson, G., & Gifford, H. (2013). Crossing the smoking divide for young adults: expressions of stigma and identity among smokers and nonsmokers. *Nicotine and Tobacco Research*, 15(2), 552-556.
- McCool, J., Paynter, J., & Scragg, R. (2011). A cross-sectional study of opinions related to the tobacco industry and their association with smoking status amongst 14-15 year old teenagers in New Zealand. *New Zealand Medical Journal*, 124(1338), 34-43.
- McDonald, S. P., Maguire, G. P., & Hoy, W. E. (2003). Validation of self-reported cigarette smoking in a remote Australian Aboriginal community. *Australian and New Zealand Journal of Public Health*, 27(1), 57-60. doi:doi:10.1111/j.1467-842X.2003.tb00380.x
- McIntire, R. K., Macy, J. T., Seo, D. C., Nelson, A. A., & Kolbe, L. J. (2014). Secondhand smoke exposure in cars and rooms: trend comparisons among subpopulations of nonsmoking U.S. middle and high school students. *Nicotine and Tobacco Research*, 16(6), 663-671.
- Meader, N., King, K., Moe-Byrne, T., Wright, K., Graham, H., Petticrew, M., . . . Sowden, A. J. (2016). A systematic review on the clustering and co-occurrence of multiple risk behaviours. *BMC Public Health*, 16(1), 657. doi:10.1186/s12889-016-3373-6
- Mealing, N. M., Banks, E., Jorm, L. R., Steel, D. G., Clements, M. S., & Rogers, K. D. (2010). Investigation of relative risk estimates from studies of the same population with

- contrasting response rates and designs. *BMC Medical Research Methodology*, 10(1), 26. doi:10.1186/1471-2288-10-26
- Messer, K., & Pierce, J. P. (2010). Changes in age trajectories of smoking experimentation during the California Tobacco Control Program. *American Journal of Public Health*, 100(7), 1298-1306.
- Minichiello, A., Lefkowitz, A. R., Firestone, M., Smylie, J. K., & Schwartz, R. (2015). Effective strategies to reduce commercial tobacco use in Indigenous communities globally: a systematic review. *BMC Public Health*, 16(1), 21.
- Ministry of Health. (2019). Annual Update of Key Results 2017/18: New Zealand Health Survey. Retrieved from <https://www.health.govt.nz/publication/annual-update-key-results-2017-18-new-zealand-health-survey>
- Mitchell, E., Bandara, P., & Smith, V. (2018). Tackling Indigenous Smoking program – final evaluation report. Retrieved from <https://beta.health.gov.au/resources/publications/tackling-indigenous-smoking-program-final-evaluation-report>
- Mitschke, D. B., Matsunaga, D. S., Loebl, K., Tatafu, E., Jr., & Robinett, H. (2008). Multi-ethnic adolescents' attitudes toward smoking: a focus group analysis. *American Journal of Health Promotion*, 22(6), 393-399.
- National Aboriginal Community Controlled Health Organisation. (2019). Definitions. Retrieved from <https://www.naccho.org.au/about/aboriginal-health/definitions/>
- National Health and Medical Research Council (NHMRC). (2019). Ethical guidelines for research with Aboriginal and Torres Strait Islander Peoples. Retrieved from <https://www.nhmrc.gov.au/research-policy/ethics/ethical-guidelines-research-aboriginal-and-torres-strait-islander-peoples>
- Neumark-Sztainer, D., Story, M., French, S., Cassuto, N., Jacobs Jr, D. R., & Resnick, M. D. (1996). Patterns of health-compromising behaviors among Minnesota adolescents: sociodemographic variations. *American Journal of Public Health*, 86(11), 1599-1606.
- Nicholson, A. K., Borland, R., Couzos, S., Stevens, M., & Thomas, D. P. (2015). Smoking-related knowledge and health risk beliefs in a national sample of Aboriginal and Torres Strait Islander people. *Medical Journal of Australia*, 202(S10), S45-S50. doi:10.5694/mja14.00877
- Nicholson, A. K., Borland, R., Davey, M. E., Stevens, M., & Thomas, D. P. (2015). Predictors of wanting to quit in a national sample of Aboriginal and Torres Strait Islander smokers. *Medical Journal of Australia*, 202(S10), S26-S32.
- Odani, S., Armour, B. S., Graffunder, C. M., Garrett, B. E., & Agaku, I. T. (2017). Prevalence and Disparities in Tobacco Product Use Among American Indians/Alaska Natives—United States, 2010–2015. *MMWR: Morbidity and Mortality Weekly Report*, 66(50), 1374-1378.
- Osborne, K., Baum, F., & Brown, L. (2013). *What works? A review of actions addressing the social and economic determinants of Indigenous health. Issues paper no. 7. Produced for the*

- Closing the Gap Clearinghouse*. Canberra: Australian Institute of Health and Welfare & Melbourne: Australian Institute of Family Studies.
- Osilla, K. C., Lonczak, H. S., Mail, P. D., Larimer, M. E., & Marlatt, G. A. (2008). Regular tobacco use among American Indian and Alaska native adolescents. *Journal of Ethnicity in Substance Abuse*, 6(3-4), 143-153.
- Paradies, Y. (2006). A systematic review of empirical research on self-reported racism and health. *International Journal of Epidemiology*, 35(4), 888-901.
- Passey, M. E., Gale, J. T., & Sanson-Fisher, R. W. (2011). "It's almost expected": rural Australian Aboriginal women's reflections on smoking initiation and maintenance: a qualitative study. *BMC Women's Health*, 11, 55.
- Patten, C. A., Enoch, C., Renner, C. C., Offord, K. P., Nevak, C., Kelley, S. F., . . . Kaur, J. S. (2009). Focus groups of Alaska Native adolescent tobacco users: preferences for tobacco cessation interventions and barriers to participation. *Health Education and Behavior*, 36(4), 711-723.
- Patten, C. A., Koller, K. R., Flanagan, C. A., Day, G. E., Umans, J. G., Austin, M. A., . . . Boyer, B. (2019). Age of initiation of cigarette smoking and smokeless tobacco use among western Alaska Native people: Secondary analysis of the WATCH study. *Addictive Behaviors Reports*, 9, 100143. doi:<https://doi.org/10.1016/j.abrep.2018.100143>
- Patton, G. C., Sawyer, S. M., Santelli, J. S., Ross, D. A., Afifi, R., Allen, N. B., . . . Bonell, C. (2016). Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*, 387(10036), 2423-2478.
- Potthoff, S. J., Bearinger, L. H., Skay, C. L., Cassuto, N., Blum, R. W., & Resnick, M. D. (1998). Dimensions of risk behaviors among American Indian youth. *Archives of Pediatrics and Adolescent Medicine*, 152(2), 157-163.
- Public Health Association of Australia. (2018). Public Health Association of Australia submission to the Close the Gap Refresh. Retrieved from <https://www.phaa.net.au/documents/item/2762>
- Public Health Association of Australia. (2019). Federal Budget 2019-20 - Pre-Budget Submission Retrieved from <https://www.phaa.net.au/documents/item/3292>
- Reeves, S., Albert, M., Kuper, A., & Hodges, B. D. (2008). Why use theories in qualitative research? *BMJ*, 337, a949.
- Rudatsikira, E., Muula, A. S., & Siziya, S. (2009). Current cigarette smoking among in-school American youth: results from the 2004 National Youth Tobacco Survey. *International Journal for Equity in Health*, 8(1), 10.
- Sawyer, S. M., Afifi, R. A., Bearinger, L. H., Blakemore, S.-J., Dick, B., Ekeh, A. C., & Patton, G. C. (2012). Adolescence: a foundation for future health. *Lancet*, 379(9826), 1630-1640.
- Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet Child & Adolescent Health*, 2(3), 223-228. doi:[https://doi.org/10.1016/S2352-4642\(18\)30022-1](https://doi.org/10.1016/S2352-4642(18)30022-1)

- Scragg, R., & Glover, M. (2007). Parental and adolescent smoking: does the association vary with gender and ethnicity? *New Zealand Medical Journal*, 120(1267), U2862.
- Scragg, R., & Laugesen, M. (2007). Influence of smoking by family and best friend on adolescent tobacco smoking: results from the 2002 New Zealand national survey of year 10 students. *Australian and New Zealand Journal of Public Health*, 31(3), 217-223.
- Scragg, R., Reeder, A. I., Wong, G., Glover, M., & Nosa, V. (2008). Attachment to parents, parental tobacco smoking and smoking among Year 10 students in the 2005 New Zealand national survey. *Australian and New Zealand Journal of Public Health*, 32(4), 348-353.
- Sherwood, J. (2013). Colonisation – It's bad for your health: The context of Aboriginal health. *Contemporary Nurse*, 46(1), 28-40. doi:10.5172/conu.2013.46.1.28
- Soto, C., Baezconde-Garbanati, L., Schwartz, S. J., & Unger, J. B. (2015). Stressful life events, ethnic identity, historical trauma, and participation in cultural activities: Associations with smoking behaviors among American Indian adolescents in California. *Addictive Behaviors*, 50, 64-69.
- Spillane, N. S., Muller, C. J., Noonan, C., Goins, R., Mitchell, C. M., & Manson, S. (2012). Sensation-seeking predicts initiation of daily smoking behavior among American Indian high school students. *Addictive Behaviors*, 37(12), 1303-1306.
- Stewart, H. S., Bowden, J. A., Bayly, M. C., Sharplin, G. R., Durkin, S. J., Miller, C. L., . . . Wakefield, M. A. (2011). Potential effectiveness of specific anti-smoking mass media advertisements among Australian Indigenous smokers. *Health Education Research*, 26(6), 961-975.
- Stewart-Brown, S. (2006). What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach? Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0007/74653/E88185.pdf
- Tackling Indigenous Smoking. (2019). About the TIS program. Retrieved from <http://tacklingsmoking.org.au/about-the-tis-program/>
- Taualii, M., Bush, N., Bowen, D. J., & Forquera, R. (2010). Adaptation of a smoking cessation and prevention website for urban American Indian/Alaska Native youth. *Journal of Cancer Education*, 25(1), 23-31.
- The Australian Prevention Partnership Centre. (2019). Informing a national approach to Aboriginal tobacco control. Retrieved from <https://preventioncentre.org.au/our-work/research-projects/informing-a-national-approach-to-aboriginal-tobacco-control/>
- The SEARCH Investigators. (2010). The Study of Environment on Aboriginal Resilience and Child Health (SEARCH): study protocol. *BMC Public Health*, 10(1), 287. doi:10.1186/1471-2458-10-287
- Thomas, D. P., & Anderson, I. P. (2006). Getting the most from Indigenous health research. *Medical Journal of Australia*, 184(10), 500.

- Thomas, D. P., Bainbridge, R., & Tsey, K. (2014). Changing discourses in Aboriginal and Torres Strait Islander health research, 1914-2014. *Medical Journal of Australia*, 201(S1), S15-S18.
- Thomas, D. P., Bennet, P. T., Briggs, V. L., Couzos, S., Hunt, J. M., Panaretto, K. S., . . . Borland, R. (2015). Smoking cessation advice and non-pharmacological support in a national sample of Aboriginal and Torres Strait Islander smokers and ex-smokers. *Medical Journal of Australia*, 202(10), S73-77.
- Thomas, D. P., Briggs, V., Anderson, I. P. S., & Cunningham, J. (2008). The social determinants of being an Indigenous non-smoker. *Australian and New Zealand Journal of Public Health*, 32(2), 110-116. doi:10.1111/j.1753-6405.2008.00185.x
- Thomas, D. P., Davey, M. E., Panaretto, K. S., & van der Sterren, A. E. (2018). Cannabis use among two national samples of Aboriginal and Torres Strait Islander tobacco smokers. *Drug & Alcohol Review*, 37, S394-S403.
- Thomas, D. P., & Glover, M. (2010). Smoking and Aboriginal and Torres Strait Islander and Maori children. *Journal of Paediatrics and Child Health*, 46(9), 516-520.
- Thomas, J. L., Renner, C. C., Patten, C. A., Decker, P. A., Utermohle, C. J., & Ebbert, J. O. (2010). Prevalence and correlates of tobacco use among middle and high school students in western Alaska. *International Journal of Circumpolar Health*, 69(2), 168-180.
- Thomas, R. E., McLellan, J., & Perera, R. (2013). School-based programmes for preventing smoking. *Evidence-Based Child Health: A Cochrane Review Journal*, 8(5), 1616-2040.
- Thompson, A. B., Mowery, P. D., Tebes, J. K., & McKee, S. A. (2017). Time Trends in Smoking Onset by Sex and Race/Ethnicity Among Adolescents and Young Adults: Findings From the 2006-2013 National Survey on Drug Use and Health. *Nicotine & Tobacco Research*, 20(3), 312-320. doi:10.1093/ntr/ntx010
- Thrift, A. P., Nancarrow, H., & Bauman, A. E. (2011). Maternal smoking during pregnancy among Aboriginal women in New South Wales is linked to social gradient. *Australian and New Zealand Journal of Public Health*, 35(4), 337-342.
- Thun, M., Peto, R., Boreham, J., & Lopez, A. D. (2012). Stages of the cigarette epidemic on entering its second century. *Tobacco Control*, 21(2), 96-101. doi:10.1136/tobaccocontrol-2011-050294
- Tong, V. T., Dietz, P. M., England, L. J., Farr, S. L., Kim, S. Y., D'Angelo, D., & Bombard, J. M. (2011). Age and racial/ethnic disparities in prepregnancy smoking among women who delivered live births. *Preventing Chronic Disease*, 8(6), A121.
- Toumbourou, J. W., Rowland, B., Williams, J., Smith, R., & Patton, G. C. (2019). Community intervention to prevent adolescent health behavior problems: Evaluation of communities that care in Australia. *Health Psychology*, 38(6), 536.
- Tyas, S. L., & Pederson, L. L. (1998). Psychosocial factors related to adolescent smoking: a critical review of the literature. *Tobacco Control*, 7(4), 409-420. doi:10.1136/tc.7.4.409

- Unger, J. B., Soto, C., & Baezconde-Garbanati, L. (2006). Perceptions of ceremonial and nonceremonial uses of tobacco by American-Indian adolescents in California. *Journal of Adolescent Health, 38*(4), 443.e449-416.
- Unger, J. B., Sussman, S., Begay, C., Moerner, L., & Soto, C. (2020). Spirituality, Ethnic Identity, and Substance Use among American Indian/Alaska Native Adolescents in California. *Substance Use and Misuse, 1-5*.
- Upton, P., Davey, R., Evans, M., Mikhailovich, K., Simpson, L., & Hacklin, D. (2014). *Tackling Indigenous Smoking and Healthy Lifestyle Programme Review*. Canberra, ACT: Commonwealth of Australia. Retrieved from <https://www.health.gov.au/resources/publications/tackling-indigenous-smoking-and-healthy-lifestyle-programme-review-2014>
- US Department of Health and Human Services. (1998). Chapter 4. Factors That Influence Tobacco Use Among Four Racial/Ethnic Minority Groups. In Tobacco Use Among U.S. Racial/Ethnic Minority Groups —African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/1998
- US Department of Health and Human Services. (2012). Chapter 3. The Epidemiology of Tobacco Use Among Young People in the United States and Worldwide. In Preventing tobacco use among young people: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/2012/
- US Department of Health and Human Services. (2012). Appendix 3.3 Measures of Cigarette Smoking. In Preventing tobacco use among young people: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/2012/
- US Department of Health and Human Services. (2012). Chapter 4. Social, Environmental, Cognitive, and Genetic Influences on the Use of Tobacco Among Youth. In Preventing tobacco use among young people: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/2012/
- US Department of Health and Human Services. (2012). Preventing tobacco use among young people: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/2012/
- US Department of Health and Human Services. (2012). Chapter 6. Efforts to Prevent and Reduce Tobacco Use Among Young People. In Preventing tobacco use among young people: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/2012/
- US Department of Health and Human Services. (2012). The health consequences of tobacco use among young people. In Preventing tobacco use among young people: A report of the Surgeon General. Retrieved from www.cdc.gov/tobacco/data_statistics/sgr/2012/

- Van Bower, V., & Woodgate, R. L. (2017). Examining the correlates of current smoking among off-reserve First Nations, Metis and Inuit youth: Evidence from the 2012 Aboriginal Peoples Survey. *Addictive Behaviors*, 69, 93-97.
- van der Sterren A, Greenhalgh EM, Knoche D, & Winstanley MH. (2016). Chapter 8.4 Smoking among Aboriginal and Torres Strait Islander children and teenagers. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-4-smoking-among-aboriginal-and-torres-strait-isl>
- van der Sterren A, Greenhalgh EM, Knoche D, & Winstanley MH. (2016). Chapter 8.3 Prevalence of tobacco use among Aboriginal and Torres Strait Islander people. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-3-prevalence-of-tobacco-use-among-aboriginal-peo>
- van der Sterren A, Greenhalgh EM, Knoche D, & Winstanley MH. (2016). Chapter 8.2 History of tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <http://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-2-history-of-tobacco-use-among-aboriginal-people>
- van der Sterren A, Greenhalgh EM, Knoche D, & Winstanley MH. (2019). Chapter 8.13 Policies for advancing tobacco control programs among Aboriginal and Torres Strait Islander peoples. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-8-aptsi/8-13-policy-recommendations-for-advancing-tobacco->
- van der Sterren, A., Greenhalgh, E., Knoche, D., & Winstanley, M. (2016). Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from www.tobaccoinaustralia.org.au/chapter-8-aptsi
- Vos, T., Barker, B., Stanley, L., & Lopez, A. (2007). *The burden of disease and injury in Aboriginal and Torres Strait Islander peoples 2003*. Retrieved from Brisbane:
- Wakefield, M. A., Durkin, S., Spittal, M. J., Siahpush, M., Scollo, M., Simpson, J. A., . . . Hill, D. (2008). Impact of tobacco control policies and mass media campaigns on monthly adult smoking prevalence. *American Journal of Public Health*, 98(8), 1443-1450.
- Wakefield, M. A., Loken, B., & Hornik, R. C. (2010). Use of mass media campaigns to change health behaviour. *The Lancet*, 376(9748), 1261-1271. [https://doi.org/10.1016/S0140-6736\(10\)60809-4](https://doi.org/10.1016/S0140-6736(10)60809-4)
- Walker, M., Fredericks, B., Mills, K., & Anderson, D. (2014). "Yarning" as a method for community-based health research with indigenous women: the indigenous women's wellness research program. *Health Care for Women International*, 35(10), 1216-1226.

- Wallace, J. M., Jr., Vaughn, M. G., Bachman, J. G., O'Malley, P. M., Johnston, L. D., & Schulenberg, J. E. (2009). Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States. *Drug and Alcohol Dependence*, 104(Suppl), S42-S49.
- Walter, M., & Andersen, C. (2013). *Indigenous statistics: A quantitative research methodology*. Left Coast Press.
- Ward, B. W., & Ridolfo, H. (2011). Alcohol, tobacco, and illicit drug use among Native American college students: an exploratory quantitative analysis. *Substance Use and Misuse*, 46(11), 1410-1419.
- Weaver, H., & Jackson, K. (2012). Cancer risks and Native Americans: The 'Healthy Living in Two Worlds' study. *Health Education Journal*, 71(6), 688-698.
- Wen, M., Van Duker, H., & Olson, L. M. (2009). Social contexts of regular smoking in adolescence: Towards a multidimensional ecological model. *Journal of Adolescence*, 32(3), 671-692.
- Whitbeck, L. B., & Armenta, B. E. (2015). Patterns of substance use initiation among Indigenous adolescents. *Addictive Behaviors*, 45, 172-179.
- Whitbeck, L. B., Hartshorn, K. J., McQuillan, J., & Crawford, D. M. (2012). Factors Associated with Growth in Daily Smoking among Indigenous Adolescents. *Journal of Research on Adolescence* 22(4), 768-781.
- Whitbeck, L. B., Yu, M., McChargue, D. E., & Crawford, D. M. (2009). Depressive symptoms, gender, and growth in cigarette smoking among indigenous adolescents. *Addictive Behaviors*, 34(5), 421-426.
- White, V., Mason, T., & Briggs, V. (2009). How do trends in smoking prevalence among Indigenous and non-Indigenous Australian secondary students between 1996 and 2005 compare? *Australian and New Zealand Journal of Public Health*, 33(2), 147-153.
- White, V. M., Durkin, S. J., Coomber, K., & Wakefield, M. A. (2015). What is the role of tobacco control advertising intensity and duration in reducing adolescent smoking prevalence? Findings from 16 years of tobacco control mass media advertising in Australia. *Tobacco Control*, 24(2), 198-204. doi:10.1136/tobaccocontrol-2012-050945
- White, V. M., Hayman, J., & Hill, D. J. (2008). Can population-based tobacco-control policies change smoking behaviors of adolescents from all socio-economic groups? Findings from Australia: 1987-2005. *Cancer Causes and Control*, 19(6), 631-640. doi:10.1007/s10552-008-9127-8
- White, V. M., Guerin, N., Williams, T., & Wakefield, M. A. (2019). Long-term impact of plain packaging of cigarettes with larger graphic health warnings: findings from cross-sectional surveys of Australian adolescents between 2011 and 2017. *Tobacco Control*, 28(e1), e77-e84. doi:10.1136/tobaccocontrol-2019-054988

- Whitesell, N. R., Asdigian, N. L., Kaufman, C. E., Big Crow, C., Shangreau, C., Keane, E. M., . . . Mitchell, C. M. (2014). Trajectories of substance use among young American Indian adolescents: Patterns and predictors. *Journal of Youth and Adolescence*, 43(3), 437-453.
- Whitesell, N. R., Kaufman, C. E., Keane, E. M., Crow, C. B., Shangreau, C., & Mitchell, C. M. (2012). Patterns of substance use initiation among young adolescents in a Northern Plains American Indian tribe. *American Journal of Drug and Alcohol Abuse*, 38(5), 383-388. doi:10.3109/00952990.2012.694525
- WHO Framework Convention on Tobacco Control. (2019). WHO FCTC. Retrieved from <https://www.who.int/fctc>
- Wiefferink, C. H., Peters, L., Hoekstra, F., Dam, G. T., Buijs, G. J., & Paulussen, T. G. W. M. (2006). Clustering of Health-Related Behaviors and Their Determinants: Possible Consequences for School Health Interventions. *Prevention Science*, 7(2), 127. doi:10.1007/s11121-005-0021-2
- Wilkinson, A. L., Scollo, M., Durkin, S. J., Bayly, M., Spittal, M. J., Chaloupka, F. J., & Wakefield, M. A. (2018). Indexation of Tobacco Excise and Customs Duty and Smoking Prevalence Among Australian Adults, 2001–2010: A Serial Cross-sectional Study. *Nicotine & Tobacco Research*, 21(3), 293-299. doi:10.1093/ntr/nty213
- Wilkinson, A. L., Scollo, M. M., Wakefield, M. A., Spittal, M. J., Chaloupka, F. J., & Durkin, S. J. (2019). Smoking prevalence following tobacco tax increases in Australia between 2001 and 2017: an interrupted time-series analysis. *The Lancet Public Health*, 4(12), e618-e627. doi.org/10.1016/S2468-2667(19)30203-8
- Williamson, A., D'Este, C., Clapham, K., Redman, S., Manton, T., Eades, S., . . . Raphael, B. (2016). What are the factors associated with good mental health among Aboriginal children in urban New South Wales, Australia? Phase I findings from the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). *BMJ Open*, 6(7). doi:10.1136/bmjopen-2016-011182
- Williamson, A. B., D'Este, C. A., Clapham, K. F., Eades, S. J., Redman, S., & Raphael, B. (2016). Psychological distress in carers of Aboriginal children in urban New South Wales: findings from SEARCH (phase one). *Medical Journal of Australia*, 205(1), 27-32.
- Wills, T. A., Knight, R., Sargent, J. D., Gibbons, F. X., Pagano, I., & Williams, R. J. (2017). Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. *Tobacco Control*, 26(1), 34-39.
- Winstanley, M., Wood, L., Greenhalgh, E., & Letcher, T. (2014). Chapter 5 Influences on the uptake and prevention of smoking. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from www.tobaccoinaustralia.org.au/chapter-5-uptake
- Winstanley, M., Wood, L., Greenhalgh, E., & Letcher, T. (2014). Chapter 5.20 Approaches to youth smoking prevention. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia:*

- Facts and Issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-20-approaches-to-youth-smoking-prevention#>
- Winstanley, M., Wood, L., Greenhalgh, E., & Letcher, T. (2019). Figure 5.2.1 Influences on uptake of smoking. Chapter 5.2 Factors influencing uptake by young people: overview. In Scollo, MM and Winstanley, MH [editors]. *Tobacco in Australia: Facts and Issues*. Retrieved from <https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-2-factors-influencing-uptake-by-young-people-ove>
- Wolf, D. A. P. S., Tovar, M., Thompson, K., Ishcomer, J., Kreuter, M. W., Caburnay, C., & Boyum, S. (2016). Speaking out about physical harms from tobacco use: Response to graphic warning labels among American Indian/Alaska Native communities. *BMJ Open*, 6(3)(e008777).
- World Health Organization. (2003). *WHO Framework Convention on Tobacco Control*. Geneva, Switzerland: WHO Document Production Services Retrieved from <https://www.who.int/fctc>.
- World Health Organization. (2018). WHO global report on trends in prevalence of tobacco smoking 2000-2025, second edition. Retrieved from <https://www.who.int/tobacco/publications/surveillance/trends-tobacco-smoking-second-edition/en/>
- World Health Organization. (2019). Tobacco Fact Sheet. Retrieved from <http://www.who.int/news-room/fact-sheets/detail/tobacco>
- Wu, L.-T., Swartz, M. S., Burchett, B., Workgroup, N. A., & Blazer, D. G. (2013). Tobacco use among Asian Americans, Native Hawaiians/Pacific Islanders, and mixed-race individuals: 2002–2010. *Drug and Alcohol Dependence*, 132(1), 87-94.
- Young, C., Craig, J. C., Clapham, K., Banks, S., & Williamson, A. (2019). The prevalence and protective factors for resilience in adolescent Aboriginal Australians living in urban areas: a cross-sectional study. *Australian and New Zealand Journal of Public Health*, 43(1), 8-14.
- Yu, M., Stiffman, A. R., & Freedenthal, S. (2005). Factors affecting American Indian adolescent tobacco use. *Addictive Behaviors*, 30(5), 889-904.
- Yu M. (2011). Tobacco use among American Indian or Alaska Native middle- and high-school students in the United States. *Nicotine Tob. Res*, 13(3), 173-81.
- Yu, M., & Whitbeck, L. B. (2016). A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents. *Addictive Behaviors*, 58, 35-41.
- Zuo, Y., Minniecon, S., & Hua, M. (2004). 'If you want your life to end bad, go ahead and smoke': a focus group study of Aboriginal and Torres Strait Islander young people's attitudes and knowledge towards smoking. *Health Promotion Journal of Australia*, 15(1), 82.

11 Appendices

11.1 Appendix 1 – Chapter 3 E-Print and Supplementary Material

11.1.1 E-print of published paper at Chapter 3



SRNT

OXFORD

Review

Factors Influencing Smoking Among Indigenous Adolescents Aged 10–24 Years Living in Australia, New Zealand, Canada, and the United States: A Systematic Review

Christina L. Heris MPH^{1,*}, Catherine Chamberlain PhD², Lina Gubhaju PhD¹, David P. Thomas PhD³, Sandra J. Eades PhD¹

¹Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria, Australia; ²Judith Lumley Centre, La Trobe University, Melbourne, Victoria, Australia; ³Menzies School of Health Research, Charles Darwin University, Darwin, Northern Territory, Australia

Corresponding Author: Christina L. Heris, MPH, Indigenous Epidemiology and Health, Centre for Epidemiology and Biostatistics, Melbourne School of Population and Global Health, University of Melbourne, Level 3, 207 Bouverie Street, Victoria 3010, Australia. E-mail: christina.heris@unimelb.edu.au Telephone: +61 3 8344 2151

Abstract

Introduction: Smoking rates are higher among Indigenous populations in most high-income countries with initiation primarily occurring in adolescence for all population groups. This review aims to identify protective and risk factors for smoking behavior among Indigenous adolescents and young adults.

Aims and Methods: We searched Medline, Embase, and Psychinfo for all original research published between January 2006 and December 2016 that reported influences on smoking for Indigenous adolescents or young adults aged 10–24 living in Australia, New Zealand, Canada, and the United States (US). Extracted data were coded to individual, social, and environmental level categories using a modified Theory of Triadic Influence framework.

Results: A total of 55 studies were included, 41 were descriptive quantitative and 14 qualitative, and 26 included Indigenous participants only. The majority were from the US (32). Frequently reported influences were at the individual and social levels such as increasing age; attitudes and knowledge; substance use; peer and family relationships; smoking norms; mental health; physical activity. At the environmental level, smoke-free spaces; second-hand smoke exposure; high community level prevalence; and social marketing campaigns were also frequently reported. Some studies referenced price, access, and traditional tobacco use. Few reported historical and cultural factors.

Conclusions: Young Indigenous people experience similar influences to other populations such as smoking among family and friends. Greater youth smoking is related to broader community level prevalence, but few studies explore the distal or historical contributing factors such as traditional tobacco use, colonization, experiences of intergenerational trauma and discrimination, or the role of cultural connection.

Implications: This review identified a range of factors that influence Indigenous youth smoking and contributes to an understanding of what prevention measures may be effective. Youth tobacco use occurs alongside other substance use and may also serve as an indicator of mental health. Comprehensive community-based programs that work more broadly to address the risk

factors related to tobacco, including improving youth mental health, will be important for other behaviors as well. This research highlights the importance of social influence and need for ongoing denormalization of smoking. Future Indigenous led and community owned research is needed to identify likely protective cultural factors.

Introduction

Tobacco use continues to be a major contributor to health problems globally with one in two smokers expected to die from a tobacco-related illness.¹ Although the burden is highest in low- and middle-income countries, smoking is still a problem in high-income countries such as Australia, New Zealand, Canada, and the United States (US) where tobacco use remains a leading cause of preventable illness and death despite comparatively lower and declining smoking rates. The 2016 World Health Organization estimates of current cigarette smoking for people aged 15 years and over were 12% in Australia, 14% Canada, 15% New Zealand, and 18% US.² These declining rates in the general population reflect the introduction over recent decades of tobacco control policies and programs under the World Health Organization Framework Convention on Tobacco Control.

Despite the overall decline in general population smoking rates, these have not been uniform and smoking prevalence remains high among some population groups. In Australia, this includes those experiencing greater social disadvantage and those living in remote areas, particularly Aboriginal and Torres Strait Islander people (hereafter referred to as Aboriginal people).³ While there have been promising and significant decreases in daily smoking rates for Aboriginal people in recent years (from 49% in 2002 to 39% in 2014–15) they remain 2.8 times higher than the non-Aboriginal population.⁴ There are parallels with other colonized populations internationally, where Indigenous people are more likely to smoke than other population groups.⁵ (We use the term “Indigenous” to refer to Indigenous communities worldwide collectively, and the term “Aboriginal” to refer specifically to Aboriginal and Torres Strait Islander people in Australia. This is for ease of reading the paper only and we respectfully acknowledge the diversity and autonomy of Indigenous peoples within these inclusive terms.) In New Zealand, daily adult Maori smoking rates have declined from 39% in 2006–07 to 31% in 2017–18, but similar to Australia remain 2.8 times higher than the non-Maori population.⁶ In Canada there have also been declines in daily smoking among First Nations adults to 40% in 2015–16 from 43% in 2008–10.⁷ In the US current smoking (daily/most days) among American Indian/Alaska Native adults was 32% in 2016, with little change from 2006 (32%).^{8,9}

Social disadvantage and remoteness do not account for the full disparity in smoking rates between Aboriginal and non-Aboriginal people in Australia. Previous analysis of national Australian data has found that within the highest socioeconomic quintile smoking rates were higher among Aboriginal people than those from the non-Aboriginal population and similar findings were reported for other indicators of household income, employment, and educational attainment.⁵ Exposure to higher prevalence environments and the normalization of smoking in their communities may contribute to the ongoing higher rates.^{3,5} The enduring impact of colonization, intergenerational trauma, previous and current government policies including forced removals from family and lands, stressful life events including frequent cycles of grief, and experiencing embedded and explicit racism and discrimination are likely risk factors for smoking and contribute to disparities in education, employment, self-determination, and equitable access to health.^{5,10} Traditional

tobacco use as practiced by Indigenous peoples of North America, and parts of Australia, may also contribute to higher reported rates in prevalence studies where a distinction between cultural and recreational use is not clear. Smoking may also be normalized by creating a positive association with cultural activities, particularly where commercial tobacco is substituted for ceremonial use, as well as from tobacco industry tactics using culturally targeted marketing.^{11,12}

A crucial component of reducing adult smoking prevalence is preventing uptake among young people as most regular smokers commence during adolescence and young adulthood,¹³ with this latter period increasingly recognized as a key stage for smoking initiation.^{14,15}

Similar to the adult smoking rates in Australia, Aboriginal adolescents are more than twice as likely to smoke occasionally or regularly than their non-Aboriginal counterparts,¹⁶ but the proportion of young Aboriginal people identifying as never-smokers has increased significantly.¹⁷ Similarly there have also been significant declines in smoking among First Nations youth in Canada with most identifying as never-smokers.⁷ Surveys of high students in both New Zealand and the US found daily smoking rates to be more than five times higher among Maori and American Indian/Alaska Native students, respectively, but overall rates have declined over time.^{18,19}

There are a number of recognized protective and risk factors for general population (and Indigenous) youth smoking in the social and physical environment including the smoking behavior and attitudes of family and peers; access and exposure to cigarettes including whether smoking occurs in the home; school attendance and engagement; social disadvantage; psychological factors including stress, boredom, and mental health; unemployment and financial stress.^{5,20,21}

Mainstream youth prevention measures include school education programs about the harms of tobacco use and social influence skills, interventions delivered by family and primary health care providers, as well as legislative measures such as the restriction of tobacco sales to minors.^{21,22} General population strategies such as plain packaging and graphic warnings, social marketing campaigns, and price increases can all influence youth smoking along with a reduction in environmental exposure in public spaces, homes, and cars.²¹ While youth prevention efforts traditionally focus on reducing smoking uptake, some young people do establish regular smoking early and programs may also aim to reduce the number of current smokers becoming long term established adult smokers. Traditional cessation support targeting adults, such as intensive one-on-one programs, may not be appropriate for adolescents at their stage of cognitive development or their level of nicotine dependence and youth specific programs are more likely to be effective.²² However, evidence for effectiveness of interventions specifically with Indigenous young people is limited.²³ A Cochrane review of tobacco prevention studies with Indigenous youth was inconclusive as only two intervention trials met the inclusion criteria and the review found insufficient evidence of effectiveness.²⁴

While there is a growing body of evidence about smoking among Indigenous adults as well as some population subgroups such as pregnant women, there is less research that focuses specifically on smoking among Indigenous adolescents and young adults. In particular, few reviews explore the social and cultural determinants of smoking

among Indigenous adolescents and the protective factors against smoking uptake. A greater understanding of the factors influencing smoking and nonsmoking behavior among young Indigenous people is needed to shape smoking prevention programs and provide the cessation support to ensure declines in smoking rates among Indigenous people continue, and where possible are accelerated.²³

The purpose of this review was to inform tobacco control policies and programs for Indigenous adolescents in Australia, Canada, New Zealand, and the US. The specific aim of this review is to identify what types of protective and risk factors have been shown to influence smoking behavior among Indigenous adolescents and young adults between the ages of 10 and 24 years.

Materials and Methods

The protocol for this systematic review was registered on PROSPERO (CRD42017077220) and we have followed the PRISMA guidelines for systematic review reporting.²⁵

Eligibility Criteria

Participants

Participants were Indigenous adolescents and young people aged 10–24 in Australia, New Zealand, Canada, or the US.

Studies were excluded if the population group included children under 10 years or adults over 24 years or where they included a range of ages beyond 10–24 years but participants within this range were not reported separately. This age range is based on the definitions of early adolescence (10–14 years), late adolescence (15–19), and young adulthood (20–24).²⁶ Studies that did not report results separately for the Indigenous adolescent subgroup or they did not make up greater than 50% of the total sample were also excluded.

The rationale for restricting the search to Australia, New Zealand, Canada, and the US was that the experiences of Indigenous adolescents and young adults will be most similar in high-income countries with common histories of colonization, where the settler population remains dominant and the countries are at similar stages of the tobacco epidemic.²⁷

Study Design

Included study designs were any original quantitative or qualitative research (descriptive, observational, or intervention studies) published in peer reviewed journals. Grey literature, reviews, books, editorials, and letters were excluded. Conference abstracts and PhD theses were included only where relevant findings had not been published separately in journal articles. Only English language publications were reviewed.

Outcomes

Outcomes were any protective and risk factors identified as influences for youth smoking uptake, including quantitative measures of association, mediators, or moderators of smoking; qualitative data examining factors associated with smoking experience; and knowledge, attitudes, and intentions in relation to smoking and nonsmoking behavior. This included smoking of commercial cigarettes and tobacco, traditional/ceremonial tobacco use as well as e-cigarettes. Studies were excluded where smoking was not reported in isolation but grouped collectively as “substance use”; where it was an exposure or mediator for another outcome; or where biological processes associated with nicotine dependence were being investigated.

Search and Selection of Studies

We searched MEDLINE, EMBASE, and PsycINFO with the search terms first developed using MEDLINE MeSH terms and key words (see [Supplementary File 1](#), available at *Nicotine and Tobacco Research* online) and then adapted for the other databases. The search was completed March 6, 2017 for studies published between January 1, 2006 and December 31, 2016. The 10-year period was due to the rapid developments in tobacco control with the adolescent smoking experiences or exposure prior to 2006 likely very different to today. A two-stage screening process was undertaken. An initial review of titles and abstracts was conducted in EndNote by one reviewer (CH) to identify potentially relevant studies against the inclusion criteria using an over-inclusive approach. The second stage involved review of the full text against inclusion criteria using a screening tool. The full text of studies that did not clearly meet the inclusion or exclusion criteria were reviewed by a second reviewer (CC).

Data Extraction and Synthesis

Data extraction and coding were completed in NVivo by one reviewer (CH). Data were extracted to a framework of study characteristics including population (age, gender, Indigenous group, and country), study type, methodology, aims, timeframes, recruitment, outcome measurement, generalizability, quality, and key findings. All text from results and discussion sections of included articles were coded line-by-line for reported influences on smoking under environmental, social, and individual level factors based on items included in an adapted model of the Theory of Triadic Influence.²¹ This was further tailored to include relevant factors for Indigenous youth and updated iteratively throughout data extraction. The full final coding framework is available in [Supplementary File 2](#), available at *Nicotine and Tobacco Research* online. Narrative synthesis was undertaken of the key findings in line with the framework. Quantitative measures of association were not extracted or combined in a meta-analysis due to the heterogeneity of study designs and measures used.

Overall Assessment of Confidence in Study Findings

We adapted an appraisal process from existing tools for assessing risk of bias in non-randomized studies. This is summarized below and the specific criteria are described in [Supplementary File 3](#), available at *Nicotine and Tobacco Research* online. A summary overall assessment of confidence within each study was conducted and included in the table of study characteristics ([Supplementary File 4](#), available at *Nicotine and Tobacco Research* online). All studies started with an assessment of “high” confidence and were downgraded one level for “serious concerns” (moderate) or two levels (low) for “very serious concerns” regarding participant selection (including Indigenous identification), measurement, confounding, and follow-up ([Supplementary File 5](#), available at *Nicotine and Tobacco Research* online). Overall confidence across study findings (eg consistency and publication bias) was not assessed in this review.

Results

The titles and abstracts of 997 articles were screened (after duplicates removed) with 170 identified as potentially relevant for full text review. Fifty-five studies (65 articles) were included (see [Figure 1](#)). Excluded studies are available on request from the primary author.

