

Article

Longitudinal Study of Indigenous Children: adolescent never smoking and associations with individual, social, and environmental factors

Abigail de Waard¹, Christina Heris², Eden M. Barrett^{2,3}, Emily Rickard¹, Rubijayne Cohen², Makayla-May Brinckley², Michelle Kennedy^{4,5}, Tom Calma⁶, Louise Lyons⁷, Margaret O'Brien², Katherine A. Thurber² and Raglan Maddox^{2,*}

¹School of Medicine and Psychology, College of Science and Medicine, Australian National University, 54 Mills Road, Canberra, Australian Capital Territory, Australia

²Yardhura Walani, National Centre for Aboriginal and Torres Strait Islander Wellbeing Research, National Centre for Epidemiology and Population Health, Australian National University, 54 Mills Road, Canberra, Australian Capital Territory, Australia

³The George Institute for Global Health, Faculty of Medicine and Health, University of New South Wales, 300 Barangaroo Ave, Barangaroo, New South Wales, Australia

⁴School of Health and Medicine, University of Newcastle, University Drive, Callaghan, New South Wales, Australia

⁵Hunter Medical Research Institute, 1 Kookaburra Cct, New Lambton Heights, New South Wales, Australia

⁶National Coordinator, Tackling Indigenous Smoking, Office of the National Coordinator Tackling Indigenous Smoking, Furzer St. Woden, Canberra, Australia

⁷The Kids Research Institute Australia, Perth Children's Hospital, 15 Hospital Ave, Nedlands, Western Australia, Australia

*Corresponding author. Yardhura Walani, National Centre for Aboriginal and Torres Strait Islander Wellbeing Research, National Centre for Epidemiology and Population Health, Australian National University College of Health and Medicine, Canberra, Australian Capital Territory, Australia. E-mail: Raglan.Maddox@anu.edu.au

Abstract

Fuelled by the tobacco industry, commercial tobacco use is a major cause of preventable morbidity and mortality among Aboriginal and Torres Strait Islander peoples. Preventing adolescent smoking initiation is critical to reducing uptake. Understanding individual, social, and environmental factors that are protective against smoking can inform prevention strategies. We analysed data from adolescents 12–15 years and their caregivers from Wave 11 (2018) of the Longitudinal Study of Indigenous Children (LSIC). Poisson regression was used to calculate adjusted prevalence ratios (PR) of never smoking in relation to individual, social, and environmental factors adjusted for age and remoteness. Never smoking was reported by 81.3% of adolescents. Half (51.3%) of those who had ever-smoked had smoked in the last year. Never smoking was significantly associated with peer never smoking, no substance use (including e-cigarettes), positive family and school environments, no boredom, no trouble with police, and no family experiences of racism. Never smoking prevalence was twofold among adolescents who had never (versus ever) tried e-cigarettes (PR = 2.10; 95%CI: 1.41, 3.14). Fostering positive social relationships, discouraging substance use, and eliminating racism and discrimination are important in preventing adolescent smoking, offering some protection against the exploitative practices of the tobacco industry. Culturally safe structural supports and comprehensive approaches to individual, social, and environmental wellbeing are required to prevent smoking and promote wellbeing.

Keywords: Indigenous peoples; tobacco control; tobacco industry; human rights; public policy; surveillance and monitoring; priority/special populations

Contribution to Health Promotion

- This article aims to improve health promotion by better understanding factors that support people to be smoke- and nicotine-free.
- The article supports the health promotion field to eradicate tobacco-industry-generated disease and death by better understanding and preventing smoking uptake. The research recognized that fostering positive social relationships, discouraging substance use, and eliminating racism and discrimination are important in preventing adolescent smoking, offering some protection against tobacco industry exploitation.
- Culturally safe structural supports and comprehensive approaches to individual, social, and environmental wellbeing are required to prevent smoking and promote wellbeing, helping to accelerate declines in smoking prevalence.

INTRODUCTION

Fuelled by the tobacco industry, tobacco use is the leading risk factor for ill health and premature death in Australia (Australian Institute of Health and Welfare 2021). The smoking-attributable burden is estimated to cause 37% of all Aboriginal and Torres Strait Islander deaths and 50% of all deaths among Aboriginal and Torres Strait Islander adults aged ≥ 45 years (Thurber, Banks *et al.* 2021). Current smoking prevalence among Aboriginal and Torres Strait Islander adults was 43% in 2018/19 (Maddox *et al.* 2020, Thurber *et al.* 2020). This is a lasting impact of ongoing colonial processes that have entrenched nicotine dependence: Aboriginal and Torres Strait Islander peoples were excluded from the education system and cash economy, paid with rations of tobacco, flour, sugar, and tea, in lieu of wages. This led to a form of bonded labour (Colonna 2020). Subsequently, commercial, industrialised tobacco use was embedded as a valuable commodity that continues to be exploited for profit by the tobacco industry and their collaborators at the expense of Indigenous and non-Indigenous lives around the world (Colonna 2020, Waa, Maddox *et al.* 2020).

The majority of Aboriginal and Torres Strait Islander adults who smoke daily began smoking before the age of 18 years (Heris, Eades *et al.* 2020). Young people who commence smoking early have a higher likelihood of becoming nicotine-dependent and a lower prevalence of successfully quitting (Greenhalgh, Stillman *et al.* 2016). Thus early adolescence, defined as between 10 and 14 years of age (Patton, Sawyer *et al.* 2016), is a fundamentally important target period to improve health outcomes. Studies have identified family and peer influences as being central to smoke-free behaviour during this period (Heris, Chamberlain *et al.* 2020, Heris, Thurber *et al.* 2021, Heris, Cutmore *et al.* 2023). The Aboriginal and Torres Strait Islander population has a young age distribution with adolescents and young adults (10–24 years) comprising nearly a third (30%) of the total population (Australian Institute of Health and Welfare 2018). Thus, preventing smoking uptake among Aboriginal and Torres Strait Islander adolescents presents a clear opportunity to improve health as smoke-free adolescents enter adulthood.

Never smoking prevalence has increased among Aboriginal and Torres Strait Islander adolescents since 2002 (Heris, Eades *et al.* 2020, Heris, Guerin *et al.* 2020, Thurber, Walker *et al.* 2020). Such an improvement has occurred alongside the introduction of population-level tobacco control measures including Aboriginal and Torres Strait Islander-led tobacco control, social marketing, and community projects as well as smoke-free legislation, advertising restrictions, plain packaging, and price measures (World Health Organization 2003, Heris, Eades *et al.* 2020, Heris, Guerin *et al.* 2020, Australian Government Department of Health and Aged Care 2023). Smoking is less common among Aboriginal and Torres Strait Islander adolescents who abstain from substance use (alcohol, marijuana, and illicit drugs), have good mental health, experience minimal stress, or discrimination and have non-smoking family and peers (Cosh, Hawkins *et al.* 2015, Heris, Thurber *et al.* 2021). Among Indigenous populations internationally, strong identity, school attendance and engagement, and socio-economic advantage have also been identified as protective against smoking initiation (Heris, Chamberlain *et al.* 2020). Furthermore, studies on e-cigarette use among adolescents in the general population have indicated a concerning preva-

lence of e-cigarette use among people who do not smoke and found e-cigarette use to be associated with smoking uptake (Leventhal, Strong *et al.* 2015, Colonna 2020, Baenziger, Ford *et al.* 2021, Banks, Yazidjoglou *et al.* 2023).

While some work has been conducted in this area, no studies of a national scale involving a diverse sample of Aboriginal and Torres Strait Islander youth have quantified the broad range of individual, social, and environmental factors associated with never-smoking in adolescence. There is limited literature which quantitatively explores key factors of potential importance to communities, such as discrimination, stressful life events, cultural identity, and e-cigarette use, and none in the last 8 years. Prevalence studies have identified the need for strengths-based prevention approaches to accelerate increases in never smoking among Aboriginal and Torres Strait Islander youth (Heris, Guerin *et al.* 2020, 2021). To inform these approaches, specific evidence on a broad range of potential protective factors is required.

