








Review Article

The impact of adverse childhood experiences on health outcomes of indigenous populations over the life course: A systematic review

K.M. Shahunja^{a,b,*} , Md Ashraful Alam^{a,b} , Edmund Wedam Kanmiki^{a,b} ,
Thilini Nisansala Egoda Kapuralalage^{a,b} , Thuy Linh Duong^a , Sarah Graham^a,
Abdullah A. Mamun^{a,b}

^a UQ Poche Centre for Indigenous Health, The University of Queensland, Brisbane, Australia

^b ARC Centre of Excellence for Children and Families over the Life Course, The University of Queensland, Brisbane, Australia



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ABSTRACT

Objective: Adverse childhood experiences (ACEs) are recognised as a strong risk factor affecting health outcomes. This systematic review seeks to synthesize evidence from global studies, investigating the associations of ACEs with the development of various health issues beyond childhood in Indigenous populations.

Study design: Systematic review.

Methods: We systematically searched for research articles published up to February 2024, in databases of peer-reviewed literature. We searched for articles on different types of ACEs recorded and their associated problematic health outcomes in different Indigenous populations across the world. Observational studies and administrative linkage study design were eligible for inclusion. Summary results of individual studies and variations of different ACE measuring tools are presented. We further explored the potential link between ACEs and various health outcomes by constructing an acyclic graph based on available evidence.

Results: We screened 2468 articles, and 56 were included in our review. Although tools for measuring ACEs were diverse, most of the studies used either the CDC-Kaiser study tool or tools by Bernstein et al. which were developed for the mainstream population. No Indigenous-specific tool was found that was used to assess ACEs in Indigenous populations. The studies assessed several types of ACEs, with sexual abuse and physical abuse being the most common. All the studies reported a significant association between ACEs and adverse health outcomes where mental health issues were more examined than physical health issues.

Conclusion: As we found that there was no validated Indigenous-specific tool for the Indigenous population, it is crucial to develop ACE measurement tools tailored to Indigenous populations that can capture trauma events related to their unique history and cultural context. Considering the higher prevalence of several physical health problems, especially cardiovascular and metabolic diseases in this population, more research should be conducted to identify their links with ACEs.

1. Introduction

Adverse Childhood Experiences (ACEs) refer to some of the most intensive and frequently occurring sources of stress that children may suffer in early life. Such ACEs include various forms of maltreatment (multiple types of abuse); neglect; violence between parents or caregivers; other serious household dysfunction such as alcohol and substance abuse; and peer, community, and collective violence.¹

ACEs can be found among people of varying socioeconomic status and both in high, and low- and middle-income countries.^{2–5} Evidence

from population-based studies found that 40–60 % of adults have experienced at least one ACEs, and a quarter of adults have had at least three such experiences.^{6,7} The prevalence of ACEs varies across different ethnicities. Several studies showed that the prevalence of ACEs in the Indigenous population is higher than their non-indigenous counterparts.^{8,9} The high rate of ACEs in Indigenous populations is closely tied to the legacy of colonization, historical trauma, and systemic marginalization.¹⁰ Forced removal of children, cultural suppression, and ongoing social and economic inequalities may also create conditions where abuse, neglect, and family dysfunction are more prevalent.

* Corresponding author. UQ Poche Centre for Indigenous Health, The University of Queensland, 74 High Street, Toowong, QLD, 4066, Australia.

E-mail address: k.shahunja@uq.edu.au (K.M. Shahunja).

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Intergenerational trauma, poverty, and a disconnect from cultural roots further exacerbate these challenges, leading to disproportionately higher rates of ACEs in Indigenous communities compared to the general population.^{11–13}

The pioneering study by Fellitti and colleagues (1998) demonstrated that exposure to ACEs is common, ACEs co-occur, and exposure to multiple ACEs is associated with an increased incidence of health risk behaviours and illnesses.^{14–16} They have also been linked to the propagation of intergenerational cycles of ACE-related mental health, behavioural, and social problems.¹⁷

Indigenous people across the world experience significant health disparities, which are rooted in historical and systemic inequalities, leading to poorer health outcomes and reduced life expectancy compared to non-Indigenous groups.^{18,19} It is postulated that these adverse health outcomes are significantly linked to the high prevalence of ACEs in this population. However, there is a paucity of systematic reviews to help understand and quantify the long-term effects of ACEs in the context of Indigenous populations.