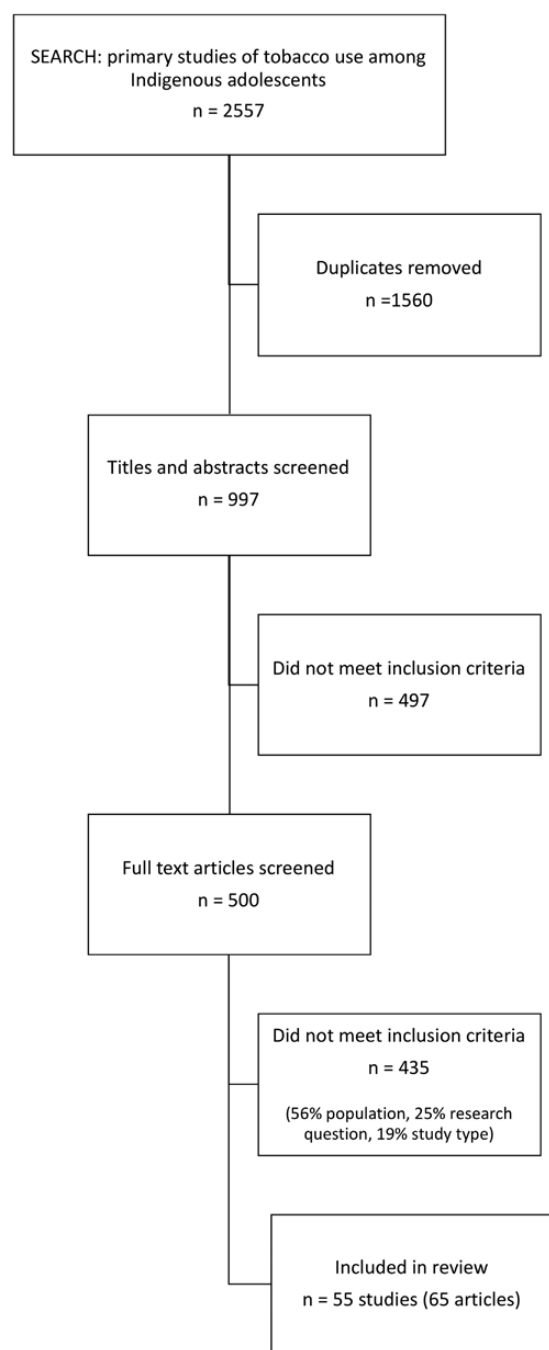


Figure 1. Study selection process.

Description of Included Studies

The majority of studies were conducted in the US ($n = 32$) followed by New Zealand ($n = 11$), Australia ($n = 8$), and Canada ($n = 5$), with one that included Indigenous participants from both the US and Canada. Studies were descriptive quantitative ($n = 41$) or qualitative ($n = 14$). Less than 50% of studies included Indigenous peoples exclusively ($n = 26$), and the remaining included both Indigenous and non-Indigenous participants. See [Supplementary File 4](#), available at *Nicotine and Tobacco Research* online for a summary of characteristics of included studies.

The level of confidence within study findings was assessed as high for most included studies taking into account risk of bias assessments.

The most regularly described limitation of the quantitative studies was a cross-sectional study design and self-reported smoking outcomes that may be representative of their region or group but not more broadly. Most measures for tobacco use were standard but the cultural identity/participation/connection measures and classification of Indigenous status were not. (We use the term “Indigenous status” to refer to the identification of Indigenous participants in the included studies whereas “cultural identity/participation” refers to a connection to traditional culture and Indigenous community.) Indigenous status was primarily determined by self-identification. In large studies broad categories were used (Aboriginal and Torres Strait Islander, American Indian/Alaska Native) whereas some smaller studies identified the individual tribal groups and Indigenous communities that participated. One study defined Indigenous Australians as participants who identified as Aboriginal, Torres Strait Islander, South East Asian, or Pacific Islander (overall confidence in findings was downgraded).²⁸ One study designated Native Hawaiian participants as either “Primary Hawaiian” or “Part Hawaiian” in an exploration of strength of cultural identity.²⁹ There was significant variation in the measure of cultural identity in the quantitative studies. Some used specific tools such as the 12-item Multigroup Ethnic Identity Measure whereas others asked questions about participation in specific traditional or cultural activities (such as sweat lodge and hunting). Authors note that null findings related to cultural identity may be due to these tools not sufficiently measuring culture and spirituality and that the types of activities identified may not be relevant expressions of culture for all participants.

No studies reported a tobacco industry conflict of interest.

Overall Main Findings

Across all included studies the most commonly reported influences on smoking or nonsmoking behavior were at the individual ($n = 50$ studies) and social ($n = 44$) levels with fewer measuring environmental level factors ($n = 35$) (Figure 2). There was a mix of risk and protective factors with some influences reported as both in different studies depending on the context (Table 1). The main findings are outlined below, in Table 1 and discussed later.

Individual Level Factors

Twenty-four studies reported age-related factors and the likelihood of smoking increasing with age^{29–57} and 20 where there were gender differences with several identifying a need for female specific interventions.^{29–34,36,38–43,47,51–56,58–62} Eighteen made comparisons between different cultural groups with many identifying higher prevalence for the Indigenous subgroup.^{29,32,33,37,39,42,47–50,58,60,62–68} Nine studies noted physical health factors,^{31,43–45,50,65,69–71} with impaired breathing or decreased fitness as motivation to stop smoking or not to start. Experiences of addiction and withdrawal were major barriers to quitting even among those motivated to quit.^{45,69,72–74} Pregnancy was explored in five studies,^{30,48,49,70,75} both as a motivator for quitting for some adolescent mothers and a relationship between maternal tobacco use and subsequent adolescent use.

Twenty-four studies discussed both positive and negative attitudes and beliefs^{29,32,33,36–38,40,44,45,55,56,58,64,69–80} with variable levels of knowledge of the range of harms from smoking.^{38,40,45,53,69–72,74,75,77,80} This knowledge was often a reason for staying smoke-free and for some existing smokers to quit, stating they wished they had had greater knowledge prior to initiation.^{45,69,72,74,77} However some studies found no difference in knowledge levels between smokers and nonsmokers.^{40,55} Others felt the warnings did not reflect the



Figure 2. Factors influencing smoking by number of studies coded. (This chart is a visual representation of the number of studies coded to each category and subcategory within the individual, social, and environment levels. The width of segment reflects the number of studies referencing the topic, not times coded.)

experience of smokers around them, that there was little short-term risk, or rationalized that there are many risks in life and they would still die.^{38,44,55,69-73,77,80} There were several perceived benefits of smoking including as an appetite suppressant, looking “cool,” appearing older, as a social or stress management aid and as a cultural display of respect.^{29,38,44,69,73,74,80} Intentions/susceptibility to future smoking was explored and some studies found a proportion of nonsmokers to be at risk of initiation.^{32,33,37,38,56,58,64,76} Many smokers experienced regrets about past smoking and had positive attitudes to quitting and supporting others to quit.^{36,44,45,69,71,72,74,79} Negative attitudes to smoking reinforced smoke-free intentions but could be overcome by social or environmental reinforcement.^{38,44,55,72}

Sixteen studies reported perceptions of smoking norms as a key influence on smoking initiation and maintenance.^{28,34,37,38,40,44,45,69,70,72,73,75,79-82} Fifteen studies included references to identity,^{28,29,35,36,38,40,42,44,45,62,72-74,77,83} this included the inconclusive role of cultural/ethnic identity in smoking (discussed further later)^{28,29,35,36,42,44,62,83} whereas low self-esteem, self-image,

and adulthood aspirations were attributed to smoking behavior.^{38,40,44,45,72-74,77}

Twenty-four studies^{29,36,37,39,40,44,45,47,52-54,56,61-63,69-74,76,77,80,83,84} discussed psychological factors. These were primarily mental health related with eight specifically referring to experiences of greater life stress or using smoking as a tool for stress relief, anger management, and mindfulness.^{40,54,69,70,72-74,83} Depression,^{36,40,52,53,56,61} suicidal ideation or attempts^{40,47} and poorer mental health in general^{36,37,40,52,62,63} were identified as increasing the likelihood of youth smoking. Boredom^{44,45,69,71,73} and unconscious habitual use^{69,70,72,73,77} were mentioned as a reason for initiation and maintenance. Few referenced spirituality^{76,80} or racism.^{56,63,84} One study reported experiences of discrimination increased the risk of smoking.⁸⁴ Fourteen studies included discussion of other substance use,^{37-40,47,50,51,54,56,61-63,69,73,85} predominantly alcohol and cannabis, with a strong relationship to smoking reported and cooccurrence of use. Some discussed other risk or self-destructive behaviors^{39,44,47,56,69,73,74,85} and impulsive, sensation seeking, and rebellious personality types as factors for smoking initiation.^{29,44,61,74}

Table 1. Summary of Protective and Risk Factors Identified at Individual, Social, Environmental Level

Protective factors	Risk factors
<i>Individual level</i>	
Physical fitness	Increasing age
Pregnancy	Gender (female)
Knowledge of harms	Withdrawal/addiction
Positive attitudes to quitting and regrets about past smoking	Perception of little short-term risk
Negative attitudes to smoking experiences	Perceived benefits of smoking
Perceptions of nonsmoking norms	Positive intentions/future susceptibility
	Perceptions of smoking norms
	Identity
	Mental health factors
	Boredom
	Habitual use
	Racism
	Other substance use
	Risk taking behaviors
	Personality types
<i>Social level</i>	
Family nonsmoking values/rules	Family smoking
Positive family relationships	Disconnection from family
Close parenting style	Low monitoring parenting style
Original parent family structure	Large or broken family structures
Higher socioeconomic advantage	Greater socioeconomic disadvantage
Nonsmoking peers	Access to finances
Positive social relationships	Peer smoking
Academic engagement and performance	Bullying
Relationships with non-parental adults	Culture of smoking at school
Nonsmoking role models (and desire to be a role model)	Greater social disadvantage of school
Connection to culture/cultural participation	Role models who smoke
	Connection to culture/cultural participation
<i>Environmental level</i>	
Smoke-free homes and other spaces	Community smoking norms
Tobacco prevention/cessation activities	High visibility of smoking adults
Social marketing campaigns	Second-hand smoke exposure
Graphic health warnings/packaging	Culture of sharing
Increasing price	Tobacco marketing
Reduced access and availability	Popular culture
Access to sport and recreation	Tobacco industry influence
	Access to tobacco products
	Social disadvantage
	Housing
	Remoteness
	Traditional/cultural tobacco use
	Historical/intergenerational trauma
	Colonization/urbanization

Social Level Factors

At the social level the largest contributing theme was family with 37 studies discussing family-related factors^{29-31,34,36-42,44,45,48,52,54-56,59,60,62,63,65,67,69-76,79-82,86-88} including the strong influence of family smoking^{29,30,34,36-38,40,41,44,45,55,59,60,69-75,81,82,88} as well as the protective effect of nonsmoking values and rules.^{34,38,41,44,45,60,63,65,71,72,74,76,79,81,88} Several studies explored the role of family relationships^{29,31,36,38-41,44,52,54,56,63,65,67,69,71-74,80,81,87,88} including parenting style,^{31,38,40,41,44,52,63,65,74,81,88} family structure,^{29,31,39,41,44,52,56,67,81} and bonding/quality of relationship.^{36,38,40,44,54,56,71,87} Positive family relationships, close parenting style, and living in two-parent

households were described as protective. Socioeconomic status^{29,31,39-42,48,55,56,60,62,67,81,86} which included parents' education/employment,^{31,39,40,42,62,67,81} family income,^{31,41,42,56,86} and the adolescent's own finances^{55,60,86} were explored in many studies with greater social-advantage generally found to be protective, although greater access to money was related to increased youth smoking in some studies.

Twenty-eight studies^{29,31,34,36-40,43-45,47,52,54-56,60,65,69-77,79,88} addressed the influence of peers, particularly smoking peers in increasing the likelihood of smoking initiation and maintenance, through overt pressure as well as a social function facilitating bonding.^{29,34,36-40,44,45,52,54-56,60,69-75,79,88} Positive nonsmoking attitudes of peers can reinforce smoke-free intentions and support quit attempts.^{38,43,45,71-73,76,77} Some studies reported greater likelihood of smoking in relation to bullying, fights, and deviant relationships.^{31,36,38-40,44,47,54,65,69,72-74,79} School was also a major theme in 15 studies.^{29,31,34,38,39,43,44,50,55,56,67,71,75,79,81} Academic engagement and performance^{29,31,39,43,44,50,55,56,81} and supportive relationships with staff^{31,71} were found to be protective against smoking. Whereas lower socioeconomic status of the school^{29,67} and a culture of smoking increased risk.^{34,38,44,75,79} Thirteen studies mentioned the potential for both positive and negative influences of role models^{31,34,38,39,41,44,45,54,69,71,72,79,80} with two also reporting the desire to be a role model as a reason not to smoke.^{45,69} Ten studies discussed cultural factors such as connection to culture and cultural participation.^{28,29,35,36,44,54,62,76,80,83} Overall this relationship was inconclusive across different studies (discussed further below).

Environmental Level Factors

Twenty-five studies reported factors related to the tobacco environment.^{33-36,38,40,44-46,50,55,60,64,69-72,74,77-82,88-91} Community smoking norms were a major theme,^{33,34,36,38,40,44-46,50,55,60,64,69-72,74,77,79-81,88,90,91} particularly visibility of smoking in the community,^{34,38,44,45,60,69,72,74,79-81} second-hand smoke exposure,^{33,34,36,38,44,55,60,80,88} and smoke-free spaces such as homes.^{34,36,38,40,44,45,50,55,60,71,74,79,80,88,90} Greater exposure increased risk of youth smoking and a perception of being surrounded by smokers influenced initiation and was a barrier to quitting, whereas nonsmoking norms supported decisions to be smoke-free. A culture of sharing was related to smoking where the sharing of tobacco facilitated social cohesion and a sense of belonging.^{38,44,69} A number of tobacco prevention and cessation activities were described^{33,36,38,45,46,64,69-72,74,91} including social marketing and packaging.^{38,45,69,71,72,74,91} Advertising and graphic health warnings were a key source of knowledge of harms. There were mixed responses from smokers to accessing counseling or nicotine replacement therapies.

Other key tobacco environment themes were access^{34,38,40,60,71,78-80,82} and price^{34,38,45,60,69-71,74} with several studies identifying cost as a motivator for quitting and easy access facilitating smoking. Few discussed tobacco industry marketing^{35,55,74,80} or influence.⁷⁸ One study found smokers to be more receptive to tobacco marketing⁵⁵ but cultural appropriation in Indigenous targeted marketing was negatively received.⁸⁰ Two studies explored a relationship between smoking and popular culture^{81,89} with one finding viewing R-rated movies to be associated with youth smoking.

Fifteen studies addressed the community context^{38,39,42-44,50,56,62,65,67,71,81,83,85,86} including access to sport and recreation,^{38,43,44,50,65,71,81} social disadvantage,^{42,62,67,81,83,86} housing,^{38,39,42,62,86} and geographic variation.^{38,56,67,86} Some studies found greater isolation, disadvantage, and poor housing to be related to youth smoking while participation in extracurricular activities such as sport reduced

risk. Few (6) studies included the historical context^{34,35,74,80,83,88} with five referencing traditional or cultural tobacco use,^{34,74,80,83,88} one historical or intergenerational trauma⁸³ and one impacts of colonization/urbanization in increasing use.³⁵ This is discussed in more detail below.

Factors Specific to Indigenous Identities, Cultural Practices, and History

In the US, Nez Henderson et al. suggested a finding of decreasing age of smoking initiation was related to the increasing urbanization and integration into broader culture and the resulting erosion of tribal identity, language, and participation.³⁵ Soto et al. explored the relationship between historical trauma, ethnic identity, stressful life events, and tobacco use.⁸³ Smoking was correlated to both stressful life events and historical trauma.⁸³ Ethnic identity was found to be protective against smoking, but this effect was mediated by historical trauma.⁸³ Cultural participation was indirectly related to smoking through the relationship to historical trauma as there were higher levels of this amongst young people who participated in cultural activities.⁸³ The authors emphasize that cultural participation is important for healing, wellbeing and resilience and participation itself did not predict smoking (despite traditional tobacco use).⁸³ Rather, cultural participation may increase an adolescent's understanding of the impact of historical events on their communities and there is a need to support young people to cope with this as they develop their identities.⁸³

Traditional tobacco use was discussed in four other US studies with American Indian adolescents^{34,74,80,88} and some acknowledged the complex relationship to tobacco as a sacred plant, integral to ceremonial practices, but as it is difficult to come by, commercial cigarettes were regularly substituted and a means by which children are introduced to smoking.³⁴ Unger noted that some young people perceived traditional tobacco to be less harmful than commercial tobacco and many felt that smoking was expected in ceremonial use as a sign of respect, while others reported that they felt it was acceptable to participate and offer the tobacco without smoking or inhaling.³⁴

Discussion

Summary of Main Findings

We found 55 studies addressing the influences on smoking and nonsmoking behavior of Indigenous adolescents in Australia, New Zealand, the US, and Canada. At the individual level these influences included increasing age, mental health, physical activity, attitudes to smoking and knowledge of risks, and other substance use. At the social level, family was a frequently reported influence including smoking and nonsmoking behaviors and attitudes of family, quality of relationships and socioeconomic status. At the environmental level, second-hand smoke exposure, smoke-free spaces, high visibility of smoking, campaigns, and health warnings were frequently reported. Some studies included references to price, access, and cultural tobacco use.

Comparisons with Other Reviews

These findings are consistent with other evidence summaries for Indigenous youth and youth smoking in general, particularly in relation to the role of psychological factors, school engagement, family and peer smoking and relationships, smoke-free environments, and

socioeconomic factors.^{5,20,21} The importance of peer and family influences was also emphasized by other published reviews^{92,93} along with attending public school and educational engagement.⁹⁴ The range of risk and protective factors for other health outcomes described in the review by Henson et al.⁹⁴ is instructive as many of those were also identified in our review as being influences for smoking uptake (mental health, depression, suicide, stressful life events, alcohol, and other substance use) or protective against smoking (family, peer, and other nonfamilial relationships/role models, school engagement, and cultural connectedness). This work highlights that there are many common risk factors for a range of health outcomes including tobacco use with potential efficiency gains in addressing the broader determinants of smoking, which will likely result in positive outcomes for other behaviors as well.

Few studies in our review examined factors specific to Indigenous youth. Those that did highlighted the complexity of the relationship between Indigenous identity, cultural participation (including traditional use), and youth smoking. The US Surgeon General's report has previously discussed this complexity in relation to other ethnic/minority groups (namely African American and Hispanic youth) and noted that while strength and resilience from cultural connectedness can be protective against smoking for some populations there are risks associated with increased exposure to racism.²⁰ The report noted that this relationship is further complicated for American Indian and Alaska Native youth where traditional tobacco use forms an important part of cultural practice.²⁰ Baker et al. in a broader review of population subgroups with high smoking prevalence in Australia highlighted the impact of colonization and the role tobacco played, the enduring resulting social disadvantage and inadequate access to culturally safe health services as contributing to tobacco use.⁹⁵ Importantly, Henson et al.⁹⁴ found that cultural connectedness was associated with resilience and academic success and was protective against mental health difficulties, suicide, alcohol use, and other behaviors. These findings are likely very relevant to tobacco control programs.

Key Issues

Overall most of the identified influences for Indigenous youth smoking were common to other population groups. Although smoking prevalence may be higher among Indigenous adolescents and young adults, some studies which had both Indigenous and non-Indigenous participants demonstrated no significant difference in this when accounting for social disadvantage and the greater number of smoking friends and family. While acknowledging that smoking amongst friends, families and communities is a key common influence, most studies do not describe the drivers of a greater community level prevalence that contributes to higher rates of Indigenous youth smoking.

Two-thirds of the included studies reported some aspect related to family factors. These ranged from positive, protective influences through strong nonsmoking attitudes, role modeling, and good relationships, to enablers such as smoking in the home, norms, and access. This demonstrates the range of competing factors in the family environment and it is unclear which has the strongest influence on youth smoking uptake. Both the Cosh et al.⁷⁰ and Johnston et al.³⁸ studies illustrated that while smoking among family members and peers are key influences, even in high prevalence environments strong antismoking sentiments within immediate social networks can be protective. Family in this context can also be a much broader concept encompassing extended family throughout the community,

a strength that may be leveraged. Gazis et al.²⁸ suggest that stronger social and community connectedness in a high prevalence environment may increase the risk of smoking. Then it may also be true that young Indigenous people may be more responsive to community level support for nonsmoking attitudes and smoke-free spaces.

Limitations

Many studies in the initial search which may have relevant findings were excluded because the results for Indigenous youth were not reported separately. Information from some qualitative studies which had wider age ranges were restricted to the quotes where it specifically identified an adolescent or group in the target age range.

This review sought to describe and understand the range of factors that may influence smoking and as such results have not been pooled. While the comparative high frequency of reporting of some factors over many studies may indicate their likely importance, this does not necessarily equate to most important or most common factors influencing smoking. It reflects what factors were of interest to the original researchers, particularly for quantitative studies with predetermined measures. Thus, there may be important influences for smoking among Indigenous adolescents that have not been captured, such as self-efficacy and cultural factors.

Overall the literature has a deficit focus with few studies framing the question around nonsmoking (such as those by Beebe³¹ and Kulis⁷⁶) and there are comparatively few protective factors identified. Deficit discourse is a product of dominant western perspectives that can marginalize Indigenous people, their knowledges and worldviews and frame Indigenous people as responsible for poorer health outcomes.⁹⁶ This focus and the general nature of the influences identified reflects that most of the studies included non-Indigenous participants, or were subanalyses of general population surveys. More work is needed to identify protective factors for Indigenous adolescents, particularly building on cultural strengths, rather than simply an absence of known risk factors. Those studies that did include Indigenous specific measures acknowledge the limitations in questions around identity and cultural participation. It is not that the distal factors are not having an impact but that they are harder to measure than the proximal factors (such as the number of friends or family who smoke) and have not been applied consistently. Other reviews have identified a need to better understand these relationships^{93,97} and Henson et al. called for better definitions and measures of cultural factors emphasizing the importance of research partnerships with Indigenous communities who can provide this knowledge.⁹⁴ This approach will also help to ensure that future studies adopt a strengths-based focus on protective factors for Indigenous wellbeing.

Implications for Policy, Practice and Research

There are several relevant findings for those working in health services and clinical practice. While this research focuses on prevention of smoking uptake some young people have established regular smoking at an early age and need cessation support. Several studies noted that young people were interested in quitting but health professionals are less likely to raise it, there are perceptions that support services are for adults, and that addiction needs to be addressed in an age/life-stage relevant way. This is true also for programs targeting initiation prevention, which increasingly must continue over a wide age range into early adulthood, and the relative importance of particular smoking influences may change over this period.¹⁵

Youth tobacco use occurs alongside other substance use (particularly alcohol and cannabis) and may also serve as an indicator for increased mental health risk. Although many of the included studies either qualitatively described smoking as a stress management strategy or showed a cross-sectional relationship with poorer mental health, causality cannot be assumed. Evidence suggests the relationship may be bidirectional with smoking both predicting and an outcome of poorer mental health.⁹⁸ Health professionals who see young smokers may consider also assessing other substance use and mental health, or similarly those presenting with mental health challenges may be at risk of tobacco and other substance use.

There are also opportunities for programs to work more broadly to holistically address smoking, poorer mental health and other behaviors through improving self-efficacy and building skills for healthy relationships and stress management. If Aboriginal youth are more likely to experience stressful life events,⁹⁹ broader interventions to reduce the frequency of those events are needed along with programs that support ways to manage stress without substance use.

Our review has again found the importance of social influence for smoking uptake. Continuing the efforts to denormalize smoking through harm reduction measures such as creating more smoke-free environments and homes and encouraging parents to quit smoking will likely support young people to stay smoke-free. A commitment to provide funding certainty for tobacco control programs and cessation support services is required. However, the wider policy considerations are to acknowledge that the high prevalence of smoking is linked to a history of marginalization of Indigenous peoples resulting in greater levels of social and economic disadvantage. Addressing the socioeconomic challenges, including education and employment opportunities, and promoting self-determination will go some way to addressing the determinants of smoking. But this process must also recognize the broader context of the enduring impacts of colonization in the form of experiences of racism, discrimination, and historical trauma.

Several studies included in this review called for culturally targeted interventions not only to reach the at-risk population but to draw on the unique strengths of their communities highlighting that cultural identity is a source of empowerment for young people. This has implications for future research as it was noted by a number of authors that the relationship between cultural connection, identity, and participation and risk behaviors such as smoking is complex and not well understood. Further research in how to best leverage the likely protective cultural factors is needed but must be Indigenous led and community owned to ensure the right questions are asked.

Conclusions

This review has identified a range of factors that influence youth smoking behavior and will contribute to an understanding of what measures may be effective in reducing adolescent smoking. Young Indigenous people have similar influences for smoking initiation to other populations including parental smoking, social disadvantage, boredom, peer influence and the normalization of smoking in high prevalence populations.

However, they may experience additional risk factors for smoking including high rates of stress, poor mental health, and the effects of intergenerational trauma. Similarly, young Indigenous people may also benefit from unique protective factors including cultural connectedness in addition to those demonstrated in other populations

such as smoke-free homes, school attendance, strong relationships, and physical activity participation.

Given there are a range of shared influences for multiple risk behaviors targeting these through comprehensive community-based wellbeing programs will be important for other behaviors as well as reducing tobacco use.

Supplementary Material

Supplementary data are available at *Nicotine and Tobacco Research* online.

Funding

This research was supported by the Australian Prevention Partnership Centre through the National Health and Medical Research Council partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department of Health and Wellbeing, Tasmanian Department of Health, and VicHealth.

Declaration of Interests

None declared.

References

- World Health Organization. Tobacco Fact Sheet 2018 [cited June 7, 2018]. Available from: <http://www.who.int/news-room/fact-sheets/detail/tobacco>. Accessed June 7, 2018.
- World Health Organization. *WHO Global Report on Trends in Prevalence of Tobacco Smoking 2000–2025*, 2nd ed. Geneva: World Health Organization; 2018 [cited July 31, 2019]. Available from: <https://www.who.int/tobacco/publications/surveillance/trends-tobacco-smoking-second-edition/en/>. Accessed July 31, 2019.
- Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017 [cited March 5, 2018]. Available from: <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
- Australian Bureau of Statistics. 4714.0—*National Aboriginal and Torres Strait Islander Social Survey, 2014–15*. Canberra: ABS; 2016. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0. Accessed 5 March, 2018.
- van der Sterren A, Greenhalgh E, Knoch D, Winstanley M. Chapter 8 Tobacco use among aboriginal peoples and Torres Strait Islanders. In: Scollo MM, Winstanley MH, eds. *Tobacco in Australia: Facts and Issues*. Melbourne: Cancer Council Victoria; 2016. Available from: www.tobaccoinaustralia.org.au/chapter-8-aptis. Accessed 9 June, 2018.
- Ministry of Health. Annual Update of Key Results 2017/18: New Zealand Health Survey 2019 [cited July 31, 2019]. Available from: <https://www.health.govt.nz/publication/annual-update-key-results-2017-18-new-zealand-health-survey>. Accessed 31 July, 2019.
- First Nations Information Governance Centre. *National Report of the First Nations Regional Health Survey Phase 3: Volume One*. Ottawa: FNIGC; 2018. Available from: https://fnigc.ca/sites/default/files/docs/fnigc_rhs_phase_3_national_report_vol_1_en_final_sm_1.pdf. Accessed 29 January, 2019.
- Jamal A, Phillips E, Gentzke AS, et al. Current cigarette smoking among adults - United States, 2016. *MMWR Morb Mortal Wkly Rep*. 2018;67(2):53–59.
- Centers for Disease Control Prevention. Cigarette smoking among adults—United States, 2006. *MMWR Morb Mortal Wkly Rep*. 2007;56(44):1157–1161.
- King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. *Lancet*. 2009;374(9683):76–85.
- US Department of Health and Human Services. Chapter 4. Factors that influence tobacco use among four racial/ethnic minority groups. In: *Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1998. Available from: www.cdc.gov/tobacco/data_statistics/sgr/1998
- Odani S, Armour BS, Graffunder CM, Garrett BE, Agaku IT. Prevalence and disparities in tobacco product use among American Indians/Alaska Natives—United States, 2010–2015. *MMWR Morb Mortal Wkly Rep*. 2017;66(50):1374–1378.
- US Department of Health and Human Services. Chapter 3 The epidemiology of tobacco use among young people in the United States and Worldwide. In: *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
- Edwards R, Carter K, Peace J, Blakely T. An examination of smoking initiation rates by age: results from a large longitudinal study in New Zealand. *Aust N Z J Public Health*. 2013;37(6):516–519.
- Heris C, Eades S, Lyons L, Chamberlain C, Thomas D. Changes in the age young aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Res Pract*. 2019 [online early publication]. doi:10.17061/phrp29121906
- Australian Institute of Health and Welfare. *Tobacco Indicators: Measuring Midpoint Progress—Reporting Under the National Tobacco Strategy 2012–2018*. Canberra: AIHW; 2016. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress
- Australian Bureau of Statistics. 4727.0.55.006—*Australian Aboriginal and Torres Strait Islander Health Survey: Updated Results, 2012–13*. Canberra: ABS; 2014 [cited May 20, 2019]. Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4727.0.55.006>
- ASH – Action for Smokefree 2025. 2018 ASH Year 10 Snapshot [cited January 31, 2019]. Available from: https://www.ash.org.nz/ash_year_10
- Centers for Disease Control Prevention (CDC). 1991–2017 High School Youth Risk Behavior Survey Data [cited January 31, 2019]. Available from: <http://nccd.cdc.gov/youthonline/>
- US Department of Health and Human Services. Chapter 4 Social, environmental, cognitive, and genetic influences on the use of tobacco among youth. In: *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
- Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In: Scollo MM, Winstanley MH, eds. *Tobacco in Australia: Facts and Issues*. Melbourne: Cancer Council Victoria; 2014. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
- US Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/
- Chamberlain C, Perlen S, Brennan S, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Syst Rev*. 2017;6(1):135.
- Carson KV, Brinn MP, Labiszewski NA, et al. Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database Syst Rev*. 2012;8:CD009325.

25. Heris C, Chamberlain C, Eades S. *Factors Influencing Smoking Among Indigenous Adolescents Aged 10–24 Years Living in Australia, New Zealand, Canada and the United States: A Systematic Review: PROSPERO: International Prospective Register of Systematic Reviews*; 2017 [CRD42017077220]. Available from: https://www.crd.york.ac.uk/prospetro/display_record.php?RecordID=77220
26. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: a foundation for future health. *Lancet*. 2012;379(9826):1630–1640.
27. Thun M, Peto R, Boreham J, Lopez AD. Stages of the cigarette epidemic on entering its second century. *Tob Control*. 2012;21(2):96–101.
28. Gazis N, Connor JP, Ho R. Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents. *J Early Adolesc*. 2010;30(3):345–368.
29. Glanz K, Mau M, Steffen A, Maskarinec G, Arriola KJ. Tobacco use among Native Hawaiian middle school students: its prevalence, correlates and implications. *Ethn Health*. 2007;12(3):227–244.
30. Angstman S, Patten CA, Renner CC, et al. Tobacco and other substance use among Alaska Native youth in western Alaska. *Am J Health Behav*. 2007;31(3):249–260.
31. Beebe LA, Vesely SK, Oman RF, Tolma E, Aspy CB, Rodine S. Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma. *Maternal Child Health J*. 2008;12(suppl 1):S82–S90.
32. Caraballo RS, Yee SL, Gfroerer JC, Pechacek TF, Henson R. Tobacco use among racial and ethnic population subgroups of adolescents in the United States. *Prev Chronic Dis*. 2006;3(2):A39.
33. Elton-Marshall T, Leatherdale ST, Burkhalter R. Tobacco, alcohol and illicit drug use among Aboriginal youth living off-reserve: results from the Youth Smoking Survey. *CMAJ*. 2011;183(8):E480–E486.
34. Forster JL, Brokenleg I, Lamont GR, Poupert J. Cigarette smoking among American Indian youth in Minneapolis-St. Paul. *Am J Prev Med*. 2008;35(6 Suppl):S449–S456.
35. Nez Henderson P, Kanekar S, Wen Y, et al. Patterns of cigarette smoking initiation in two culturally distinct American Indian tribes. *Am J Public Health*. 2009;99(11):2020–2025.
36. Hutchinson PJ, Richardson CG, Botorff JL. Emergent cigarette smoking, correlations with depression and interest in cessation among Aboriginal adolescents in British Columbia. *Can J Public Health*. 2008;99(5):418–422.
37. Indig D, Haysom L. Smoking behaviours among young people in custody in New South Wales, Australia. *Drug Alcohol Rev*. 2012;31(5):631–637.
38. Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian indigenous youth. *BMC Public Health*. 2012;12:963.
39. Kulis SS, Jager J, Ayers SL, Lateef H, Kiehne E. Substance use profiles of Urban American Indian adolescents: a latent class analysis. *Subst Use Misuse*. 2016;51(9):1159–1173.
40. Lemstra M, Rogers M, Thompson A, Moraros J, Tempier R. Prevalence and risk indicators of smoking among on-reserve First Nations youth. *Paediatr Child Health*. 2011;16(10):e71–e77.
41. Lonczak HS, Fernandez A, Austin L, Marlatt G, Donovan DM. Family structure and substance use among American Indian youth: a preliminary study. *Families Syst Health* 2007;25(1):10–22.
42. Marie D, Fergusson DM, Boden JM. Does socioeconomic inequality explain ethnic differences in nicotine dependence? Evidence from a New Zealand birth cohort. *Aust N Z J Psychiatry*. 2010;44(4):378–383.
43. Osilla KC, Lonczak HS, Mail PD, Larimer ME, Marlatt GA. Regular tobacco use among American Indian and Alaska Native adolescents. *J Ethn Subst Abuse*. 2008;6(3–4):143–153.
44. Passey ME, Gale JT, Sanson-Fisher RW. “It’s almost expected”: rural Australian Aboriginal women’s reflections on smoking initiation and maintenance: a qualitative study. *BMC Womens Health*. 2011;11:55.
45. Patten CA, Enoch C, Renner CC, et al. Focus groups of Alaska Native adolescent tobacco users: preferences for tobacco cessation interventions and barriers to participation. *Health Educ Behav*. 2009;36(4):711–723.
46. Thomas DP, Bennet PT, Briggs VL, et al. Smoking cessation advice and non-pharmacological support in a national sample of Aboriginal and Torres Strait Islander smokers and ex-smokers. *Med J Aust*. 2015;202(10):S73–S77.
47. Thomas JL, Renner CC, Patten CA, Decker PA, Utermohle CJ, Ebbert JO. Prevalence and correlates of tobacco use among middle and high school students in western Alaska. *Int J Circumpolar Health*. 2010;69(2):168–180.
48. Thrift AP, Nancarrow H, Bauman AE. Maternal smoking during pregnancy among Aboriginal women in New South Wales is linked to social gradient. *Aust N Z J Public Health*. 2011;35(4):337–342.
49. Tong VT, Dietz PM, England LJ, et al. Age and racial/ethnic disparities in pre-pregnancy smoking among women who delivered live births. *Prev Chronic Dis*. 2011;8(6):A121.
50. Ward BW, Ridolfo H. Alcohol, tobacco, and illicit drug use among Native American college students: an exploratory quantitative analysis. *Subst Use Misuse*. 2011;46(11):1410–1419.
51. Whitbeck LB, Armenta BE. Patterns of substance use initiation among Indigenous adolescents. *Addict Behav*. 2015;45:172–179.
52. Whitbeck LB, Hartshorn KJ, McQuillan J, Crawford DM. Factors associated with growth in daily smoking among indigenous adolescents. *J Res Adolesc*. 2012;22(4):768–781.
53. Whitbeck LB, Yu M, McChargue DE, Crawford DM. Depressive symptoms, gender, and growth in cigarette smoking among indigenous adolescents. *Addict Behav*. 2009;34(5):421–426.
54. Whitesell NR, Asdigian NL, Kaufman CE, et al. Trajectories of substance use among young American Indian adolescents: patterns and predictors. *J Youth Adolesc*. 2014;43(3):437–453.
55. Yu M. Tobacco use among American Indian or Alaska Native middle- and high-school students in the United States. *Nicotine Tob Res*. 2011;13(3):173–181.
56. Yu M, Whitbeck LB. A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents. *Addict Behav*. 2016;58:35–41.
57. Whitesell NR, Kaufman CE, Keane EM, Crow CB, Shangreau C, Mitchell CM. Patterns of substance use initiation among young adolescents in a Northern Plains American Indian tribe. *Am J Drug Alcohol Abuse*. 2012;38(5):383–388.
58. Centers for Disease Control & Prevention. Racial/ethnic differences among youths in cigarette smoking and susceptibility to start smoking—United States, 2002–2004. *MMWR Morb Mortal Wkly Rep*. 2006;55(47):1275–1277.
59. Scragg R, Glover M. Parental and adolescent smoking: does the association vary with gender and ethnicity? *N Z Med J*. 2007;120(1267):U2862.
60. Scragg R, Laugesen M. Influence of smoking by family and best friend on adolescent tobacco smoking: results from the 2002 New Zealand national survey of year 10 students. *Aust N Z J Public Health*. 2007;31(3):217–223.
61. Spillane NS, Muller CJ, Noonan C, Goins RT, Mitchell CM, Manson S. Sensation-seeking predicts initiation of daily smoking behavior among American Indian high school students. *Addict Behav*. 2012;37(12):1303–1306.
62. Van Bower V, Woodgate RL. Examining the correlates of current smoking among off-reserve First Nations, Métis and Inuit youth: evidence from the 2012 aboriginal peoples survey. *Addict Behav*. 2017;69:93–97.
63. Chavez GE, Sanchez DT. A clearer picture of multiracial substance use: rates and correlates of alcohol and tobacco use in multiracial adolescents and adults. *Race Soc Probl*. 2010;2(1):1–18.
64. Elton-Marshall T, Leatherdale ST, Burkhalter R, Brown KS. Changes in tobacco use, susceptibility to future smoking, and quit attempts among Canadian youth over time: a comparison of off-reserve Aboriginal and non-Aboriginal youth. *Int J Environ Res Public Health*. 2013;10(2):729–741.
65. Guo H, Reeder AI, McGee R, Darling H. Adolescents’ leisure activities, parental monitoring and cigarette smoking—a cross-sectional study. *Subst Abuse Treat Prev Policy*. 2011;6:12.
66. Rudatsikira E, Muula AS, Siziya S. Current cigarette smoking among in-school American youth: results from the 2004 National Youth Tobacco Survey. *Int J Equity Health*. 2009;8:10.