The aim of this work is to explore the relationships between individual, social, and environmental factors and never-smoking in a national sample of Aboriginal and Torres Strait Islander youth, using data from the Longitudinal Study of Indigenous Children (LSIC). Understanding determinants of being smoke-free in adolescence can inform contextually relevant tobacco control policies and community-based prevention programs.

METHODS

Longitudinal Study of Indigenous Children

LSIC, also known as *Footprints in Time*, helps to address the paucity of literature surrounding the development of Aboriginal and Torres Strait Islander children. The data underlying this article are available through the Australian Government Department of Social Services. LSIC has conducted annual face-to-face interviews with Aboriginal and Torres Strait Islander children and their caregivers since 2008, with a total of 1759 participants taking part over the years. The study survey spans a range of areas, including the physical, social, and emotional wellbeing of children and their caregivers (Thurber, Banks *et al.* 2015).

Two cohorts of children have been followed since 2008, the kindergarten (K) and baby (B) cohorts. For this study, we analysed data from Wave 11 of the study collected in 2018 (retention rate 71%, response rate 80%) (Thurber, Thandrayen *et al.* 2020). The analysis is restricted to the K cohort, aged 12–15 years, as the younger cohort was not asked about the frequency of their smoking behaviours. All variables were collected via caregiver-report or adolescent self-report, except for remoteness which was based on participants' postcode.

Measures

Strengths-based approach

Adopting a strengths-based approach, we have focused our analysis on the positive outcome of never-smoking (rather than ever smoking), with the aim of identifying protective (rather than risk) factors associated with never smoking. This included individual, family, and environmental strengths that are often not considered in relation to tobacco use (Thurber *et al.* 2020). Identifying strengths of Aboriginal and Torres Strait Islander peoples and communities (rather than deficits) through a strengths-based approach aligns with community values and direction to undertaking this study.

Outcome variables

The primary outcome was self-reported never smoking based on responses to the question ‘Have you ever tried smokes (cigarettes)?’ (Fig. 1). Adolescents responding ‘no’ were categorised as never smoked and those responding ‘yes’ (yes, lots of times; yes, a few times; and yes, just a few puffs) were categorised as ever-smoked. Those who answered ‘don’t know’ or refused to answer were categorised as missing. All adolescents who had ever smoked were asked if they had smoked in the last 12 months. If they had smoked in the last 12 months, they were asked how often they had smoked, which was reported separately. Due to small numbers, those who had ever-smoked responding to how often they smoked were categorised into ‘at least weekly’ (including once a week, 2–3 times a week, 4–6 times a week, once a day, twice a day, and 3 times a day or more) and ‘rarely or never’.

Exposure variables

Potential factors protective against smoking were identified from reviews of literature on Aboriginal and Torres Strait Islander youth smoking (Cosh, Hawkins *et al.* 2015, Heris, Chamberlain *et al.* 2020, Heris, Thurber *et al.* 2021, Smith 2021). Demographic variables included age (12–13, 14–15 years), sex (male, female), and remoteness (major cities/inner regional/outer regional, remote/very remote), based on the Australian Statistical Geography Standard five category remoteness classification. Individual variables included measures of wellbeing and risk-taking behaviours. Social variables included measures relating to family, friends, and school experience. Environmental variables included measures of the physical environment and experiences of exclusion and discrimination. Describing their local area as having ‘nothing to do’ was used as a proxy measure of boredom. Further details on the variables and their definitions are outlined in [Supplementary Table S1](#).

Participants who answered ‘don’t know’, ‘refused to answer’, or ‘does not want to proceed’ were categorised as missing for the relevant exposure variable.

Statistical analysis

Chi-squared tests were used to test for differences in smoking experiences between age, sex, and remoteness groups. To quantify the relationship between individual, social, and environmental factors and never smoking, Poisson regression was used to calculate unadjusted prevalence ratios (PRs) and 95% confidence interval (CI). The models were then adjusted

for age and remoteness as these were identified as potential confounders in the exposure-outcome relationship. Adjusted results are presented in the text. Models were not adjusted for sex due to potential limitations in statistical power given the relatively small sample size.

Participants with missing smoking data were excluded from the analysis. [Supplementary Table S2](#) compares the demographic characteristics of participants with, versus without data on ever-smoking. Analyses were conducted in Stata SE 16.1. In line with LSIC policy on small cells, we have suppressed cells based on counts of < 4 (with the exception of the missing data categories).

Ethics

This study was developed by and with Aboriginal and Torres Strait Islander peoples, including input and guidance from Thiitu Tharrmay, an Aboriginal and Torres Strait Islander Reference Group who provided valuable guidance that privileged Aboriginal and Torres Strait Islander worldviews. The research question arose from community and policy priorities identified through ongoing engagement with Aboriginal and Torres Strait Islander communities. We worked closely with Aboriginal and Torres Strait Islander peoples (including authors R.C., M.M.B., M.K., T.C., L.L., and M.O.B.) in developing the data analysis plan, undertaking analysis, contextualising findings, and developing conclusions.

This also included sharing preliminary findings with the Aboriginal and Torres Strait Islander Research Administration Officers (RAOs), who conduct LSIC surveys. RAOs provided input and assisted in contextualising the findings.

The project upholds ethical principles of research with Aboriginal and Torres Strait Islander peoples consistent with the National Health and Medical Research Council Guidelines for ethical conduct in Aboriginal and Torres Strait Islander Health Research. LSIC data collection is conducted with approvals from the departmental ethics committee of the Australian Government Department of Health and Aged Care, and from ethics committees in each state and territory, including relevant Aboriginal and Torres Strait Islander organisations. Ethics approval for this LSIC analysis was granted by the Australian National University’s Human Research Ethics Committee (Protocol No. 2016/534).

Research team

We also recognise the importance of relationality and our credentials, found in our respective relational roles and

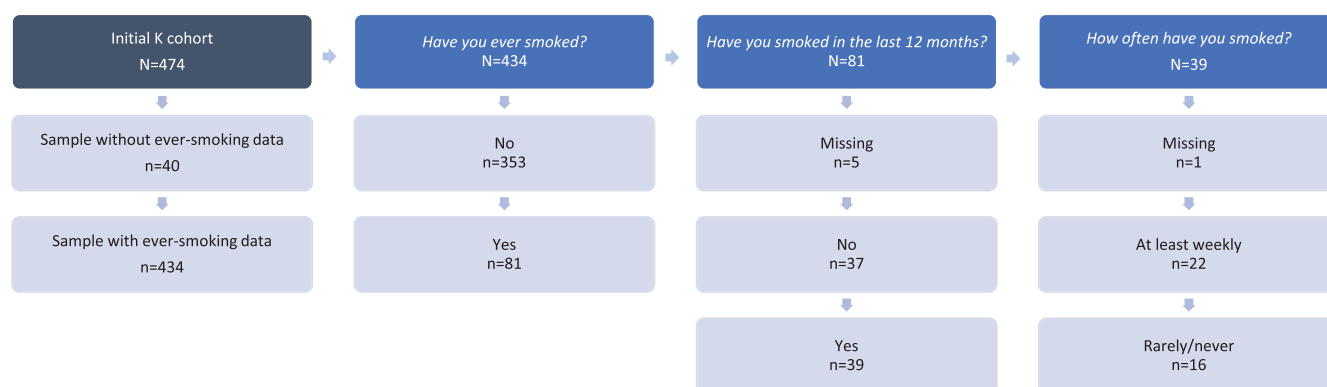


Figure 1. Cohort flow diagram for smoking status in the Longitudinal Study of Indigenous Children.

community accountabilities. This includes acknowledging the research team's worldviews which influence our perspectives and values, such as how the study was conducted and how findings were interpreted—not merely a matter of identity (Leavy, Wood *et al.* 2010, Moreton-Robinson 2016, Smith 2021). The first author (Ad.W.) is a non-Indigenous medical student and our research team includes Aboriginal and Torres Strait Islander lived experience (R.C., M.M.B., M.K., T.C., L.L., and M.O.B.), Indigenous lived experience (R.M.), Indigenous tobacco research experience (C.H., E.M.B., R.C., M.M.B., M.K., T.C., L.L., M.O.B., K.A.T., and R.M.), public health (all authors), and epidemiology (C.H., E.M.B., M.O.B., K.A.T., and R.M.).