67. Wallace JM Jr, Vaughn MG, Bachman JG, O'Malley PM, Johnston LD, Schulenberg JE. Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States. *Drug Alcohol Depend.* 2009;104 (suppl 1):S42–S49.
68. Wills TA, Knight R, Sargent JD, Gibbons FX, Pagano I, Williams RJ. Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii. *Tob Control.* 2017;26(1):34–39.
69. Anderson K. *Tobacco Use and Cessation: What Matters to Southeast Alaska Native Young Adults?* [PhD thesis] Fairbanks, Alaska: University of Alaska Fairbanks; 2013.
70. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Aust J Prim Health.* 2015;21(3):334–341.
71. Marsh L, Dawson A, McGee R. What do young New Zealanders want in terms of smoking cessation? *J Smok Cessat.* 2014;9(2):98–108.
72. Gifford H, Tautolo el-S, Erick S, Hoek J, Gray R, Edwards R. A qualitative analysis of Māori and Pacific smokers' views on informed choice and smoking. *BMJ Open.* 2016;6(5):e011415.
73. Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again—qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr.* 2010;21(3):208–214.
74. Tauaii M, Bush N, Bowen DJ, Forquera R. Adaptation of a smoking cessation and prevention website for urban American Indian/Alaska Native youth. *J Cancer Educ.* 2010;25(1):23–31.
75. Dennis MK, Momper SL. "It's bad around here now": tobacco, alcohol and other drug use among American Indians living on a rural reservation. *J Ethn Subst Abuse.* 2012;11(2):130–148.
76. Kulis S, Hodge DR, Ayers SL, Brown EF, Marsiglia FF. Spirituality and religion: intertwined protective factors for substance use among urban American Indian youth. *Am J Drug Alcohol Abuse.* 2012;38(5):444–449.
77. McCool J, Hoek J, Edwards R, Thomson G, Gifford H. Crossing the smoking divide for young adults: expressions of stigma and identity among smokers and nonsmokers. *Nicotine Tob Res.* 2013;15(2):552–556.
78. McCool J, Paynter J, Scragg R. A cross-sectional study of opinions related to the tobacco industry and their association with smoking status amongst 14–15 year old teenagers in New Zealand. *N Z Med J.* 2011;124(1338):34–43.
79. Mitschke DB, Matsunaga DS, Loeb K, Tatafu E Jr, Robinett H. Multi-ethnic adolescents' attitudes toward smoking: a focus group analysis. *Am J Health Promot.* 2008;22(6):393–399.
80. Unger JB, Soto C, Baezconde-Garbanati L. Perceptions of ceremonial and nonceremonial uses of tobacco by American-Indian adolescents in California. *J Adolesc Health.* 2006;38(4):443.e9–443.e16.
81. Davis KC, Nonnemaker JM, Asfaw HA, Vallone DM. Racial/ethnic differences in perceived smoking prevalence: evidence from a national survey of teens. *Int J Environ Res Public Health.* 2010;7(12):4152–4168.
82. Maubach N, Hoek JA, Edwards R, Gifford H, Erick S, Newcombe R. 'The times are changing': New Zealand smokers' perceptions of the tobacco endgame. *Tob Control.* 2013;22(6):395–400.
83. Soto C, Baezconde-Garbanati L, Schwartz SJ, Unger JB. Stressful life events, ethnic identity, historical trauma, and participation in cultural activities: associations with smoking behaviors among American Indian adolescents in California. *Addict Behav.* 2015;50:64–69.
84. Crengle S, Robinson E, Ameratunga S, Clark T, Raphael D. Ethnic discrimination prevalence and associations with health outcomes: data from a nationally representative cross-sectional survey of secondary school students in New Zealand. *BMC Public Health.* 2012;12:45.
85. Kang J, Ciecierski CC, Malin EL, et al. A latent class analysis of cancer risk behaviors among U.S. college students. *Prev Med.* 2014;64:121–125.
86. Barnett R, Pearce J, Moon G. Community inequality and smoking cessation in New Zealand, 1981–2006. *Soc Sci Med.* 2009;68(5):876–884.
87. Scragg R, Reeder AI, Wong G, Glover M, Nosa V. Attachment to parents, parental tobacco smoking and smoking among year 10 students in the 2005 New Zealand national survey. *Aust N Z J Public Health.* 2008;32(4):348–353.
88. Weaver H, Jackson K. Cancer risks and Native Americans: the 'healthy living in two worlds' study. *Health Educ J.* 2012;71(6):688–698.
89. Laugesen M, Scragg R, Wellman RJ, DiFranza JR. R-rated film viewing and adolescent smoking. *Prev Med.* 2007;45(6):454–459.
90. McIntire RK, Macy JT, Seo DC, Nelson AA, Kolbe LJ. Secondhand smoke exposure in cars and rooms: trend comparisons among subpopulations of nonsmoking U.S. middle and high school students. *Nicotine Tob Res.* 2014;16(6):663–671.
91. Patterson Silver Wolf DA, Tovar M, Thompson K, et al. Speaking out about physical harms from tobacco use: response to graphic warning labels among American Indian/Alaska Native communities. *BMJ Open.* 2016;6(3):e008777.
92. Thomas DP, Glover M. Smoking and aboriginal and Torres Strait Islander and Māori children. *J Paediatr Child Health.* 2010;46(9):516–520.
93. Liu DM, Alameda CK. Social determinants of health for Native Hawaiian children and adolescents. *Hawaii Med J.* 2011;70(11 suppl 2):9–14.
94. Henson M, Sabo S, Trujillo A, Teufel-Shone N. Identifying protective factors to promote health in American Indian and Alaska Native Adolescents: a literature review. *J Prim Prev.* 2017;38(1-2):5–26.
95. Baker A, Ivers RG, Bowman J, et al. Where there's smoke, there's fire: high prevalence of smoking among some sub-populations and recommendations for intervention. *Drug Alcohol Rev.* 2006;25(1):85–96.
96. Fogarty W, Bulloch H, McDonnell S, Davis M. *Deficit Discourse and Indigenous Health: How Narrative Framings of Aboriginal and Torres Strait Islander People Are Reproduced in Policy.* Melbourne, VIC: The Lowitja Institute; 2018.
97. Alexander LA, Trinidad DR, Sakuma KL, et al. Why we must continue to investigate Menthol's Role in the African American Smoking Paradox. *Nicotine Tob Res.* 2016;18(suppl 1):S91–S101.
98. Hockenberry JM, Timmons EJ, Weg MW. Adolescent mental health as a risk factor for adolescent smoking onset. *Adolesc Health Med Ther.* 2011;2:27–35.
99. Australian Bureau of Statistics. 4704.0—The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010. Canberra: ABS; 2011 Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/lookup/4704.0Chapter430Oct+2010>

11.1.2 Chapter 3 - Supplementary File 1: Search terms

Ovid Medline Search (Using: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE and Versions(R))

1	exp Oceanic Ancestry Group/
2	exp Indians, North American/
3	exp Alaska Natives/ or exp Inuits/
4	exp Indians, South American/
5	1 or 2 or 3 or 4
6	exp Adolescent/
7	exp Young Adult/
8	exp Child/
9	exp Adolescent Behavior/
10	exp "Age of Onset"/
11	exp Minors/
12	exp Students/
13	6 or 7 or 8 or 9 or 10 or 11 or 12
14	exp Smoking/ or exp Smoking Cessation/
15	exp "Tobacco Use Disorder"/ or exp "Tobacco Use"/
16	exp Tobacco/
17	exp Tobacco Products/
18	exp Nicotine/
19	14 or 15 or 16 or 17 or 18
20	5 and 13 and 19
21	limit 20 to (english language and yr="2006 -Current")
22	Indigen*.mp.
23	(Indigenous adj2 people*).mp.
24	(Indigen* adj3 Austral*).mp.
25	Indigenous population*.mp.
26	Aborig*.mp.
27	(Aborig* adj3 Australia*).mp.
28	Torres Strait*.mp.
29	First Nation*.mp.
30	Meti*.mp.
31	Eskimo*.mp.
32	Yupik*.mp.
33	Inuit*.mp.
34	Aleut*.mp.
35	Inuk*.mp.
36	(Alaska* adj1 native*).mp.
37	M?ori*.mp.
38	((trib* or first) adj people*).mp.
39	(Native* adj1 Hawaii*).mp.

40	(American adj1 Indian*).mp.
41	Native* American*.mp.
42	Native* Canadian*.mp.
43	(Canad* adj3 Aborig*).mp.
44	Sa?mi.mp.
45	Pacific Island* America*.mp.
46	Other Pacific Islander*.mp.
47	Mapuche*.mp.
48	22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47
49	5 or 48
50	Adolesc*.mp.
51	Teen*.mp.
52	Early adulthood.mp.
53	Emerging adult*.mp.
54	(Young adj2 people*).mp.
55	Young adult*.mp.
56	Juvenile.mp.
57	school?age*.mp.
58	Student*.mp.
59	Child*.mp.
60	Minor*.mp.
61	(Onset adj2 age).mp.
62	50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61
63	13 or 62
64	Smoking.mp.
65	Smoker*.mp.
66	Smoked.mp.
67	Tobacco.mp.
68	Cigarette*.mp.
69	Nicotine.mp.
70	64 or 65 or 66 or 67 or 68 or 69
71	19 or 70
72	49 and 63 and 71
73	limit 72 to (english language and yr="2006 -Current")

Search strategy: Initial search of the three concepts was conducted using MESH subject headings only: combined MESH terms for Indigenous status (row 5), age (row 13), tobacco use (row 19). To expand the scope of results text words for each concept were then added and combined with the MESH terms: Indigenous status (row 49), age (row 63), tobacco use (row 71). Row 72 is the final combined search for the three concepts comprised of both MESH and text words.

11.1.3 Chapter 3 - Supplementary File 2: NVIVO coding structure

1. Study Descriptions
 - a) Methodology
 - i. Quant - descriptive observational
 - ii. Qual - descriptive observational
 - iii. Intervention
 - iv. Mixed methods
 - v. Other
 - b) Study start and end date
 - c) Study Aims
 - d) Study Description
 - e) Conflict of interest (tobacco)
2. Population and Setting
 - a) Country
 - i. Australia
 - ii. New Zealand
 - iii. Canada
 - iv. United States
 - v. All Indigenous
 - vi. Unclear or other
 - b) Participant recruitment
 - i. Inclusion & exclusion criteria
 - ii. Number approached
 - iii. Number included
 - iv. Number of withdrawals
 - c) Sample profile
 - i. Age of population
 - ii. Cultural groups
 - a. Indigenous only
 - b. Indigenous and non-Indigenous
 - iii. Gender
 - iv. Representativeness of sample
 - v. Sub-group reporting
3. Outcomes
 - a) Outcome measurement
 - b) Unit of analysis
 - c) Key conclusions
4. Influences on smoking prevalence
 - a) ENVIRONMENTAL LEVEL FACTORS
 - i. Tobacco environment
 - Tobacco Marketing (pro advertising)
 - Pop culture images of smoking (movies, games, tv)
 - Tobacco industry influence
 - Access (incl display bans, underage sales, access at home)
 - Price (incl increases)
 - Community smoking norms
 - Adult smoking prevalence (visibility)
 - Environmental exposure (homes, cars, public spaces)
 - o Restrictions on smoking (smoke free homes and cars, smoke-free community events and spaces)
 - o SHS Homes, Cars, Events
 - Tobacco prevention and cessation support
 - o Youth cessation support
 - o Adult or mainstream cessation
 - o School-based tobacco education
 - o Health service tobacco control programs
 - o Mass media campaigns, social marketing, graphic health warnings, plain packs
 - o Quit success stories
 - Culture of sharing (incl cigarettes)
 - ii. Community context

- Remoteness
- Sport & recreation
- Housing
- Socioeconomic and cultural context
 - Employment
 - Social disadvantage
 - Access to culturally safe support services
 - Education attainment in community
- Health context (high rates of CDCs, risk behaviours)
- Other
 - Community control and governance
 - Political context
 - Attitudes to youth and youth culture
- iii. Historical context
 - Traditional or cultural tobacco use
 - Historical role of tobacco in colonisation
 - Historical and intergenerational trauma
 - Embedded racism
- b) SOCIAL LEVEL FACTORS
 - i. Family
 - Family smoking
 - Parents
 - Siblings
 - Other Family
 - Family general
 - Family non-smoking values
 - Household rules about smoking
 - Parental values & attitudes to smoking (rules around smoking)
 - Other family attitudes to smoking
 - Family general attitudes to smoking
 - Relationship to parents
 - Parenting style (parental monitoring)
 - Family structure
 - Bonding with parents (quality of relationship)
 - Relationships to other family
 - Parental mental illness
 - Family SES
 - Youth income, pocket money
 - Parent education and employment status
 - Family income
 - Home ownership
 - SES general
 - ii. Friends and peers
 - Smoking of friends and peers
 - Non-smoking attitudes of friends and peers
 - Relationships with friends and peers
 - iii. Romantic relationships
 - iv. Other community relationships
 - v. Role Modelling
 - Influence of role models - Positive or Deviant [sic]
 - Desire to be a role model for others
 - vi. School
 - Relationships with adults at school
 - Education attitudes, engagement, performance
 - School SES
 - Smoking culture at school
 - vii. Cultural factors (participation, connection to culture, country, ancestors)
 - viii. Substance use general (fam, friends)
- c) INDIVIDUAL LEVEL FACTORS
 - i. Personal beliefs and values
 - Smoking attitudes & knowledge of harms
 - Belief no short term risk or everything is a risk

- Perceived risks and harms
 - Benefits of smoking and positive attitudes
 - Future intentions and susceptibility
 - Attitudes to quitting and regrets of past smoking
 - Negative attitudes to smoking experience
- Perceptions of smoking norms (incl perceptions of parental, family, peer smoking)
- Identity
 - Self-esteem, image, smoking identity
 - Adulthood aspirations and identity
 - Cultural and ethnic identity (incl language use but not participation)
- Other
 - Curiosity
 - Individual choice
- ii. Physiological factors
 - Pregnancy and in utero exposure
 - In utero exposure (self)
 - Pregnancy (own)
 - Age (puberty and adolescence)
 - Gender
 - Addiction and withdrawal
 - Physical activity and smoking impacts
 - Fitness & breathing difficulties
- iii. Psychological factors
 - Mental health
 - Stress, relaxes, anger management, mindfulness
 - Suicide
 - Depression
 - Mental health & SEWB general
 - Boredom
 - Racism and discrimination
 - Spirituality
 - Religion
 - Traditional spiritual beliefs
 - Habit and unconscious use
 - Personality (sensation seeking, risk taking)
- iv. Individual behaviours
 - Substance use
 - Smoking at school
 - Smoking trajectories
 - Risk taking behaviours
 - Other Intrinsic (comparisons across cultural groups)
- d) Quality Assessment
 - i. Participant selection
 - ii. Measurement
 - iii. Confounding
 - iv. Follow-up

11.1.4 Chapter 3 - Supplementary File 3: Adapted Risk of Bias Assessment Tool

Assessment of confidence in study findings (Study Limitations/Risk of Bias)	
<i>Participant selection</i>	<i>Yes / No / Unclear / NA</i>
- Was Indigenous identity ascertained by the researcher? (Y e.g. participant self-identification or community identification; N e.g. under enumeration in state datasets, reclassification by researcher combined into other ethnic sub-groups) - For Indigenous specific studies was recruitment conducted through Community? (Y e.g. Community level consent procedures, Community organisations and gatekeepers conducted recruitment, participatory research projects; N e.g. social research panels) - Did recruitment strategies of population level studies adequately include Indigenous participants? (N e.g. excluded substantial population sub-groups (students not attending school, people living on-reserve, people living in urban areas)) - Were recruitment and data collection methods appropriate to reach youth participants (N e.g. telephone studies) - Is the study sample representative and generalisable to other Indigenous sub-groups in the country? (N e.g. small, purposive samples)	
<i>Measurement</i>	<i>Yes / No / Unclear / NA</i>
- Were there standard validated measures for outcomes? (Y e.g. standard tools to record self-report smoking or biochemical validation) - Did studies differentiate between levels or types of smoking (Y e.g. smoking initiation vs regular smoking; traditional vs recreational use) - Were there standard validated measures for exposures? - Were ethnic identity and cultural participation measures appropriate? (Y/Unclear e.g. use of existing standardised ethnic identity measurement tools (adapted/validated with population of interest?); N e.g. authors apply own categorisation of identity; Unclear e.g. uncertain relevance of specified activities for all participants) - Was the study design appropriate to answer the research question? (Y e.g. longitudinal designs for exposure variables and smoking outcomes; Unclear e.g. cross-sectional studies where causality cannot be inferred) - Were qualitative research methods robust (Y e.g. data saturation reached; thoughtful composition of focus groups to facilitate discussion; experienced focus group moderator; detailed description of qualitative analysis; more than one qualitative researcher conducting data analysis) - For face-to-face studies was consideration given to the relationship between interviewer and participants (Y e.g. community based participatory research conducted by community members, Indigenous interviewers) - Where appropriate was potential for recall bias or social-desirability bias acknowledged and discussed? - Was the sample size adequate to detect outcomes? (N e.g. insufficient power to detect significant results, insufficient power to adjust for confounders in analysis) - Was data weighted appropriately? (Y e.g. national/state level weights included distribution of Indigenous population) - No authors declared a tobacco industry conflict of interest?	

Confounding	Yes / No / Unclear / NA
For quantitative studies was confounding adequately controlled for in analysis? (Y key measures were controlled for e.g. demographic and family data including age/school year, sex, SES/deprivation/financial measures, location, clustered sampling designs; N or Unclear e.g. adjusting for factors that may be important and independently related to outcome (e.g. peer or family smoking, mental health, alcohol use) that could be reported)	
Follow-up	Yes / No / Unclear / NA
For longitudinal studies was follow-up adequate? (N e.g. differences in retention by ethnic sub-group and/or variables of interest)	

Tool developed from:

- Cochrane Effective Practice and Organisation of Care (EPoC). (2017). Suggested risk of bias criteria for EPoC reviews. Retrieved from <http://epoc.cochrane.org/resources/epoc-resources-review-authors>
- Sterne, J. A., Hernán, M. A., Reeves, B. C., Savović, J., Berkman, N. D., Viswanathan, M., . . . Higgins, J. P. (2016). ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*, 355.
- Critical Appraisal Skills Programme. (2017). CASP Qualitative checklist. Retrieved from http://docs.wixstatic.com/ugd/dded87_25658615020e427da194a325e7773d42.pdf

Creating a summary of overall confidence in study findings

A summary overall assessment of confidence in the findings within each study was conducted as follows. All studies started with an assessment of 'high' confidence, and were 'downgraded' one level for 'serious concerns' or two levels for 'very serious concerns' regarding participant selection, measurement, confounding or follow-up. Overall confidence across study findings (e.g. consistency and publication bias) was not assessed in this scoping review.

Criteria for summary overall assessment of confidence in study findings	
<i>High</i>	No serious concerns regarding participant selection, measurement, confounding or follow-up
<i>Moderate</i>	Serious concerns regarding participant selection, measurement, confounding or follow-up
<i>Low</i>	Very serious concerns regarding participant selection, measurement, confounding or follow-up

Note: The overall assessment of confidence was converted from a Risk of Bias score out of 4: High Confidence (ROB Score 3-4) - No more than 1 x Moderate ROB across all four categories; Moderate (ROB Score 2) 2 x Moderate ROB scores; or 1 x High ROB and 3 x Low ROB in all other categories; Low (ROB Score 0-1) - e.g. at least 1 x High ROB and 1 x Moderate ROB score; Low (ROB Score 0-1) - e.g. at least 1 x High ROB and 1 x Moderate ROB score.

11.1.5 Chapter 3 - Supplementary File 4: Characteristics of Included Studies

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Anderson	2013	Tobacco use and cessation: What matters to southeast Alaska Native young adults?	⁶⁹	US	Yes	Qual	Interest in quitting (without supports). Short-term concerns (impact on appearance, children) over long-term health impacts.	Low
Angstman	2007	Tobacco and other substance use among Alaska Native youth in western Alaska	³⁰	US	Yes	Quant	Smoking higher among females and with increasing age and correlated to maternal tobacco use during and after pregnancy.	High
Barnett	2009	Community inequality and smoking cessation in New Zealand, 1981-2006	¹	NZ	No	Quant	Smoking association with community inequality. Smoking cessation strategies must shift from individual behavioural change to include environmental factors.	High
Beebe	2008	Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma	³¹	US	Yes	Quant	Non-smoking was associated with family structure, good health practices and non-parent role-models	High
Caraballo	2006	Tobacco use among racial and ethnic population subgroups of adolescents in the United States	³²	US	No	Quant	Identified a need for sustained, culturally appropriate prevention interventions.	High
CDC	2006	Racial/ethnic differences among youths in cigarette smoking and susceptibility to start smoking--United States, 2002-2004	²	US	No	Quant	Highest smoking prevalence among American Indian/Alaskan Native youths.	High
Chavez	2010	A clearer picture of multiracial substance use: Rates and correlates of alcohol and tobacco use in multiracial adolescents and adults	⁶³	US	No	Quant	Smoking associated with mental health (feeling depressed)	High
Cosh	2015	Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation	⁷⁰	Aus	Yes	Qual	Smoking due to stress, boredom and social influences. Quitting motivated by pregnancy, children, fitness, cost.	High
Crengle	2012	Ethnic discrimination prevalence and associations with health outcomes: data from a nationally representative cross-sectional	³	NZ	No	Quant	Ethnic discrimination associated with cigarette smoking and adverse health outcomes.	Moderate

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
		survey of secondary school students in New Zealand						
Davis	2010	Racial/ethnic differences in perceived smoking prevalence: evidence from a national survey of teens	⁸¹	US	No	Quant	Minority youth overestimate smoking prevalence. Norm correction interventions are needed.	Moderate
Dennis	2012	"It's bad around here now": tobacco, alcohol and other drug use among American Indians living on a rural reservation	⁷⁵	US	Yes	Qual	Tobacco use pervasive, culturally appropriate interventions designed by target groups needed.	High
Primary ref Elton-Marshall	2011	Tobacco, alcohol and illicit drug use among Aboriginal youth living off-reserve: results from the Youth Smoking Survey	³³	Can	No	Quant	Interest in quitting. Need for more primary care screening, awareness of SHS, and culturally appropriate interventions.	High
Associated ref Elton-Marshall	2013	Changes in tobacco use, susceptibility to future smoking, and quit attempts among Canadian youth over time: a comparison of off-reserve Aboriginal and non-Aboriginal youth	⁶⁴	Can	No	Quant	Increased quit attempts. But disparity in higher smoking rates and greater susceptibility to future smoking than non-Aboriginal youth has increased over time.	High
Forster	2008	Cigarette smoking among American Indian youth in Minneapolis-St. Paul	³⁴	US	Yes	Quant	Non-smoking associated with household rules against smoking and hearing of others caught smoking at school	High
Gazis	2010	Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents	²⁸	Aus	No	Quant	Indigenous youth with strong cultural identity may be more vulnerable to peer influence risk.	Low
Gifford	2016	A qualitative analysis of Maori and Pacific smokers' views on informed choice and smoking	⁴	NZ	Yes	Qual	Smoking perceived as a symbol of adulthood. Normalised in communities. Opportunities to increase smokefree spaces and denormalise use.	High
Glanz	2007	Tobacco use among Native Hawaiian middle school students: its prevalence, correlates and implications	²⁹	US	Yes	Quant	Smoking associated with parent and peer smoking, cultural factors were not. Interventions needed to reduce parent smoking and target peers at school.	Moderate

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Guo	2011	Adolescents' leisure activities, parental monitoring and cigarette smoking-A cross-sectional study	⁶⁵	NZ	No	Quant	Parental monitoring protective against smoking. Attending a skate park a risk factor.	High
Henderson	2009	Patterns of cigarette smoking initiation in two culturally distinct American Indian tribes	³⁵	US	Yes	Quant	Decreasing age of smoking initiation.	High
Hutchinson	2008	Emergent cigarette smoking, correlations with depression and interest in cessation among Aboriginal adolescents in British Columbia	³⁶	Can	Yes	Quant	Best friend who smokes, mental health and lower life satisfaction were associated with smoking. Interest in quitting and opportunities for early cessation interventions.	High
Indig	2012	Smoking behaviours among young people in custody in New South Wales, Australia	³⁷	Aus	No	Quant	People in youth detention likely to smoke on release despite previous history. Culturally appropriate education and supports beyond NRT are needed.	Moderate
Johnston	2012	Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth	³⁸	Aus	No	Qual	Social environment key influence on smoking/non-smoking experience. Increased efforts to denormalise smoking through smokefree environments needed.	High
Kang	2014	A latent class analysis of cancer risk behaviors among U.S. college students	⁵	US	No	Quant	Risk behaviours cluster in young adults. Multiple behaviour interventions are needed.	High
Kulis	2016	Substance Use Profiles of Urban American Indian Adolescents: A Latent Class Analysis	³⁹	US	Yes	Quant	Urban AI substance use occurs in distinct patters of alcohol, tobacco and marijuana; these with other illicit drugs or pharmaceuticals; and those combining these substances but without alcohol.	High
Kulis	2012	Spirituality and religion: Intertwined protective factors for substance use among urban American Indian youth	⁷⁶	US	Yes	Quant	Traditional spiritual beliefs associated with antidrug attitudes, norms and expectancies.	Moderate
Leavy	2010	Try and try again--qualitative insights into adolescent smoking experimentation and notions of addiction	⁶	Aus	No	Qual	Interventions needed to address addiction in short-term effects relevant to youth and reinforce not only an adult experience	High
Lemstra	2011	Prevalence and risk indicators of smoking among on-reserve First Nations youth	⁴⁰	Can	Yes	Quant	Risk factors for smoking were older age, unhappy home life, suicidal ideation, 3+ smoking friends. Need younger targeted school-based prevention alongside mental health promotion.	High

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Primary ref Lonczak	2007	Family structure and substance use among American Indian youth: A preliminary study	41	US	Yes	Quant	Living in original two-parent household protective against smoking. Single parent household greater likelihood of regular smoking, cohabiting with extended family increased likelihood of smoking initiation.	Moderate
Associated ref Osilla	2008	Regular tobacco use among American Indian and Alaska Native adolescents	43	US	Yes	Quant	Non-smoking predicted by tertiary education aspirations, as well as participation in sport and music.	High
Marie	2010	Does socioeconomic inequality explain ethnic differences in nicotine dependence? Evidence from a New Zealand birth cohort	42	NZ	No	Quant	Socioeconomic, not cultural factors, contributing to smoking. Same factors as non-Maori youth.	High
Marsh	2014	What do young New Zealanders want in terms of smoking cessation?	71	NZ	No	Qual	Social environment can facilitate or hinder quit attempts. Encouraging parents to quit, whole family quitting, friends quitting in groups.	High
Maubach	2013	'The times are changing': New Zealand smokers' perceptions of the tobacco endgame	7	NZ	No	Qual	Interventions: restricting supply, diminishing visibility, decreasing availability and affordability, and increasing quit support.	High
McCool	2013	Crossing the smoking divide for young adults: expressions of stigma and identity among smokers and nonsmokers	77	NZ	No	Qual	Interventions to promote smokefree identities as achievable, desirable, without stigmatising and socially excluding smokers by generating empathy and understanding of addiction.	High
McCool	2011	A cross-sectional study of opinions related to the tobacco industry and their association with smoking status amongst 14-15 year old teenagers in New Zealand	78	NZ	No	Quant	Acceptance of the tobacco industry was higher among the sub-groups more likely to smoke (including Maori youth)	High
Mitschke	2008	Multi-ethnic adolescents' attitudes toward smoking: a focus group analysis	79	US	No	Qual	Family influences are important for youth attitudes toward tobacco use	High
Passey	2011	"It's almost expected": rural Australian Aboriginal women's reflections on smoking initiation and maintenance: a qualitative study	44	Aus	Yes	Qual	Interventions must address contextual factors, recognising persistent marginalisation contributing to high smoking prevalence. Aboriginal identity and culture is a source of empowerment.	High

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Patten	2009	Focus groups of Alaska Native adolescent tobacco users: preferences for tobacco cessation interventions and barriers to participation	⁴⁵	US	Yes	Qual	Adverse health impacts, self-image/appearance and a desire to be a role-model were motivators to quit. Addiction/withdrawal/cravings were barriers. Support for cessation in group format combining medication and personal stories.	Moderate
Primary ref Scragg	2007	Influence of smoking by family and best friend on adolescent tobacco smoking: results from the 2002 New Zealand national survey of year 10 students	⁶⁰	NZ	No	Quant	Smoking associated with both parents smoking. Lower than the risks associated with best friend smoking. Parental effects as strong as peer effects, targeting parents may be more effective than peers.	High
Associated refs Laugesen	2007	R-rated film viewing and adolescent smoking	⁸	NZ	No	Quant	At least weekly viewing of R-rated films tripled the risk of future smoking susceptibility and doubled past experimentation.	Moderate
Scragg	2007	Parental and adolescent smoking: does the association vary with gender and ethnicity?	⁵⁹	NZ	No	Quant	Interventions need to target parental smoking. Maternal smoking had a greater effect than paternal smoking. Accounts for 40+% of youth smoking (in addition to parental controls and peer smoking). Maternal smoking had greater effect on Maori girls than boys).	High
Scragg	2008	Attachment to parents, parental tobacco smoking and smoking among Year 10 students in the 2005 New Zealand national survey	⁹	NZ	No	Quant	Smoking associated with low parent attachment. Interventions to improve attachment between parents and their children may be protective.	High
Soto	2015	Stressful life events, ethnic identity, historical trauma, and participation in cultural activities: Associations with smoking behaviors among American Indian adolescents in California	¹⁰	US	Yes	Quant	Historical trauma is a direct risk factor for smoking and through mediating the effects of Ethnic Identity, cultural activities, and SLEs. Interventions needed to develop strategies to cope with HT and empower them without smoking.	Moderate
Spillane	2012	Sensation-seeking predicts initiation of daily smoking behavior among American Indian high school students	⁶¹	US	Yes	Quant	Sensation-seeking predicted smoking for females. Gender-specific prevention programs may be warranted.	Low
Taualii	2010	Adaptation of a smoking cessation and prevention website for urban American Indian/Alaska Native youth	¹¹	US	Yes	Intervention	Reasons for starting to smoke include stress, peer pressure, and self-destructive behavior.	High

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Thomas	2015	Smoking cessation advice and non-pharmacological support in a national sample of Aboriginal and Torres Strait Islander smokers and ex-smokers	⁴⁶	Aus	No	Quant	Older patients more likely to receive quit advice from a health professional. There is an opportunity to increase the provision of advice to younger patients.	High
Thomas	2010	Prevalence and correlates of tobacco use among middle and high school students in western Alaska	⁴⁷	US	No	Quant	Smoking was associated with marijuana use, suicidal ideation, increasing age.	High
Thrift	2011	Maternal smoking during pregnancy among Aboriginal women in New South Wales is linked to social gradient	⁴⁸	Aus	No	Quant	Teenage pregnant women more likely to smoke. Addressing socio-economic factors in urban areas important.	High
Tong	2011	Age and racial/ethnic disparities in prepregnancy smoking among women who delivered live births	⁴⁹	US	No	Quant	Younger women more likely to smoke during pregnancy. Age-appropriate and culturally specific interventions needed to reach young women before they become pregnant.	Moderate
Unger	2006	Perceptions of ceremonial and nonceremonial uses of tobacco by American-Indian adolescents in California	⁸⁰	US	Yes	Qual	Ceremonial use an early opportunity to experiment with commercial tobacco. Difference between sacred and commercial tobacco understood. There are culturally appropriate ways to participate and minimise exposure. Need culturally appropriate strategies to prevent regular smoking.	High
Van Bower	2017	Examining the correlates of current smoking among off-reserve First Nations, Metis and Inuit youth: Evidence from the 2012 Aboriginal Peoples Survey	⁶²	Can	Yes	Quant	Smoking was associated with heavy drinking and speaking an Aboriginal language, but not other traditional activities. Low socio-economic factors and poor mental health also important.	Moderate
Wallace	2009	Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States	⁶⁷	US	No	Quant	Smoking higher among AI girls, in particular those who do not live with both parents, parents have low education, attend low SES schools and have higher disposable income.	High
Ward	2011	Alcohol, tobacco, and illicit drug use among Native American college students: an exploratory quantitative analysis	⁵⁰	US	No	Quant	Non-smoking was associated with being married.	High
Weaver	2012	Cancer risks and Native Americans: The 'Healthy Living in Two Worlds' study	¹²	US	Yes	Quant	High exposure to smoking behaviours among family and friends may lead to uptake later	Moderate

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Wen	2009	Social contexts of regular smoking in adolescence: Towards a multidimensional ecological model	¹³	US	No	Quant	Best friend and household smoking more important predictor than school and state prevalence. An ecological model including different social systems better than single-system model.	High
Primary ref Whitesell	2014	Trajectories of substance use among young American Indian adolescents: Patterns and predictors	⁵⁴	US	Yes	Quant	Stress, early puberty, age, female, and deviant peer relationships were associated substance use. Protective factors were strong relationships with parents and prosocial peers. Cultural engagement associated with cigarette use in univariate analysis.	High
Associated ref Whitesell	2012	Patterns of substance use initiation among young adolescents in a Northern Plains American Indian Tribe	⁵⁷	US	Yes	Quant	Smoking initiation increased with age, beginning age 10 with higher initiation rates and lifetime use among females.	High
Wills	2017	Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii	⁶⁸	US	No	Quant	E-cigarette users are more likely to start smoking cigarettes. Use was predicted by age, Native Hawaiian ethnicity, lower parental education and support, rebelliousness, perception they are healthier.	High
Wolf	2016	Speaking out about physical harms from tobacco use: Response to graphic warning labels among American Indian/Alaska Native communities	¹⁴	US	Yes	Quant	A key determinant is the influence of community social networks on health-related beliefs and attitudes. Graphic warning labels may effect change by harnessing the influence of peers and family.	High

Author	Year	Title	Ref	Country	Indigenous only	Study Type	Brief Summary of Main Outcomes	Overall Confidence in Study Findings
Primary ref Yu	2016	A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents	⁵⁶	Can/US	Yes	Quant	Higher smoking of females. Family warmth and support and positive school activities protective against smoking. Risk factors for smoking were depressive symptoms (frequent smoking only), intention to smoke, best friend smoking, marijuana and alcohol use, deviant behaviours for smoking.	High
Associated refs Whitbeck	2015	Patterns of substance use initiation among Indigenous adolescents	⁵¹	Can/US	Yes	Quant	Nicotine is likely a gateway substance and precedes alcohol and marijuana use.	
Whitbeck	2012	Factors Associated with Growth in Daily Smoking among Indigenous Adolescents	⁵²	Can/US	Yes	Quant	Numbers of smoking peers, depression and conduct problems were associated with early daily smoking. Age and increases in peer smoking increased odds of daily smoking.	
Whitbeck	2009	Depressive symptoms, gender, and growth in cigarette smoking among indigenous adolescents	⁵³	Can/US	Yes	Quant	Adolescent smoking increases quickly. Increase in smoking among girls was associated with depressive symptoms, but not boys. Cessation programs for adolescents needed and include simultaneous treatment for depression. Female specific interventions may be required.	
Primary ref Yu	2011	Tobacco use among American Indian or Alaska Native middle- and high-school students in the United States	⁵⁵	US	Yes	Quant	Age, family member smoking, refusal to smoke, school truancy, receptivity to tobacco marketing. Need to provide skills to respond to parent and peer smoking, encourage smokefree homes, enhance academic engagement and motivation.	Moderate
Associated refs McIntire	2014	Secondhand smoke exposure in cars and rooms: trend comparisons among subpopulations of nonsmoking U.S. middle and high school students	¹⁵	US	No	Quant	Declining trends in SHS exposure in cars and rooms. Exposure was higher in rooms than cars.	High
Rudatsikira	2009	Current cigarette smoking among in-school American youth: results from the 2004 National Youth Tobacco Survey	⁶⁶	US	No	Quant	Smoking higher among NH White and American Indian adolescents than all other groups.	High

11.1.6 Chapter 3 - Supplementary File 5: Assessment of Confidence

Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)				Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding	Follow- Up		
Anderson	2014	Tobacco use and cessation: What matters to southeast Alaska Native young adults?	High	Moderate	Low/NA	Low/NA	Low	Concerns about sampling strategy (small sample, sub-groups underrepresented), saturation, analysis
Angstman	2007	Tobacco and other substance use among Alaska Native youth in western Alaska	Moderate	Low/NA	Low/NA	Low/NA	High	
Barnett	2009	Community inequality and smoking cessation in New Zealand, 1981-2006	Low/NA	Moderate	Low/NA	Low/NA	High	
Beebe	2008	Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma	Low/NA	Low/NA	Low/NA	Low/NA	High	
Caraballo	2006	Tobacco use among racial and ethnic population subgroups of adolescents in the United States	Low/NA	Moderate	Low/NA	Low/NA	High	
Centers for Disease Control	2006	Racial/ethnic differences among youths in cigarette smoking and susceptibility to start smoking--United States, 2002-2004	Low/NA	Moderate	Low/NA	Low/NA	High	
Chavez	2010	A clearer picture of multiracial substance use: Rates and correlates of alcohol and tobacco use in multiracial adolescents and adults	Low/NA	Low/NA	Low/NA	Low/NA	High	
Cosh	2015	Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation	High	Low/NA	Low/NA	Low/NA	Moderate	Concerns about sampling strategy (representativeness of social research panel)
Crengle	2012	Ethnic discrimination prevalence and associations with health outcomes: data from a nationally representative cross-sectional survey of secondary school students in New Zealand	Moderate	Moderate	Low/NA	Low/NA	Moderate	Concerns about selection bias, outcome/exposure validation

Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)			Follow-Up	Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding			
Davis	2010	Racial/ethnic differences in perceived smoking prevalence: evidence from a national survey of teens	Moderate	Moderate	Low/NA	Low/NA	Moderate	Concerns about selection bias, outcome validation
Dennis	2012	"It's bad around here now": tobacco, alcohol and other drug use among American Indians living on a rural reservation	Low/NA	Low/NA	Low/NA	Low/NA	High	
Primary ref Elton-Marshall	2011	Tobacco, alcohol and illicit drug use among Aboriginal youth living off-reserve: results from the Youth Smoking Survey	Low/NA	Low/NA	Low/NA	Low/NA	High	
Associated ref Elton-Marshall	2013	Changes in tobacco use, susceptibility to future smoking, and quit attempts among Canadian youth over time: a comparison of off-reserve Aboriginal and non-Aboriginal youth	Moderate	Low/NA	Low/NA	Low/NA	High	
Forster	2008	Cigarette smoking among American Indian youth in Minneapolis-St. Paul	Moderate	Low/NA	Low/NA	Low/NA	High	
Gazis	2010	Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents	High	High	Low/NA	Low/NA	Low	Concerns about selection bias, outcome/exposure validation, data analysis
Gifford	2016	A qualitative analysis of Maori and Pacific smokers' views on informed choice and smoking	Low/NA	Low/NA	Low/NA	Low/NA	High	
Glanz	2007	Tobacco use among Native Hawaiian middle school students: its prevalence, correlates and implications	Moderate	Moderate	Low/NA	Low/NA	Moderate	Concerns about selection bias, outcome/exposure validation
Guo	2011	Adolescents' leisure activities, parental monitoring and cigarette smoking-A cross-sectional study	Low/NA	Low/NA	Low/NA	Low/NA	High	
Henderson	2009	Patterns of cigarette smoking initiation in two culturally distinct American Indian tribes	Low/NA	Moderate	Low/NA	Low/NA	High	

Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)			Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding	Follow- Up	
Hutchinson	2008	Emergent cigarette smoking, correlations with depression and interest in cessation among Aboriginal adolescents in British Columbia	Low/NA	Moderate	Low/NA	Low/NA	High
Indig	2012	Smoking behaviours among young people in custody in New South Wales, Australia	Moderate	Moderate	Low/NA	Low/NA	Moderate
Johnston	2012	Starting to smoke: a qualitative study of the experiences of Australian indigenous youth	Moderate	Low/NA	Low/NA	Low/NA	High
Kang	2014	A latent class analysis of cancer risk behaviors among U.S. college students	Moderate	Low/NA	Low/NA	Low/NA	High
Kulis	2016	Substance Use Profiles of Urban American Indian Adolescents: A Latent Class Analysis	Low/NA	Low/NA	Low/NA	Low/NA	High
Kulis	2012	Spirituality and religion: Intertwined protective factors for substance use among urban American Indian youth	Moderate	Moderate	Low/NA	Low/NA	Moderate
Leavy	2010	Try and try again--qualitative insights into adolescent smoking experimentation and notions of addiction	Low/NA	Moderate	Low/NA	Low/NA	High
Lemstra	2011	Prevalence and risk indicators of smoking among on-reserve First Nations youth	Low/NA	Low/NA	Low/NA	Low/NA	High
Primary ref Lonczak	2007	Family structure and substance use among American Indian youth: A preliminary study	Moderate	Moderate	Low/NA	Low/NA	Moderate
Associated ref Osilla	2008	Regular tobacco use among American Indian and Alaska Native adolescents	Moderate	Low/NA	Low/NA	Low/NA	High
Marie	2010	Does socioeconomic inequality explain ethnic differences in nicotine dependence? Evidence from a New Zealand birth cohort	Low/NA	Low/NA	Low/NA	Low/NA	High
Marsh	2014	What do young New Zealanders want in terms of smoking cessation?	Low/NA	Low/NA	Low/NA	Low/NA	High

Concerns about selection bias, outcome/exposure validation, sample size, analysis

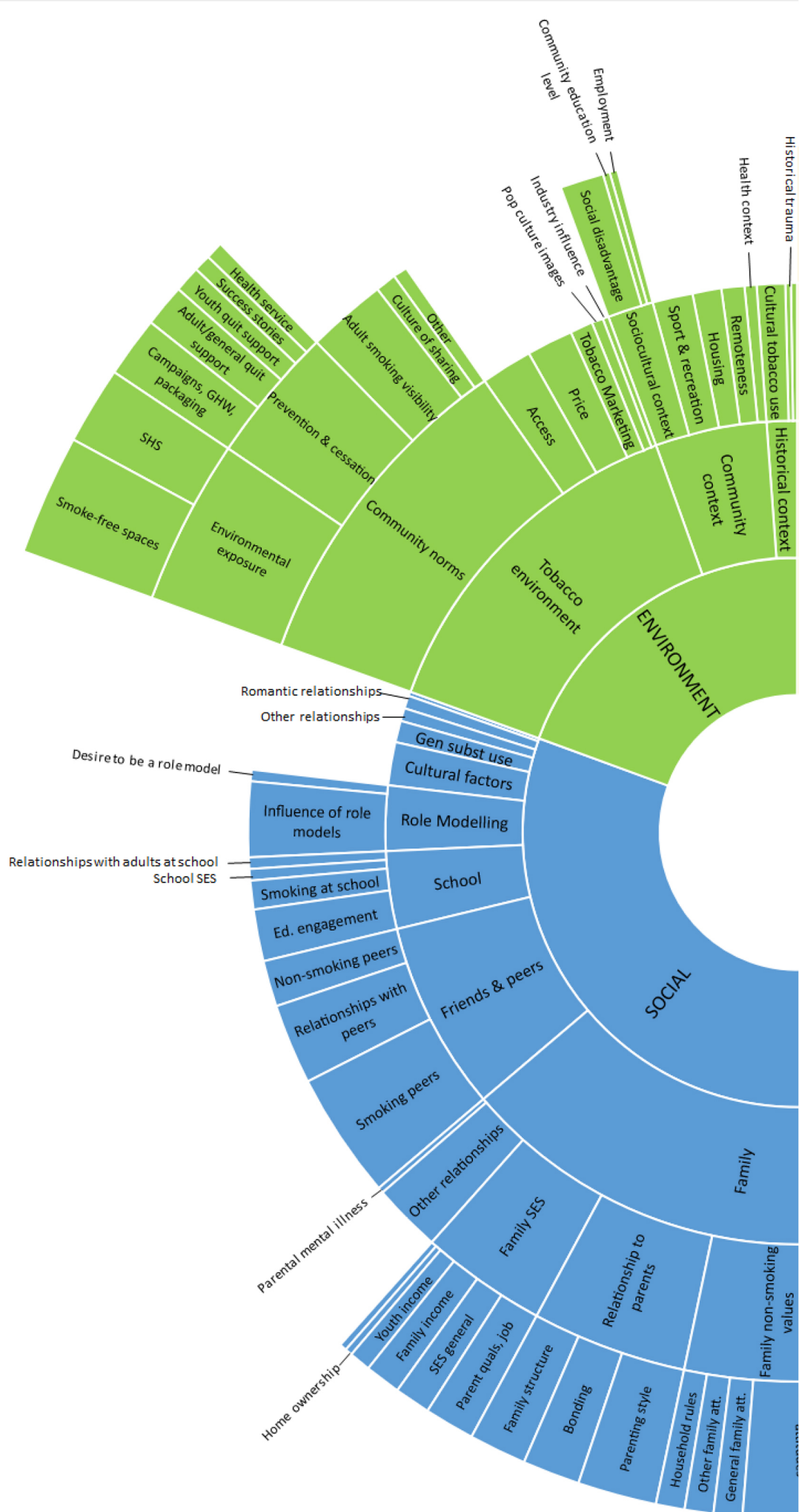
Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)			Follow-Up	Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding			
Maubach	2013	'The times are changing': New Zealand smokers' perceptions of the tobacco endgame	Low/NA	Low/NA	Low/NA	Low/NA	High	
McCool	2013	Crossing the smoking divide for young adults: expressions of stigma and identity among smokers and nonsmokers	Low/NA	Low/NA	Low/NA	Low/NA	High	
McCool	2011	A cross-sectional study of opinions related to the tobacco industry and their association with smoking status amongst 14-15 year old teenagers in New Zealand	Low/NA	Low/NA	Low/NA	Low/NA	High	
Mitschke	2008	Multi-ethnic adolescents' attitudes toward smoking: a focus group analysis	Low/NA	Low/NA	Low/NA	Low/NA	High	
Passey	2011	"It's almost expected": rural Australian Aboriginal women's reflections on smoking initiation and maintenance: a qualitative study	Moderate	Low/NA	Low/NA	Low/NA	High	
Patten	2009	Focus groups of Alaska Native adolescent tobacco users: preferences for tobacco cessation interventions and barriers to participation	Low/NA	High	Low/NA	Low/NA	Moderate	Concerns about qualitative methodology and analysis
Primary ref Scragg	2007	Influence of smoking by family and best friend on adolescent tobacco smoking: results from the 2002 New Zealand national survey of year 10 students	Moderate	Low/NA	Low/NA	Low/NA	High	Concerns about selection bias, outcome/exposure validation
Associated ref Laugesen	2007	R-rated film viewing and adolescent smoking	Moderate	Moderate	Low/NA	Low/NA	Moderate	
Scragg	2007	Parental and adolescent smoking: does the association vary with gender and ethnicity?	Low/NA	Low/NA	Low/NA	Low/NA	High	
Scragg	2008	Attachment to parents, parental tobacco smoking and smoking among	Low/NA	Moderate	Low/NA	Low/NA	High	

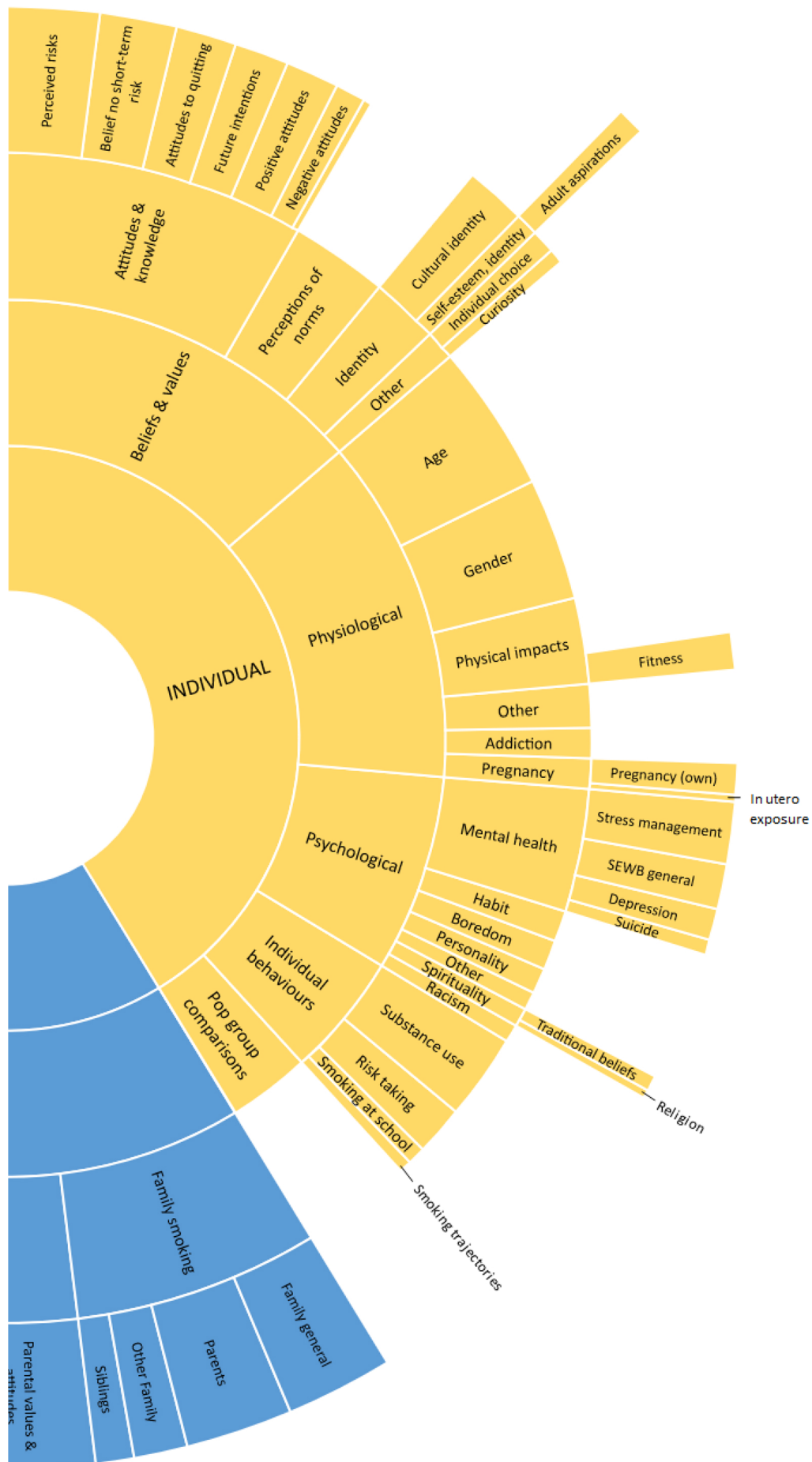
Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)			Follow-Up	Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding			
		Year 10 students in the 2005 New Zealand national survey						
Soto	2015	Stressful life events, ethnic identity, historical trauma, and participation in cultural activities: Associations with smoking behaviors among American Indian adolescents in California	Low/NA	High	Low/NA	Low/NA	Moderate	Concerns about outcome/exposure validation
Spillane	2012	Sensation-seeking predicts initiation of daily smoking behavior among American Indian high school students	Moderate	Moderate	Low/NA	High	Low	Concerns about selection bias, outcome/exposure validation, follow-up/incomplete data,
Taualii	2010	Adaptation of a smoking cessation and prevention website for urban American Indian/Alaska Native youth	Low/NA	Low/NA	Low/NA	Low/NA	High	
Thomas	2015	Smoking cessation advice and non-pharmacological support in a national sample of Aboriginal and Torres Strait Islander smokers and ex-smokers	Low/NA	Low/NA	Low/NA	Low/NA	High	
Thomas	2010	Prevalence and correlates of tobacco use among middle and high school students in western Alaska	Moderate	Low/NA	Low/NA	Low/NA	High	
Thrift	2011	Maternal smoking during pregnancy among Aboriginal women in New South Wales is linked to social gradient	Low/NA	Moderate	Low/NA	Low/NA	High	
Tong	2011	Age and racial/ethnic disparities in prepregnancy smoking among women who delivered live births	Moderate	Moderate	Low/NA	Low/NA	Moderate	Concerns about selection bias, outcome validation
Unger	2006	Perceptions of ceremonial and nonceremonial uses of tobacco by American-Indian adolescents in California	Low/NA	Moderate	Low/NA	Low/NA	High	
Van Bower	2017	Examining the correlates of current smoking among off-reserve First Nations, Metis and Inuit youth: Evidence from the 2012 Aboriginal Peoples Survey	Moderate	Moderate	Low/NA	Low/NA	Moderate	Concerns about selection bias, outcome validation

Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)			Follow-Up	Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding			
Wallace	2009	Race/ethnicity, socioeconomic factors, and smoking among early adolescent girls in the United States	Moderate	Low/NA	Low/NA	Low/NA	High	
Ward	2011	Alcohol, tobacco, and illicit drug use among Native American college students: an exploratory quantitative analysis	Moderate	Low/NA	Low/NA	Low/NA	High	
Weaver	2012	Cancer risks and Native Americans: The 'Healthy Living in Two Worlds' study	High	Low/NA	Low/NA	Low/NA	Moderate	Concerns about selection bias, sample size
Wen	2009	Social contexts of regular smoking in adolescence: Towards a multidimensional ecological model	Low/NA	Low/NA	Low/NA	Low/NA	High	
Primary ref Whitesell	2014	Trajectories of substance use among young American Indian adolescents: Patterns and predictors	Low/NA	Moderate	Low/NA	Low/NA	High	
Associated ref Whitesell	2012	Patterns of substance use initiation among young adolescents in a Northern Plains American Indian Tribe	Moderate	Low/NA	Low/NA	Low/NA	High	
Wills	2017	Longitudinal study of e-cigarette use and onset of cigarette smoking among high school students in Hawaii	Low/NA	Low/NA	Low/NA	Low/NA	High	
Wolf	2016	Speaking out about physical harms from tobacco use: Response to graphic warning labels among American Indian/Alaska Native communities	Moderate	Low/NA	Low/NA	Low/NA	High	
Primary ref Yu	2011	Tobacco use among American Indian or Alaska Native middle- and high-school students in the United States	Moderate	Moderate	Low/NA	Low/NA	Moderate	Concerns about selection bias, outcome/exposure validation
Associated refs McIntire	2014	Secondhand smoke exposure in cars and rooms: trend comparisons among subpopulations of nonsmoking U.S. middle and high school students	Moderate	Low/NA	Low/NA	Low/NA	High	

Author	Year	Title	Risk of Bias (Low/NA, Moderate, High)			Follow-Up	Overall Confidence (High, Mod, Low)	Reason for downgrading overall confidence assessment
			Participant Selection	Measurement	Confounding			
Rudatsikira	2009	Current cigarette smoking among in-school American youth: results from the 2004 National Youth Tobacco Survey	Moderate	Low/NA	Low/NA	Low/NA	High	
Primary ref Yu	2016	A prospective, longitudinal study of cigarette smoking status among North American Indigenous adolescents	Low/NA	Low/NA	Low/NA	Low/NA	High	Concerns about selection bias, outcome/exposure validation
Associated refs Whitbeck	2015	Patterns of substance use initiation among Indigenous adolescents	Low/NA	Moderate	Low/NA	Low/NA	High	
Whitbeck	2012	Factors Associated with Growth in Daily Smoking among Indigenous Adolescents	Low/NA	Low/NA	Low/NA	Low/NA	High	
Whitbeck	2009	Depressive symptoms, gender, and growth in cigarette smoking among indigenous adolescents	Moderate	Moderate	Low/NA	Low/NA	Moderate	

11.1.7 Chapter 3 – Supplementary File 6: Starburst Chart Large Reproduction





11.2 Appendix 2 – Chapter 4 E-print and Supplementary Material

11.2.1 E-print of published paper at Chapter 4

The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy

Christina L. Heris,¹ Nicola Guerin,² David P. Thomas,³ Sandra J. Eades,¹ Catherine Chamberlain,⁴ Victoria M. White^{2,5}

Tobacco use is the leading preventable cause of illness and death and the largest contributing risk factor to the gap in health outcomes between Aboriginal and Torres Strait Islander people and non-Indigenous Australians.¹ High smoking prevalence in Aboriginal and Torres Strait Islander people is an enduring legacy of colonisation, which saw tobacco included in rations during settlement and social disadvantage entrenched through government policies.² Consequently, Aboriginal and Torres Strait Islander people are overrepresented in the socioeconomic groups with higher prevalence and a greater normalisation of smoking.³

The past five decades has seen Australia implement a comprehensive population-level approach to tobacco control that includes price measures, standardised packaging with graphic health warnings, smoke-free legislation, advertising restrictions and social marketing campaigns.⁴ From the late 2000s tailored interventions for Aboriginal and Torres Strait Islander people have also been implemented including targeted social marketing and locally delivered community programs.⁵ It is in this context that substantial declines in daily smoking prevalence among Aboriginal and Torres Strait Islander adults have been observed (2004–05: 50%; 2018–19: 40%)^{6,7} as well as significant increases in never smoking in 15–24 year olds (44% in 2002 to 56% in 2014–15).⁸

Abstract

Objective: Smoking is a major cause of preventable illness for Aboriginal and Torres Strait Islander people, with most commencing in adolescence. Understanding trends in youth tobacco use can inform prevention policies and programs.

Methods: Logistic regression models examined smoking trends among Aboriginal and Torres Strait Islander and all students aged 12–17 years, in five nationally representative triennial surveys, 2005–2017. Outcomes measured lifetime, past month, past week tobacco use and number of cigarettes smoked daily (smoking intensity).

Results: Aboriginal and Torres Strait Islander students' never smoking increased (2005: 49%, 2017: 70%) with corresponding declines in past month and week smoking. Smoking intensity reduced among current smokers (low intensity increased 2005: 67%, 2017: 77%). Trends over time were similar for Aboriginal and Torres Strait Islander students as for all students (8–10% annual increase in never smoking).

Conclusions: Most Aboriginal and Torres Strait Islander students are now never smokers. Comparable declines indicate similar policy impact for Aboriginal and Torres Strait Islander and all students.

Implications for Public Health: Comprehensive population-based tobacco control policies can impact all students. Continued investment, including in communities, is needed to maintain and accelerate reductions among Aboriginal and Torres Strait Islander students to achieve equivalent prevalence rates and reduce health inequities.

Key words: tobacco, adolescent health, Aboriginal and Torres Strait Islander people, smoking

As half Aboriginal and Torres Strait Islander people aged 18–24 years who smoke started smoking daily when aged 15–18 years, and a quarter before age 15 years,⁸ further prevention of initiation and transition to established smoking is important to reducing tobacco related health inequities with non-Indigenous Australians. Understanding smoking trends in earlier adolescence is vital for tailoring prevention policies.

The Australian Secondary School Students' Alcohol and Drug Survey (ASSAD) is currently the only national data source on tobacco use among Aboriginal and Torres Strait Islander adolescents aged 12–14 years and the largest sample of adolescents aged 12–17 years. Using standard methods and measures since 1984 ASSAD allows for analysis of smoking trends covering a period of substantial tobacco control policy change in Australia.

1. School of Population and Global Health, the University of Melbourne, Victoria

2. Centre for Behavioural Research in Cancer, Cancer Council Victoria, Victoria

3. Menzies School of Health Research, Northern Territory

4. Judith Lumley Centre, La Trobe University, Victoria

5. School of Psychology, Deakin University, Victoria

Correspondence to: Christina Heris, Indigenous Epidemiology and Health, Centre for Epidemiology and Biostatistics, School of Population and Global Health, Level 3 207 Bouverie Street, The University of Melbourne, Victoria 3010; e-mail: christina.haris@unimelb.edu.au

Submitted: December 2019; Revision requested: May 2020; Accepted: June 2020

The authors have stated they have no conflict of interest.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

Aust NZ J Public Health. 2020; 44:397–403; doi: 10.1111/1753-6405.13022

Previous ASSAD analysis found smoking prevalence among Aboriginal and Torres Strait Islander students declined between 1996 and 2005, with current (past week) smoking decreasing from 27% to 17% in 12–15-year-olds and from 44% to 33% in 16–17-year-olds.⁹

We extend that work⁹ to first explore if smoking prevalence in Aboriginal and Torres Strait Islander secondary students aged 12–17 years has changed between 2005 and 2017; then to determine if any observed changes were steady over time; and if there were different effects for demographic sub-groups or in the total ASSAD sample.

Methods

ASSAD study

ASSAD is a national, triennial (1984–2017) survey of self-reported tobacco, alcohol and other drug use among Australian secondary school students. Sampling and survey administration have been described previously.^{9,10} Briefly, ASSAD surveys use stratified two-stage probability sampling to randomly select secondary schools in states and territories (excluding schools smaller than 100 students), stratified by education sector (government, independent and Catholic), and then select students within schools. Separate school samples are drawn for years 7–10 and 11–12. Researchers work with participating schools to select approximately 80 students across year levels. From 2011, class-based sampling was used with participating schools identifying non-selective classes to participate. School response rates have declined from 63% in 2005 to 17% in 2017.^{9,10} Principals give permission for the survey to be conducted in schools. Passive parental consent was gained for student participation unless active consent was required by specific states or schools. Researchers administered the survey on school premises and students completed questionnaires anonymously. State and school policies determined teacher presence during survey administration, and this has not been found to meaningfully affect results.¹⁰

Ethics and approvals

Ethical approval was gained from the Cancer Council Victoria Human Research Ethics Committee (HREC1013) and registered with the University of Melbourne HREC (1953771).

Measures

Indigenous Status

Aboriginal and Torres Strait Islander students self-identified by answering 'Yes' to the question "Are you of Aboriginal or Torres Strait Islander descent?" with options: No; Yes – Aboriginal descent; Yes – Torres Strait Islander descent; Yes – both Aboriginal and Torres Strait Islander descent.

Smoking Experience

We used binary measures of smoking experience: never smoking (not even a puff of a cigarette in their lifetime); past month smoking (any number of cigarettes smoked in the previous four weeks); current smoking (having smoked cigarettes in the previous seven days). Students with missing smoking data were excluded (1% of the total sample, 2% Aboriginal and Torres Strait Islander students).

Smoking Intensity

Students reported the number of cigarettes smoked on each of the preceding seven days, and average number smoked per day was calculated for current smokers. Due to substantial skewness in the data, this measure was categorised into three groups: 1–4 cigarettes, 5–9 cigarettes and 10 or more cigarettes per day, based on definitions of light and heavy smoking for adolescents.^{11,12}

Demographics

Demographic measures of age (12–15; 16–17; 12–17); sex (male, female); location (urban, non-urban based on school postcode and the 2016 ASGS classification); socioeconomic status tertiles (low, middle, high; based on school postcode using SEIFA Index of Relative Socioeconomic Disadvantage (IRSD) in the most recent year, 2005 – SEIFA 2001, 2008 – SEIFA 2006, 2011–2014 – SEIFA 2011, 2017 – SEIFA 2016).

Statistical analysis

We used data from the 2017, 2014, 2011, 2008, 2005 ASSAD surveys. Analyses were focused on the sample of Aboriginal and Torres Strait Islander students. We used logistic regression with unweighted data to compare smoking prevalence in 2005 with each subsequent survey year and to model change in smoking prevalence between consecutive survey years. Models were repeated for each age, gender, location, and SES sub-group. We ran similar models

to examine trends for each smoking intensity category. The interaction between time (survey year as a linear variable) and location and SES group was evaluated for each smoking outcome to determine whether change over time was consistent across these groups. Models adjusted for covariates of education sector (government, Catholic, independent); state/territory, age (continuous), sex, remoteness (five category) and SES were included in all models. Simple categorical variables were used for sub-group analyses (such as the 12–15 and 16–17 age groups or urban/non-urban categories), however, where possible continuous variables or more granular categorical variables were used as covariates in adjusted models to preserve information from the original data. We report adjusted odds ratios (ORs) and 95% CIs adjusted for within-school clustering. We used STATA MP 14.2 for all analyses.

Using survey year as a continuous time measure the regression analyses were extrapolated to estimate annual change in likelihood of never, past month, and current smoking separately for the total ASSAD sample and the Aboriginal and Torres Strait Islander sub-sample. Finally, change in prevalence between 2005 and 2017 and this difference as a proportion of baseline prevalence (2005) was calculated to further compare rates of change over time. These 95% CIs were calculated manually using the sum of the standard errors (SE) of the 2005, 2017 estimates for the difference, and the relative risk SE formula for the relative change.

To provide context for the results, analyses were repeated for the total ASSAD sample of 12–17-year-olds, which includes Aboriginal and Torres Strait Islander students. As the two samples are not independent, we did not make statistical comparisons.

Results

Sample characteristics

Aboriginal and Torres Strait Islander students aged 12–17 years accounted for 4% (n=887) of the 2005 ASSAD sample, 5% (n=1,284) in 2008, 5% (n=1,242) in 2011, and 6% (n=1,225) in 2017. Characteristics of Aboriginal and Torres Strait Islander students surveyed are shown in Table 1. In 2017, 38% of Aboriginal and Torres Strait Islander students attended schools in urban locations, and 53% schools in areas of lower social advantage.

Smoking behaviour among Aboriginal and Torres Strait Islander students

Never smoking among Aboriginal and Torres Strait Islander students increased between 2005 and 2017 with corresponding declines in past month and current smoking (Table 2 and Supplementary File 2). In 2017, 70% of students aged 12–17 years had never smoked (76% of younger students aged 12–15 years; 55% of older students aged

16–17 years), a significant increase from 49% in 2005 ($p<0.001$). Past month smoking decreased significantly ($p<0.001$) from 24% in 2005 to 14% in 2017, with similar reductions in current smoking (21% to 10%) (Figure 1, Supplementary File 1). In 2017, 18% of older students and 7% of younger students currently smoked (Supplementary File 2).

For Aboriginal and Torres Strait Islander students aged 12–17 the likelihood of never smoking was significantly higher in 2017 than

in 2005 (OR 2.93 [2.40, 3.58] $p<0.001$) and at least 2.5 times higher odds ($p<0.001$) were found in each age, sex, location and SEIFA subgroup (Table 2). There was an overall trend of increased never smoking with each consecutive survey year for all sub-groups although the increase between 2011–2014 was not significant. The largest increase in the likelihood of never smoking for 12–17-year-olds was between 2005 and 2008 (OR 1.54 [1.27, 1.87] $p<0.001$). The likelihood of past

Table 1: Sample characteristics of Aboriginal and Torres Strait Islander secondary school students 12–17 years in 2005, 2008, 2011, 2014, 2017 by age, gender, location and SEIFA index.

	12 to 15 years					16 to 17 years					12 to 17 years				
	2005	2008	2011	2014	2017	2005	2008	2011	2014	2017	2005	2008	2011	2014	2017
Total ASSAD (n)	14,725	16,364	15,814	15,769	12,433	7,180	8,252	9,098	7,529	6,997	21,905	24,616	24,912	23,298	19,430
Indigenous (n)	673	1,023	898	1,037	899	214	261	344	314	326	887	1,284	1,242	1,351	1,225
% Males	47%	47%	52%	50%	44%	52%	61%	56%	54%	49%	49%	50%	53%	51%	46%
% Urban	47%	36%	42%	40%	33%	49%	52%	45%	42%	49%	48%	39%	43%	40%	38%
% Low SEIFA	39%	46%	43%	37%	56%	40%	52%	30%	41%	47%	39%	47%	39%	38%	53%
% Middle SEIFA	36%	36%	35%	37%	30%	28%	25%	41%	30%	35%	34%	34%	37%	35%	31%
% High SEIFA	25%	17%	23%	26%	14%	32%	23%	29%	30%	18%	26%	19%	24%	27%	15%

Table 2: Never smoking among students aged 12–17 years, by gender, age, SEIFA index, location, 2005–17.

	2005		2008		2011		2014		2017		OR [2017 cf 05] (95% CI)
	% (n)	OR [ref]	% (n)	OR [2008 cf 05] (95% CI)	% (n)	OR [2011 cf 08] (95% CI)	% (n)	OR [2014 cf 11] (95% CI)	% (n)	OR [2017 cf 14] (95% CI)	
Overall ASSAD student sample 12–17											
12–17	63% (13,772)	1	71% (17,265)	1.51*** (1.40, 1.62)	75% (18,404)	1.30*** (1.21, 1.41)	79% (18,225)	1.28*** (1.18, 1.40)	81% (15,497)	1.20*** (1.09, 1.32)	3.01*** (2.76, 3.29)
Aboriginal & Torres Strait Islander students 12–17											
Age group											
12–17	49% (424)	1	60% (755)	1.54*** (1.27, 1.87)	62% (757)	1.25* (1.05, 1.48)	64% (847)	1.08 (0.91, 1.29)	70% (843)	1.41*** (1.17, 1.69)	2.93*** (2.40, 3.58)
12–15	53% (352)	1	64% (645)	1.62*** (1.30, 2.01)	69% (604)	1.27* (1.04, 1.54)	68% (695)	1.00 (0.82, 1.23)	76% (665)	1.51*** (1.22, 1.88)	3.12*** (2.49, 3.90)
16–17	34% (72)	1	43% (110)	1.33 (0.88, 2.02)	45% (153)	1.27 (0.88, 1.83)	49% (152)	1.26 (0.91, 1.73)	55% (178)	1.16 (0.85, 1.58)	2.46*** (1.68, 3.62)
Sex (12–17)											
Males	49% (208)	1	60% (377)	1.51** (1.16, 1.98)	63% (406)	1.25 (1.00, 1.55)	65% (435)	1.10 (0.87, 1.38)	71% (387)	1.45** (1.12, 1.87)	2.99*** (2.24, 3.99)
Females	48% (214)	1	60% (368)	1.53** (1.17, 2.01)	62% (347)	1.27 (0.98, 1.65)	63% (399)	1.08 (0.83, 1.40)	69% (434)	1.38* (1.06, 1.79)	2.89*** (2.20, 3.80)
SEIFA (12–17)											
Low	48% (156)	1	58% (324)	1.58** (1.15, 2.17)	62% (295)	1.07 (0.82, 1.39)	59% (296)	1.10 (0.82, 1.48)	72% (458)	1.75*** (1.30, 2.34)	3.23*** (2.32, 4.50)
Med	50% (143)	1	62% (251)	1.64** (1.20, 2.25)	64% (281)	1.35* (1.02, 1.79)	68% (318)	1.01 (0.77, 1.32)	69% (259)	1.12 (0.82, 1.54)	2.51*** (1.82, 3.47)
High	49% (108)	1	56% (122)	1.33 (0.87, 2.05)	61% (178)	1.49 (0.99, 2.25)	65% (233)	1.07 (0.72, 1.57)	67% (125)	1.33 (0.88, 2.00)	2.81*** (1.84, 4.30)
Region (12–17)											
Urban	50% (207)	1	60% (293)	1.47* (1.09, 1.97)	62% (322)	1.23 (0.94, 1.61)	67% (356)	1.18 (0.88, 1.58)	69% (312)	1.30 (0.97, 1.74)	2.76*** (2.05, 3.72)
Non-Urban	48% (205)	1	59% (404)	1.58** (1.22, 2.04)	63% (432)	1.26* (1.01, 1.57)	62% (491)	1.01 (0.80, 1.28)	71% (530)	1.51** (1.18, 1.93)	3.04*** (2.31, 4.00)

Notes:

*** $p<0.001$; ** $p<0.01$; * $p<0.05$

month and current smoking was significantly lower in 2017 than 2005 for 12–17-year-olds overall (OR 0.45 [0.34, 0.60] $p<0.001$, OR 0.36 [0.27, 0.48] $p<0.001$, respectively) and across all sub-groups, except for past month smoking among high SEIFA students (OR 0.68 [0.40, 1.16] $p=0.158$). However, the change between consecutive survey years was generally not significant for different sub-groups (Supplementary File 2). There was no significant interaction between location and time for any measure of smoking experience, indicating no changes were detected over time in never ($p=0.859$), past month ($p=0.345$) and current smoking ($p=0.427$) between urban and non-urban residential areas. Similarly, no changes over time were detected between SEIFA tertiles (never: $p=0.571$; past month: $p=0.594$; current: $p=0.614$). See also Supplementary File 2.

Smoking behaviour among the total ASSAD sample

The changes in smoking prevalence at the total ASSAD sample level was similar to the Aboriginal and Torres Strait Islander student sub-group. In the total sample aged 12–17 years, never smoking was significantly more common in 2017 (81%) than 2005 (63%) (OR 3.01 [2.76, 3.29] $p<0.001$) with significant decreases in past month (OR 0.52 [0.46, 0.58] $p<0.001$) and current smoking (OR 0.46 [0.40, 0.52] $p<0.001$) (Table 2 and Supplementary File 2).

Comparison in rate of change: total ASSAD and Aboriginal and Torres Strait Islander students

The average annual rate of change in prevalence of never smoking, past month

smoking and current smoking was similar for the two groups (Table 3). Specifically, the odds of never smoking increased significantly by 8–10% with each year for both groups (Aboriginal and Torres Strait Islander students: OR 1.08 [1.07, 1.10] $p<0.001$; total ASSAD: OR 1.10 [1.09, 1.10] $p<0.001$), while the odds of past month and current smoking decreased significantly by 6–7% ($p<0.001$) with each year (Table 3).

Between 2005 and 2017 the proportion of never smokers increased by 22% for the Aboriginal and Torres Strait Islander students and 17% in the total sample. The relative increase in never smoking was larger for Aboriginal and Torres Strait Islander students (45% vs 28%), due to the lower baseline prevalence of never smoking in 2005 in the total sample. While the absolute decline in prevalence of past month and current smoking was greater for Aboriginal and Torres Strait Islander students (10% past month, 11% current) than for the total ASSAD sample (5% past month, 4% current), when change was considered as a proportion of those smoking at 2005, the decrease was similar for both groups (Table 3).

Smoking intensity among Aboriginal and Torres Strait Islander students

Aboriginal and Torres Strait Islander current smokers aged 12–17 years generally smoked at low intensity (1–4 cigarettes per day), and the proportion smoking at this level increased significantly between 2005 (67%) and 2017 (77%) (OR 1.96 [1.04, 3.68] $p=0.036$). Correspondingly, smoking at higher intensities declined over the same period (5–9 cigarettes daily, 2005: 18%; 2017: 12%, OR 0.56 [0.27, 1.15] $p=0.116$; 10 or more cigarettes daily, 2005: 15%; 2017: 12%, OR 0.55 [0.23, 1.32] $p=0.178$), although this was not statistically significant likely due to the low numbers in these categories. These changes varied over time with the largest between 2011 and 2014 (1–4 cigarettes, OR 2.04 [1.19, 3.48] $p=0.009$; 10 or more cigarettes, OR 0.45 [0.21, 0.99] $p=0.048$).

Figure 1: Smoking experience among Aboriginal and Torres Strait Islander and all students aged 12–17 years, ASSAD 2005–17.

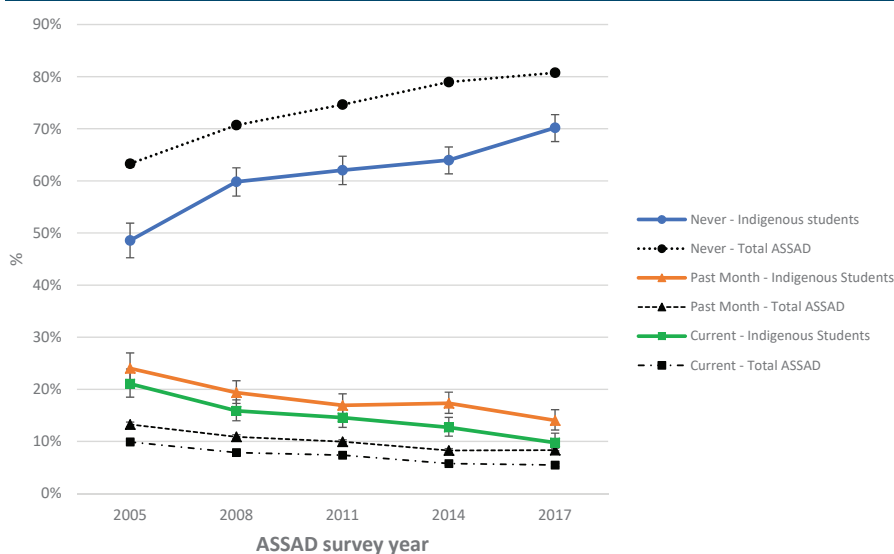


Table 3: Change in never, past month and past week smoking prevalence among students aged 12–17 years, 2005–17.

		Average annual change in likelihood of smoking (OR)	Total change in prevalence 2005–17 (% (95% CI))	Total relative change in prevalence 2005–17, as a proportion of prevalence at 2005 (%)
Never smoking	Indigenous Students	1.08 (1.07, 1.10)	22% (17%, 26%)	45% (37%, 52%)
	Total ASSAD	1.10 (1.09, 1.10)	17% (17%, 18%)	28% (26%, 29%)
Past month	Indigenous Students	0.94 (0.93, 0.96)	-10% (-13%, -7%)	-42% (-60%, -23%)
	Total ASSAD	0.94 (0.94, 0.95)	-5% (-6%, -4%)	-37% (-43%, -31%)
Current	Indigenous Students	0.93 (0.93, 0.95)	-11% (-14%, -8%)	-54% (-75%, -32%)
	Total ASSAD	0.94 (0.93, 0.95)	-4% (-5%, -4%)	-45% (-52%, -38%)

Note:

Average annual change calculated using logistic regression (adjusted for age, sex, state, school type, remoteness, SEIFA)

Discussion

This first study to examine smoking trends among Aboriginal and Torres Strait Islander students aged 12–17 years between 2005 and 2017 found it is increasingly likely these students have never smoked a cigarette and less likely to currently smoke. Taken with

previous findings,⁹ our results demonstrate continued decline in current (weekly) smoking over the past 20 years in both younger adolescents (aged 12–15 years, 1996: 27%; 2017: 7%) and older adolescents aged 16–17 years (1996: 44%; 2017: 18%). Encouragingly these declines have been accompanied by substantial increases in the proportion who have never smoked in the same period for both age groups (aged 12–15 years, 39% to 76%; aged 16–17 years, 22% to 55%).

In extending previous work⁹ we demonstrate the ongoing declines in youth smoking in the context of more than two decades of comprehensive tobacco control in Australia including peak investment in national social marketing, graphic health warnings on packaging, increased smoke-free legislation, the introduction of tobacco plain packaging from 2012 and annual excise increases from 2013.^{4,13–15} The period covered by the current study also encompasses the 2008 Council of Australian Governments' (COAG) *Closing the Gap Strategy* and the target to halve the daily smoking rate among Aboriginal and Torres Strait Islander adults by 2018, along with targeted social marketing campaigns, the introduction of the *Tackling Indigenous Smoking and Healthy Lifestyle Program* (TISHLP) in 2010 and its revised tobacco focused model in 2015, *Tackling Indigenous Smoking* (TIS).^{5,13,16} These measures introduced in recognition of tobacco's direct contribution to health inequities.¹⁷ Over this period local community level tobacco control has been prioritised through TISHLP and TIS,¹⁸ an approach considered best practice.^{2,19,20} A 2018 evaluation of TIS suggests it will contribute to a reduction in smoking (although no empirical evidence of the impact of the program on prevalence is yet available).¹⁸

These investments and policy measures coincide with the significant increases in never smoking and declines in smoking prevalence we have reported among Aboriginal and Torres Strait Islander students. Our findings reflect other ASSAD analyses that showed substantial reduction in smoking for all secondary students in the total ASSAD sample (which includes Aboriginal and Torres Strait Islander students) between 1999 and 2008, and a slowing of progress in more recent years to 2017 as youth smoking overall reaches low levels.¹⁰ However, in our study smoking prevalence among Aboriginal and Torres Strait Islander students aged 12–17

years continued to decline over this period. Our results are also consistent with other studies with Aboriginal and Torres Strait Islander adolescents and adults, and agree with the likely impact the comprehensive approach combining whole of population and targeted or community level strategies has had on young people in particular.^{6,8}

There have been substantial changes to tobacco control funding and programs over the study period. In addition to removing the broader healthy lifestyles elements from TISHLP to focus on tobacco in the TIS program, funding has been reduced for TIS and to Aboriginal health generally, the Australian National Preventive Health Agency closed, there were no national mainstream social marketing campaigns since 2012 and limited periods of targeted campaigns.^{21–25} While funding for TIS has been committed to 2021–22, the 2018 evaluation noted that coverage was incomplete and recommended complementary measures to support local tobacco control, such as national campaigns.¹⁸ The fluctuations in adolescent smoking decline may reflect these changes, with limited national campaign activity representing a substantial lost opportunity to accelerate declining smoking trends.^{26,27} Our results strengthen calls for increased investment in tobacco control to maintain progress,⁶ particularly among socially disadvantaged high prevalence communities. Previous work has shown that intense periods of tobacco control decreased youth smoking prevalence consistently across all SES groups, but during low investment periods smoking increased overall, particularly in the more socially disadvantaged students.²⁸

Importantly, between 2005 and 2017 trends in never, past month and current smoking among Aboriginal and Torres Strait Islander students generally followed those of the total ASSAD sample. Although the increase in never smoking and smoking declines were greater for Aboriginal and Torres Strait Islander students, this reflects their different starting points. When considered as a proportion of baseline prevalence, the rate of change in smoking by year is similar for Aboriginal and Torres Strait Islander students and the total sample, suggesting current policies have been similarly effective for all students. While reducing smoking at a similar rate is positive, this outcome is not equitable and reflects a continuing gap in health outcomes. Specifically, never smoking prevalence remains lower among Aboriginal

and Torres Strait Islander adolescents than in the broader population, and current smoking remains twice as high. This pattern is also observed in other countries with a similar history of colonisation²⁹ and is related to how Aboriginal and Torres Strait Islander young people, and other First Nations adolescents globally, share similar influences for smoking uptake to the broader population, but are also more likely to be exposed to these influences, including smoking among family and community, and life stressors.³⁰

As has been noted for the adult population in Australia, reducing the gap in disease burden requires maintaining and intensifying the most effective tobacco control measures to accelerate smoking declines among Aboriginal and Torres Strait Islander populations such that health outcomes are equivalent to the broader population.^{4,6} While it is difficult to identify independently effective components from Australia's comprehensive tobacco control program, our results demonstrate that the current approach is having an impact and should be sustained.⁶ To achieve this goal, evidence from First Nations populations globally, including Australia, indicates that comprehensive population-wide approaches, including price measures, smoke-free legislation and social marketing, are important alongside community-led, strengths-based programs as these are best placed to address the contextual factors influencing higher smoking prevalence.^{2,19,20,30,31}

Two findings from this study may inform future policy and program design as part of a comprehensive approach. These relate to price measures and the target age range and objectives for prevention interventions. Firstly, our study found the prevalence of heavier smoking started to decline in Aboriginal and Torres Strait Islander students around 2014. This period corresponds to the introduction of tax-driven changes in cigarette prices, measures shown to reduce smoking and prompt quit attempts, including among young people and socially disadvantaged sub-groups.^{32,33} This period also saw a proliferation of actions by tobacco companies designed to counter increasing prices, including many that may have been aimed at young smokers (increased brands and variants, small pack and roll-your-own pack sizes).^{32,34} The decline in smoking prevalence and smoking intensity found in our study post 2014 suggests that the

actions taken by the tobacco industry did not completely mitigate impact of tax rises on smoking behaviours of Aboriginal and Torres Strait Islander adolescents.