RESULTS

Sample

Interviews were conducted with 474 adolescents and their caregivers, of whom 434 (91.6%) provided smoking behaviour responses. Forty adolescents (8.4%) did not provide an answer on their smoking behaviour, including 25 whose carers did not provide permission to answer questions about smoking or were not asked, 10 who did not respond/refused and five who said 'Don't know'.

Of the participants who provided answers on their smoking behaviour, 45.2% ($n = 196$) were aged 12–13 years and 54.8% ($n = 238$) aged 14–15 years; 50.7% ($n = 220$) male and 49.3% ($n = 214$) female; 77.6% ($n = 337$) from major cities or regional areas; and 22.4% ($n = 97$) from remote or very remote areas. The demographic profile of the overall K cohort, including participants with and without data on ever-smoking, is detailed in [Supplementary Table S2](#).

Smoking experience

Overall, 81.3% of adolescents (81.8% of females and 80.9% of males) self-reported never smoking ([Table 1](#)). Never smoking

prevalence was 84.2% for adolescents aged 12–13 years and 79.0% for adolescents aged 14–15 years. Among adolescents living in major cities and regional areas, 82.5% reported never smoking; 77.3% of adolescents living in remote/very remote settings reported never smoking. There were no significant differences in smoking status by age group ($P = .167$), sex ($P = .817$), or remoteness ($P = .249$).

Smoking recency and frequency among adolescents who had ever smoked

Among adolescents who had ever-smoked, around half (48.7%) reported not smoking in the last year. This was significantly more common ($P = .011$) among the younger age group (66.7%) compared to the older age group (37.0%) but was not significantly different by sex or remoteness. Among those who had smoked in the last year, around half (57.9%) smoked at least weekly. There were no significant differences by demographics among those who had smoked in the last year.

Relationships between exposure variables and adolescent never smoking

Individual

The prevalence of never smoking was significantly higher among adolescents who had not participated in other risk-taking behaviours including trying cannabis (PR = 6.89; 2.95, 16.08), alcohol (PR = 2.00; 1.50, 2.65), or e-cigarettes (PR = 2.10; 1.41, 3.14; [Table 2](#)). While the magnitude of the effect for suicide ideation is relatively strong, it is not statistically significant (PR = 1.40; 0.95, 2.06), and we see a null relationship between never smoking and physical activity (PR = 0.98; 0.87, 1.11) as detailed in [Table 2](#).

Social

Never smoking was significantly more common among adolescents who reported high (compared to low) enjoyment of

Table 1. Distribution of adolescent self-reported smoking behaviour overall and by age, sex, and remoteness among children in the K cohort participating in LSIC Wave 11 (2018)

	Smoking experience ^a (N = 434)				Smoking intensity in ever smoked (N = 81)							
	Never		Ever		Smoked in last 12 months (N = 76) ^b				Frequency if smoked in last 12 months (N = 38) ^c			
					No		Yes		Rarely/never		> Weekly	
	%	n/N	%	n/N	%	n/N	%	n/N	%	n/N	%	n/N
Total	81.3	353/434	18.7	81/434	48.7	37/76	51.3	39/76	42.1	16/38	57.9	22/38
Age (years)												
12–13	84.2	165/196	15.8	31/196	66.7 ^d	20/30	33.3	10/30	55.6	5/9	44.4	4/9
14–15	79.0	188/238	21.0	50/238	37.0 ^d	17/46	63.0	29/46	37.9	11/29	62.1	18/29
Sex												
Female	81.8	175/214	18.2	39/214	48.6	18/37	51.4	19/37	33.3	6/18	66.7	12/18
Male	80.9	178/220	19.1	42/220	48.7	19/39	51.3	20/39	50.0	10/20	50.0	10/20
Remoteness												
Major cities/regional	82.5	278/337	17.5	59/337	52.7	29/55	47.3	26/55	48.0	12/15	52.0	13/15
Remote/very remote	77.3	75/97	22.7	22/97	38.1	8/21	61.9	13/21	30.8	4/13	69.2	9/13

^aRestricted to children who provided responses on smoking behaviour (up to 434/474).

^bMissing data for 'Smoked in the last 12 months', $n = 5$.

^cMissing data for 'Frequency if smoked in last 12 months', $n = 1$.

^dIndicates significantly different at $P < .05$.

Table 2. Adolescent never smoking and relationships with individual factors among children in the K cohort participating in LSIC Wave 11 (2018)

	Smoking experience N = 434				PR of never smoking			
	Never		Ever					
	%	n/N	%	n/N	Unadjusted	95% CI	Adjusted ^a	95% CI
INDIVIDUAL								
Demographics								
Age (years)								
12–13 years	84.2	165/196	15.8	31/196	1.00		1	
14–15 years	79.0	188/238	21.0	50/238	0.94	0.86, 1.02	0.94	0.86, 1.02
Sex								
Male	80.9	178/220	19.1	42/220	1.00		1	
Female	81.8	175/214	18.2	39/214	1.01	0.92, 1.11	1.01	0.92, 1.10
Remoteness								
Major cities/regional	82.5	278/337	17.5	59/337	1.00		1	
Remote/very remote	77.3	75/97	22.7	22/97	0.94	0.84, 1.05	0.94	0.84, 1.05
Wellbeing								
Hours spent active on a weekday ^b								
< 1 hr	83.9	47/56	16.1	9/56	1.00		1	
≥ 1 hr	81.8	288/352	18.2	64/352	0.97	0.86, 1.10	0.98	0.87, 1.11
Missing	69.2	18/26	30.8	8/26				
Suicide ideation in past year								
Yes	60.0	12/20	40.0	8/20	1.00		1	
No	83.7	304/363	16.3	59/363	1.40	0.95, 2.05	1.40	0.95, 2.06
Missing	72.5	37/51	27.5	14/51				
Risk taking behaviours								
Tried e-cigarettes								
Ever	40.9	18/44	59.1	26/44	1.00		1	
Never	85.8	331/386	14.2	55/386	2.10	1.40, 3.13	2.10	1.41, 3.14
Missing	100	4/4	0	0/4				
Tried e-cigarettes with nicotine in past year								
Ever	36.4	4/11	63.6	7/11	1.00		1	
Never	82.9	344/415	17.1	71/415	2.28	1.04, 5.01	2.28	1.03, 5.05
Missing	62.5	5/8	37.5	3/8				
Tried cannabis								
Ever	12.8	5/39	87.2	34/39	1.00		1	
Never	88.6	343/387	11.4	44/387	6.91	2.95, 16.19	6.89	2.95, 16.08
Missing	62.5	5/8	37.5	3/8				
Tried alcohol								
Current consumer (in past year)	47.2	25/53	52.8	28/53	1.00		1	
Previous consumer (not in past year)	72.2	70/97	27.8	27/97	1.53	1.12, 2.09	1.53	1.12, 2.09
Never	92.5	248/268	7.5	20/268	1.96	1.47, 2.62	2.00	1.50, 2.65
Missing	62.5	10/16	37.5	6/16				

^aAdjusted for age and remoteness.^bVariable answered by the caregiver.

family life (PR = 1.46; 1.07, 2.00) and that their family got along at least a 'fair bit' of the time (PR = 1.35; 1.01, 1.79; Table 3). Never smoking was significantly associated with living in a smoke-free home (PR = 1.23; 1.00, 1.50). Adolescents in families that had no funeral attendance in the past year (PR = 1.16; 1.04, 1.30) had a higher prevalence of never smoking compared to families that had attended ≥ 3 funerals.

Adolescents whose peers do not smoke cigarettes or e-cigarettes had a higher prevalence of never smoking

(PR = 1.55; 1.33, 1.82, and 1.23; 1.04, 1.47, respectively). Positive school experience was significantly associated with never smoking: adolescents who were always or mostly happy to go to school (PR = 1.22; 1.06, 1.41) and had not missed school without permission in the last 2 weeks (PR = 1.58; 1.22, 2.04) had a higher prevalence of never smoking.

We did not observe a significant association between never smoking and other exposures, including carer employment

Table 3. Adolescent never smoking and relationships with social factors among children in the K cohort participating in LSIC Wave 11 (2018)

	Smoking experience N = 434				PR of never smoking			
	Never		Ever					
	%	n/N	%	n/N	Unadjusted	95% CI	Adjusted ^a	95% CI
SOCIAL								
Family								
Enjoyment of family life (vs worry) ^b								
Low	59.1	13/22	40.9	9/22	1		1	
Medium	59.6	28/47	40.4	19/47	1.01	0.68, 1.48	1.00	0.68, 1.47
High	86.8	309/356	13.2	47/356	1.47	1.07, 2.01	1.46	1.07, 2.00
Missing	33.3	3/9	66.7	6/9				
Family gets along								
Little bit/not much/never	61.3	19/31	38.7	12/31	1		1	
Always/most of the time/fair bit	82.4	322/391	17.6	69/391	1.34	1.01, 1.79	1.35	1.01, 1.79
Missing	100	12/12	0	0/12				
Any caregiver employed ^b								
No	73.7	28/38	26.3	10/38	1.		1	
Yes	84.7	243/287	15.3	44/287	1.15	0.95, 1.39	1.13	0.92, 1.39
Missing	75.2	82/109	24.8	27/109				
Anyone smoking at home ^b								
Yes	68.4	39/57	31.6	18/57	1		1	
No	83.9	313/373	16.1	60/373	1.23	1.00, 1.50	1.23	>1.00, 1.50
Missing	25.0	1/4	75.0	3/4				
Caregiver smoking ^b								
Smoking currently with no past year quit attempts	78.3	36/46	21.7	10/46	1		1	
Smoking currently with past year quit/reduction attempts	75.5	105/139	24.5	34/139	0.97	0.80, 1.16	0.97	0.80, 1.16
Ex or never smoked	86.7	208/240	13.3	32/240	1.11	0.93, 1.32	1.11	0.93, 1.31
Missing	44.4	4/9	55.6	5/9				
Any child involved in or upset by family arguments at home ^b								
Yes	76.9	70/91	23.1	21/91	1		1	
No	83.6	276/330	16.4	54/330	1.09	0.98, 1.21	1.09	0.98, 1.21
Missing	53.8	7/13	46.2	6/13				
Funerals attended in past year ^b								
≥3	74.5	82/110	25.5	28/110	1		1	
1–2	82.1	119/145	17.9	26/145	1.10	0.96, 1.27	1.10	0.96, 1.26
None	87.4	139/159	12.6	20/159	1.17	1.04, 1.32	1.16	1.04, 1.30
Missing	65.0	13/20	35.0	7/20				
Family short of money in past year ^b								
Yes	78.6	114/145	21.4	31/145	1.00		1.00	
No	83.6	235/281	16.4	46/281	1.06	0.97, 1.16	1.08	0.99, 1.19
Missing	50.0	4/8	50.0	4/8				
Friends								
Plays with 'good kids' ^b								
Definitely not/usually not	50.0	8/16	50.0	8/16	1		1	
Sometimes	70.8	46/65	29.2	19/65	1.42	0.81, 2.48	1.40	0.80, 2.47
Mostly/always	86.5	263/304	13.5	41/304	1.73	0.96, 3.11	1.71	0.95, 3.11
Missing	73.5	36/49	26.5	13/49				
Friends smoke cigarettes								
Yes	59.0	72/122	41.0	50/122	1		1	
No	91.9	248/270	8.1	22/270	1.56	1.33, 1.82	1.55	1.33, 1.82
Missing	78.6	33/42	21.4	9/42				

Table 3. Continued

	Smoking experience N = 434				PR of never smoking			
	Never		Ever					
	%	n/N	%	n/N	Unadjusted	95% CI	Adjusted ^a	95% CI
Friends smoke e-cigarettes								
Yes	69.0	49/71	31.0	22/71	1		1	
No	85.1	263/309	14.9	46/309	1.23	1.04, 1.46	1.23	1.04, 1.47
Missing	75.9	41/54	24.1	13/54				
Plays with older adolescents ^b								
Most days (≥5)	80.5	70/87	19.5	17/87	1		1	
1–4 days per week	85.6	83/97	14.4	14/97	1.06	0.94, 1.20	1.06	0.94, 1.20
Less than once a week/rarely/never	81.3	161/198	18.7	37/198	1.01	0.88, 1.16	1.02	0.88, 1.17
Missing	75.0	39/52	25.0	13/52				
School experience								
Happy to go to school								
Not much/never	73.1	38/52	26.9	14/52	1		1	
Fair bit/little bit	77.5	107/138	22.5	31/138	1.06	0.88, 1.28	1.08	0.90, 1.29
Always/most of the time	87.3	200/229	12.7	29/229	1.20	1.03, 1.38	1.22	1.06, 1.41
Missing	53.3	8/15	46.7	7/15				
Good at schoolwork								
Not much/never	73.3	22/30	26.7	8/30	1		1	
Fair bit/little bit	80.6	137/170	19.4	33/170	1.10	0.88, 1.37	1.12	0.89, 1.40
Always/most of the time	84.9	185/218	15.1	33/218	1.16	0.94, 1.43	1.19	0.96, 1.46
Missing	56.2	9/16	43.8	7/16				
Missed school without parent permission in last 2 weeks								
Yes	57.1	16/28	42.9	12/28	1		1	
No	89.3	275/308	10.7	33/308	1.56	1.20, 2.03	1.58	1.22, 2.04
Missing	63.3	62/98	36.7	36/98				

^aAdjusted for age and remoteness.^bVariable answered by the caregiver.

(PR = 1.13; 0.92, 1.39), carer smoking (PR = 1.11; 0.93, 1.31), playing with ‘good kids’ (PR = 1.71; 0.95, 3.11), and being good at schoolwork (PR = 1.19; 0.96, 1.46) as detailed in Table 3.

Environmental

Never smoking was more common among adolescents who disagreed versus agreed with the statement that their local area had ‘nothing to do’ (PR = 1.14; 1.02, 1.26).

Adolescents whose caregivers reported that their family hardly ever or never experienced racism, prejudice, or discrimination had a higher prevalence of never smoking compared to families experiencing racism at least weekly (PR = 1.23; 1.02, 1.47; Table 4). Adolescents who reported no experiences of bullying in the past month had a higher prevalence of never smoking, including bullying others (PR = 1.31; 1.17, 1.46) and being bullied (PR = 1.15; 1.05, 1.26). Not having had problems with the police was also significantly associated with adolescents never smoking (PR = 1.32; 1.09, 1.61).

No significant association was observed between never smoking and environmental exposures relating to overcrowded housing (PR = 1.03; 0.88, 1.19) or being bullied due to being Aboriginal and/or Torres Strait Islander (PR = 1.10; 0.87, 1.39) as detailed in Table 4.