Secondly, while the proportion of 12–17-year-old Aboriginal and Torres Strait Islander students who had ever experimented with cigarettes in 2017 had reduced to 30% from 50% in 2005, this still represents a substantial proportion of students at risk of regular smoking. Further, the quarter of 12–15-year-olds who had already tried smoking highlights the importance of the early secondary years for prevention. These findings reinforce the self-reported age of initiation of Aboriginal and Torres Strait Islander young adults, most of whom commenced regular smoking before age 18 years and a quarter before 15 years,⁸ and are in line with the early adolescence initiation recorded with Indigenous young people of North America.^{35,36}

We found that in 2017 18% of 16–17-year-olds were already smoking at least weekly. Youth prevention programs have a role to play in not only minimising transition to regular smoking, but also in providing age appropriate quit support. While some young Aboriginal and Torres Strait Islander people do not perceive traditional cessation supports to be relevant to them,³⁷ ABS data shows an interest in quitting with more than a third of Aboriginal and Torres Strait Islander smokers aged 15–17 years having made a quit attempt.^{7,38} There may be opportunities to deliver relevant prevention programs in community and/or school settings. While the evidence for school-based interventions is mixed there are indications that programs that include a focus on developing self-efficacy skills are more likely to be effective than information-only programs.^{39,40}

Limitations

A potential limitation to generalising our results is the representativeness of the achieved ASSAD sample. Characteristics of the Aboriginal and Torres Strait Islander sub-sample are broadly consistent with national population data, including the proportion of 12–17-year-olds identifying as Aboriginal or Torres Strait Islander in the 2006, 2011 and 2016 Censuses (4%, 5% and 5%, respectively)^{41–43} and the higher proportions of students from areas of greater social disadvantage.⁵ However, it was more urban than the national population distribution, with greater proportions of Aboriginal and

Torres Strait Islander students participating from schools in major cities, 39% in 2008 ASSAD, 40% in 2014 and 38% in 2017, compared with 32% living in major cities in 2008, 35% on 2014–15 and 37% in 2016,^{44,45} reflecting exclusion of smaller schools. There were no significant differences between urban and non-urban areas, however, the higher smoking prevalence often found for more remote areas might be missed in ASSAD data, which may not include students attending some types of remote schools.⁴⁴

In addition, recruitment challenges led to substantially lower proportions of participants from the Northern Territory and South Australia in 2017 than in previous surveys. However, when these states were excluded from analyses, results were similar to those reported from the final models. While school response rates have declined over the study period there is no evidence that there is a meaningful difference in smoking behaviours between schools that do or do not participate.⁴⁶ Finally, ASSAD includes only adolescents currently attending school. As school attendance and engagement is associated with lower levels of smoking, our results might underestimate prevalence.⁴⁷

Conclusions and implications for public health

Few national studies have examined smoking among Aboriginal and Torres Strait Islander people in early adolescence, a key period for smoking initiation. This study extends recent findings of increased never smoking and reduced smoking prevalence among Aboriginal and Torres Strait Islander adolescents and young adults, and the total ASSAD sample. Importantly the findings demonstrate increased never smoking for all demographic sub-groups including those living in non-urban areas and experiencing greater social disadvantage. Although similar trends were found for both the Aboriginal and Torres Strait Islander students and the total ASSAD sample, suggesting parallel policy impact across all students, current smoking remained substantially higher demonstrating a persisting gap in smoking outcomes. Along with slower progress during periods of lower intensity tobacco control, continuing higher prevalence of smoking highlights the need for sustained or greater investment to accelerate increases in never smoking and improve health equity. Resourcing strengths-based Aboriginal

community-controlled programs should remain a priority as part of comprehensive, population-wide strategies.

Acknowledgements

The ASSAD survey receives funding from the Australian Government Department of Health and State and Territory Governments of New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, the Northern Territory and the ACT; as well as from Cancer Councils in Victoria, South Australia, Queensland, and Tasmania, Cancer Institute NSW and the South Australian Health and Medical Research Institute.

The authors thank and acknowledge the government and non-government education authorities, school principals, teachers, and students who cooperated to make this study possible. We thank the research staff for assistance with data collection.

CH receives a PhD scholarship from the Australian Prevention Partnership Centre funded through the National Health and Medical Research Council (NHMRC) partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth. CC receives an NHMRC Career Development Fellowship (1161065).

References

1. Australian Institute of Health and Welfare. Australian Burden of Disease Study: Impact and Causes of Illness and Death in Aboriginal and Torres Strait Islander People 2011 [Internet]. Australian Burden of Disease Study Series No. 6. Catalogue No.: BOD 7 Canberra (AUST): AIHW; 2016 [cited 2019 Oct 12]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
2. Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control*. 2003;12 Suppl 2:ii5–ii8.
3. van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8: Tobacco use among Aboriginal peoples and Torres Strait Islanders. In: Scollo MM, Winstanley MH editors. *Tobacco in Australia: Facts and Issues* [Internet]. Melbourne (AUST): Cancer Council Victoria; 2016 [cited 2020 Apr 20]. Available from: www.tobaccoinaustralia.org.au/chapter-8-apts
4. Australian Institute of Health and Welfare. *Tobacco Indicators: Measuring Midpoint Progress—Reporting under the National Tobacco Strategy 2012–2018* [Internet]. Drug Statistics Series No.: 30. Catalogue No.: PHE 210 Canberra (AUST): AIHW; 2016 [cited 2019 May 28]. Available from: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress

5. Australian Health Ministers' Advisory Council. *Aboriginal and Torres Strait Islander Health Performance Framework 2017 Report* [Internet]. Canberra (AUST): AHMAC; 2017 [cited 2019 Dec 12]. Available from: <https://www.niaa.gov.au/resource-centre/indigenous-affairs/health-performance-framework-2017-report>
6. Lovett R, Thurber K, Wright A, Maddox R, Banks E. Deadly progress: Changes in Australian Aboriginal and Torres Strait Islander adult daily smoking, 2004–2015. *Public Health Res Pract.* 2017;27(5):e2751742.
7. Australian Bureau of Statistics. 4715.0 - *National Aboriginal and Torres Strait Islander Health Survey, 2018–19* [Internet]. Canberra (AUST): ABS; 2019 [cited 2019 Dec 11]. Available from: <https://www.abs.gov.au/ausstats/abs@nsf/PrimaryMainFeatures/4715.0>
8. Heris CL, Eades SJ, Lyons L, Chamberlain C, Thomas DP. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Res Pract.* 2020;30(2).
9. White V, Mason T, Briggs V. How do trends in smoking prevalence among Indigenous and non-Indigenous Australian secondary students between 1996 and 2005 compare? *Aust N Z J Public Health.* 2009;33(2):147–53.
10. Guerin N, White V. *ASSAD 2017 Statistics and Trends: Australian Secondary Students' Use of Tobacco, Alcohol, Over-the-counter Drugs, and Illicit Substances.* Melbourne (AUST): Cancer Council Victoria; 2018.
11. Husten CG. How should we define light or intermittent smoking? Does it matter? *Nicotine Tob Res.* 2009;11(2):111–21.
12. US Department of Health and Human Services. Appendix 3.3 measures of cigarette smoking. In: *Preventing Tobacco Use Among Young People. A Report of the Surgeon General.* Atlanta (GA): Centers for Disease Control and Prevention; 2012.
13. Intergovernmental Committee on Drugs Standing Committee on Tobacco. *National Tobacco Strategy 2012–2018.* Canberra (AUST): Government of Australia; 2012.
14. Australian Department of Health. *Tobacco Control Timeline* [Internet]. Canberra (AUST): Government of Australia; 2018 [cited 2019 Jun 3]. Available from: <https://www.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc-timeline>
15. Wilkinson AL, Scollo M, Durkin SJ, et al. Indexation of Tobacco excise and customs duty and smoking prevalence among Australian adults, 2001–2010: A serial cross-sectional study. *Nicotine Tob Res.* 2018;21(3):293–9.
16. Tackling Indigenous Smoking. *About the TIS Program* [Internet]. Canberra (AUST): Australian Department of Health; 2019 [cited 2019 Aug 30]. Available from: <http://tacklingsmoking.org.au/about-the-tis-program/>
17. Department of Prime Minister and Cabinet. *Closing the Gap Report 2019* [Internet]. Canberra (AUST): Government of Australia; 2019 [cited 2019 Oct 30]. Available from: <https://ctgreport.niaa.gov.au/>
18. Mitchell E, Bandara P, Smith V. *Tackling Indigenous Smoking Program – Final Evaluation Report* [Internet]. Canberra (AUST): Australian Department of Health; 2018 [cited 2019 Jun 3]. Available from: <https://beta.health.gov.au/resources/publications/tackling-indigenous-smoking-program-final-evaluation-report>
19. Minichiello A, Lefkowitz AR, Firestone M, Smylie JK, Schwartz R. Effective strategies to reduce commercial tobacco use in Indigenous communities globally: A systematic review. *BMC Public Health.* 2015;16(1):21.
20. Chamberlain C, Perlen S, Brennan S, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: An overview of reviews among Indigenous peoples. *Syst Rev.* 2017;6(1):135.
21. Australian Department of Health. *The History of the National Tobacco Campaign* [Internet]. Canberra (AUST): Government of Australia; 2019 [cited 2019 Aug 30]. Available from: <https://web.archive.nla.gov.au/awa/20190208165138/http://www.health.gov.au/internet/main/publishing.nsf/Content/tobacco-educat>
22. Haughton J. Indigenous Affairs: Health and Wellbeing. In: *2017–18 Budget Review* [Internet]. Canberra (AUST): Australian Parliamentary Library; 2017 [cited 2019 Aug 30]. Available from: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/BudgetReview201718/IndigenousHealth
23. Public Health Association of Australia. *Public Health Association of Australia Submission to the Close the Gap Refresh* [Internet]. Canberra (AUST): PHAA; 2018 [cited 2019 Oct 5]. Available from: <https://www.phaa.net.au/documents/item/2762>
24. Public Health Association of Australia. *Federal Budget 2019–20 - Pre-Budget Submission* [Internet]. Canberra (AUST): PHAA; 2019 [cited 2019 Aug 30]. Available from: <https://www.phaa.net.au/documents/item/3292>
25. Daube M. Tobacco in Australia: Time to Get Back to Basics. *MJA InSight+* [Internet]. 2018 [cited 2019 Jun 3]. Available from: <https://insightplus.mja.com.au/2018/16/tobacco-in-australia-time-to-get-back-to-basics/>
26. White VM, Durkin SJ, Coomber K, Wakefield MA. What is the role of tobacco control advertising intensity and duration in reducing adolescent smoking prevalence? Findings from 16 years of tobacco control mass media advertising in Australia. *Tob Control.* 2015;24(2):198–204.
27. Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *Lancet.* 2010;376(9748):1261–71.
28. White VM, Hayman J, Hill DJ. Can population-based tobacco-control policies change smoking behaviors of adolescents from all socio-economic groups? Findings from Australia: 1987–2005. *Cancer Causes Control.* 2008;19(6):631–40.
29. King M, Smith A, Gracey M. Indigenous health part 2: The underlying causes of the health gap. *Lancet.* 2009;374(9683):76–85.
30. Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10–24 years living in Australia, New Zealand, Canada and the United States: A systematic review. *Nicotine Tob Res.* 2019 Nov 27;ntz219. doi: 10.1093/ntr/ntz219
31. Nicholson AK, Borland R, Couzos S, Stevens M, Thomas DP. Smoking-related knowledge and health risk beliefs in a national sample of Aboriginal and Torres Strait Islander people. *Med J Aust.* 2015;202(10):S45–S50.
32. Wilkinson AL, Scollo MM, Wakefield MA, Spittal MJ, Chaloupka FJ, Durkin SJ. Smoking prevalence following tobacco tax increases in Australia between 2001 and 2017: An interrupted time-series analysis. *Lancet Public Health.* 2019;4(12):e618–e27.
33. Chaloupka FJ, Yurekli A, Fong GT. Tobacco taxes as a tobacco control strategy. *Tob Control.* 2012;21(2):172–80.
34. Bayly M, Freeman B, Scollo M. 10.8: Trends in Products and Packaging. In: Scollo MM, Winstanley MH, editors. *Tobacco in Australia: Facts and Issues* [Internet]. Melbourne (AUST): Cancer Council Victoria; 2017 [cited 2019 Oct 30]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-10-tobacco-industry/10-8-trends-in-products-and-packaging>
35. Patten CA, Koller KR, Flanagan CA, et al. Age of initiation of cigarette smoking and smokeless tobacco use among western Alaska Native people: Secondary analysis of the WATCH study. *Addict Behav Rep.* 2019;9:100143.
36. Hautala D, Sittner K, Walls M. Latent trajectories and profiles of commercial cigarette smoking frequency from adolescence to young adulthood among North American Indigenous People. *Nicotine Tob Res.* 2020;ntaa063. doi: 10.1093/ntr/ntaa063
37. Cosh S, Hawkins K, Skaczkowski G, Copley D, Bowden J. Tobacco use among urban Aboriginal Australian young people: A qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Aust J Prim Health.* 2015;21(3):334–41.
38. Azzopardi PS, Sawyer SM, Carlin JB, et al. Health and wellbeing of Indigenous adolescents in Australia: A systematic synthesis of population data. *Lancet.* 2018;391(10122):766–82.
39. Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Cochrane Database Syst Rev.* 2013;(4):CD001293.
40. Stewart-Brown S. *What is the Evidence on School Health Promotion in improving Health or Preventing Disease and, Specifically, What is the Effectiveness of the Health Promoting Schools Approach?* (Health Evidence Network Report) [Internet]. Copenhagen (DNK): World Health Organisation Regional Office for Europe. 2006 [cited 2019 Oct 16]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0007/74653/E88185.pdf
41. Australian Bureau of Statistics. 2002.0 - *2006 Census Community Profile Series* [Internet]. Canberra (AUST): ABS; 2007 [cited 2019 Aug 26]. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2006/communityprofile/0?opendocument
42. Australian Bureau of Statistics. 2002.0 - *2011 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples* [Internet]. Canberra (AUST): ABS; 2012 [cited 2019 Aug 26]. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/0?opendocument
43. Australian Bureau of Statistics. 2002.0 - *2016 Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Profile* [Internet]. Canberra (AUST): ABS; 2017 [cited 2019 Aug 26]. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument
44. Australian Bureau of Statistics. 4714.0 - *National Aboriginal and Torres Strait Islander Social Survey, 2014–15* [Internet]. Canberra (AUST): ABS; 2016 [cited 2019 Oct 14]. Available from: www.abs.gov.au/ausstats/abs@nsf/mf/4714.0
45. Australian Bureau of Statistics. 2076.0 - *Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2016* [Internet]. Canberra (AUST): ABS; 2018 [cited 2019 Jun 3]. Available from: <https://www.abs.gov.au/ausstats/abs@nsf/mf/2076.0>
46. White VM, Guerin N, Williams T, Wakefield MA. Long-term impact of plain packaging of cigarettes with larger graphic health warnings: Findings from cross-sectional surveys of Australian adolescents between 2011 and 2017. *Tob Control.* 2019;28(e1):e77–e84.
47. Greenhalgh E, Winstanley M. 1.6: Prevalence of Smoking—Teenagers. In: Scollo MM, Winstanley MH, editors. *Tobacco in Australia: Facts and Issues* [Internet]. Melbourne (AUST): Cancer Council Victoria; 2019 [cited 2019 Dec 9]. Available from: <https://www.tobaccoinaustralia.org.au/chapter-1-prevalence-of-smoking-teenagers>

Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary Table 1: Estimates of proportions of never, past month and current smokers (and 95% confidence intervals) for Aboriginal and Torres Strait Islander students 12–17, and the total ASSAD sample, 2005–2017.

Supplementary File 2: Additional data for never, past month and past week smoking and smoking intensity for Aboriginal and Torres Strait Islander Students 12–17; demographic and geographic sub-group comparisons.

11.2.2 Chapter 4 - Supplementary File 1: Figure 1 supporting data

11.2.2.1 Supplementary Table 1 (supporting data for Figure 1): Estimates of proportions of never, past month and current smokers (and 95% confidence intervals) for Aboriginal and Torres Strait Islander students 12-17, and the total ASSAD sample, 2005-2017

12 to 17 years Aboriginal & Torres Strait Islander Students % (95% CI)					
	2005	2008	2011	2014	2017
Never	48.6% (45.3%, 51.9%)	59.8% (57.1%, 62.5%)	62.0% (59.3%, 64.7%)	64.0% (61.3%, 66.5%)	70.2% (67.5%, 72.7%)
Past Month	24.0% (21.3%, 27.0%)	19.4% (17.3%, 21.6%)	16.9% (14.9%, 19.1%)	17.3% (15.4%, 19.5%)	14.0% (12.2%, 16.1%)
Current (last week)	21.1% (18.5%, 23.9%)	15.9% (14.0%, 18.0%)	14.6% (12.7%, 16.7%)	12.7% (11.0%, 14.6%)	9.8% (8.2%, 11.6%)
12 to 17 years (Total ASSAD sample) % (95% CI)					
	2005	2008	2011	2014	2017
Never	63.3% (62.7%, 63.9%)	70.7% (70.1%, 71.3%)	74.6% (74.1%, 75.2%)	79.0% (78.4%, 79.5%)	80.7% (80.2%, 81.3%)
Past Month	13.3% (12.8%, 13.7%)	10.9% (10.5%, 11.3%)	10.0% (9.6%, 10.3%)	8.3% (7.9%, 8.6%)	8.3% (7.9%, 8.7%)
Current (last week)	9.9% (9.5%, 10.3%)	7.9% (7.5%, 8.2%)	7.4% (7.0%, 7.7%)	5.8% (5.5%, 6.1%)	5.5% (5.2%, 5.8%)

11.2.3 Chapter 4 - Supplementary File 2: Additional data for never, past month and past week smoking and smoking intensity

11.2.3.1 Supplementary Table 2.1: Never smoking

NEVER SMOKING [% (n) OR (95% CI)] adjusted for school type, state/territory, age, sex, remoteness (except Urban/Non-urban analyses), SEIFA (except SEIFA sub-analysis)														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
All ASSAD students 12-17														
2005	63	1	71	1.51	(1.40, 1.62)	75	1.96	(1.82, 2.12)	79	2.52	(2.31, 2.74)	81	3.01	(2.76, 3.29)
Previous survey year	13,772	1	17,265	1.51	(1.40, 1.62)	18,404	1.30	(1.21, 1.41)	18,225	1.28	(1.18, 1.40)	15,497	1.20	(1.09, 1.32)
Indigenous students 12-17														
2005	49	1	60	1.54	(1.27, 1.87)	62	1.92	(1.59, 2.33)	64	2.08	(1.70, 2.54)	70	2.93	(2.40, 3.58)
Previous survey year	424	1	755	1.54	(1.27, 1.87)	757	1.25	(1.05, 1.48)	847	1.08	(0.91, 1.29)	843	1.41	(1.17, 1.69)
Indigenous students 12-15														
2005	53	1	64	1.62	(1.30, 2.01)	69	2.05	(1.66, 2.53)	68	2.06	(1.64, 2.58)	76	3.12	(2.49, 3.90)
Previous survey year	352	1	645	1.62	(1.30, 2.01)	604	1.27	(1.04, 1.54)	695	1.00	(0.82, 1.23)	665	1.51	(1.22, 1.88)
Indigenous students 16-17														
2005	34	1	43	1.33	(0.88, 2.02)	45	1.70	(1.15, 2.50)	49	2.13	(1.45, 3.12)	55	2.46	(1.68, 3.62)
Previous survey year	72	1	110	1.33	(0.88, 2.02)	153	1.27	(0.88, 1.83)	152	1.26	(0.91, 1.73)	178	1.16	(0.85, 1.58)
Indigenous male students 12-17														
2005	49	1	60	1.51	(1.16, 1.98)	63	1.88	(1.44, 2.46)	65	2.06	(1.56, 2.74)	71	2.99	(2.24, 3.99)
Previous survey year	208	1	377	1.51	(1.16, 1.98)	406	1.25	(1.00, 1.55)	435	1.10	(0.87, 1.38)	387	1.45	(1.12, 1.87)
Indigenous female students 12-17														
2005	48	1	60	1.53	(1.17, 2.01)	62	1.95	(1.48, 2.56)	63	2.10	(1.59, 2.77)	69	2.89	(2.20, 3.80)
Previous survey year	214	1	368	1.53	(1.17, 2.01)	347	1.27	(0.98, 1.65)	399	1.08	(0.83, 1.40)	434	1.38	(1.06, 1.79)

Supplementary Table 2.1: Never smoking (continued)

NEVER SMOKING [% (n) OR (95% CI)] adjusted for school type, state/territory, age, sex, remoteness (except Urban/Non-urban analyses), SEIFA (except SEIFA sub-analysis)														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
Indigenous students 12-17 SEIFA 1														
2005	48	1	58	1.58	(1.15, 2.17)	62	1.69	(1.22, 3.33)	59	1.85	(1.30, 2.64)	72	3.23	(2.32, 4.50)
Previous survey year	156	1	324	1.58	(1.15, 2.17)	295	1.07	(0.82, 1.39)	296	1.10	(0.82, 1.48)	458	1.75	(1.30, 2.34)
Indigenous students 12-17 SEIFA 2														
2005	50	1	62	1.64	(1.20, 2.25)	64	2.22	(1.66, 2.96)	68	2.23	(1.64, 3.04)	69	2.51	(1.82, 3.47)
Previous survey year	143	1	251	1.64	(1.20, 2.25)	281	1.35	(1.02, 1.79)	318	1.01	(0.77, 1.32)	259	1.12	(0.82, 1.54)
Indigenous students 12-17 SEIFA 3														
2005	49	1	56	1.33	(0.87, 2.05)	61	1.99	(1.33, 2.98)	65	2.12	(1.42, 3.16)	67	2.81	(1.84, 4.30)
Previous survey year	108	1	122	1.33	(0.87, 2.05)	178	1.49	(0.99, 2.25)	233	1.07	(0.72, 1.57)	125	1.33	(0.88, 2.00)
Indigenous students 12-17 Urban														
2005	50	1	60	1.47	(1.09, 1.97)	62	1.80	(1.36, 2.39)	67	2.13	(1.57, 2.89)	69	2.76	(2.05, 3.72)
Previous survey year	207	1	293	1.47	(1.09, 1.97)	322	1.23	(0.94, 1.61)	356	1.18	(0.88, 1.58)	312	1.30	(0.97, 1.74)
Indigenous students 12-17 Non-Urban														
2005	48	1	59	1.58	(1.22, 2.04)	63	1.99	(1.54, 2.59)	62	2.02	(1.53, 2.66)	71	3.04	(2.31, 4.00)
Previous survey year	205	1	404	1.58	(1.22, 2.04)	432	1.26	(1.01, 1.57)	491	1.01	(0.80, 1.28)	530	1.51	(1.18, 1.93)

*Reference year:

2005: all Odds Ratios reported against base of 2005 survey

Previous survey year: all odds ratios reported against the preceding survey e.g. 2011:2008, 2017:2014

11.2.3.2 Supplementary Table 2.2: Past month smoking

PAST MONTH SMOKING [% (n) OR (95% CI)] adjusted for school type, state/territory, age, sex, remoteness (except Urban/Non-urban analyses), SEIFA (except SEIFA sub-analysis)														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
All ASSAD students 12-17														
2005	13	1	11	0.77	(0.69, 0.85)	10	0.66	(0.60, 0.73)	8	0.53	(0.48, 0.59)	8	0.52	(0.46, 0.58)
Previous survey year	2,890	1	2,674	0.77	(0.69, 0.85)	2,464	0.86	(0.77, 0.95)	1,911	0.81	(0.73, 0.90)	1,604	0.97	(0.86, 1.09)
Indigenous students 12-17														
2005	24	1	19	0.77	(0.59, 0.99)	17	0.59	(0.45, 0.77)	17	0.63	(0.49, 0.82)	14	0.45	(0.34, 0.60)
Previous survey year	211	1	248	0.77	(0.59, 0.99)	207	0.77	(0.61, 0.97)	231	1.07	(0.85, 1.35)	170	0.72	(0.56, 0.92)
Indigenous students 12-15														
2005	20	1	17	0.79	(0.59, 1.07)	12	0.51	(0.37, 0.71)	14	0.62	(0.47, 0.84)	11	0.42	(0.30, 0.58)
Previous survey year	135	1	175	0.79	(0.59, 1.07)	102	0.65	(0.48, 0.87)	141	1.21	(0.90, 1.62)	94	0.67	(0.50, 0.91)
Indigenous students 16-17														
2005	36	1	28	0.69	(0.44, 1.07)	31	0.72	(0.48, 1.08)	29	0.68	(0.45, 1.04)	23	0.54	(0.35, 0.83)
Previous survey year	76	1	73	0.69	(0.44, 1.07)	105	1.04	(0.71, 1.53)	90	0.95	(0.66, 1.36)	76	0.79	(0.54, 1.16)
Indigenous male students 12-17														
2005	25	1	19	0.72	(0.51, 1.02)	18	0.63	(0.45, 0.89)	17	0.60	(0.42, 0.86)	15	0.47	(0.33, 0.68)
Previous survey year	105	1	122	0.72	(0.51, 1.02)	117	0.88	(0.66, 1.18)	112	0.95	(0.70, 1.29)	81	0.78	(0.57, 1.07)
Indigenous female students 12-17														
2005	23	1	20	0.85	(0.61, 1.19)	15	0.56	(0.39, 0.80)	18	0.69	(0.49, 0.96)	13	0.46	(0.32, 0.67)
Previous survey year	104	1	122	0.85	(0.61, 1.19)	87	0.66	(0.47, 0.92)	113	1.23	(0.88, 1.73)	84	0.67	(0.47, 0.95)

Supplementary Table 2.2: Past month smoking (continued)

PAST MONTH SMOKING [% (n) OR (95% CI)] adjusted for school type, state/territory, age, sex, remoteness (except Urban/Non-urban analyses), SEIFA (except SEIFA sub-analysis)														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
Indigenous students 12-17 SEIFA 1														
2005	26	1	19	0.63	(0.41, 0.99)	16	0.59	(0.37, 0.95)	19	0.61	(0.38, 0.98)	13	0.40	(0.25, 0.63)
Previous survey year	86	1	110	0.63	(0.41, 0.99)	79	0.93	(0.63, 1.37)	95	1.03	(0.69, 1.52)	82	0.65	(0.44, 0.95)
Indigenous students 12-17 SEIFA 2														
2005	23	1	17	0.72	(0.49, 1.07)	17	0.59	(0.40, 0.87)	16	0.65	(0.44, 0.97)	14	0.46	(0.30, 0.72)
Previous survey year	66	1	69	0.72	(0.49, 1.07)	75	0.82	(0.56, 1.19)	73	1.10	(0.77, 1.58)	52	0.71	(0.47, 1.08)
Indigenous students 12-17 SEIFA 3														
2005	23	1	25	1.17	(0.69, 1.97)	17	0.62	(0.37, 1.03)	17	0.71	(0.43, 1.17)	19	0.68	(0.40, 1.16)
Previous survey year	50	1	55	1.17	(0.69, 1.97)	51	0.53	(0.34, 0.83)	63	1.15	(0.74, 1.79)	36	0.95	(0.60, 1.52)
Indigenous students 12-17 Urban														
2005	25	1	21	0.79	(0.54, 1.15)	17	0.55	(0.38, 0.81)	15	0.51	(0.34, 0.74)	15	0.42	(0.28, 0.64)
Previous survey year	103	1	103	0.79	(0.54, 1.15)	89	0.70	(0.50, 0.99)	82	0.91	(0.64, 1.31)	66	0.84	(0.57, 1.24)
Indigenous students 12-17 Non-Urban														
2005	23	1	19	0.79	(0.55, 1.14)	17	0.65	(0.45, 0.94)	19	0.75	(0.52, 1.08)	14	0.50	(0.34, 0.74)
Previous survey year	100	1	131	0.79	(0.55, 1.14)	116	0.83	(0.61, 1.12)	149	1.15	(0.86, 1.53)	104	0.67	(0.49, 0.91)

*Reference year:

2005: all Odds Ratios reported against base of 2005 survey

Previous survey year: all odds ratios reported against the preceding survey e.g. 2011:2008, 2017:2014

11.2.3.3 Supplementary Table 2.3: Current (past week) smoking

CURRENT SMOKING [% (n) OR (95% CI)] adjusted for school type, state/territory, age, sex, remoteness (except Urban/Non-urban analyses), SEIFA (except SEIFA sub-analysis)														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
All ASSAD students 12-17														
2005	10	1	8	0.74	(0.66, 0.83)	7	0.66	(0.59, 0.74)	6	0.51	(0.45, 0.57)	5	0.46	(0.40, 0.52)
Previous survey year	2,163	1	1,929	0.74	(0.66, 0.83)	1,825	0.89	(0.79, 1.00)	1,330	0.76	(0.68, 0.86)	1,055	0.91	(0.79, 1.04)
Indigenous students 12-17														
2005	21	1	16	0.71	(0.55, 0.92)	15	0.59	(0.45, 0.77)	13	0.53	(0.40, 0.70)	10	0.36	(0.27, 0.48)
Previous survey year	185	1	203	0.71	(0.55, 0.92)	179	0.83	(0.65, 1.06)	168	0.90	(0.70, 1.16)	118	0.68	(0.51, 0.89)
Indigenous students 12-15														
2005	17	1	14	0.73	(0.53, 0.99)	10	0.54	(0.39, 0.76)	10	0.56	(0.41, 0.77)	7	0.32	(0.22, 0.46)
Previous survey year	114	1	138	0.73	(0.53, 0.99)	89	0.75	(0.54, 1.03)	105	1.04	(0.75, 1.44)	61	0.56	(0.40, 0.80)
Indigenous students 16-17														
2005	33	1	25	0.66	(0.42, 1.02)	26	0.65	(0.43, 0.97)	21	0.49	(0.31, 0.76)	18	0.42	(0.27, 0.66)
Previous survey year	71	1	65	0.66	(0.42, 1.02)	90	0.98	(0.68, 1.43)	63	0.75	(0.52, 1.09)	57	0.86	(0.57, 1.31)
Indigenous male students 12-17														
2005	21	1	16	0.74	(0.52, 1.05)	16	0.67	(0.48, 0.94)	13	0.53	(0.37, 0.78)	12	0.44	(0.30, 0.64)
Previous survey year	90	1	105	0.74	(0.52, 1.05)	102	0.91	(0.66, 1.24)	84	0.80	(0.58, 1.11)	64	0.82	(0.58, 1.17)
Indigenous female students 12-17														
2005	21	1	15	0.71	(0.50, 1.01)	13	0.53	(0.37, 0.77)	13	0.55	(0.38, 0.78)	8	0.30	(0.20, 0.46)
Previous survey year	93	1	94	0.71	(0.50, 1.01)	74	0.75	(0.53, 1.06)	81	1.02	(0.72, 1.46)	50	0.56	(0.37, 0.84)

Supplementary Table 2.3: Current (past week) smoking (continued)

CURRENT SMOKING [% (n) OR (95% CI)] adjusted for school type, state/territory, age, sex, remoteness (except Urban/Non-urban analyses), SEIFA (except SEIFA sub-analysis)														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
Indigenous students 12-17 SEIFA 1														
2005	23	1	16	0.58	(0.37, 0.89)	14	0.59	(0.38, 0.93)	14	0.51	(0.31, 0.81)	10	0.34	(0.22, 0.53)
Previous survey year	76	1	88	0.58	(0.37, 0.89)	69	1.03	(0.69, 1.55)	69	0.85	(0.56, 1.29)	62	0.68	(0.45, 1.02)
Indigenous students 12-17 SEIFA 2														
2005	21	1	14	0.66	(0.44, 0.99)	14	0.55	(0.36, 0.83)	11	0.47	(0.31, 0.73)	9	0.32	(0.19, 0.56)
Previous survey year	59	1	56	0.66	(0.44, 0.99)	64	0.83	(0.55, 1.26)	49	0.87	(0.57, 1.31)	33	0.68	(0.39, 1.17)
Indigenous students 12-17 SEIFA 3														
2005	19	1	21	1.22	(0.71, 2.10)	15	0.69	(0.41, 1.18)	14	0.73	(0.44, 1.22)	12	0.54	(0.29, 1.00)
Previous survey year	41	1	47	1.22	(0.71, 2.10)	45	0.57	(0.36, 0.91)	50	1.05	(0.66, 1.66)	23	0.74	(0.42, 1.30)
Indigenous students 12-17 Urban														
2005	21	1	17	0.75	(0.52, 1.10)	14	0.54	(0.37, 0.79)	11	0.42	(0.28, 0.63)	10	0.33	(0.21, 0.52)
Previous survey year	89	1	86	0.75	(0.52, 1.10)	75	0.71	(0.50, 1.02)	59	0.79	(0.53, 1.16)	46	0.79	(0.51, 1.22)
Indigenous students 12-17 Non-Urban														
2005	21	1	15	0.70	(0.49, 1.01)	15	0.66	(0.46, 0.96)	14	0.61	(0.42, 0.89)	10	0.39	(0.26, 0.58)
Previous survey year	88	1	105	0.70	(0.49, 1.01)	103	0.94	(0.69, 1.30)	109	0.92	(0.67, 1.26)	72	0.63	(0.44, 0.91)

*Reference year:

2005: all Odds Ratios reported against base of 2005 survey

Previous survey year: all odds ratios reported against the preceding survey e.g. 2011:2008, 2017:2014

11.2.3.4 Supplementary Table 2.4: Smoking intensity

SMOKING INTENSITY AMONG CURRENT SMOKERS, INDIGENOUS STUDENTS 12-17 [% (n) OR (95% CI)]														
adjusted for school type, state/territory, age, sex, remoteness, SEIFA														
	2005		2008			2011			2014			2017		
Reference year*:	% (n)	OR	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
Low (1-4 cigarettes per/day on average)														
2005	67	1	79	1.74	(1.05, 2.86)	68	1.14	(0.67, 1.92)	81	2.31	(1.30, 4.10)	77	1.96	(1.04, 3.68)
Previous survey year	119	1	154	1.74	(1.05, 2.86)	116	0.65	(0.40, 1.07)	132	2.04	(1.19, 3.48)	80	0.85	(0.45, 1.60)
Moderate (5-9 cigarettes per/day on average)														
2005	18	1	13	0.75	(0.41, 1.36)	19	1.08	(0.60, 1.92)	12	0.68	(0.36, 1.30)	12	0.56	(0.27, 1.15)
Previous survey year	32	1	25	0.75	(0.41, 1.36)	32	1.44	(0.78, 2.63)	20	0.63	(0.34, 1.19)	12	0.82	(0.39, 1.74)
High (10+ cigarettes per/day on average)														
2005	15	1	8	0.47	(0.21, 1.02)	13	0.67	(0.32, 1.40)	7	0.30	(0.13, 0.71)	12	0.55	(0.23, 1.32)
Previous survey year	26	1	15	0.47	(0.21, 1.02)	23	1.43	(0.70, 2.92)	11	0.45	(0.21, 0.99)	12	1.79	(0.68, 4.73)

*Reference year:

2005: all Odds Ratios reported against base of 2005 survey

Previous survey year: all odds ratios reported against the preceding survey e.g. 2011:2008, 2017:2014

11.2.3.5 Supplementary Table 2.5: Urban vs non-urban comparisons

Adjusted odds of never smoking, past month, current smoking in non-urban vs urban locations, in each survey year, Indigenous students 12-17 adjusted for school type, state/territory, age, sex, SEIFA															
	2005			2008			2011			2014			2017		
	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
NEVER SMOKING															
urban	50 (207)	1		60 (293)	1		62 (322)	1		67 (356)	1		69 (312)	1	
non-urban	48 (205)	1.12	(0.77, 1.62)	59 (404)	0.81	(0.58, 1.13)	63 (432)	0.97	(0.73, 1.30)	62 (491)	0.83	(0.61, 1.13)	71 (530)	0.75	(0.53, 1.05)
Overall omnibus interaction test time* non-urban vs urban p=0.8587															
PAST MONTH SMOKING															
urban	25 (103)	1		21 (103)	1		17 (89)	1		15 (82)	1		15 (66)	1	
non-urban	23 (100)	0.63	(0.39, 1.01)	19 (131)	1.21	(0.82, 1.78)	17 (116)	1.04	(0.69, 1.58)	19 (149)	1.39	(0.94, 2.04)	14 (104)	1.65	(1.00, 2.73)
Overall omnibus interaction test time* non-urban vs urban p=0.3452															
CURRENT SMOKING															
urban	21 (89)	1		17 (86)	1		14 (75)	1		11 (59)	1		10 (46)	1	
non-urban	21 (88)	0.66	(0.40, 1.10)	15 (105)	1.02	(0.66, 1.59)	15 (103)	1.18	(0.77, 1.81)	14 (109)	1.39	(0.87, 2.22)	10 (72)	1.50	(0.86, 2.62)
Overall omnibus interaction test time* non-urban vs urban p=0.4270															

11.2.3.6 Supplementary Table 2.6: SEIFA comparisons

SEIFA tertiles in each survey year Indigenous students 12-17 adjusted for school type, state/territory, age, sex, remoteness															
	2005			2008			2011			2014			2017		
	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI	% (n)	OR	95% CI
NEVER SMOKING [% (n) OR (95% CI)]															
SEIFA 1 (0-33%)	48 (156)	1		58 (324)	1		62 (295)	1		59 (196)	1		72 (458)	1	
SEIFA 2 (34-66%)	50 (143)	1.06	(0.75, 1.51)	62 (251)	0.98	(0.72, 1.34)	64 (281)	1.35	(1.02, 1.79)	68 (318)	1.37	(0.99, 1.90)	69 (259)	0.84	(0.60, 1.20)
SEIFA 3 (67-100%)	49 (108)	1.09	(0.69, 1.70)	56 (122)	0.89	(0.59, 1.35)	61 (178)	1.03	(0.70, 1.50)	65 (233)	1.22	(0.80, 1.87)	67 (125)	0.75	(0.48, 1.17)
Overall omnibus interaction test time* SEIFA p=0.571															
PAST MONTH SMOKING [% (n) OR (95% CI)]															
SEIFA 1 (0-33%)	26 (86)	1		19 (110)	1		16 (79)	1		19 (95)	1		13 (82)	1	
SEIFA 2 (34-66%)	23 (66)	1.06	(0.67, 1.67)	17 (69)	1.12	(0.74, 1.71)	17 (75)	0.82	(0.53, 1.28)	16 (73)	0.91	(0.61, 1.35)	14 (52)	1.13	(0.67, 1.92)
SEIFA 3 (67-100%)	23 (50)	0.71	(0.38, 1.31)	25 (55)	1.49	(0.93, 2.40)	17 (51)	0.92	(0.55, 1.52)	17 (63)	1.04	(0.65, 1.66)	19 (36)	1.65	(0.93, 2.92)
Overall omnibus interaction test time* SEIFA p=0.594															
CURRENT SMOKING [% (n) OR (95% CI)]															
SEIFA 1 (0-33%)	23 (76)	1		16 (88)	1		14 (69)	1		14 (69)	1		10 (62)	1	
SEIFA 2 (34-66%)	21 (59)	1.08	(0.68, 1.72)	14 (56)	1.18	(0.74, 1.86)	14 (64)	0.87	(0.56, 1.37)	11 (49)	0.81	(0.51, 1.28)	9 (33)	0.97	(0.49, 1.92)
SEIFA 3 (67-100%)	19 (41)	0.59	(0.32, 1.09)	21 (47)	1.48	(0.83, 2.61)	15 (45)	1.07	(0.63, 1.81)	14 (50)	1.19	(0.66, 2.15)	12 (23)	1.40	(0.72, 2.71)
Overall omnibus interaction test time* SEIFA p=0.614															

11.3 Appendix 3 – Chapter 5 E-Print and Supplementary Material

11.3.1 E-print of published paper at Chapter 5

Research

Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015

Christina L Heris^a, Sandra J Eades^a, Louise Lyons^b,
Catherine Chamberlain^c and David P Thomas^{d,e}

^a Melbourne School of Population and Global Health, University of Melbourne, VIC, Australia

^b Victorian Aboriginal Community Controlled Health Organisation, Melbourne, Australia

^c School of Nursing and Midwifery, Judith Lumley Centre, La Trobe University, Melbourne, VIC, Australia

^d Wellbeing and Preventable Chronic Disease Division, Menzies School of Health Research, Darwin, NT, Australia

^e Corresponding author: david.thomas@menzies.edu.au

Article history

Publication date: June 2020

Citation: Heris CL, Eades SJ, Lyons L, Chamberlain C, Thomas DP. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. Public Health Res Pract. 2020;30(2):e29121906. First published 2 May 2019. <https://doi.org/10.17061/phrp29121906>

Key points

- Smoking prevalence among young Aboriginal people declined between 2002 and 2015
- An increasing minority of young people may be starting daily smoking after 18 years of age, while the majority still start before 18 years
- Smoking prevention must target the total period of adolescence into young adulthood, from 10 to 24 years, to ensure smoking uptake continues to decline and is not just delayed

Abstract

Objectives: To analyse trends in smoking initiation and prevalence among young Aboriginal and Torres Strait Islander people (Indigenous people) to identify which stages of adolescence and young adulthood prevention activities should target.