DISCUSSION

Most (81.3%) of the Aboriginal and Torres Strait Islander adolescents (aged 12–15 years) in this cohort had never tried smoking in 2018. These results are generally consistent with current national estimates of never smoking among Aboriginal and Torres Strait Islander youth (Heris, Eades *et al.* 2020, Heris, Guerin *et al.* 2020), with a never smoking prevalence of 76% for 12- to 15-year-old secondary students in 2017 (Heris, Guerin *et al.* 2020) and 85% for 15- to 17-year-old participants in the 2018/19 National Aboriginal and Torres Strait Islander Social Survey (Thurber, Walker *et al.* 2020). This baseline dataset provides critical insights into adolescent smoking behaviours and protective factors, forming a foundation for tracking trends as future LSIC waves emerge. This longitudinal perspective is especially relevant amid regulatory developments like the 2024 Australian reforms targeting e-cigarette availability and reducing harms. These changes offer opportunities to strengthen protective measures and assess their impact while aligning with broader calls for systemic reforms, including the eradication of the tobacco industry to improve health outcomes and equity (Maddox, Telford *et al.* 2024). Framing the industry as a human-made agent of disease highlights the urgency of structural interventions beyond individual behaviour change (Maddox, Telford *et al.* 2024).

Table 4. Adolescent never smoking and relationships with environmental factors among children in the K cohort participating in LSIC Wave 11 (2018)

	Smoking experience N = 434				PR of never smoking			
	Never		Ever					
	%	n/N	%	n/N	Unadjusted	95% CI	Adjusted ^a	95% CI
ENVIRONMENTAL								
Physical environment								
Local area has 'nothing to do'								
Strongly agree/agree	75.9	129/170	24.1	41/170	1		1	
Neutral	82.4	98/119	17.6	21/119	1.09	0.97, 1.21	1.08	0.97, 1.20
Disagree/strongly disagree	87.1	115/132	12.9	17/132	1.15	1.03, 1.28	1.14	1.02, 1.26
Missing	84.6	11/13	15.4	2/13				
Overcrowded housing in past year ^b								
Yes	80.0	40/50	20.0	10/50	1		1	
No	82.2	313/381	17.8	68/381	1.03	0.89, 1.19	1.03	0.88, 1.19
Missing	0	0/3	100	3/3				
Systems of exclusion and discrimination								
Bullied because Aboriginal and/or Torres Strait Islander ^b								
Always/sometimes for this reason	73.5	25/34	26.5	9/34	1		1	
No	80.0	64/80	20.0	16/80	1.09	0.86, 1.37	1.10	0.87, 1.39
Missing	82.5	264/320	17.5	56/320				
Family experiences of racism, discrimination, or prejudice ^b								
At least weekly	69.4	25/36	30.6	11/36	1		1	
Sometimes/occasionally	82.6	128/155	17.4	27/155	1.19	0.99, 1.43	1.19	0.99, 1.44
Never/hardly ever	83.8	197/235	16.2	38/235	1.21	1.00, 1.45	1.23	1.02, 1.47
Missing	37.5	3/8	62.5	5/8				
Bullied others in past month								
Yes	67.8	78/115	32.2	37/115	1		1	
No	89.3	250/280	10.7	30/280	1.32	1.18, 1.47	1.31	1.17, 1.46
Missing	64.1	25/39	35.9	14/39				
Bullied in past month								
Yes	75.0	96/128	25.0	32/128	1		1	
No	86.2	231/268	13.8	37/268	1.15	1.05, 1.26	1.15	1.05, 1.26
Missing	68.4	26/38	31.6	12/38				
Any problems with police ^b								
Ever	64.1	41/64	35.9	23/64	1		1	
Never	85.0	312/367	15.0	55/367	1.33	1.10, 1.61	1.32	1.09, 1.61
Missing	0	0/3	100	3/3				

^aAdjusted for age and remoteness.^bVariable answered by the caregiver.

Our exploratory study provides quantitative evidence for the protective role of positive peer and family life, not encountering bullying and not being bored in supporting non-uptake of smoking by Aboriginal and Torres Strait Islander adolescents. Other factors identified by our analysis as associated with never smoking were generally consistent with broader literature. These included non-smoking peers (cigarettes/e-cigarettes), the absence of risk-taking behaviours, and a positive family and school environment. Several environmental factors were also significantly associated with non-uptake, including not feeling bored and not having family experiences of racism or discrimination.

These findings have implications for understanding the mechanisms that support Aboriginal and Torres Strait Islander ado-

lescents to be smoke-free, highlighting the need for structural changes and tailored interventions (Colonna 2020, Maddox, Telford *et al.* 2024). For example, the 2024 reforms help address risks from tobacco industry activities and products like e-cigarettes and help provide a policy framework to complement community-controlled, strengths-based programs promoting smoke-free behaviours (Colonna 2020).

Schools play a crucial role in supporting these protective factors through the implementation of comprehensive smoke-free and vape-free policies. Creating culturally safe environments within schools—where Aboriginal and Torres Strait Islander students feel valued, respected, and supported—can help foster engagement and a sense of belonging, both of which are protective against smoking. Health promotion

activities integrated into school curricula such as the Tackling Indigenous Smoking program, including education on smoking and vaping, are fundamentally important (Colonna 2020). Consistent enforcement of smoke-free and vape-free policies for students and staff reinforces these messages and supports smoke-free norms. Schools can also serve as critical settings for early intervention by identifying and addressing risk factors, such as disengagement or bullying, that may increase the likelihood of smoking. Such measures, tailored to the specific needs of Aboriginal and Torres Strait Islander peoples and communities, can be pivotal for sustaining smoke-free behaviours among adolescents (Colonna 2020).

The availability of smoking recency and frequency measures is a strength of this exploratory study. Although most Aboriginal and Torres Strait Islander adolescents had never smoked, half (51.3%) of those who had ever tried smoking had smoked in the last year, and half of those were already smoking at a regular frequency, at least weekly. Frequent smoking poses a risk of developing long-term nicotine dependence at this early age. Many who have tried smoking have not progressed to regular smoking and it is important to understand what factors have supported those who have tried smoking but have not gone on to smoke regularly.

Risk and racism

Our results suggest that the absence of other risk-taking behaviours, such as e-cigarette use, cannabis, and alcohol, is associated with a lower prevalence of cigarette smoking. These findings are consistent with evidence that demonstrates the clustering of adolescent risk behaviours among Aboriginal and Torres Strait Islander adolescents, particularly tobacco, marijuana, and alcohol use (Johnston, Westphal *et al.* 2012). Experimentation with these substances may occur concurrently at social gatherings and reinforce belonging to peer groups where experimentation is encouraged (Johnston, Westphal *et al.* 2012). The root causes of these behaviours are likely shared and may include experiences of racism, discrimination, and trauma (Thurber, Colonna *et al.* 2021, Heris, Cutmore *et al.* 2023). This baseline dataset provides critical context for identifying trends in substance use behaviours and their clustering over time, offering a framework for longitudinal evaluations of how protective and risk factors evolve.