Methods: Secondary analysis of 'daily smoking' and 'never smoked' responses from Indigenous people aged 15 years and older in five national Indigenous surveys from 2002 to 2014–15, and of initiation age among those aged 18 years and older in 2004–05 and 2012–13.

Results: Smoking prevalence among 15–24-year-olds declined significantly between 2002 and 2014–15, falling 14 percentage points (95% confidence interval [CI] 8, 21) from 45% to 31%. The greatest decline was among 18–19-year-olds, with a decrease of 17 percentage points (95% CI 4, 29) from 48% to 31%. The proportion of 15–24-year-olds who had never smoked increased significantly, by 12 percentage points (95% CI 6, 18) from 44% in 2002 to 56% in 2014–15.

Between 2004–05 and 2012–13, the proportion of 18–24-year-old smokers who had started daily smoking before the age of 18 years declined significantly, down 8 percentage points (95% CI 2, 15) from 84% to 76%. In 2012–13, 24% of smokers aged 18–24 years started daily smoking after age 18, half (49%) started between 15 and 18 years, and around a quarter started before age 15.

Conclusions: There have been significant declines in smoking prevalence among young Indigenous people between 2002 and 2014–15 as fewer take up smoking. Smoking initiation occurs over a wide age range. The majority of daily smokers started before the age of 18; however, initiation may be delayed until early adulthood for an increasing number. The challenge for tobacco prevention is to reach young people in early adolescence and continue to reinforce smoke-free intentions into young adulthood.

Introduction

Tobacco use continues to be a major cause of preventable ill health for Aboriginal and Torres Strait Islander people (Indigenous people), contributing to deaths and disability from cancer, and respiratory and cardiovascular diseases. Smoking is the largest contributing risk factor (23%) to the gap in disease burden between Indigenous people and non-Indigenous Australians¹, a legacy of the social and economic impacts of colonisation and a disparity shared with other populations with a similar historical context (New Zealand, Canada and the US).²

Although the most recent national data showed current smoking among Indigenous people to be 2.7 times higher than among non-Indigenous people^{3,4}, there have been positive improvements over the past two decades, with a significant decline in adult smoking rates from 55% in 1994 to 45% in 2014–15.⁵

Reducing smoking prevalence involves supporting existing smokers to quit and preventing smoking initiation. Most regular smoking begins during adolescence and young adulthood, defined in this paper as 10–24 years: early adolescence (10–14), late adolescence (15–19) and young adulthood (20–24).⁶ Almost all (99%) daily smokers begin smoking before age 26.⁷ Promisingly, the greatest declines between 2002 and 2014–15 were recorded in the 15–17 and 18–24 years age groups, down from 33% to 17% and 58% to 41%, respectively.⁴ There was also an increase in young 'never-smokers' over the same period, indicating fewer young people are taking up smoking.^{3,4}

Smoking uptake involves transitioning through different stages that may occur over several years, beginning with the first try (a few puffs to a full cigarette), then repeated experimentation, before establishing regular smoking (consumed 100 cigarettes and/or at least daily smoking for more than 1 month).^{8,9} Smoking prevention can target any or all of these stages.¹⁰ Many young people do not progress beyond experimentation, and, for those who do, the timing of these transitions is not uniform. One model of initiation describes four trajectories: 'early establishers' (trying cigarettes at around 12–13 years of age, progressing to daily use by age 17); 'late establishers' (beginning around 15–16 years of age, with use peaking in the early 20s); 'quitters' (who experiment early, before 11 years of age, and peak at less than daily use at age 16); and 'nonsmokers'.⁷

Population health surveys measuring smoking uptake differ in the stage reported: some record the age of the first full cigarette smoked, others the age daily smoking commenced. The 2016 National Drug Strategy Household Survey (NDSHS) found that the mean age of first smoking a full cigarette for all Australian youth has increased significantly over time from 14 years in 1995 to 16 years in 2016.¹¹ The most recent NDSHS data reporting the age of the first full cigarette smoked for young Indigenous people are from 2013. The data showed no significant

changes between 2010 and 2013, with the first full cigarette smoked at around 15 years of age.¹² However, the NDSHS does not record the age that regular smoking commenced, and includes few survey participants from remote areas. This is a significant limitation of this dataset given that, at the 2011 census, 21% of Indigenous people were recorded as living in remote regions¹³, where smoking prevalence is also known to be higher than in other areas.^{3,14}

In contrast, cross-sectional surveys by the Australian Bureau of Statistics (ABS) – National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS) and National Aboriginal and Torres Strait Islander Social Survey (NATSISS) – reflect the geographic distribution of the Aboriginal population, including in remote areas. The health surveys also record the age that daily smoking commenced. Data from a recent analysis of smoking trends among Indigenous people who had ever smoked daily showed that the proportions of people aged 18 years or older who started smoking before age 18 years were similar over time: 70% in 2004–05 and 69% in 2012–13.⁵ This analysis also found an overall decrease of 13 percentage points in the prevalence of current smoking among 15–17-year-olds, from 30% in 1994 to 17% in 2014–15, and an average annual relative decrease of 4%, indicating a reduction in smoking uptake.⁵

However, analysis of clinic data from Victorian Aboriginal Community Controlled Health Organisation (VACCHO) member services suggests higher smoking prevalence among 20–24-year-olds than 15–19-year-olds, which may indicate that the improvements in teenage smoking could be due to more young people delaying smoking initiation until their 20s.

This paper extends previous national analyses of smoking initiation trends by investigating smoking prevalence among 15–24-year-olds, and the age at which 18–24-year-old smokers and ex-smokers started to smoke. It is part of a broader project led by VACCHO.

Methods

Data sources

Data sources were the 2002, 2008 and 2014–15 NATSISS, the 2004–05 NATSIHS and 2012–13 AATSIHS, collected between August 2002 and April 2003, August 2004 and July 2005, August 2008 and April 2009, April 2012 and February 2013, and September 2014 and June 2015. There were 9359 (2002), 5757 (2004–05), 7823 (2008), 6037 (2012–13) and 7022 (2014–15) Indigenous respondents aged 15 years and older (18 years and older for the 2004–05 NATSIHS).

Data collection methods and access

Data collection for the ABS surveys included face-to-face interviews of a multistage random sample of Indigenous people identified as usual household residents of private dwellings. Further details are available in the ABS technical user guides.^{15–19}

Data were obtained from confidentialised unit record files for the 2002, 2008, 2014–15 NATSISS, 2004–05 NATSIHS and 2012–13 AATSIHS, accessed through the ABS Remote Access Data Laboratory.

Outcome and predictor variables

Outcome variables included smoking status (daily and never smoking) from each survey from 2002 to 2014–15, and age daily smoking commenced from the 2004–05 NATSIHS and 2012–13 AATSIHS. Daily smoking (and age it commenced) was defined as at least one cigarette a day. See Supplementary Table 1 (available from: doi.org/10.26188/5c99c4be884cb) for question variations. Never-smokers were defined differently in the NATSISS (never smoked daily) and the NATSIHS/AATSIHS (less than 100 cigarettes in a lifetime or other tobacco products less than 20 times).

Predictor variables included age, gender, state or territory, and remote/non-remote location.

Data analysis

Estimates of smoking prevalence, never-smoked status and the age daily smoking commenced were obtained from all surveys using Stata 10 (College Station, TX: StataCorp LP; special edition). Weighted population estimates and standard errors were calculated using reference weights as described by Donath²⁰, and the variances of the differences between estimates were calculated from the sum of the variances of the estimates.

Results are for Indigenous people nationally, with subgroup analyses by gender, remoteness, age group and state/territory (excluding Tasmania and the Australian Capital Territory, which are combined by the ABS in several surveys).

Daily smoking and never-smoked status were compared between the 2002 NATSISS and subsequent surveys for groups within the 15–24 age range (18–24 in 2004–05, when smoking data were restricted to those aged 18 or older).

Due to the age limits in 2004–05, comparisons between surveys in age of smoking initiation are for those aged 18 or older. Comparisons were also made within and between the 2004–05 and 2012–13 surveys across 10-year age groups (20–29, 30–39, 40–49, 50 years and older) to determine whether any changes are due to a longer-term cohort effect. The nearly 10-year gap between surveys means most current and ex-smokers would have moved into the next 10-year age group; for example, 40–49-year-olds surveyed in 2012–13 would be

from the same birth cohort as 30–39-year-olds surveyed in 2004–2005.

Ethics approval

The Menzies School of Health Research and the Northern Territory Department of Health Top End Human Research Ethics Committee Indigenous subcommittee provided ethics approval (HREC-2012-1844).

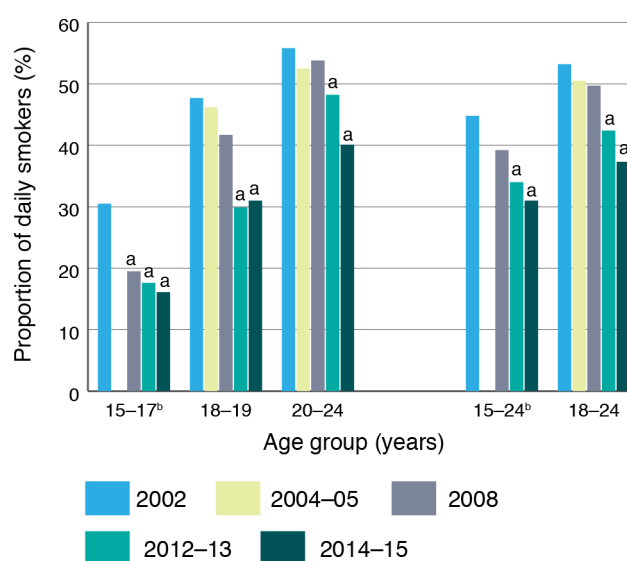
Results

Changes in daily smoking prevalence

Between 2002 and 2014–15, daily smoking prevalence declined significantly among young people aged 15–24, from 45% down to 31%, a reduction of 14 percentage points (95% confidence interval [CI] 8, 21) (see Figure 1). Within this age range there were also significant decreases among 18–24-year-olds and all age subgroups (15–17, 18–19 and 20–24 years). The greatest magnitude of change was for 18–19-year-olds, a 17 percentage point decline between 2002 and 2014–15 (95% CI 4, 29), down from 48% to 31%.

The proportion of never-smokers among 15–24-year-olds increased significantly, by 12 percentage points (95% CI 6, 18) from 44% in 2002 to 56% in 2014–15 (see Figure 2). As with daily smoking, there were significant

Figure 1. Proportion of Indigenous adolescents and young adults aged 15–24 years who smoked daily, 2002 to 2014–15

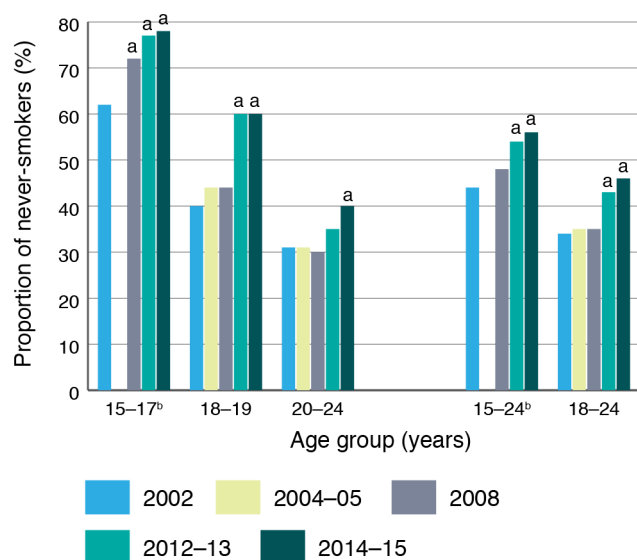


^a Significantly different from 2002, $p < 0.05$

^b Not available for 2004–05, question restricted to 18 years and older

Sources: 2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS); 2004–05 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS); 2008 NATSISS; 2012–13 Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS); 2014–15 NATSISS

Figure 2. Proportion of Indigenous adolescents and young adults aged 15–24 years who have never smoked, 2002 to 2014–2015



^a Significantly different from 2002, $p < 0.05$

^b Not available for 2004–05, question restricted to 18 years and older

Sources: 2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS); 2004–05 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS); 2008 NATSISS; 2012–13 Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS); 2014–15 NATSISS

changes for all age subgroups, and the greatest change was among 18–19-year-olds with a 20 percentage point increase (95% CI 7, 32) in never smoking from 40% in 2002 to 60% in 2014–15.

Changes in the age daily smoking started

For all respondents aged 18 years and older who have ever smoked daily, the age daily smoking commenced did not change between 2004–05 and 2012–13, with the majority (70%) starting before 18 years of age and around 30% starting before age 15.

To investigate trends among more recently established smokers, we concentrated on 18–24-year-olds. We found significant declines between surveys in the proportions commencing smoking before age 18. In 2004–05, 84% of young people aged 18–24 years had started smoking daily before age 18; in 2012–13, the proportion had fallen to 76%, an 8 percentage point difference (95% CI 2, 15) (see Table 1). There was a nonsignificant decline in the proportion starting before age 15, down 8 percentage points (95% CI 0, 15) from 34% in 2004–05 to 26% in 2012–13.

Within the 18–24 years age group, there was a significant decrease of 9 percentage points (95% CI 1, 17) in the proportion of 20–24-year-olds who started smoking before 18 years of age. There was a

nonsignificant decrease (4 percentage points; 95% CI –5, 13) among 18–19-year-olds. Both Western Australia (WA) and Victoria had significant reductions in the proportion of 18–24-year-olds starting smoking before age 18: a decline of 28 percentage points in Victoria (from 91% in 2004–05 to 63% in 2012–13) and 17 percentage points in WA (from 89% to 72%). There were also nonsignificant declines in almost all other age categories.

Among current and ex-daily smokers who started smoking daily before age 18, there were no consistent differences between the groups in each of the 10-year age/birth cohorts, either between or within survey waves, with one exception: a higher proportion of 20–29-year-olds started smoking before age 18 compared with the 30–39-year-old group (see Supplementary Table 2, available from: doi.org/10.26188/5c99c69983651).

Discussion

Our results demonstrate that fewer young Indigenous people are taking up smoking, and, of those who do, an increasing proportion are starting daily smoking later, after age 18. This appears to be a recent change.

These findings add to recent reports of the decline in smoking among Indigenous people over the past 10–15 years^{3,5,21}, particularly young people, largely due to the increase in the proportion of never-smokers. This will have substantial health benefits for Indigenous people because nonsmokers live 10 years longer on average than smokers.²² With increases in the number of lifelong never-smokers alongside thousands of people who have quit, the burden from premature mortality and tobacco-related illnesses will decline.^{5,21}

Sustaining and accelerating this progress requires continued commitment to the comprehensive tobacco control approach that has supported these improvements for young people in particular.^{5,21} It is not possible to determine if any individual component has been more effective than others, but measures that are Indigenous-led and culturally tailored are identified as particularly important.^{21,23} A greater understanding of what works for young people of different ages is needed to design programs that continue to prevent smoking throughout adolescence and into adulthood.²³

Our results may indicate a trend towards delayed smoking initiation, with the largest increase in never smoking since 2002 among 18–19-year-olds and more moderate changes among 20–24-year-olds. As shown previously for both Indigenous and non-Indigenous people⁵, we found that the majority of Indigenous adolescents and young adults who have ever smoked regularly started smoking before age 18. However, our analysis found an increasing number of people commencing after 18 years of age. This is similar to changes in the broader population, in which the average age for the first full cigarette smoked increased to 16 years in 2016, up from 14 years in 1995, and the

Table 1. Proportion of current and ex-daily smokers who started daily smoking before age 18, Indigenous respondents aged 18–24 years (*N* = 660)

Variable	2004–05		2012–13		Difference 2004–05 to 2012–13
	%	<i>n</i>	%	<i>n</i>	Percentage points (95% CI)
Age					
Total 18–24 years	84	554	76	391	–8 (–15, –2) ^a
18–19 years	92	159	88	110	–4 (–13, 5)
20–24 years	81	395	72	281	–9 (–17, –1) ^a
Gender					
Male	84	227	75	163	–10 (–20, 0)
Female	84	327	77	228	–7 (–15, 1)
Location					
Remote	78	178	65	149	–12 (–24, 0)
Non-remote	86	376	79	242	–7 (–15, 0)
State/territory					
NSW	86	92	89	73	3 (–6, 13)
Vic	91	72	63	23	–28 (–48, –8) ^a
Qld	80	101	68	71	–12 (–28, 4)
SA	85	55	79	44	–6 (–27, 15)
WA	89	90	72	65	–17 (–30, –5) ^a
NT	75	70	64	68	–12 (–29, 5)

^a Statistically significant difference, *p* < 0.05

Sources: 2004–05 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), 2012–13 Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS)

proportion of people older than 18 years trying smoking for the first time increased significantly from 28% in 2013 to 31% in 2016 (increasing steadily from 18% in 2004).¹¹ Our results suggest a more recent shift among Indigenous adolescents and young adults, with no significant differences between age cohorts except the greater proportion of 20–29-year-olds starting daily smoking before age 18 years, as expected for existing smokers in their 20s.

Based on the initiation model described earlier, our results suggest a potential shift from ‘early’ to ‘late establishers’, or possibly an increase in age for all categories. There may be some relative positive health impacts of fewer smokers commencing in early adolescence, as those who start earlier are less likely to make successful quit attempts^{24,25}, are more likely to become heavy smokers and to develop tobacco-related diseases.⁷

Despite the relative benefits of delayed smoking initiation, preventing later uptake and progression to long-term smoking is nonetheless important. The risk and protective factors for smoking change throughout adolescence and young adulthood, and the transition

is a period of increased vulnerability and susceptibility to smoking uptake.¹⁰ New risk factors for smoking may be introduced, and previously protective influences diminished as young people enter early adulthood: leaving school and home, and starting work, study, households and families. Previously positive influences of smoke-free homes and cars, family attitudes to smoking, engagement with school and sport, and exposure to youth-focused health promotion may be replaced by new smoking norms at home, work and among friends, along with greater access to cigarettes (due to age and income).

There may also be some time-specific factors. The changes reported here are for a group aged 18–24 years in 2012–13. That is, their smoking was established before, or during, the renewed national focus on tobacco control following a peak in tobacco control activities in the late 1990s to early 2000s. Funding for the Tackling Indigenous Smoking program began in 2010; the first Indigenous targeted social marketing campaign, Break the Chain, aired in 2011; mainstream campaign activity increased from 2012; tobacco plain packaging was introduced in 2012; and the annual excise on tobacco increased from 2013.

Is it possible that this cohort progressed through adolescence with lower exposure to health promotion and social marketing, particularly Indigenous-led tobacco control, and were more susceptible to smoking uptake as they entered young adulthood? Or perhaps the effect of measures that prevented uptake during their teenage years was not sustained, contributing to later smoking initiation and a renormalisation of smoking in this age group? Increased understanding of the factors that influence smoking uptake for young Indigenous people during the transition into adulthood, and what measures are effective to reduce uptake, is required, including the unique determinants of smoking initiation for this population within the historical context of colonisation.²⁶ It is necessary to invest in, and where required adapt, health promotion programs and policies to ensure tobacco prevention and cessation supports are effective and culturally relevant for Indigenous adolescents. Further, it is important to ensure smoke-free messages are reinforced and remain relevant across all stages of adolescence and young adulthood, and continue to reduce smoking initiation, not just delay it.

Strengths and limitations

A strength of this work is that it reports data that are not routinely published, from a nationally representative sample of Indigenous people, including those in remote areas. However, there are some limitations. The surveys sample people living in private residences, which excludes hospitals, correctional facilities, hostels, other short-stay accommodation and boarding schools. For some subgroups, the sample sizes and changes are insufficient to detect potentially important differences. While some outcomes are analysed by remoteness or state/territory, the data are primarily reported at a national level, which does not allow identification of regional variation. There were minor changes in questions about smoking status and initiation between remote and nonremote areas and between surveys. The definition of 'never smoking' differed between the NATSISS and the NATSIHS/AATSIHS; however, the definition is consistent in our comparisons between 2002 and 2014–15.

The analysis of the age that daily smoking commenced includes only two time points. We used birth cohort comparisons to demonstrate that the detected differences in later uptake appear to be a recent change. While significant differences have been detected, they should be interpreted with caution; the analysis should be repeated when a third wave of this ABS data is available to provide greater certainty. In the interim, qualitative research may facilitate an in-depth exploration of the experiences leading to later smoking uptake and any relevant time-period factors.

Conclusions

Smoking prevalence among young Indigenous people has been declining since 2002, with a growing number of never-smokers. However, nonsmoking adolescents entering young adulthood may still be susceptible to starting smoking. Primary health care services cannot assume that a client who previously presented as a never-smoker in their late teens or early 20s will remain so. Nor can it be assumed that activities that have been effective in driving down youth smoking rates continue to be effective with young adults.

Influences on smoking initiation change throughout adolescence and young adulthood. While our results show that most daily smoking continues to be established before age 18, around one-quarter of smokers start before 15 years of age, a similar proportion start after 18 years (and that may be increasing), with the remaining 50% starting between 15 and 17 years.

Commitment to the comprehensive tobacco control measures that have contributed to the reduction in youth smoking must be sustained, and Indigenous-led prevention must be prioritised to ensure cultural relevance. Our results suggest that these interventions need to continue across all of adolescence and young adulthood, reinforcing tobacco prevention at very different life stages, to ensure smoking uptake continues to decline and is not simply delayed.

Acknowledgements

Funding was provided to VACCHO by the Victorian Department of Health and Human Services for a broader project including this research, and provided travel support for authors. A portion of this funding was provided to the Menzies School of Health Research for completion of the analysis. CH receives a PhD scholarship from The Australian Prevention Partnership Centre funded through the National Health and Medical Research Council Partnership Centre grant scheme (Grant ID: GNT9100001).

Peer review and provenance

Externally peer reviewed, not commissioned.

Competing interests

None declared.

Author contributions

CH was involved in the conception and design of the study, carried out the data analyses, interpretation of results and wrote the first draft of the manuscript. SE, LL and CC were involved in the conception and design of the study, interpretation of results and drafting the

manuscript. DT was involved in the conception and design of the study, data analyses, interpretation of results and drafting the manuscript. All authors read and approved the final manuscript.

References

1. Australian Institute of Health and Welfare. Australian burden of disease study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Canberra: AIHW; 2016 [cited 2018 Mar 5]. Available from: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians
2. van der Sterren A, Greenhalgh EM, Knoche D, Winstanley MH. Prevalence of tobacco use among Aboriginal and Torres Strait Islander people. In: Scollo MM, Winstanley MH, editors. Tobacco in Australia: facts and issues. Melbourne: Cancer Council Victoria; 2016 [cited 2018 Aug 3]. Available from: www.tobaccoinaustralia.org.au/chapter-8-aptis/8-3-prevalence-of-tobacco-use-among-aboriginal-peo
3. Australian Bureau of Statistics. National Aboriginal and Torres Strait Islander Social Survey, 2014–15. Canberra: ABS; 2016 [cited 2018 Mar 5]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0
4. Australian Health Ministers' Advisory Council. Aboriginal and Torres Strait Islander Health Performance Framework 2017 report. Canberra: AHMAC; 2017 [cited 2018 Mar 5]. Available from: www.niaa.gov.au/sites/default/files/publications/2017-health-performance-framework-report_1.pdf
5. Australian Bureau of Statistics. Aboriginal and Torres Strait Islander peoples: smoking trends, Australia, 1994 to 2014–15. Canberra: ABS; 2017 [cited 2018 Mar 5]. Available from: www.abs.gov.au/ausstats/abs@.nsf/mf/4737.0
6. Sawyer SM, Afifi RA, Bearinger LH, Blakemore S-J, Dick B, Ezech AC, et al. Adolescence: a foundation for future health. *Lancet*. 2012;379(9826):1630–40.
7. US Department of Health and Human Services. Preventing tobacco use among young people: a report of the surgeon general. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012 [cited 2018 Apr 4]. Available from: www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/full-report.pdf
8. Choi WS, Gilpin EA, Farkas AJ, Pierce JP. Determining the probability of future smoking among adolescents. *Addiction*. 2001;96(2):313–23.
9. Messer K, Pierce JP. Changes in age trajectories of smoking experimentation during the California Tobacco Control Program. *Am J Public Health*. 2010;100(7):1298–306.
10. Winstanley M, Wood L, Greenhalgh E, Letcher T. Influences on the uptake and prevention of smoking. In: Scollo MM, Winstanley MH, editors. Tobacco in Australia: facts and issues. Melbourne: Cancer Council Victoria; 2014 [cited 2018 Mar 5]. Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake
11. Australian Institute of Health and Welfare. National drug strategy household survey 2016: detailed findings. Canberra: AIHW; 2017 [cited 2018 Mar 5]. Available from: www.aihw.gov.au/getmedia/15db8c15-7062-4cde-bfa4-3c2079f30af3/21028a.pdf.aspx?inline=true
12. Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress. Reporting under the national tobacco strategy 2012–2018. Canberra: AIHW; 2016 [cited 2018 Mar 5]. Available from: www.aihw.gov.au/getmedia/fcf4f834-8ef8-44a0-99cb-8fc28150428d/20065.pdf.aspx?inline=true
13. Australian Bureau of Statistics. The Australian statistical geography standard (ASGS) remoteness structure. Canberra: ABS; 2018 [updated 15 Mar 2018; cited 2018 Mar 23]. Available from: www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure
14. Australian Bureau of Statistics. Estimates of Aboriginal and Torres Strait Islander Australians, June 2011. Canberra: ABS; 2013 [cited 2018 Mar 5]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3238.0.55.001Main+Features1June%202011?OpenDocument
15. Australian Bureau of Statistics. Australian Aboriginal and Torres Strait Islander health survey: users' guide, 2012–13. Canberra: ABS; 2013 [cited 2018 Mar 5]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4727.0.55.002Main+Features12012-13
16. Australian Bureau of Statistics. National Aboriginal and Torres Strait Islander health survey: users' guide, 2004–05. Canberra: ABS; 2006 [cited 2018 Mar 5]. Available from: [www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/8B24B5C90B33D2BFCA257164007FCC1D/\\$File/4715055004_2004-05.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/8B24B5C90B33D2BFCA257164007FCC1D/$File/4715055004_2004-05.pdf)
17. Australian Bureau of Statistics. National Aboriginal and Torres Strait Islander social survey, 2002. Canberra: ABS; 2004 [cited 2018 Mar 5]. Available from: [www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/AE3942DB21AD4A27CA256EBB0079843D/\\$File/47140_2002.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/AE3942DB21AD4A27CA256EBB0079843D/$File/47140_2002.pdf)
18. Australian Bureau of Statistics. National Aboriginal and Torres Strait Islander social survey: users' guide, 2008. Canberra: ABS; 2010 [cited 2018 Mar 5]. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4720.0Main+Features12008
19. Australian Bureau of Statistics. National Aboriginal and Torres Strait Islander social survey: user guide, 2014–15. Canberra: ABS; 2016 [cited 2018 Mar 5]. Available from: www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4720.0

20. Donath SM. How to calculate standard errors for population estimates based on Australian National Health Survey data. *Aust N Z J Public Health*. 2005;29(6):565–71.
21. Lovett R, Thurber K, Wright A, Maddox R, Banks E. Deadly progress: changes in Australian Aboriginal and Torres Strait Islander adult daily smoking, 2004–2015. *Public Health Res Pract*. 2017;27(5):e2751742.
22. Banks E, Joshy G, Weber MF, Liu B, Grenfell R, Egger S, et al. Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Medicine*. 2015;13(1):38.
23. Chamberlain C, Perlen S, Brennan S, Rychetnik L, Thomas D, Maddox R, et al. Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Systematic Reviews*. 2017;6(1):135.
24. Breslau N, Peterson EL. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *Am J Public Health*. 1996;86(2):214–20.
25. Greenhalgh EM, Stillman S, Ford C. Factors that predict success or failure in quit attempts. In: Scollo MM, Winstanley MH, editors. *Tobacco in Australia: facts and issues*. Melbourne: Cancer Council Victoria; 2016 [cited 2018 Mar 5]. Available from: www.tobaccoinaustralia.org.au/chapter-7-cessation/7-7-personal-factors-associated-with-quitting
26. Lovett R, Thurber KA, Maddox R. The Aboriginal and Torres Strait Islander smoking epidemic: what stage are we at, and what does it mean? *Public Health Res Pract*. 2017;27(4):e2741733.

11.3.2 Chapter 5 - Supplementary File 1: Summary of questionnaire wording 2002 – 2014-15

2002 NATSISS	2004-05 NATSIHS	2008 NATSISS	2012-13 NATSIHS	2014-15 NATSISS
<u>NON-REMOTE</u> DO YOU CURRENTLY SMOKE? <u>REMOTE</u> DO YOU SMOKE?	<u>ALL</u> DO YOU CURRENTLY SMOKE?	<u>ALL</u> DO YOU CURRENTLY SMOKE?	<u>ALL</u> DO YOU/DOES (NAME) CURRENTLY SMOKE?	<u>ALL</u> DO YOU CURRENTLY SMOKE?
<u>NON-REMOTE</u> DO YOU SMOKE REGULARLY, THAT IS, ONE SMOKE A DAY OR MORE? <u>REMOTE</u> DO YOU HAVE ONE SMOKE A DAY OR MORE?	<u>NON-REMOTE</u> DO YOU SMOKE REGULARLY, THAT IS, AT LEAST ONCE A DAY? <u>REMOTE</u> DO YOU HAVE AT LEAST ONE SMOKE A DAY?	<u>ALL</u> DO YOU SMOKE REGULARLY, THAT IS, AT LEAST ONCE A DAY?	<u>NON-REMOTE</u> DO YOU/DOES (NAME) SMOKE REGULARLY, THAT IS, AT LEAST ONCE A DAY? <u>REMOTE</u> DO YOU/DOES (NAME) HAVE AT LEAST ONE SMOKE A DAY?	<u>ALL</u> DO YOU SMOKE REGULARLY, THAT IS, AT LEAST ONCE A DAY?
<u>NON-REMOTE</u> HAVE YOU EVER SMOKED REGULARLY (THAT IS, ONE SMOKE A DAY OR MORE)? <u>REMOTE</u> HAVE YOU EVER SMOKED REGULARLY, THAT IS, ONE SMOKE A DAY OR MORE?	<u>NON-REMOTE</u> HAVE YOU EVER SMOKED REGULARLY (THAT IS AT LEAST ONCE A DAY?) <u>REMOTE</u> HAVE YOU EVER SMOKED REGULARLY, THAT IS, AT LEAST ONE A DAY?	<u>ALL</u> HAVE YOU EVER SMOKED REGULARLY (THAT IS, AT LEAST ONCE A DAY?)	<u>NON-REMOTE</u> HAVE YOU/HAS (NAME) EVER SMOKED REGULARLY, THAT IS, AT LEAST ONCE A DAY? <u>REMOTE</u> HAVE YOU/HAS (NAME) EVER HAD AT LEAST ONE SMOKE A DAY?	<u>ALL</u> HAVE YOU EVER SMOKED REGULARLY (THAT IS, AT LEAST ONCE A DAY?)
-	<u>ALL</u> HAVE YOU SMOKED AT LEAST 100 CIGARETTES IN YOUR ENTIRE LIFE?	<u>ALL</u> HAVE YOU SMOKED AT LEAST 100 CIGARETTES IN YOUR ENTIRE LIFE?	<u>ALL</u> HAVE YOU/HAS (NAME) SMOKED AT LEAST 100 CIGARETTES IN YOUR/HIS/HER ENTIRE LIFE?	<u>ALL</u> HAVE YOU SMOKED AT LEAST 100 CIGARETTES IN YOUR ENTIRE LIFE?

2002 NATSISS	2004-05 NATSIHS	2008 NATSISS	2012-13 NATSIHS	2014-15 NATSISS
-	<u>ALL</u> HAVE YOU SMOKED PIPES, CIGARS OR OTHER TOBACCO PRODUCTS AT LEAST 20 TIMES IN YOUR ENTIRE LIFE?	<u>ALL</u> HAVE YOU SMOKED PIPES, CIGARS OR OTHER TOBACCO PRODUCTS AT LEAST 20 TIMES IN YOUR ENTIRE LIFE?	<u>ALL</u> HAVE YOU/HAS (NAME) EVER: 1. CHEWED TOBACCO 2. SMOKED PIPES 3. SMOKED CIGARS 4. SMOKED OTHER TOBACCO PRODUCTS (SPECIFY) 5. NO DO YOU/DOES (NAME) (1ST, 2ND,...4TH CATEGORY SELECTED) DAILY? HAVE YOU/HAS (NAME) EVER (1ST, 2ND,...4TH CATEGORY SELECTED) 20 TIMES IN YOUR ENTIRE LIFE?	<u>ALL</u> HAVE YOU SMOKED PIPES, CIGARS OR OTHER TOBACCO PRODUCTS AT LEAST 20 TIMES IN YOUR ENTIRE LIFE?
-	<u>NON-REMOTE</u> HOW OLD WERE YOU WHEN YOU FIRST STARTED TO SMOKE REGULARLY (THAT IS AT LEAST ONCE A DAY)? <u>REMOTE</u> HOW OLD WERE YOU WHEN YOU FIRST STARTED TO SMOKE REGULARLY (AT LEAST ONE A DAY)	-	<u>ALL</u> HOW OLD WERE YOU/WAS (NAME) WHEN YOU/HE/SHE FIRST STARTED TO SMOKE REGULARLY (THAT IS, AT LEAST ONCE A DAY)	-

11.3.3 Chapter 5 - Supplementary File 2: Additional analysis

11.3.3.1 Supplementary Table 2(a)

A) Percentage of Aboriginal current and ex-smokers who commenced daily smoking before 18 years by age group in 2004-05 and 2012-13, differences between age groups within surveys

Age group	2004-05		2012-13	
	Commenced <18 years % (N)	Difference to age group 10 years younger % (95% CI)	Commenced <18 years % (N)	Difference to age group 10 years younger % (95% CI)
20-29 years	74 (733)	-	73 (592)	-
30-39 years	69 (758)	-6 (-11, 0) ^a	67 (543)	-6 (-12, 1)
40-49 years	71 (572)	2 (-4, 8)	72 (554)	4 (-3, 11)
50-59 years	67 (340)	-3 (-10, 4)	68 (407)	-3 (-11, 5)

11.3.3.2 Supplementary Table 2(b)

B) Percentage of Aboriginal current and ex-smokers who commenced daily smoking before 18 years by approximate birth cohort in 2004-05 and 2012-13, differences between age cohorts between surveys

	2004-05	2012-13	Difference of 2012-13 results to age group 10 years younger in 2004-05 (i.e. from similar birth cohort) % (95% CI)
	Commenced <18 years % (N)	Commenced <18 years % (N)	
20-29 years	74 (733)	73 (592)	-
30-39 years	69 (758)	67 (543)	-7 (-13, -1) ^a
40-49 years	71 (572)	72 (554)	3 (-3, 9)
50-59 years	67 (340)	68 (407)	-2 (-10, 5)

Data sources: 2004-05 NATSIHS, 2012-13 AATSIHS

^a statistically significant difference, $p < 0.05$

11.4 Appendix 4 – Chapter 6 E-print

11.4.1 E-print of published paper at Chapter 6

Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017

CHRISTINA HERIS¹ , NICOLA GUERIN², DAVID THOMAS³ ,
CATHERINE CHAMBERLAIN⁴ , SANDRA EADES¹  & VICTORIA M. WHITE^{2,5} 

¹School of Population and Global Health, University of Melbourne, Melbourne, Australia, ²Centre for Behavioural Research in Cancer, Cancer Council Victoria, Melbourne, Australia, ³Menzies School of Health Research, Darwin, Australia, ⁴Judith Lumley Centre, La Trobe University, Melbourne, Australia, and ⁵School of Psychology, Deakin University, Melbourne, Australia

Abstract

Introduction and Aims. Smoking is a major cause of preventable illness for Indigenous peoples. As most regular smoking is established during adolescence when other substances are often first used, effective tobacco prevention requires an understanding of the patterns of related substance use for Indigenous youth. **Design and Methods.** We reviewed smoking among Indigenous students through cross-sectional analyses of the 2017 Australian Secondary Students' Alcohol and Drug survey and compared findings to non-Indigenous participants. We used logistic regression to evaluate differences in prevalence of tobacco, alcohol and cannabis use, and how smoking and other substance use were related. **Results.** Past month smoking was strongly associated with alcohol and cannabis use for both Indigenous and non-Indigenous students. The association between tobacco and cannabis use did not differ by Indigenous status, but the tobacco and alcohol use association was weaker for Indigenous students ($P = 0.004$). However, the prevalence of tobacco [odds ratio (OR) 1.91 (95% confidence interval; CI 1.55, 2.36)], alcohol [OR 1.44 (1.25, 1.66)] and cannabis [OR 1.97 (1.56, 2.48)] use in the past month was significantly higher in Indigenous than non-Indigenous students. Even within the most socially advantaged sub-group, Indigenous students were more likely to smoke than non-Indigenous students [OR 3.37 (2.23, 5.09)]. **Discussion and Conclusions.** Cannabis and alcohol use are important predictors of smoking for all students. Tobacco policies and community programs must address common determinants of tobacco and other substance use, including resilience and social influence skills as well as broader family and community factors that may be different for Indigenous students. [Heris C, Guerin N, Thomas D, Chamberlain C, Eades S, White VM. Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017. *Drug Alcohol Rev* 2020]

Key words: adolescent, tobacco, cannabis, alcohol consumption, oceanic ancestry group.