The significant association between the never use of e-cigarettes and the never use of cigarettes among Aboriginal and Torres Strait Islander adolescents is important. Although the direction of this effect cannot be determined due to the cross-sectional nature of this exploratory study, findings from longitudinal studies and systematic reviews indicate e-cigarette use among people who do not smoke increases the risk of cigarette-smoking initiation (Leventhal, Strong *et al.* 2015, Baenziger, Ford *et al.* 2021, Banks, Yazidjoglou *et al.* 2023, Martinelli, Candel *et al.* 2023). A longitudinal study in the Netherlands found a positive relationship between e-cigarette and cigarette use in both directions for adolescents, that is, baseline e-cigarette use was associated with later tobacco use and baseline tobacco use was associated with later e-cigarette use. This may indicate a perpetual ‘gateway’ working in both directions and/or that e-cigarette and cigarette use share common risk factors, which is particularly concerning given the potential to reverse the downward trend in tobacco use among Aboriginal and Torres Strait Islander adolescents since 2005 (Heris, Guerin *et al.* 2020, Rickard, Heris *et al.* in process). Findings in a parallel LSIC e-cigarette study indicate social

and emotional protective factors for e-cigarette smoking in Aboriginal and Torres Strait Islander adolescents consistent with those identified here (Rickard, Heris *et al.* in process). These findings suggest that comprehensive interventions and structural changes that promote factors protective against smoking, such as school engagement, positive family relationships, and the absence of racism and risk-taking behaviours, may be effective at reducing use of both cigarettes and e-cigarettes (World Health Organization 2003, Chamberlain, Perlen *et al.* 2017, Heris, Chamberlain *et al.* 2020, Australian Government Department of Health and Aged Care 2023).

Boredom is frequently reported as a driver of smoking initiation and maintenance by Aboriginal and Torres Strait Islander young people in qualitative studies (Cosh, Hawkins *et al.* 2015, East, Reid *et al.* 2023, Heris, Cutmore *et al.* 2023). Describing their local area as having ‘nothing to do’ was used as a proxy measure of boredom in the current exploratory study. The results showed a potential protective effect of not being bored against smoking among adolescents. This was supported by discussions with Aboriginal and Torres Strait Islander Research Administration Officers (RAOs) who conduct LSIC surveys and perceived that in regional and urban areas where there were more community resources and infrastructure (such as sportsgrounds), smoking was still quite rare, but that more young people had started to smoke in remote areas where there was not a lot to do. RAOs noted that in some places, funding cuts to schools and communities, particularly in relation to groundskeeping, were impacting the availability of activities for young people. This aligns with our (nonsignificant) findings of a greater prevalence of never smoking in non-remote areas. In other communities, hunting and fishing trips were reportedly helping to keep young people smoke-free. Locally tailored, community-based programs and recreational activities may help improve youth engagement with peers, family, community, and the education system. For success, these programs should be strengths-focused and community-designed and controlled in order to encourage ownership and capacity building (Osborne, Baum *et al.* 2013). Such interventions may have widespread benefits, including improved community wellbeing and reductions in substance use (including tobacco, e-cigarettes, and other substances), but need to be adequately resourced. The Australian Government funds a broad range of community-based tobacco control initiatives through the Tackling Indigenous Smoking (TIS) program, with current evaluations showing promising engagement with Aboriginal and Torres Strait Islander youth and young people (Cultural & Indigenous Research Centre Australia 2022).

We found a positive association between adolescents never smoking and lack of exposure to racism at the family level. Racism is a key threat to wellbeing and a risk factor for substance use. LSIC data have demonstrated that children exposed to racism have seven times increased risk of trying cigarettes (at ages 10–12 years) (Calma 2016), increased social and emotional issues (Shepherd, Li *et al.* 2017), poorer mental health, and higher prevalence/risk of sleep difficulties, and asthma compared to children who are not exposed to racism (Shepherd, Li *et al.* 2017). These effects have been observed even when racism is experienced indirectly, such as racism experienced by the children’s caregivers.

Avoiding involvement in bullying—either as a perpetrator or victim—was significantly associated with never smoking among adolescents. Experiencing bullying due

to being Aboriginal and/or Torres Strait Islander was not significantly associated with never smoking. This variable was reported by the adolescents' parents who may not be fully aware of the context of the bullying incident. Furthermore, it is possible that there is a lack of attribution to Indigeneity specifically, potentially resulting in under reporting. Bullying is harmful regardless of the intended or perceived reason. Racism, discrimination, and bullying have negative impacts on adolescent health (Patton, Sawyer *et al.* 2016, Graham, Heris *et al.* 2021). In addition, bullying is a form of social exclusion which may result in adolescents seeking out other marginalised young people (Johnston, Westphal *et al.* 2012).

Consistent with this, a recent study of young Aboriginal people found not being bullied to be protective against marijuana use (Thurber, Colonna *et al.* 2021). Discriminatory treatment may also be reflected in racial profiling by law enforcement, a commonly reported issue by Aboriginal and Torres Strait Islander adults (Passey, Gale *et al.* 2011). Our results found that not having problems with the police was significantly associated with adolescents never smoking. Having problems with the police is a complex factor and may indicate racial profiling leading to adolescents being unfairly bothered by the police (Passey, Gale *et al.* 2011). Nonetheless, trajectories linking the cumulative stress of racism exposure to poorer health outcomes, including increased risk of substance use, have been frequently observed (Passey, Gale *et al.* 2011, Priest, Paradies *et al.* 2011, Shepherd, Li *et al.* 2017).

Healthy homes and schools

Family plays a key role in adolescent wellbeing. Our results were consistent with studies demonstrating the role of family strength and resilience (Passey, Gale *et al.* 2011, Cosh, Hawkins *et al.* 2015). Family relationships are complex and dynamic but can protect against smoking by providing emotional strength and resilience, and role modelling of smoke-free norms (Johnston, Westphal *et al.* 2012, Heris, Guerin *et al.* 2020). The 2018 baseline dataset captures a snapshot of these protective family and school dynamics, providing a valuable reference point for tracking shifts in these influences over time. This will be critical for understanding how social and environmental changes impact adolescent smoking behaviours and outcomes.

Studies of Aboriginal and Torres Strait Islander youth describe the protective effect of direct role modelling of smoke-free behaviours and non-smoking rules at home in limiting access to tobacco (Johnston, Westphal *et al.* 2012, Heris, Chamberlain *et al.* 2020). Many youths report their 'first puff' as occurring opportunistically where tobacco is available at home (Johnston, Westphal *et al.* 2012). The RAOs reported that caregivers were continuing to make positive changes for themselves and their children, with many minimising the availability of cigarettes and having quit or tried to cut down on cigarettes consumed per day. RAOs emphasised the importance of a smoke-free home environment as adolescents growing up around family members smoking and smoking in the home were more likely to try it themselves. Also important are adolescent and caregiver relationships where they share openly and reinforce smoke-free messaging, such as the potential future impacts of smoking on health and finances.

School attendance and engagement were associated with never smoking. Supportive relationships, engagement, and

performance at school are established protective factors against smoking for Indigenous adolescents internationally (Heris, Chamberlain *et al.* 2020). This is reflected in legislation prohibiting student or teacher smoking in schools in most Australian states and territories (Northern Territory Government: Department of Education 2019, Greenhalgh, Scollo *et al.* 2014). Exemptions and anachronisms that persist, such as the Northern Territory policy which allows teachers to vote on a designated smoking area in their school each year (Greenhalgh, Scollo *et al.* 2014), should be removed to reinforce consistent messaging to promote smoke-free behaviours among staff and students. RAOs felt there was a particularly important role for schools to play in both setting and enforcing smoke-free expectations, and as a setting for health promotion programs.

Within the cohort, we did not observe significant differences in never smoking by age group, sex, or remoteness. Among adolescents who had ever smoked, the 12- to 13-year age group had a significantly lower prevalence of smoking in the last 12 months compared to the 14- to 15-year age group (33% vs 63%), and lower, but not significantly, of smoking at least weekly (44% vs 62%). This may reflect changing influences at different stages of adolescence. RAOs shared anecdotal reports of some increased experimentation with tobacco since Wave 11 data collection as the cohort has aged. This highlights the importance of education and awareness about smoking in community and school settings with locally tailored programs for different stages of adolescence as youth are exposed to changing pressures to smoke. RAOs called for greater support and uptake of youth-specific cessation resources.