Introduction

Smoking continues to be a major cause of preventable ill-health globally, with half of all smokers estimated to die from tobacco-related illnesses [1]. In Australia, smoking is the leading single cause of disease and death [2] and accounts for two-thirds of deaths in current smokers [3]. Australian adult daily smoking rates have declined from 24% in 1995 to 14% in 2017–2018 [4], with current (weekly) smoking also declining markedly between 1996 and 2017 for adolescents aged 12–15 (17% to 3%) and 16–17 years (30% to 10%) [5]. Record low

prevalence has been achieved through a range of tobacco control measures over recent decades [6].

In Australia, smoking has also declined in populations with historically higher prevalence, including those experiencing greater social disadvantage, living outside major cities and Aboriginal and Torres Strait Islander peoples [hereafter, Indigenous people (Note: We use the term 'Indigenous' to refer to Aboriginal and Torres Strait Islander people in Australia and First Nations communities worldwide collectively. This is for ease of reading the paper only and we respectfully acknowledge the diversity and autonomy of Indigenous peoples within this inclusive term)] [2]. Daily smoking among Indigenous adults aged

Christina Heris MPH, PhD Candidate, Nicola Guerin PhD, Research Fellow, David Thomas PhD, Professor, Catherine Chamberlain PhD, Associate Professor, Sandra Eades PhD, Professor, Victoria M. White PhD, Professor. Correspondence to: Ms Christina Heris, Indigenous Epidemiology and Health, Centre for Epidemiology and Biostatistics, School of Population and Global Health, Level 3 207 Bouverie Street, University of Melbourne, Victoria 3010, Australia. Tel: 0401 461 514; E-mail: christina.heris@unimelb.edu.au

Received 13 February 2020; accepted for publication 15 June 2020.

18 years and over declined between 2004–2005 and 2018–2019, from 50% to 40%, but remains almost three times more prevalent than in non-Indigenous Australians (14%) [7]. Smoking is the largest contributing risk factor to the gap in disease burden [8]. This disparity in smoking rates and health outcomes is a legacy of colonisation that introduced commercial tobacco to Indigenous people in rations and entrenched social disadvantage through the enduring impact of government policies [9]. As an ongoing process, colonisation contributes to experiences of life stress, discrimination and disconnection from family and culture, each related to higher smoking prevalence and normalisation [9,10]. This mirrors the experience of colonised Indigenous peoples internationally where smoking rates are higher than the dominant settler population [10].

Most smoking is established during adolescence, including for Indigenous Australians [11,12]. Therefore, it is important to target this age group in prevention programs. The design of effective targeted and mainstream tobacco control interventions will be best supported by improved understanding of current patterns of tobacco use among Indigenous young people and how these differ from non-Indigenous adolescents. A key focus of the current research is the relationship between smoking and known risk factors such as alcohol and other drug use, often also initiated during adolescence [13].

The relationship between smoking and alcohol consumption or illicit drug use has been widely demonstrated

for adults and adolescents [11,14–17]. Problem Behaviour Theory (PBT) explains the co-occurrence of these ‘problem behaviours’ in adolescence [18]. This psychosocial model of health behaviour describes common determinants within three ‘systems’ and how these interact to increase or decrease risk of problem behaviour [18,19]. The systems of: (i) personality (such as self-esteem, values, beliefs); (ii) perceived environment (including peer behaviours, parental monitoring); and (iii) behaviour, conventional (such as academic achievement) and problem behaviours (including substance use), with each problem behaviour related to increased risk of others [18,19]. Later iterations of PBT integrate the broader socio-demographic and socioeconomic environment, and present risk and protective factors in a more exhaustive, ecological model [18,19]. PBT offers a model to understand differences in behaviour between population groups where there are different demographic/economic conditions, social norms and personality system assets (such as self-esteem) (Figure 1).

A handful of studies have explored the relationship between smoking and other substance use for Indigenous adolescents. One systematic review described a strong relationship between smoking and other substance use (primarily alcohol and cannabis) [22]. A longitudinal study of North American Indigenous adolescents in that review used PBT as an analytical framework and found both alcohol and cannabis predicted smoking [21]. Other key predictors were

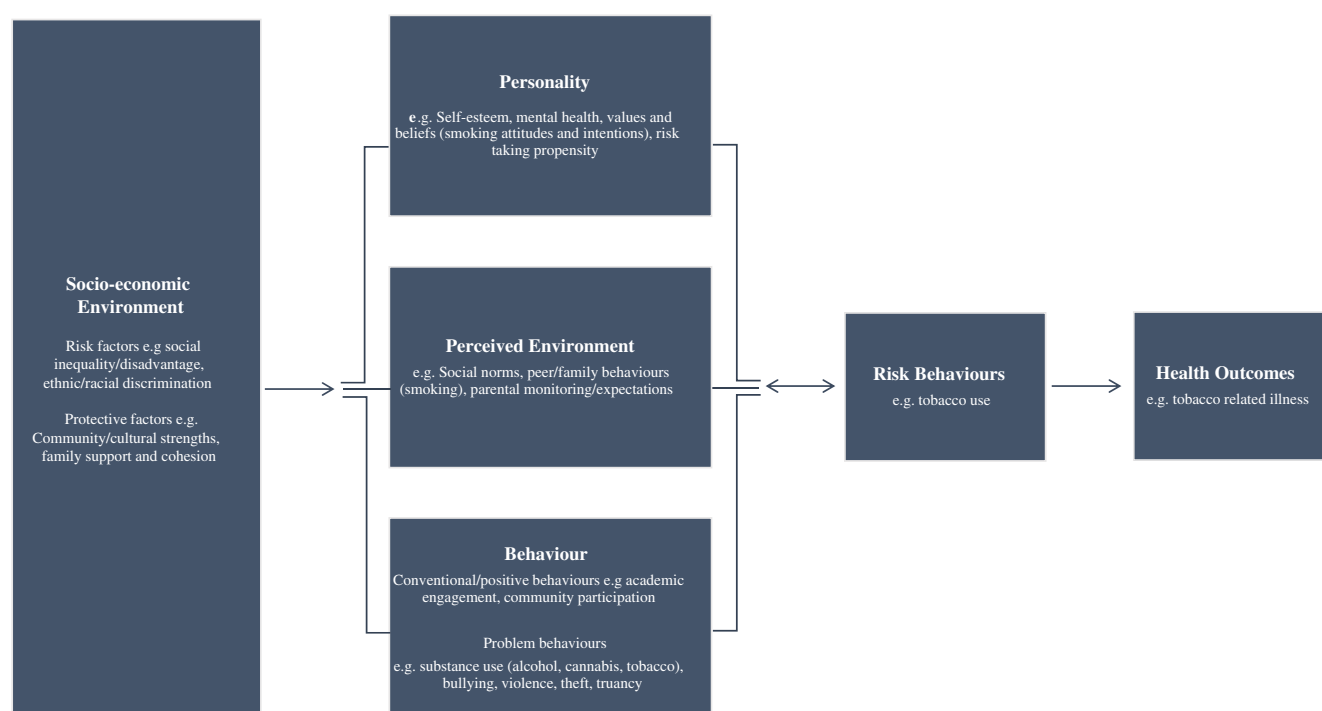


Figure 1. Problem behaviour theory and Indigenous adolescent tobacco use. Adapted from Jessor [20], Yu [21].

deviant behaviours (such as bullying, theft, violence), friends' smoking, intention to smoke and depressive symptoms [21]. However, few studies have explored the relationship between tobacco and substance use in Indigenous Australian adolescents and these have largely been qualitative [23,24]. One found smoking commonly occurred alongside alcohol and cannabis use in social settings, with alcohol providing the opportunity for young people to socialise, increasing access to cigarettes and lowering inhibitions to smoking [23].

In the present study, we used data from the 2017 Australian Secondary Students' Alcohol and Drug Survey (ASSAD), a large, representative sample of students aged 12–17 years. Previous comparisons of regular (past week) and occasional (past month) smoking from the 2014 ASSAD showed higher prevalence among Indigenous than non-Indigenous students (2.6 and 2.4 times higher, respectively [25]). However, these analyses did not explore variations by remoteness and area-level socioeconomic advantage, nor the relationship between smoking and other substance use. We aimed to compare patterns of past month tobacco use among Indigenous and non-Indigenous adolescents aged 12–17 years and evaluate any differences between these groups in associations between smoking and alcohol or cannabis use.

Methods

ASSAD survey

ASSAD is a national, triennial schools-based self-report survey of tobacco, alcohol and other drug use among Australian secondary students. Sampling and survey administration have been described previously and briefly here [26,27]. ASSAD uses a stratified two-stage probability sampling method to randomly select two samples of secondary schools (years 7–10; and years 11–12) in each state and territory, stratified by education sector (government schools, independent schools and Catholic schools), and randomly select representative classes of students within each participating school. Schools with fewer than 100 enrolled students were excluded. Research staff administered the printed questionnaire to participants. All responses were anonymous and confidential.

Ethics and approvals

Principals gave permission to conduct the survey within their school and informed consent was gained from individual students and their parents using active or passive protocols as approved by education bodies.

Approval for the current study was granted by the Cancer Council Victoria Human Research Ethics Committee (HREC1013) and the University of Melbourne HREC (1953771).

Current study

We used data collected during the 2017 school year and included participants aged 12–17 years who reported their Indigenous status.

Measures

Substance use. Primary outcome variables for tobacco, alcohol and cannabis use were calculated as binary measures of 'ever use' (ever had at least a few puffs of a cigarette/not; ever had even part of an alcoholic drink/not; ever smoked or used cannabis/not), and 'past month' use (used in the previous 4 weeks/not).

Indigenous status. Students were asked "Are you of Aboriginal or Torres Strait Islander descent?" and responded: No; Yes—Aboriginal descent; Yes—Torres Strait Islander descent; or Yes—both Aboriginal and Torres Strait Islander descent. Students who self-identified as Aboriginal and/or Torres Strait Islander were classified as 'Indigenous' and those who selected 'No' as 'non-Indigenous'. Those who did not indicate Indigenous status were excluded.

Demographics. Demographic variables included age (continuous and groups 12–15, 16–17), sex (male, female), state or territory, education sector (government, independent, Catholic) and school postcode. School postcode generated two measures of location: area-level socio-economic advantage using the Australian Bureau of Statistics 2016 Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (tertiles of most to least socially disadvantaged areas: 'Low', 'Mid', 'High' Advantage); and 'urban location' ('Urban': major cities; or 'Non-Urban': regional/remote) using the 2016 Australian Statistical Geography Standard five-category remoteness classifications (major cities, inner regional, outer regional, remote, very remote) [28,29]. This five-category remoteness variable was also used.

Statistical analysis

We used STATA MP 14.2 for all analyses. Descriptive statistics for sample characteristics are reported by Indigenous status and age-group (Table 1).

Proportions for past-month substance use are reported by Indigenous status (Tables 2–4). We used logistic regression to assess differences between Indigenous and non-Indigenous students in the likelihood of past-month tobacco, alcohol and cannabis use, a significant effect indicated substance use differed between Indigenous and non-Indigenous students. We also evaluated interactions of Indigenous status and demographic variables. When the *P*-value of adding an interaction term was less than 0.10, we repeated the original analysis separately for the relevant sub-group (completed for area-level socio-economic advantage, sex).

We used the same logistic regression approach to assess whether past-month smoking was associated with past-month alcohol use; past-month cannabis use; or past-month alcohol use and cannabis use considered together. Interaction terms (Indigenous status $\times$ alcohol use; Indigenous status $\times$ cannabis use) indicated differences by Indigenous status in the association between smoking and alcohol use or cannabis use. Unweighted data was used in all logistic regression models and adjusted for clustering within schools to calculate unadjusted odds ratios with 95% confidence intervals (CI). All logistic regression models adjusted for education sector and state/territory, and finally sex, age (continuous), remoteness (five category) and area-level advantage.

Results

Sample characteristics are summarised in Table 1. ASSAD 2017 data included valid responses from 19 430 participants, with 1225 participants self-identifying as Indigenous. We excluded responses from 114 participants (0.6% of the sample) who did not indicate Indigenous status. The proportion of Indigenous students in the sample (6.3%) closely approximated the 5% of Australians aged

12–17 years that self-identified as being of Indigenous origin in the 2016 Census [30]. Higher proportions of non-Indigenous students than Indigenous students attended schools in urban and more socially advantaged areas [Urban: 65.1% non-Indigenous cf. 37.7% Indigenous ($P < 0.001$); High social advantage: 39.0% cf. 15.4% ($P < 0.001$)]. The majority were aged 12–15 years, and a greater proportion of Indigenous students (73.4%) than non-Indigenous (63.2%) were in this age group.

Two-thirds of all students aged 12–17 years had ever used alcohol, while less than one-third had ever used tobacco or cannabis (Table 1). Ever use of alcohol did not differ significantly by Indigenous status overall ($P = 0.137$). Indigenous males were significantly more likely than non-Indigenous males to have ever consumed alcohol [odds ratio (OR) 1.31 (1.04, 1.65)], and Indigenous students in urban [OR 1.39 (1.14, 1.69)] and most disadvantaged areas [OR 1.28 (1.03, 1.60)] were more likely than non-Indigenous students to have consumed alcohol. The likelihood of having ever used tobacco [OR 1.93 (1.65, 2.25)] or cannabis [OR 1.86 (1.54, 2.23)] was significantly higher for Indigenous than non-Indigenous students aged 12–17 years. Among those aged 12–15 years, Indigenous students were around twice as likely to have ever smoked [OR 2.24 (1.88, 2.66)] or used cannabis [OR 2.05 (1.61, 2.61)].

Indigenous students were significantly more likely than non-Indigenous students to have used tobacco [OR 1.91 (1.55, 2.36)], alcohol [OR 1.44 (1.25, 1.66)] or cannabis [OR 1.97 (1.56, 2.48)] in the past-month (Table 2). Odds of past-month tobacco use continued to be significantly higher for Indigenous students compared to non-Indigenous students when also adjusting for alcohol use [OR 1.71 (1.36, 2.15)], cannabis use [OR 1.48 (1.12, 1.94)] or both [OR 1.45 (1.09, 1.93)].

For smoking, the effect of Indigenous status was greater in areas of higher social advantage (overall

Table 1. Number of secondary school students aged between 12 and 17 years surveyed across Australia in 2017, by Indigenous status, age, gender, location and Socio-Economic Indexes for Areas index; lifetime tobacco and other substance use experience

	12–15 years		16–17 years		12–17 years	
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous
Total (<i>n</i>)	899	11 441	326	6650	1225	18 091
% Males	45.5	48.0	50.2	43.9	46.8	46.5
% Urban	33.4	61.2	49.5	71.8	37.7	65.1
% Low advantage	55.6	29.7	47.1	26.0	53.4	28.4
% Mid advantage	30.0	33.1	34.8	31.9	31.3	32.6
% High advantage	14.4	37.2	18.2	42.1	15.4	39.0
% Ever use: Tobacco	24.3	11.2	44.9	31.2	29.8	18.6
% Ever use: Alcohol	64.6	59.7	86.5	83.0	70.4	68.2
% Ever use: Cannabis	18.8	9.5	42.3	29.8	25.2	17.2

Table 2. Likelihood of past month tobacco, alcohol and cannabis use among students aged 12–17 years in 2017 by Indigenous status and significant interactions with socioeconomic status and sex

	% (n/total)	OR (95% CI)	AOR (95% CI)	P-value of interaction with Indigenous status
Past month tobacco use				
Total, 12–17 years				
Non-Indigenous	8.0 (1429/17 947)	1	1	
Indigenous	14.0 (170/1212)	1.89 (1.55, 2.30)	1.91 (1.55, 2.36)	
Area-level social advantage				P = 0.059
Low				
Non-Indigenous	8.9 (452/5085)	1	1	
Indigenous	12.7 (82/646)	1.49 (1.12, 1.98)	1.73 (1.28, 2.33)	
Mid				
Non-Indigenous	8.6 (504/5835)	1	1	
Indigenous	13.7 (52/379)	1.68 (1.24, 2.29)	1.70 (1.22, 2.38)	
High				
Non-Indigenous	6.7 (464/6979)	1	1	
Indigenous	19.4 (36/186)	3.37 (2.23, 5.09)	3.54 (2.12, 5.92)	
Past month alcohol use				
Total, 12–17 years				
Non-Indigenous	28.4 (5121/18014)	1	1	
Indigenous	34.1 (416/1221)	1.30 (1.11, 1.52)	1.44 (1.25, 1.66)	
Past month cannabis use				
Total, 12–17 years				
Non-Indigenous	8.6 (1343/15645)	1	1	
Indigenous	14.1 (145/1031)	1.74 (1.39, 2.8)	1.97 (1.56, 2.48)	
Sex				P = 0.041
Male				
Non-Indigenous	9.6 (684/7143)	1	1	
Indigenous	14.2 (64/450)	1.57 (1.16, 2.11)	1.61 (1.18, 2.20)	
Female				
Non-Indigenous	7.6 (629/8277)	1	1	
Indigenous	14.0 (78/556)	1.98 (1.50, 2.62)	2.31 (1.73, 3.08)	

AOR: odds ratio (OR) adjusted for school type, state, age, sex, school location, area-level advantage. CI, confidence interval.

interaction test approached significance: $P = 0.059$). Specifically, smoking among Indigenous students in areas of high social advantage was 19.4%, 6.7% non-Indigenous [OR 3.54 (2.12, 5.92)]; 12.7% in areas of low social advantage cf. 8.9% [OR 1.73 (1.28, 2.33)].

Patterns of past-month tobacco use were similar for both Indigenous and non-Indigenous students (Table 3) with no significant difference in the likelihood of use by sex, urban/non-urban or social advantage of area. Older students (16–17 years) were significantly more likely to have used tobacco in the past month than younger students (12–15 years) [Indigenous OR 2.53 (1.72, 3.70); non-Indigenous OR 3.79 (3.23, 4.34)].

For both Indigenous and non-Indigenous students, the likelihood of past-month smoking increased significantly with past-month alcohol and/or cannabis use (Table 4). Adjusting for use of the other substance (either cannabis or alcohol) reduced the associations between past month smoking and drinking or cannabis use substantially (by approximately half), but the

relationship remained significant for both Indigenous and non-Indigenous students.

The relationship between cannabis and tobacco use did not vary significantly by Indigenous status [interaction $P = 0.86$, Indigenous OR 18.17 (11.14, 29.62); non-Indigenous OR 24.23 (20.56, 28.56)]. There was however a significant interaction between Indigenous status and past month drinking ($P = 0.004$) whereby the association of smoking and drinking was stronger among non-Indigenous students [OR 17.39 (14.51, 20.85)] than Indigenous students [OR 8.79 (5.73, 13.48)].

Discussion

We examined smoking and other substance use among Australian secondary students in 2017 and found that regardless of Indigenous status smoking prevalence was higher among those who had used either alcohol or cannabis than for non-users. However, the association between alcohol and tobacco use was significantly

Table 3. Association of demographic factors with past month tobacco use among Indigenous and non-Indigenous students aged 12–17 years in 2017 by sex, age and residence

	% (n/total)	OR (95% CI)	AOR (95% CI)
Past month tobacco use			
<i>Indigenous</i>			
Total	14.0 (170/1212)	-	
Sex			
Male	14.8 (81/547)	1	1
Female	13.3 (84/634)	0.88 (0.64, 1.20)	0.92 (0.67, 1.27)
Age, years			
12–15	10.6 (94/887)	1	1
16–17	23.4 (76/325)	2.57 (1.81, 3.66)	2.53 (1.72, 3.70)
School location			
Urban	14.5 (66/455)	1	1
Non-urban	13.8 (104/756)	0.94 (0.63, 1.40)	1.50 (0.93, 2.43)
Low advantage	12.7 (82/646)	1	1
Mid advantage	13.7 (52/379)	1.09 (0.70, 1.72)	1.11 (0.70, 1.74)
High advantage	19.4 (36/186)	1.65 (1.07, 2.55)	1.59 (0.94, 2.70)
<i>Non-Indigenous</i>			
Total	8.0 (1429/17947)	—	
Sex			
Male	8.1 (660/8197)	1	1
Female	7.8 (736/9482)	0.96 (0.83, 1.12)	0.93 (0.81, 1.07)
Age, years			
12–15	4.3 (487/11328)	1	1
16–17	14.2 (942/6619)	3.69 (3.04, 4.48)	3.79 (3.23, 4.34)
School location			
Urban	7.6 (886/11648)	1	1
Non-urban	8.5 (534/6251)	1.13 (0.87, 1.48)	1.14 (0.91, 1.41)
Low advantage	8.9 (452/5085)	1	1
Mid advantage	8.6 (504/5835)	0.97 (0.71, 1.32)	0.92 (0.74, 1.15)
High advantage	6.7 (464/6979)	0.73 (0.52, 1.03)	0.94 (0.71, 1.26)

AOR, odds ratio (OR) adjusted for school type, state, age, sex, school location, area-level advantage. CI, confidence interval.

Table 4. Likelihood of past month tobacco use among Indigenous and non-Indigenous students 12–17 years in 2017, by past month alcohol and cannabis use

Past month tobacco use					
% (n/total)		OR (95% CI)	AOR ^a (95% CI) adjusted for demographics	AOR ^b (95% CI) adjusted for demographics and substance use	P-value of interaction with Indigenous status
Indigenous students					
<i>Past-month alcohol use</i>					
No	4.2 (33/794)	1	1	1	0.004 ^a /0.013 ^b
Yes	33.1 (137/414)	11.41 (7.93, 16.41)	8.79 (5.73, 13.48)	4.79 (2.89, 7.94)	
<i>Past-month cannabis use</i>					
No	6.4 (56/880)	1	1	1	0.086 ^a /0.282 ^b
Yes	57.9 (84/145)	20.26 (12.97, 31.65)	18.17 (11.14, 29.62)	11.57 (7.12, 18.79)	
Non-Indigenous students					
<i>Past-month alcohol use</i>					
No	1.4 (178/12789)	1	1	1	—
Yes	24.4 (1242/5090)	22.87 (19.07, 27.42)	17.39 (14.51, 20.85)	9.31 (7.65, 11.31)	
<i>Past-month cannabis use</i>					
No	3.7 (528/14224)	1	1	1	—
Yes	55.6 (741/1333)	32.47 (27.74, 38.00)	24.23 (20.56, 28.56)	12.07 (10.23, 14.23)	

^aAdjusted for all demographic variables (school type, state, age, sex, school location, area-level advantage). ^bAdjusted for other substance use variable with all demographic variables (school type, state, age, sex, school location, area-level advantage and alcohol or cannabis). AOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

weaker for Indigenous students. Overall, Indigenous students had higher prevalence of tobacco, alcohol and cannabis use in the past month than non-Indigenous students. These findings for 2017 ASSAD data extend reported 2014 findings [25] and allow evaluation of the effects of the later Australian policy environment, which saw further increases in cigarette price and more legislation for smoke-free environments [6,31].

Many studies have identified a cluster of risk behaviours for adolescent smoking, including alcohol and illicit drug use [11,14–17]. These associations have been found among Indigenous adolescents of North America [22,32] and in qualitative work in Australia [23,24] with researchers noting the importance of social settings that promote sharing and experimentation with illicit substances. Our results suggest other substance use is an important risk factor for smoking for all young people.

Our finding of a significantly weaker association between alcohol and tobacco use for Indigenous than non-Indigenous students indicates a less uniquely important role of alcohol use for Indigenous students. One potential explanation is that smoking in non-Indigenous students more commonly occurs in social settings where students are trialling alcohol. In contrast, with higher community level smoking prevalence, Indigenous students are likely to have more frequent access and opportunities to experiment with tobacco, and consequently establish regular smoking. Indigenous adolescents are also more likely to experience other drivers of smoking. An Australian qualitative study reported that Indigenous and non-Indigenous Australian adolescents provided similar descriptions of concurrent social smoking and alcohol use, but Indigenous adolescents were more likely to say their smoking was related to stress and life problems [24], which may be related to a greater likelihood of experiencing such events [22]. The stronger and consistent association between cannabis and tobacco use may reflect that cannabis is often mixed with tobacco when it is smoked [33].

The strong association between smoking, drinking and cannabis use clearly suggests common determinants as explained by PBT. Adolescent smoking can also serve as an indicator of risk, with those who experiment or establish smoking in early high school more likely to adopt other problem behaviours, including substance use, later in high school and adolescence [32,34]. The call for coordinated health promotion programs to address multiple risk behaviours through common determinants has been made for both Indigenous adolescents [21,32,35] and adolescents in general [15,34]. These determinants may include self-efficacy and other coping and refusal skills that can be applied to multiple behaviours, as well as important protective factors such as self-esteem, family relationships and peer attitudes [15,32]. Additional protective factors

identified specifically for Indigenous adolescents include cultural connectedness [21,35].

Our results thus suggest that a coordinated and holistic approach to substance use prevention is likely to be most effective, and provide efficiencies in community programs and school curriculums. This is supported by reviews of school-based interventions, which have shown mixed results for tobacco prevention and recommend targeting broader determinants to protect against substance use, rather than focusing on information provision alone. Broader determinants include promoting social and emotional wellbeing, and skills development, such as self-efficacy and problem solving [36,37]. An Australian school-based cluster-randomised controlled trial of a program aiming to improve mental health and build resilience among students while reducing tobacco, alcohol and illicit drug use, achieved reductions in regular smoking [38]. However, a second trial showed no effect on smoking, highlighting the need for a better understanding of individual, family and community-level protective factors as well as additional risk factors, such as substance use among family and friends [39].

One approach focused on promoting protective factors in the social and community environment to reduce adolescent risk behaviours is *Communities That Care*, a community-based intervention framework first developed in the United States and later applied in Australia [40]. Using a mix of evidence-based family, school and community interventions, *Communities That Care* localities saw significant and more rapid declines in adolescent tobacco, alcohol and cannabis use than in the general population [40]. However, the evaluation did not report results specifically for Indigenous Australian adolescents, and there continues to be limited evidence of the effectiveness of tobacco prevention interventions with Indigenous adolescents [41,42].

While it is likely that some components of an intervention will be universally effective, tobacco prevention programs must also take into account the smoking context for Indigenous adolescents, including higher community prevalence and the influence of unique social, economic, cultural and historical factors. Our finding of greater past month tobacco use among Indigenous than non-Indigenous adolescents is consistent with international findings of higher smoking among other Indigenous populations, including Māori in New Zealand, and American Indian or Alaska Native secondary students in North America [43,44]. The drivers of this are complex and include the normalisation of smoking in high prevalence environments. As the ASSAD survey does not collect national information on family or peer smoking, a key predictor for youth smoking, it was not possible to consider this in our analysis.

Moreover, the higher prevalence of smoking in Indigenous communities is underpinned by a range of social and cultural determinants related to ongoing colonisation processes that manifest in persistent disparities in education, employment and access to health services (including tobacco control activities), combined with forced disconnection from culture, limits on self-determination, effects of intergenerational trauma and experiences of racial discrimination [10,45].

In our study, the differences between Indigenous and non-Indigenous smoking prevalence were greater for those in more socio-economically advantaged areas than for those in more disadvantaged areas. That is, prevalence was more similar in students attending schools in more socio-economically disadvantaged areas (where there is a higher overall likelihood of smoking) reflecting the relationship between social determinants and smoking for all populations. Although relative advantage as determined by school location does not necessarily equate to individual household situation, our findings indicate that the difference in smoking prevalence in Indigenous and non-Indigenous students in more advantaged areas is not fully explained by socio-economic factors. Similar findings have been reported for Indigenous adults, where smoking differences by Indigenous status were greater among adults who were not experiencing socioeconomic disadvantage [46]. Again, highlighting the additional risk factors experienced by Indigenous people. Conversely, increasingly evidence shows the importance of Indigenous cultures for health and wellbeing and protective against adolescent smoking [35,47,48].

Strengths and limitations

A key strength of this study is the largely representative sample, with the proportion of Indigenous students corresponding to national census data [30]. Furthermore, the proportion of Indigenous students from urban schools (38%) closely approximated the proportion of Indigenous people residing in urban areas (37% major cities) and the sample skewed towards areas of greater social disadvantage, in line with the national distribution of Indigenous people against the SEIFA index [49]. The Indigenous leadership in this study is also a key strength of the work and a self-determining research approach.

However, some limitations should be also be considered. ASSAD sampling excludes schools of fewer than 100 students, which might have reduced the representativeness as smaller schools are more likely to be in non-urban areas. Also, our analyses are cross-sectional and do not support causal conclusions. While teachers were frequently present when students completed the

survey, it was administered by research staff and we found no evidence of under-reporting substance use with teacher presence. Finally, only adolescents currently attending school are included in the sample. Older adolescents might be underrepresented and, as school attendance is associated with non-smoking [5], our findings might underestimate prevalence for students aged 16–17 generally and Indigenous adolescents specifically with lower proportions aged 16–17 years in this sample (27% Indigenous cf. 37% non-Indigenous) and lower comparative school attendance [50]. However, the large size and highly representative random sample of younger adolescents allowed us to evaluate key risk factors for adolescent smoking including age, remoteness, social disadvantage, and other substance use, while noting that both remoteness and social disadvantage are area level indicators from school postcode, not individual residence, and as such some participants may be misclassified.

Implications for policy and practice

Our findings demonstrate the importance of considering underlying social and cultural determinants of smoking in developing tobacco control policy, as well as reducing the appeal and availability of tobacco products. Unlike school-based interventions, community-driven programs also have the potential to reach young people not attending school and to leverage family and community protective factors, to holistically address related risk factors which also predict alcohol and cannabis use. Additional risk and protective factors likely to also be important for smoking among Indigenous adolescents include racism [51], and the role of cultural strengths in promoting adolescent wellbeing [35,52]. While a significant evidence gap remains for the effectiveness of prevention interventions with Indigenous youth, comprehensive, resourced, strengths-based community-controlled programs are likely to be most effective and urgently needed [9,41]. Integrating and disseminating Indigenous-led program evaluation findings would benefit Indigenous communities globally. However, mainstream programs and population level policies to reduce tobacco and other substance use among both young people and adults remain vital to ensure community level interventions are reinforced in wider social and economic environments. Evaluation of the impact of these measures with Indigenous adolescents is also a priority.

Acknowledgements

The authors thank and acknowledge the government and non-government education authorities, the school principals, teachers and students who cooperated to

make this study possible. We thank the research staff for assistance with data collection. The ASSAD survey receives funding from the Australian Government Department of Health and State and Territory Governments of New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, the Northern Territory and the Australian Capital Territory; as well as from Cancer Councils in Victoria, South Australia, Queensland and Tasmania, Cancer Institute NSW and the South Australian Health and Medical Research Institute. CH received a PhD scholarship from the Australian Prevention Partnership Centre funded through the National Health and Medical Research Council (NHMRC) partnership centre grant scheme (Grant ID: GNT9100001, GNT9100003) with the NHMRC, Australian Government Department of Health, ACT Health, Cancer Council Australia, NSW Ministry of Health, South Australian Department for Health and Wellbeing, Tasmanian Department of Health, and VicHealth. CC receives an NHMRC Career Development Fellowship (1161065).

Conflict of Interest

The authors have no conflicts of interest.

References

- [1] World Health Organization. Tobacco fact sheet. Geneva, Switzerland: World Health Organization; 2019. Available at: <http://www.who.int/news-room/fact-sheets/detail/tobacco> (accessed 14 October 2019).
- [2] Australian Institute of Health and Welfare. Alcohol, tobacco & other drugs in Australia. Canberra: AIHW, 2019 Available at: <https://www.aihw.gov.au/reports/alcohol/alcohol-tobacco-other-drugs-australia> (accessed 14 October 2019).
- [3] Banks E, Joshy G, Weber MF *et al.* Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Med* 2015;13:38.
- [4] Australian Bureau of Statistics. 4364.0.55.001—National Health Survey: First Results, 2017–18. Canberra: ABS, 2019 Available at: <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.001~2017-18~Main%20Features~Smoking~85>.
- [5] Greenhalgh E, Winstanley M. 1.6 Prevalence of smoking—teenagers. In: Scollo MM, Winstanley MH, eds. Tobacco in Australia: facts and issues. Melbourne: Cancer Council Victoria, 2019 Available at: <https://www.tobaccoinaustralia.org.au/chapter-1-prevalence/1-6-prevalence-of-smoking-teenagers> (accessed 9 December 2019).
- [6] Department of Health. Tobacco control timeline. Canberra: Commonwealth of Australia; 2018. Available at: <https://www.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc~timeline> (accessed 15 October 2019).
- [7] Australian Bureau of Statistics. 4715.0 - National Aboriginal and Torres Strait Islander Health Survey, 2018–19. Canberra: ABS, 2019. Available at: <https://www.abs.gov.au/ausstats/abs@.nsf/PrimaryMainFeatures/4715.0> (accessed 11 December 2019).
- [8] Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011. Australian Burden of Disease Study series no. 6. Cat. no. BOD 7. Canberra: AIHW, 2016 Available at: www.aihw.gov.au/reports/burden-of-disease/australian-bod-study-2011-indigenous-australians (accessed 12 October 2019).
- [9] Briggs VL, Lindorff KJ, Ivers RG. Aboriginal and Torres Strait Islander Australians and tobacco. *Tob Control* 2003;12:ii5–8.
- [10] van der Sterren A, Greenhalgh E, Knoche D, Winstanley M. Chapter 8 Tobacco use among Aboriginal peoples and Torres Strait Islanders. In: Scollo MM, Winstanley MH, eds. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria, 2016 Available from: www.tobaccoinaustralia.org.au/chapter-8-aptsi (accessed 14 October 2019).
- [11] US Department of Health and Human Services. Chapter 3. The epidemiology of tobacco use among young people in the United States and Worldwide. In: Preventing tobacco use among young people. A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2012. Available from: www.cdc.gov/tobacco/data_statistics/sgr/2012/ (accessed 15 October 2019).
- [12] Heris CL, Eades SJ, Lyons L, Chamberlain C, Thomas DP. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Res & Pract* 2020;30:e29121906.
- [13] Sawyer SM, Afifi RA, Bearinger LH *et al.* Adolescence: a foundation for future health. *Lancet* 2012;379:1630–40.
- [14] Winstanley M, Wood L, Greenhalgh E, Letcher T. Chapter 5 Influences on the uptake and prevention of smoking. In: Scollo MM, Winstanley MH, eds. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria, 2014 Available from: www.tobaccoinaustralia.org.au/chapter-5-uptake (accessed 5 March 2018).
- [15] Wiefferink CH, Peters L, Hoekstra F, Dam GT, Buijs GJ, Paulussen TGWM. Clustering of health-related behaviors and their determinants: possible consequences for school health interventions. *Prev Sci* 2006;7: 127–49.
- [16] Meader N, King K, Moe-Byrne T *et al.* A systematic review on the clustering and co-occurrence of multiple risk behaviours. *BMC Public Health* 2016;16:657.
- [17] Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: a critical review of the literature. *Tob Control* 1998;7:409–20.
- [18] Jessor R, Costa FM. Problem-Behavior Theory—A Brief Overview n.d. Available from: https://ibs.colorado.edu/jessor/pb_theory.html (accessed 11 December 2019).
- [19] Jessor R, Donovan JE, Costa FM. Beyond adolescence: problem behaviour and young adult development. Cambridge, UK: Cambridge University Press, 1994.
- [20] Jessor R. The origins and development of problem behavior theory. New York: Springer; 1994.
- [21] Yu M, Whitbeck LB. A prospective longitudinal study of cigarette smoking status among North American Indigenous adolescents. *Addict Behav* 2016;58:35–41.
- [22] Heris CL, Chamberlain C, Gubhaju L, Thomas DP, Eades SJ. Factors influencing smoking among Indigenous adolescents aged 10–24 years living in Australia, New Zealand, Canada and the United States: a systematic review. *Nicotine Tob Res* 2019 [Epub ahead of print].
- [23] Johnston V, Westphal DW, Earnshaw C, Thomas DP. Starting to smoke: a qualitative study of the experiences of Australian Indigenous youth. *BMC Public Health* 2012;12:963.
- [24] Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr* 2010;21:208–14.
- [25] Australian Institute of Health and Welfare. Tobacco indicators: measuring midpoint progress—reporting under the National Tobacco Strategy 2012–2018. Drug statistics series no. 30. Cat. no. PHE 210. Canberra: AIHW, 2016 Available at: www.aihw.gov.au/reports/smoking/tobacco-indicators-measuring-midpoint-progress (accessed 28 May 2019).
- [26] White V, Mason T, Briggs V. How do trends in smoking prevalence among Indigenous and non-Indigenous Australian secondary students between 1996 and 2005 compare? *Aust N Z J Public Health* 2009;33: 147–53.
- [27] Guerin N, White V. ASSAD 2017 Statistics & Trends: Australian Secondary Students' Use of Tobacco, Alcohol, Over-the-counter Drugs, and Illicit Substances. Cancer Council Victoria; 2018.
- [28] Australian Bureau of Statistics. 1270.0.55.005—Australian Statistical Geography Standard (ASGS): Volume 5—Remoteness Structure. Canberra: ABS, 2018 Available at: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/1270.0.55.005> (accessed July 2016).

- [29] Australian Bureau of Statistics. 2033.0.55.001—Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. Canberra: ABS, 2018 Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001> (accessed 9 December 2019).
- [30] Australian Bureau of Statistics. 2002.0-2006. Census of Population and Housing: Aboriginal and Torres Strait Islander Peoples Profile. Canberra: ABS, 2017 Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument (accessed 26 August 2019).
- [31] Grace C. Chapter 15.7 Legislation to ban smoking in public places. In: Scollo MM, Winstanley MH, eds. Tobacco in Australia: Facts and issues. Melbourne: Cancer Council Victoria, 2019 Available from: <https://www.tobaccoinaustralia.org.au/chapter-15-smokefree-environment/15-7-legislation> (accessed 15 October 2019).
- [32] Hautala D, Sittner K, Walls M. Onset, comorbidity, and predictors of nicotine, alcohol, and marijuana use disorders among North American Indigenous adolescents. *J Abnorm Child Psychol* 2019;47:1025–38.
- [33] Thomas DP, Davey ME, Panaretto KS, van der Sterren AE. Cannabis use among two national samples of Aboriginal and Torres Strait Islander tobacco smokers. *Drug Alcohol Rev* 2018;37:S394–403.
- [34] Ellickson PL, Tucker JS, Klein DJ. High-risk behaviors associated with early smoking: results from a 5-year follow-up. *J Adolesc Health* 2001;28:465–73.
- [35] Henson M, Sabo S, Trujillo A, Teufel-Shone N. Identifying protective factors to promote health in American Indian and Alaska Native adolescents: a literature review. *J Prim Prev* 2017;38:5–26.
- [36] Thomas RE, McLellan J, Perera R. School-based programmes for preventing smoking. *Evid Based Child Health* 2013;8:1616–2040.
- [37] Stewart-Brown S. What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach? Copenhagen: WHO Regional Office for Europe (Health Evidence Network report), 2006 Available at: http://www.euro.who.int/_data/assets/pdf_file/0007/74653/E88185.pdf (accessed 16 October 2019).
- [38] Bond L, Patton G, Glover S *et al.* The gatehouse project: can a multi-level school intervention affect emotional wellbeing and health risk behaviours? *J Epidemiol Community Health* 2004;58:997–1003.
- [39] Hodder RK, Freund M, Bowman J *et al.* Effectiveness of a pragmatic school-based universal resilience intervention in reducing tobacco, alcohol and illicit substance use in a population of adolescents: cluster-randomised controlled trial. *BMJ Open* 2017;7:e016060.
- [40] Toumbourou JW, Rowland B, Williams J, Smith R, Patton GC. Community intervention to prevent adolescent health behavior problems: evaluation of communities that care in Australia. *Health Psychol* 2019;38:536–44.
- [41] Chamberlain C, Perlen S, Brennan S *et al.* Evidence for a comprehensive approach to Aboriginal tobacco control to maintain the decline in smoking: an overview of reviews among Indigenous peoples. *Syst Rev* 2017;6:135.
- [42] Carson KV, Brinn MP, Labiszewski NA *et al.* Interventions for tobacco use prevention in Indigenous youth. *Cochrane Database Syst Rev* 2012;18:CD009325.
- [43] ASH – Action for Smokefree 2025. 2018 ASH Year 10 Snapshot. Available from: https://www.ash.org.nz/ash_year_10 (accessed 31 January 2019).
- [44] Centers for Disease Control Prevention (CDC). 1991–2017 High School Youth Risk Behavior Survey Data. Available from: <http://nccd.cdc.gov/youthonline/> (accessed 31 January 2019).
- [45] King M, Smith A, Gracey M. Indigenous health part 2: the underlying causes of the health gap. *Lancet* 2009;374:76–85.
- [46] Australian Bureau of Statistics. 4722.0.55.004 - Tobacco Smoking - Aboriginal and Torres Strait Islander people: A snapshot, 2004–05 Canberra: ABS; 2007. Available from: www.abs.gov.au/AUSSTATS/abs@.nsf/productsbyCatalogue/D030A9BD9BF14B08CA25730E0021BCE1 (accessed 15 October 2019).
- [47] Bourke S, Wright A, Guthrie J, Russell L, Dunbar T, Lovett R. Evidence review of Indigenous culture for health and wellbeing. *Int J Health Wellness Soc* 2018;8:11–27.
- [48] Unger JB, Sussman S, Begay C, Moerner L, Soto C. Spirituality, ethnic identity, and substance use among American Indian/Alaska Native adolescents in California. *Subst Use Misuse* 2020;55:1194–8.
- [49] Australian Bureau of Statistics. 2076.0 - Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2016 Canberra: ABS; 2018 [cited 3 June 2019]. Available from: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/2076.0>.
- [50] Department of Prime Minister and Cabinet. Closing the gap report 2019. Canberra: Commonwealth of Australia, 2019.
- [51] Cave L, Cooper MN, Zubrick SR, Shepherd CC. Caregiver-perceived racial discrimination is associated with diverse mental health outcomes in Aboriginal and Torres Strait Islander children aged 7–12 years. *Int J Equity Health* 2019;18:142.
- [52] Department of Health. Implementation plan for the National Aboriginal and Torres Strait Islander health plan 2013–2023. Canberra: Commonwealth of Australia; 2015.

11.5 Appendix 5 – Chapter 7 Supplementary Material

11.5.1 Chapter 7 - Supplementary File 1: Summary of survey questions used in analysis

TOPIC	QUESTION	Primary Caregiver	Youth	Notes
Demographics	Age (years)		Y	Categorised as 12-15/16-17 Continuous measure used in adjusted regression analyses
Demographics	Sex (male/female)		Y	Categorised Female/Male
Demographics	What relationship is the main adult who looks after you at home to you? (Mother/Father/Grandmother/Grandfather/Aunty/Uncle/Sibling/Foster Carer/Guardian/Other)		Y	Categorised Mother/Other
Demographics	Do you still go to school? (<i>No/Yes/ Refused/Don't know</i>)		Y	Categorised Yes/No
Demographics	Are you of Aboriginal or Torres Strait Islander descent? (<i>Yes, Aboriginal/Yes, Torres Strait Islander/Yes, Aboriginal & Torres Strait Islander/No</i>)	Y		Categorised as (Aboriginal and/or Torres Strait Islander) / Non-Aboriginal
Demographics	How would you describe your current employment status? (<i>employed full-time/part-time/unemployed/student and working/student and not working/ home duties/retired/unable to work due to health problems/other/refused/don't know</i>)	Y		Categorised as (Employed/Studying) / Home duties / (Unemployed/Unable to work due to health)
Demographics	Which these groupings would best describe your household's income for the past 2 weeks from all sources (e.g. wages, CDEP, pensions and study allowances etc)? (<i>\$1-\$199/\$200-\$399/\$400-\$599/\$600-\$799/\$800-\$1999/\$2000 and over/None/Other/Refused/Don't Know</i>)	Y		Categorised as <\$400/\$400-\$799/\$800 or more, and <\$800/\$800 or more
Demographics	What qualifications do you have? (Cross all that apply) (<i>None/ Trade/apprenticeship /Certificate from college /Diploma (beyond Year 12) /Bachelor degree /Post Graduate Diploma/higher degree /Other (please specify /refused/ don't know)</i>)	Y		Categorised as None / (Trade/Certificate/Diploma/Other) / (Bachelor Degree/Post-Graduate Degree)
Demographics	Since [SC] was born how many different house has he/she lived in? (<i>[] number / refused / don't know</i>)	Y		Categorised to <4 houses / 4+ houses

TOPIC	QUESTION	Primary Caregiver	Youth	Notes
Smoking	Have you ever smoked cigarettes regularly? <i>(Yes/No/Refused/Don't know)</i>	Y	Y	Categorised as Yes/No Youth response of "No" = primary outcome of 'Never Smoked Regularly' in analysis.
Smoking	Are you a regular smoker now? <i>(No/Yes/ Refused/Don't know)</i>	Y	Y	Categorised as Yes/No PC response of "Yes" = caregiver current smoking exposure Combined with previous question to categorise as Current/Former/Never
Smoking	Do either of your parents smoke cigarettes <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as Yes/No
Smoking	During the pregnancy with [SC] did you/did [SC]'s mother smoke cigarettes? <i>(No/Yes/ Refused/Don't know)</i>	Y		Categorised as Yes/No PC response of "No" = no in utero smoking exposure
Smoking	How many people who live there smoke inside your home? <i>([] Number / Refused / Don't Know)</i>	Y		Categorised as Smoking Allowed in Home: Yes (1 or more) / No (o) PC response of "o" = smoke-free home measure
Smoking	How old were you when you started smoking? <i>([] Years/Refused/Don't Know)</i>		Y	Categorised as <13 years / 13+ years
Smoking	About how many cigarettes per day do you smoke now or did you smoke in the past (if you have given up) <i>([] cigarettes per day)</i>		Y	Categorised as 1-4 cigarettes / 5-9 cigarettes / 10+ cigarettes
Individual	Have you ever had a full serve of alcohol? (e.g. a glass of wine, a whole nip of spirits, a glass of beer etc) <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as ever (yes)/never (no)
Individual	How often have you used any of the following: Marijuana/yarndi <i>(never/over one year ago/less than monthly/about weekly/daily/refused/don't know)</i>		Y (16-17)	Categorised as ever (any other response)/never
Individual	Have you ever had sex? <i>(No/Yes/ Refused/Don't know)</i>		Y (16-17)	Categorised as ever (yes)/never (no)

TOPIC	QUESTION	Primary Caregiver	Youth	Notes
Individual	Over the past 7 days, have you exercised or played sport or games that made you sweat or breath hard (e.g. basketball, netball, football, riding a bike, running)? <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as No/Yes
Individual	During the past 12 months have you seriously thought about killing yourself? <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as Yes/No
Individual	Strengths and Difficulties Questionnaire (SDQ) (25 statements, 6 questions) <i>(Generates a total difficulties score)</i>		Y	Categorised as Close to average (0-13)/ Elevated (14+) The SDQ has been validated with the SEARCH cohort ^{16, 17}
Individual	How much do you know about Aboriginal culture and history <i>(Nothing at all/ a little / some / quite a lot / a great deal / refused / don't know)</i>		Y	Categorised as Nothing at all / At least a little (all other responses)
Social	How important is it for you to: (i) Have good marks at school; (ii) Attend school regularly. <i>(Not at all/ a little/ some/ quite a lot/ very much/ refused/ don't know)</i>		Y	Categorised as (Not at all – a little) / (Some – quite a lot) / (Very much)
Social	In the past 6 months have people treated you badly or refused you service because you are Aboriginal? <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as Yes/No
Social	In the past 6 months have you: a) Been questioned by the police about something they thought you might have done or been involved with? b) Been to court or had a warning from the police for anything you have done? c) Been to children's court for anything you have done? <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as Yes/No Also combined variable of all three questions and following juvenile justice centre question for “Any interaction with justice system (Any/None)”
Social	Have you ever been sentenced to spend time in a juvenile justice centre or prison? <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as Yes/No
Social	Have any of your friends ever been sentenced to spend time in a prison or juvenile justice centre? <i>(No/Yes/ Refused/Don't know)</i>		Y	Categorised as Yes/No

TOPIC	QUESTION	Primary Caregiver	Youth	Notes
Social	Stressful life events (16 questions) Have any of these issues affected you and your family in the past 12 months? (<i>No/Yes/ Refused/Don't know</i>) a) A close family member had a serious medical problem (illness or accident) and was in hospital b) A close family member was badly hurt, injured or sick c) A close family member was arrested or in gaol/prison d) Your child/children were involved in or upset by family arguments e) A parent/caregiver lost his/her job or became unemployed f) A close family member had an alcohol or drug problem g) Your family didn't have enough money to buy food, for bus fares or to pay bills h) A close family member has a physical handicap i) An important family member passed away j) Parents or carer left (because of family problems) k) You have felt too crowded in where you lived l) Your child/children had to take care of others in the family m) Your child/children have been in a foster home n) Your child/children were badly scared by other people's behaviour o) Your child/children were suspended or expelled from school p) You were forced to move out of a place you were living for any reason	Y		Categorised individually as Yes/No Grouped variable of More than two SLEs in 12 months/ two or fewer Individual items (d) and (o) are also reported. Item (d) is described as a measure of family relationships.
Environment	Do you strongly agree, agree, are neutral, disagree or strongly disagree: This neighbourhood has a strong sense of community (<i>strongly agree/agree/neutral/disagree/strongly disagree/refused/don't know</i>)	Y		Categorised as 'Strongly disagree/disagree' / 'Neutral/agree/strongly agree'
Environment	Are you happy with what is available for you to do in your free time, like movies, disco, sports, places to go? (<i>Very unhappy/a little bit unhappy/neither happy nor unhappy/a little bit happy/very happy/refused/don't know</i>)		Y	Categorised as 'Very unhappy/little bit unhappy/neutral' / 'A little bit happy/very happy'

11.5.2 Chapter 7 - Supplementary File 2: Comparison of key characteristics and exposures
between those with and without complete smoking data

	Included participants with complete smoking data (n=106)	Excluded participants with incomplete smoking data (n=14)
12-15 years % (Mean age)	80% (14.5)	100% (14.1)
Female	53%	50%
Mother as primary carer	75%	86%
Attending school	86%	93%
Carer employed	86%	73%
Carer post school qualifications	58%	50%
Fortnightly household income \$800+	54%	20%
Lived in <4	48%	67%
Parent currently smokes (youth)	75%	57%
Caregiver currently smokes (self)	52%	50%
Maternal smoking	59%	67%
Smoke-free home	60%	64%
Never drunk alcohol	68%	64%
Good mental health	66%	62%
Questioned by police	21%	50%
Stressful life events (<3)	27%	25%
Children not upset by family arguments	53%	67%
Children not suspended or expelled	72%	67%

11.6 Appendix 6 – Chapter 8 Supplementary Material

11.6.1 Chapter 8 – Supplementary File 1: Discussion Guides

11.6.1.1 Supplementary File 1(a): Original Discussion Guide

- Welcome + reminder of ethics
- Introductions

- What does being “healthy” mean to you? What does it look like?
- What is the opposite?
- What things help or don’t help being healthy?

- Where does smoking fit in that mix?
- What have you seen or heard about smoking?
- How do you think most people your age feel about smoking?
- Would anyone like to share any experiences – your own or friends or family?
- What things do you think might mean someone takes up smoking?
- What things do you think might prompt them to quit?
- What about never taking up smoking at all?

- Card sort activity – things that you think may be important for when or how someone like you might start smoking or not.
 - Pull out the three most important things for young people smoking
 - Pull out the three most important things for staying a non-smoker
 - Tell us a bit about the ones you picked out. Any that were not important at all?

- Here were some things that looked like they might be important for being a non-smoker in the SEARCH survey results – do you agree?
 - Good mental health
 - Good family relationships (no arguments, live with Mum or Dad)
 - Haven’t moved around a lot
 - Non-drinkers
 - Not sexually active
 - Not been in trouble with school (expelled/suspended) – or other family
 - Not questioned by police, or had to go to court, or friends in juvenile detention/prison.
 - No yarndi use
 - School engagement and positive attitudes about going and good marks
 - Parents don’t smoke
 - Strong sense of community where they live
 - More money at home
- Any missing?
- Any that would be more or less important as you get older?

- Thinking about everything we’ve discussed what’s one thing we could do more of to help young people like you grow up as non-smokers?

- Thanks + give out vouchers

11.6.1.2 Supplementary File 1(b): Final Discussion Guide Modified/Adapted with Site 2

- Welcome + reminder of ethics
- Introductions

- What does being “healthy” mean to you? What does it look like?
- What is the opposite?
- What things help or don’t help being healthy?

- Where does smoking fit in that mix?
- What have you seen or heard about smoking?
- How do you think most people your age feel about smoking?
- Would anyone like to share any experiences – your own or friends or family?
- What things do you think might mean someone takes up smoking?
- What things do you think might prompt them to quit?
- What about never taking up smoking at all?

- Card sort activity – things that you think may be important for when or how someone like you might start smoking or not.
 - Organise into non-smoking, smoking, unsure/could go both ways
 - Pull out one or more you feel are most important for young people smoking
 - Pull out one or more you feel are most important for young people non-smoking
 - Tell us a bit about the ones you picked out. Any that were not important at all or unsure about or could be both?

- Thinking about everything we’ve discussed what could we could do more of to help young people like you grow up as non-smokers and be healthy in general?
 - What would a program look like or involve?
 - Who would it target? Age/smoking status?
 - How often/long would it run?
 - What sort of activities would you want?

- Thanks + give out vouchers

11.6.2 Chapter 8 – Supplementary File 2: Cards used in card sort activity

Age	Gender	Bored
Stress	Fitness	Sport
Live with Mum	Good mental health	Depression/anxiety Other mental health challenges
Bullying	Racism	Connected to Aboriginal culture
Know about Aboriginal culture/history	Cigarette cost	Cigarette packaging
Anti-smoking ads	Smoking on TV/movies	Alcohol

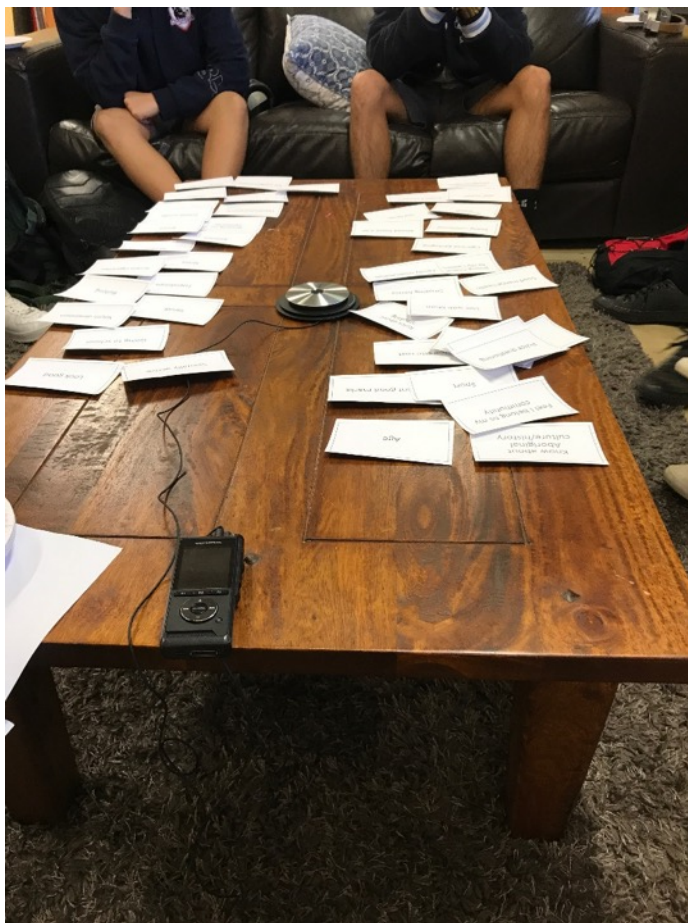
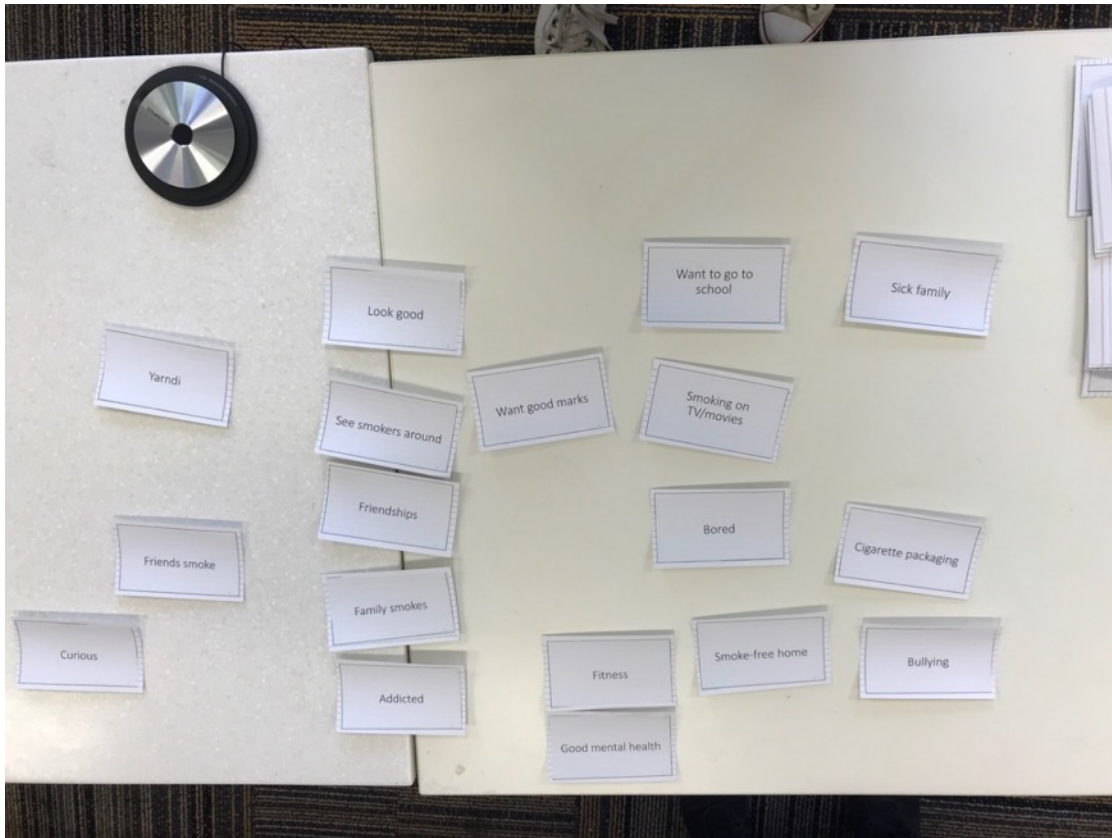
Yarndi	Family smokes	Friends smoke
Role models	Smoke-free home	Sexually active
Going to school	Want good marks	Want to go to school
Suspended expelled	Moved house a lot	Strong community
Strong Connection to my Community	Feel I belong to my community	Sick family
Police questioning	Go to court	Youth detention

Addicted	Smoking harms	Curious
Look good	Family relationships	Friendships
Rules about smoking	See smokers around	Access cigarettes

11.6.3 Chapter 8 – Supplementary File 3: Fieldwork photos







11.6.4 Chapter 8 – Supplementary File 4: NVIVO Coding Structure

1. Health in general

What is healthy vs unhealthy

Healthy

- Balance
- Education
- Employment
- Good mental health (SEWB)
- Hygiene and environment
- Lifestyle general
- Long life
- No substance use
 - No drug use
 - Non-drinker
 - Non-smoking
- Nutrition and Physical Activity
 - Diet
 - Fruit
 - Non-specific healthy food
 - Non-sugary drinks
 - Portion sizes and calorific intake
 - Vegetables
 - Wraps (eg subway)
 - Healthy body weight
 - Physical activity
- Social connections

Unhealthy

- Diseases and health consequences
 - Cancer
 - Diabetes
- Kids sick
- Lack of parental supervision
- Not able to do what you want in life
- Not accessing culture
- Poor mental health
 - Negative mindset
- Poor nutrition or physical activity
 - Diet
 - Confectionary
 - Eat out or takeaway, fatty foods
 - Sugary drinks (juice, soft drinks)
 - Unhealthy foods general
 - Lack of physical activity
- Obesity
- Substance use
 - Alcohol
 - Drug use
 - Smoking
- Unhealthy general
 - Don't care about looking after themselves
- Violence (incl DV)

What makes it easier or harder to be healthy

Barriers

- Addicted (food, substance use)
- AMS appointment times
- Food - convenient, fast, unhealthy, cheap food options
- Kids
- Lack of knowledge
 - Sources
 - Friends and colleagues
 - Online
- Personal choice
- Poor role models or deviant relationships
- Safety
- Stuck at home
- Time constraints

Enablers

- Access to healthy food
- AMS programs etc
- Community Safety

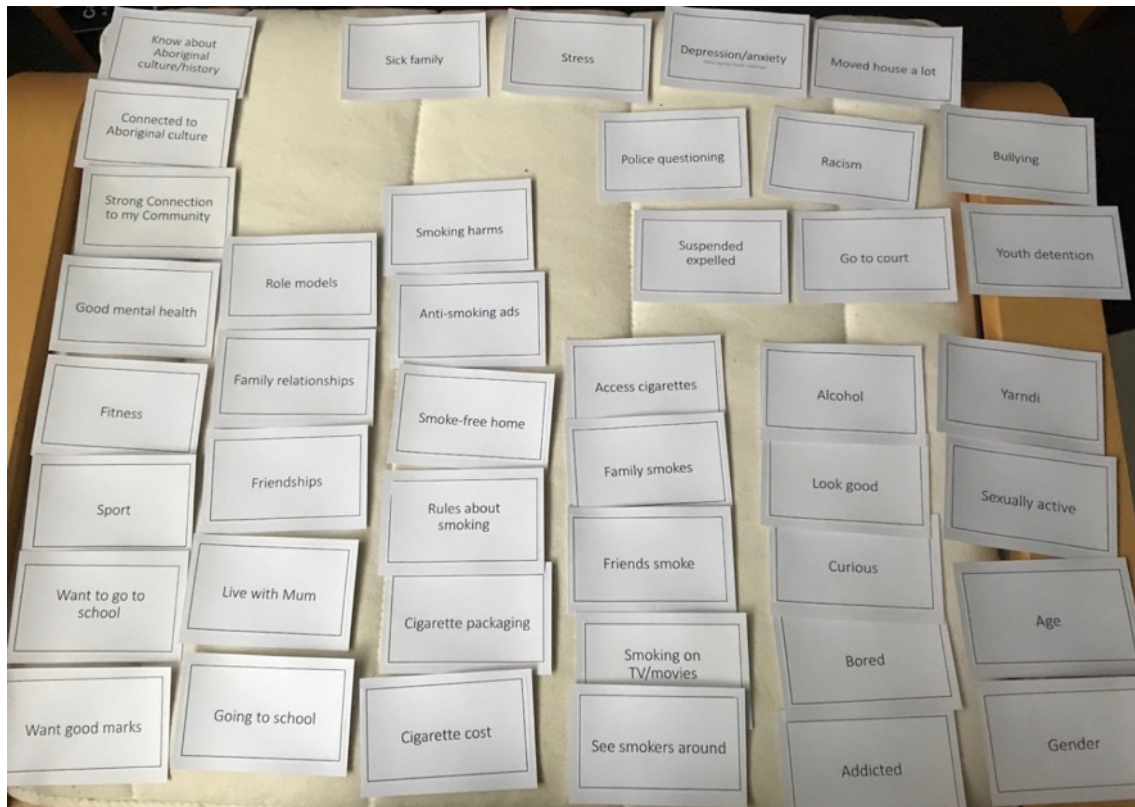
- Gyms
- Healthy role models
- Time management
 - Distance to service
 - Routine
 - Wait times
- Transport
- 2. Smoking - general
 - Attitudes and beliefs
 - Confidence to verbalise attitudes (share views and influence others)
 - Saying No for self
 - Telling others why they shouldn't smoke or to move away
 - Future aspirations (not smoking specific)
 - Knowledge
 - Awareness of information sources or support services
 - Family
 - Popular culture
 - Posters or social marketing (incl packaging)
 - Quit supports and other support services
 - AMS or doctors
 - Apps
 - Other support services
 - Quitline
 - School education & supports
 - Sport
 - Unsure
 - Harm to others
 - Burden on family
 - SHS exposure
 - Harms to self
 - Financial impacts
 - Cigarette cost
 - Loss of future opportunities
 - Loss of time with family
 - Perception of differential harm and intensity
 - Physical health impacts
 - Cancer
 - Cosmetic (teeth)
 - Damage lungs and breathing problems
 - Death
 - Impacts fitness
 - Unhealthy general
 - Historical smoking
- Negative attitudes
 - Attitudes to smoking of others
 - Disgusted
 - Hurt and upset
 - Ignored
 - Image
 - Shame or embarrassing
 - Uncool
 - Silly
 - Stupid
 - Too young
 - Waste of money
 - Wrong
 - Bad habit
 - Gross
 - Coughing or choking
 - Smell
 - Teeth
 - Yuck - feel yuck or sick
 - Impact friendships
 - Not for me
 - Not worth it (cost, smoking restrictions - getting too hard)
 - Regrets about own smoking
- Perceived reasons for smoking or not
 - Access to cigarettes
 - Addicted
 - Age
 - Adulthood aspirations

- Alcohol and other drug use
 - Cannabis use
 - Drinking
 - Drugs general
- Boredom
- Curious or experimentation
- Domestic Violence
- Don't know
- Family factors
 - Family smoking
 - Bonding
 - Parents don't know
- Fatalistic view (we're going to die anyway)
- Friends smoke (incl colleagues)
 - Peer pressure
 - Self image (think they're cool, try to fit in, rebellious)
- Gender differences
 - Males
- Generational change
- Habit or routine
- Knowledge or rejection of harms
- Legislation and rules around smoking
- Mental health
 - Depression
 - Stress & anger management
 - Other (music, fishing)
 - Smoking
 - Support services
- Personal choice
- School factors
 - Few consequences at school
 - Smoking teachers
 - Wagging class
- Short term vs long term focus
- Social influences general
 - Society
 - Social smoking (e.g. parties, work)
- Smoking relative to other health outcomes
- Experiences and intentions
 - Non-smoking personal experience or future intentions
 - Pro and neg exposure or attitudes from others
 - Family
 - Non-smoking
 - Smoking
 - Friends or peers (incl colleagues)
 - Non-smoking
 - Smoking
 - Age groups
- SHS and smoke-free rules or legislation
 - Avoid personal exposure
 - Distance from restaurants, bus stops
 - Exposure to kids
 - Parties
 - Smoke-free homes or smoking at home
 - Smoke-free pubs clubs
 - Smoking at school
 - Smoking in cars or smokefree cars
 - Visibility in community
 - Workplace
- Vaping
- Smoking personal experiences intentions
 - Access
 - Co-existing health problems
 - Current Smoker
 - Initiation
 - Age smoking commences
 - Intensity and frequency
 - Other behaviours
 - Pregnancy
 - Quitting or not continuing to smoke
 - Relapse

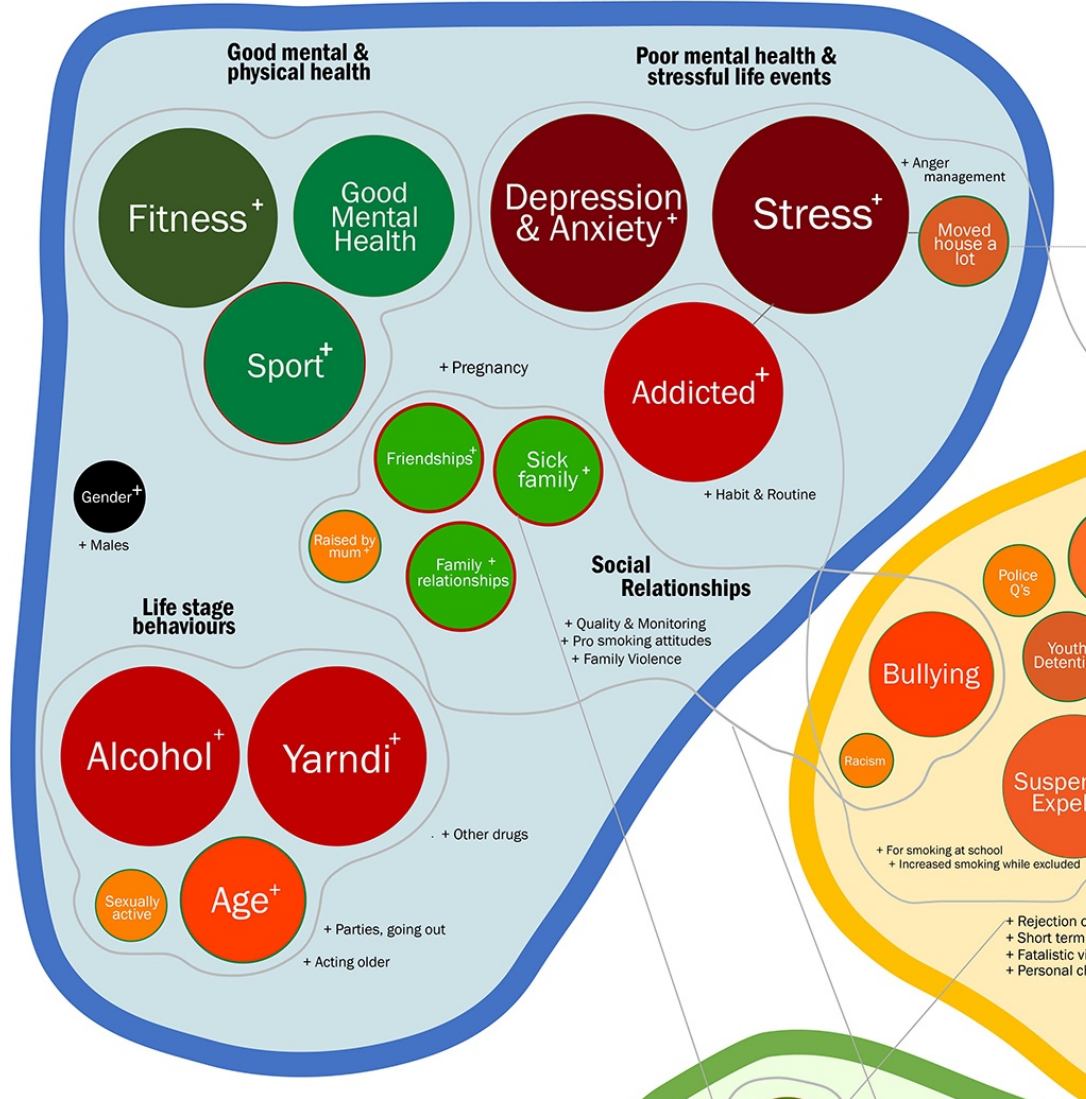
- School
- 3. Smoking - specific prompted card sort responses
 - Access to cigarettes
 - Addicted
 - Age
 - Alcohol
 - Anti-smoking ads
 - Bored
 - Bullying
 - Cigarette cost
 - Cigarette packaging
 - Connected to Aboriginal culture
 - Curious
 - Depression, anxiety, other mental health
 - Family relationships
 - Family smokes
 - Feel I belong to my community
 - Fitness
 - Friends smoke
 - Friendships
 - Gender
 - Go to court
 - Going to school
 - Good mental health
 - Know about Aboriginal culture and history
 - Live with Mum
 - Look good
 - Moved house a lot
 - Police questioning
 - Racism
 - Role models
 - Rules about smoking
 - See smokers around
 - Sexually active
 - Sick family
 - Smoke-free home
 - Smoking harms
 - Smoking on TV or movies
 - Sport
 - Stress
 - Strong community
 - Strong connection to my Community
 - Suspended or expelled
 - Want good marks
 - Want to go to school
 - Yarndi
 - Youth detention
- 4. Program ideas
 - Features
 - Compulsory attendance
 - Diversional activities
 - Computer access
 - Cultural
 - Art class and street art murals
 - Camp
 - Cooking class and traditional food recipes
 - Cultural awareness and knowledge general
 - Aboriginal pictures on posters
 - Cultural dancing
 - Cultural games
 - Cultural music (learn to make and play didge)
 - Jewellery making
 - Women's group
 - Youth group
 - Game night
 - Movie night
 - Music festival, recording or disco
 - Non-team physical activity (yoga, swimming, dancing)
 - Sport
 - Food
 - Incentive (Koori designed merch for participants)

- Interactive learning
 - Fun
 - Hands-on
- Role Models
 - Personal stories
- Support group
 - Mums and Bubs
- Writing
- Objectives
 - Awareness (prevention general)
 - Information and education sessions
 - Quit attempts
 - Skills building and reducing other behaviours
 - Future or general whole of life focus
 - Healthy nutrition and lifestyle
 - Manage peer pressure
 - Mental health & stress management
 - Other substance use
- Settings
 - Advertising
 - Media
 - Pamphlets
 - Posters
 - Community
 - Event
 - Health professionals
 - School
 - Sports clubs
- Target audience
 - Age
 - Behaviours
 - Gender
- Timing
 - Duration
 - Frequency
- 5. Summary
 - Summary non-smoking influences
 - Summary smoking influences
 - Summary undecided or neutral or both
- 6. Key quotes

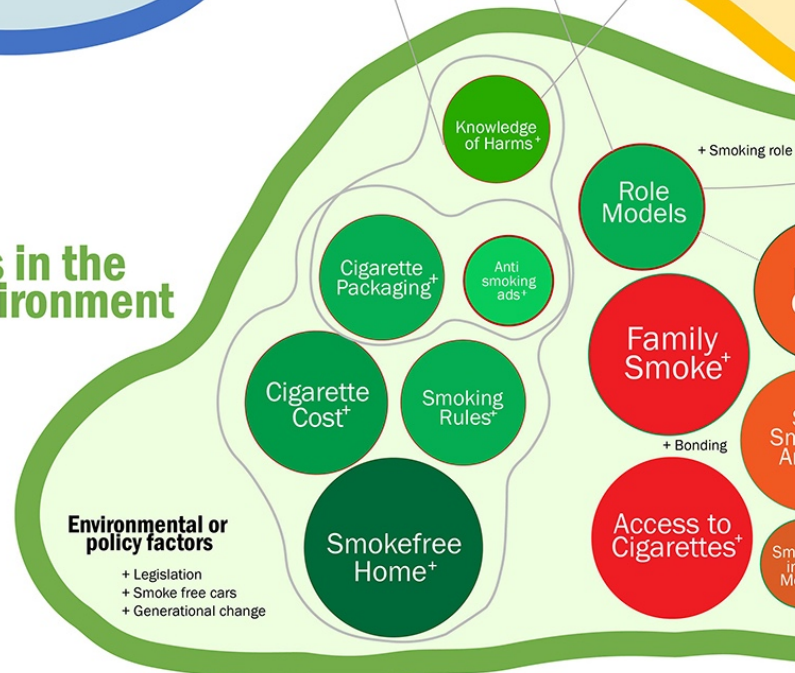
11.6.5 Chapter 8 – Supplementary File 5: Data analysis and maps

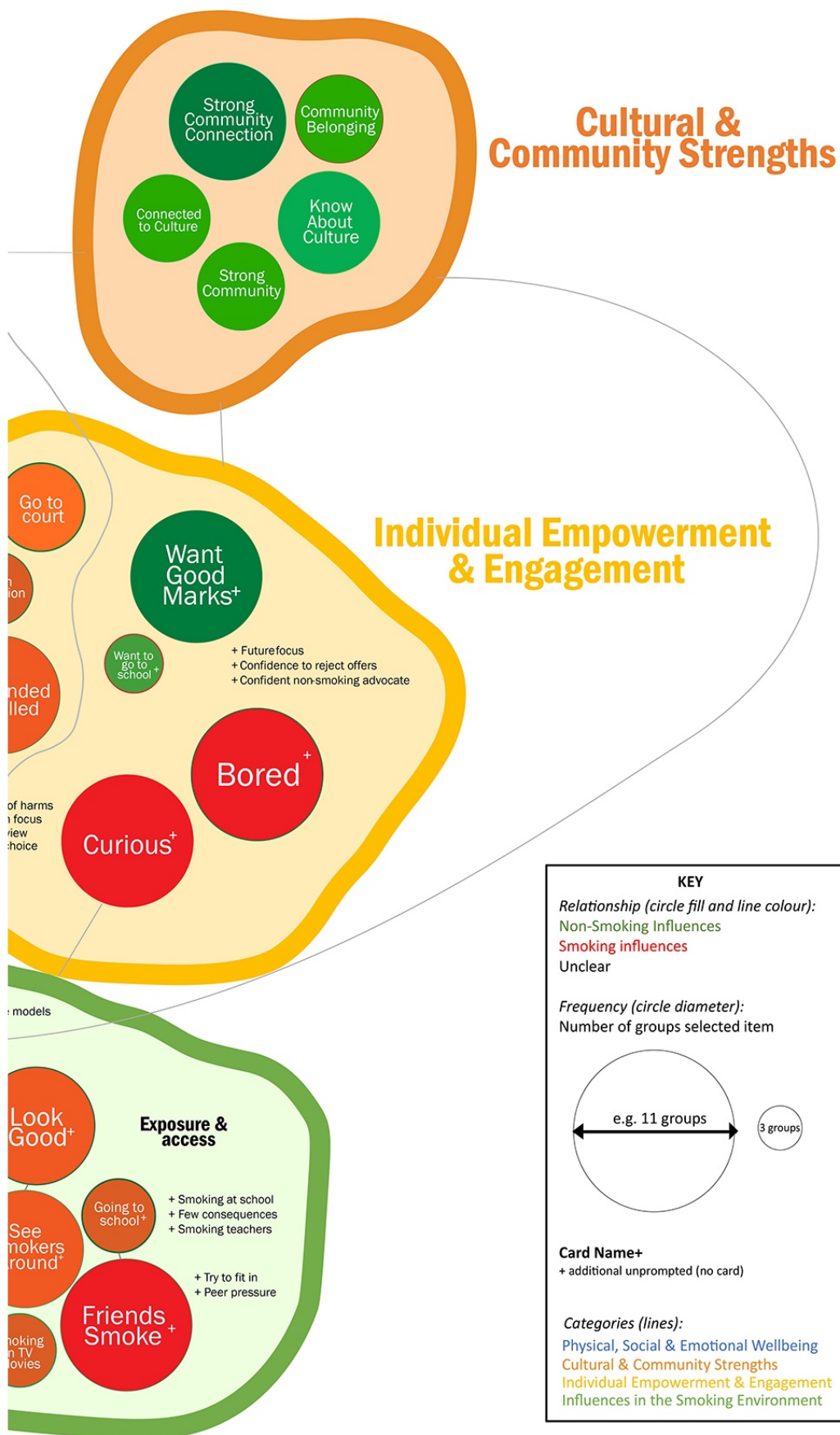


Physical, Social & Emotional Wellbeing



Influences in the Smoking Environment







Non-smoking influences
Bigger circle = more groups selecting card

Smoking influences
Bigger circle = more groups selecting card