Limitations

LSIC incorporates a large, diverse sample of Aboriginal and Torres Strait Islander peoples. However, it is not designed to be representative of all Aboriginal and Torres Strait Islander adolescents. Thus, prevalence estimates from the cohort are not generalisable to the entire population. However, the findings from internal comparisons, that is the associations between exposures and never smoking, are understood to be generalisable beyond the study sample (Mealing, Banks *et al.* 2010). Therefore, the PR results should be generally applicable to all Aboriginal and Torres Strait Islander adolescents.

Despite the sensitive nature of the topic, a high proportion of the K cohort participants (91.6%, up to $n = 434/474$) responded to questions regarding smoking. This reflects the development of trusting relationships with the RAOs (Thurber, Olsen *et al.* 2018). Our analysis was restricted to participants with data on ever-smoking. While there were no significant differences by age or sex between included and excluded participants, we observed that participants from remote/very remote areas were disproportionately missing data on smoking (Supplementary Table S2). We controlled for remoteness in the adjusted regression models. However, it may mean that the experiences of adolescents in remote areas may not be fully captured in this exploratory study. Research, monitoring, and evaluation with a larger sample of adolescents living in remote/very remote settings would be valuable. Several variables, including those addressing racism and problems with the police, were reported by caregivers rather than the adolescent (indicated in Table 2). While all variables were considered in the context of the broader literature, it is

possible that the adolescents' perspective may be under- or overrepresented by their caregiver.

Several potential protective factors of interest were not fully explored due to survey limitations. Good mental health and positive wellbeing is generally protective for never smoking (Heris, Chamberlain *et al.* 2020); however, this wave of the survey did not contain a strengths-based measure of mental health. The absence of suicide ideation in the past year was used as an acute measure of poor mental health, with results indicating a positive but non-significant association. The lack of significant association could be a reflection of low statistical power to detect differences with a small number of participants identifying they had experienced suicide ideation. Nevertheless, our results demonstrate positive associations between never smoking and numerous social and environmental factors involved in mental health, such as family and friend relationships, and experiences of racism.

Identity and connection to culture are fundamental to wellbeing of Aboriginal and Torres Strait Islander peoples, including children (Heris, Chamberlain *et al.* 2020). The LSIC survey did not contain validated measures of cultural identity. There is an opportunity for LSIC surveys to include validated measures of cultural identity and wellbeing developed with young Aboriginal and Torres Strait Islander people in order to explore and characterise the protective role of cultural identity in supporting smoke-free behaviours and overall wellbeing.

As a result, we were unable to evaluate the potential protective role of cultural practice and expression in staying smoke-free. Finally, our cross-sectional design prevented exploration of the direction of the observed effects. Further investigation is warranted, particularly longitudinally and given the design of the study, to assess the nature and size of the observed associations.

CONCLUSIONS AND IMPLICATIONS FOR PUBLIC HEALTH

This exploratory study demonstrates associations between never smoking and positive social relationships, non-participation in substance use or risk-taking behaviours, and minimal experiences of discrimination. The 2024 Australian government reforms on vaping, which restrict product availability, present a timely opportunity to strengthen these protective measures. Health promotion efforts should leverage these reforms which can help provide a policy framework to complement culturally safe, strengths-based programs tailored to Aboriginal and Torres Strait Islander adolescents. Such programs should promote smoke-free behaviours and holistic wellbeing, addressing risk factors like disengagement and boredom while fostering protective environments in schools, families, and communities. These efforts will not only contribute to accelerating declines in smoking prevalence but also support long-term health and wellbeing improvements.

This dataset provides a critical foundation for identifying trends, evaluating interventions, and understanding the long-term impacts of evolving social, regulatory, and industry-driven changes. Strengths-based, community-controlled programs should target Aboriginal and Torres Strait Islander adolescents to promote smoke-free behaviours and holistic wellbeing, to help accelerate ongoing declines in smoking prevalence and improvement in health outcomes.

SUPPLEMENTARY MATERIAL

Supplementary material is available at Health Promotion International online.

ACKNOWLEDGEMENTS

The authors acknowledge the Traditional Owners and Custodians of the lands on which they live and work, and where this study was conducted. They pay their respects to Elders past, present, and future. We also acknowledge and honour the youth and young people, the future leaders of our communities, who continue to inspire us with their resilience, wisdom, knowledges, and insights for a commercial tobacco- and nicotine-free future. We recognise their vital role in preserving and advancing our cultures, traditions, and ways of knowing, being, and doing. The authors acknowledge the generosity of the Aboriginal and Torres Strait Islander peoples, families, and communities who participated in the Longitudinal Study of Indigenous Children (LSIC). This article used unit record data from LSIC conducted by the Australian Government Department of Social Services (DSS). The authors would like to thank the LSIC RAOs for providing input and sharing their views during engagement and feedback sessions and the LSIC staff for their support and assistance. LSIC RAOs/DSS staff were invited as authors in acknowledgement of their contribution. The findings and views reported in this article, however, should not be attributed to the Australian Government, DSS, or any of DSS' contractors or partners. DOI: 10.26193/ICEBFP 'Footprints in Time: The Longitudinal Study of Indigenous Children, Release 11 (Waves 1–11)'.

CONFLICT OF INTEREST

Consistent with the Journal's policies, the authors have no conflict of interest to declare.

FUNDING

The National Health and Medical Research Council (NHMRC) Fellowship (KAT#1156276; MK#1158670).

DATA AVAILABILITY

The data used in this study were accessed through the Longitudinal Study of Indigenous Children (LSIC), conducted by the Australian Government Department of Social Services (DSS), in accordance with DSS protocols and processes. This study recognises the critical importance of Indigenous Data Sovereignty Principles (IDSP), which assert that Aboriginal and Torres Strait Islander peoples have the right to self-determination in the collection, ownership, and use of their data. Researchers are strongly encouraged to respect, uphold, and integrate these principles in the design, analysis, and reporting of Indigenous data consistent with ethical practice. Applications for access to LSIC datasets can be made by following the procedures outlined by the DSS, with detailed information available on the DSS website.

ETHICS

The project upholds ethical principles of research with Aboriginal and Torres Strait Islander peoples consistent

with the National Health and Medical Research Council Guidelines for ethical conduct in Aboriginal and Torres Strait Islander Health Research. LSIC data collection is conducted with approvals from the departmental ethics committee of the Australian Government Department of Health and Aged Care, and from ethics committees in each state and territory, including relevant Aboriginal and Torres Strait Islander organisations. Ethics approval for this LSIC analysis was granted by the Human Research Ethics Committee (Protocol No. 2016/534).

REFERENCES

- Australian Government Department of Health and Aged Care. *National Tobacco Strategy 2023-2030*. Canberra, Australia: Australian Government Department of Health and Aged Care, 2023.
- Australian Institute of Health and Welfare. *Aboriginal and Torres Strait Islander Adolescent and Youth Health and Wellbeing*. 018. Cat. no. AIHW 202. Canberra, Australia: AIHW, 2018.
- Australian Institute of Health and Welfare. *Australian Burden of Disease Study 2018: Interactive Data on Risk Factor Burden*. Canberra, Australia: Australian Institute of Health and Welfare, 2021.
- Baenziger ON, Ford L, Yazidjoglou A *et al*. E-cigarette use and combustible tobacco cigarette smoking uptake among non-smokers, including relapse in former smokers: umbrella review, systematic review and meta-analysis. *BMJ Open* 2021;11:e045603. <https://doi.org/10.1136/bmjopen-2020-045603>
- Banks E, Yazidjoglou A, Brown S *et al*. Electronic cigarettes and health outcomes: umbrella and systematic review of the global evidence. *Med J Aust* 2023;218:267–75. <https://doi.org/10.5694/mja2.51890>
- Calma T. *How Discrimination and Stressful Events Affect the Health of our Indigenous Kids*. *The Conversation*, 2016. <https://theconversation.com/how-discrimination-and-stressful-events-affect-the-health-of-our-indigenous-kids-67548>.
- 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 Rev* 2017;6:1–28.
- Colonna E, Maddox R, Marmor A *et al*. Review of tobacco use among Aboriginal and Torres Strait Islander peoples. *Australian Indigenous Health Bulletin* 2020;20:62.
- Cosh S, Hawkins K, Skaczkowski G *et al*. Tobacco use among urban Aboriginal Australian young people: a qualitative study of reasons for smoking, barriers to cessation and motivators for smoking cessation. *Australian J Prim Health* 2015;21:334–41. <https://doi.org/10.1071/PY13157>
- East KA, Reid JL, Hammond D. Smoking and vaping among Canadian youth and adults in 2017 and 2019. *Tob Control* 2023;32:259–62. <https://doi.org/10.1136/tobaccocontrol-2021-056605>
- Graham S, Heris CL, Gubhaju L *et al*. Young Aboriginal people in Australia who have never used marijuana in the “Next Generation Youth Well-being study”: a strengths-based approach. *Int J Drug Policy* 2021;95:103258. <https://doi.org/10.1016/j.drugpo.2021.103258>
- Greenhalgh E, Scollo M, Winstanley M. *Approaches to Youth Smoking Prevention*. In: Greenhalgh EM, Scollo MM and Winstanley MH (ed.), *Tobacco in Australia: Facts and issues*. Melbourne: Cancer Council Victoria, 2014. <https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-20-approaches-to-youth-smoking-prevention>
- Greenhalgh E, Stillman S, Ford C. Factors that predict success or failure in quit attempts. In: *Tobacco in Australia: Facts and Issues*. Melbourne: Cancer Council Victoria, 2016.
- Heris C, Guerin N, Thomas D *et al*. Smoking behaviours and other substance use among Indigenous and non-Indigenous Australian secondary students, 2017. *Drug Alcohol Rev* 2021;40:58–67. <https://doi.org/10.1111/dar.13130>
- Heris C, Thurber KA, Wright D *et al*. Staying smoke-free: factors associated with nonsmoking among urban aboriginal adolescents in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH). *Health Promot J Austr* 2021;32:185–96.
- Heris CL, Chamberlain C, Gubhaju L *et al*. 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* 2020;22:1946–56.
- Heris CL, Cutmore M, Chamberlain C *et al*. 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). *Int J Environ Res Public Health* 2023;20:4587. <https://doi.org/10.3390/ijerph20054587>
- Heris CL, Eades SJ, Lyons L *et al*. Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015. *Public Health Res Pract* 2020;30:1–8.
- Heris CL, Guerin N, Thomas DP *et al*. The decline of smoking initiation among Aboriginal and Torres Strait Islander secondary students: implications for future policy. *Aust N Z J Public Health* 2020;44:397–403. <https://doi.org/10.1111/1753-6405.13022>
- Johnston V, Westphal DW, Earnshaw C *et al*. Starting to smoke: a qualitative study of the experiences of Australian indigenous youth. *BMC Public Health* 2012;12:1–14.
- Leavy J, Wood L, Phillips F *et al*. Try and try again: qualitative insights into adolescent smoking experimentation and notions of addiction. *Health Promot J Austr* 2010;21:208–14. <https://doi.org/10.1071/he10208>
- Leventhal AM, Strong DR, Kirkpatrick MG *et al*. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *JAMA* 2015;314:700–7. <https://doi.org/10.1001/jama.2015.8950>
- Maddox R, Telford RM, Waa A *et al*. *Eradication of Commercial Tobacco Related Disease and Death*. *Tobacco Control*. <https://doi.org/10.1136/tc-2023-058547>.
- Maddox R, Thurber KA, Calma T *et al*. *Deadly News: The Downward Trend Continues in Aboriginal and Torres Strait Islander Smoking 2004–2019*. *Australian and New Zealand Journal of Public Health* 2020;44:449–50. <https://doi.org/10.1111/1753-6405.13049>
- Martinelli T, Candel MJ, de Vries H *et al*. Exploring the gateway hypothesis of e-cigarettes and tobacco: a prospective replication study among adolescents in the Netherlands and Flanders. *Tob Control* 2023;32:170–8.
- Mealing NM, Banks E, Jorm LR *et al*. Investigation of relative risk estimates from studies of the same population with contrasting response rates and designs. *BMC Med Res Methodol* 2010;10:1–12.
- Moreton-Robinson A. Relationality. In: *Sources and Methods in Indigenous Studies*. 2016. Routledge, United Kingdom, 69–83.
- Northern Territory Government: Department of Education. *Smoke Free Premises Policy*. Department of Education. 2019.
- Osborne, K., Baum, F. and Brown L. *What works? A Review of Actions Addressing the Social and Economic Determinants of Indigenous Health*. Canberra, Australia: Closing the Gap Clearinghouse, 2013.
- Passey ME, Gale JT and 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;11:1–12.
- Patton GC, Sawyer SM, Santelli JS *et al*. Our future: a Lancet commission on adolescent health and wellbeing. *Lancet* 2016;387:2423–78.
- Priest N, Paradies Y, Stewart P *et al*. Racism and health among urban Aboriginal young people. *BMC Public Health* 2011;11:1–9.
- Rickard E, Heris C, Barrett EM *et al*. (in process). Associations between individual, social, and environmental factors and never-use of e-cigarettes among adolescents in the Australian Longitudinal Study of Indigenous Children. *Health Promotion International*.
- Shepherd CC, Li J, Cooper MN *et al*. The impact of racial discrimination on the health of Australian Indigenous children aged 5–10 years: analysis of national longitudinal data. *Int J Equity Health* 2017;16:1–12.

- Smith, LT. *Decolonizing Methodologies: Research and Indigenous Peoples*. Sydney, Australia: Bloomsbury Publishing, 2021.
- Thurber, K, Walker J, Maddox R *et al*. *A Review of Evidence on the Prevalence of and Trends in Cigarette and E-cigarette Use by Aboriginal and Torres Strait Islander Youth and Adults*. Canberra, Australia: Australian National University, 2020.
- Thurber KA, Banks E and Banwell C; LSIC Team. Cohort profile: footprints in time, the Australian longitudinal study of Indigenous children. *Int J Epidemiol* 2015;**44**:789–800. <https://doi.org/10.1093/ije/dyu122>
- Thurber, KA, Banks E, Joshy G, *et al*. Tobacco smoking and mortality among Aboriginal and Torres Strait Islander adults in Australia. *Int J Epidemiol* 2021;**50**:942–54.
- Thurber KA, Colonna E, Jones R *et al*.; On Behalf Of The Mayi Kuwayu Study Team. Prevalence of everyday discrimination and relation with wellbeing among Aboriginal and Torres Strait Islander adults in Australia. *Int J Environ Res Public Health* 2021;**18**:6577. <https://doi.org/10.3390/ijerph18126577>
- Thurber KA, Olsen A, Guthrie J *et al*. “Telling our story... Creating our own history”: caregivers reasons for participating in an Australian longitudinal study of Indigenous children. *Int J Equity Health* 2018;**17**:1–15.
- Thurber KA, Thandrayen J, Banks E *et al*. Strengths-based approaches for quantitative data analysis: a case study using the Australian longitudinal study of indigenous children. *SSM-Popul Health* 2020;**12**:100637.
- Waa A, Maddox R and Nez Henderson P. Big tobacco using Trojan horse tactics to exploit Indigenous peoples. *Tob Control* 2020;**29**:e132–3. <https://doi.org/10.1136/tobaccocontrol-2020-055766>
- World Health Organization. *World Health Organization Framework Convention on Tobacco Control*. Geneva, Switzerland: World Health Organization, 2003.