Although ACEs has been widely studied in the general population, a gap remains in synthesising this knowledge specifically for Indigenous populations. Radford and colleagues recently examined ACEs within an Indigenous population.⁹ The goal of their review was to synthesize relevant ACE research in Indigenous populations in North America. However, due to the scarcity of literature on Canadian Indigenous populations, the review was broadened to encompass other countries' (e.g. Australian) Indigenous populations. Their review was limited to papers published from 2000 to October 2019; searches were modified to list by relevance, and the first 1000 results were searched in each database. They included 21 studies in their review, all described relationships between ACEs and mental or physical health outcomes for Indigenous populations.⁹ Our study aims to conduct a comprehensive systematic review of the literature on ACEs and problematic health outcomes over the life course of the Indigenous population in the global context without any time limitation. Our search was more recent, and we expected to have more current and robust information than previous.

2. Methods

We conducted a systematic review following the 'Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.²⁰ Searches were completed and subsequent results were reported in adherence with these guidelines. The study was prospectively registered in the international database of prospectively registered systematic reviews (PROSPERO CRD42022366417).²¹ A PRISMA flowchart of the study is shown (see the result section).

2.1. Data sources and search strategy

To identify the articles, we used five search engines including PubMed, Embase, CINAHL, PsycNET, and ProQuest. We conducted our search in February 2024 and there was no time/date limitation in our inclusion criteria. We used a combination of different keywords and appropriate 'Boolean Operators' to search for the articles as described in [Supplementary Table S1](#). References were managed with Endnote 20 (Clarivate Analytics, Boston, USA), Microsoft Excel for Office 365 (Microsoft Corporation, Redmond, WA, USA), and Covidence 2020 (Veritas Health Innovation Ltd, Melbourne, Australia). Additional information related to searches are provided in the supplementary material.

2.2. Inclusion and exclusion criteria

We followed the PECO (Population, Exposure, Comparator, and Outcomes) criteria²² for the inclusion and exclusion of the studies ([Table 1](#)). We used this standard framework to formulate appropriate questions to assess the associations between exposures and outcomes.

Table 1

PECO criteria for inclusion and exclusion of studies.

Parameter	Inclusion criteria	Exclusion criteria
Population	Indigenous people	None
Exposure	Exposed to any type of adverse childhood experiences (ACEs)	None
Comparator	Not exposed to any ACE	None
Outcome	Adverse health outcomes	None
Study design	Observational (cross-sectional, cohort and case-control) study, Data linkage study	Editorial, Methodological article, Review article

2.3. Selecting the target population

Indigenous people across the globe were our target population for this study. According to the 'World Bank', Indigenous Peoples are distinct social and cultural groups that share collective ancestral ties to the lands and natural resources where they live, occupy, or from which they have been displaced.²³ However, in our review, we included the articles where authors stated their study population was Indigenous as per their countries' context such as Indigenous, First Nation, Native American, American Indian, Alaska natives, Aboriginal and Torres Strait Islander, Māori, Sami and Inuit.

2.4. Selecting the exposures

In this review, we considered ACEs as per the CDC-Kaiser Study,²⁴ WHO ACE-IQ¹ and studies that assessed one or more ACE items or the composite score of multiple ACEs.

2.5. Selecting the outcomes

We considered adverse health outcomes as our outcome variable. Broad definitions of adverse health outcomes or measurement of mental and physical health were included. For example, self-perceived, self-report measurement, objective measurement, and/or clinical diagnoses were included.

2.6. Articles selection and data extraction

The screening was conducted by two independent reviewers (KMS and AAM). Disagreements were discussed and resolved through group meetings. These reviewers also completed a standard data-extraction form, summarising each article's study design and other relevant data, including author, publication year, sample size, population, study type, exposure, and outcome (see result section). We only included articles that were original, full-text available, and in the English language. We did not include review articles, editorials, or conference abstracts.

2.7. Quality assessment

A modified Newcastle Ottawa Scale²⁵ for observational studies was used to assess the methodological quality of the selection, comparability, and outcome of the included studies ([Supplementary Table S2](#)). Two independent reviewers (KMS and AAM) performed the quality assessment and scored the studies for adherence to the prespecified criteria ([Supplementary Table S3](#)).

2.8. Data analysis and presentation

Descriptive analyses were done and presented in different tables and graphs. We assessed the distributions of different Indigenous communities, types of ACEs, and variations of the ACEs measuring tools across the reviewed articles. We also described the relationships between ACEs and different problematic health outcomes through graphical presentation.

3. Results

3.1. Search outcome

We identified a total of 2927 references by the search strategy. Upon conducting this systematic approach, we ultimately included 56 articles in this review. The detailed process of article selection has been illustrated in Fig. 1.

3.2. Characteristics of included studies

The 56 articles presented data from 45,629 individuals of varying ages. One study was a case-control design, and the rest were cross-sectional studies (Supplementary Table S4). Most of the studies (36 studies) were from the USA, followed by Canada (seven studies) and Australia (four studies) (Supplementary Fig. S1). Based on the quality assessment mentioned in Supplementary Tables S2 and 24 (43 % studies were of high quality, scoring 8–9 out of 10. The other 32 (57 % studies scored 6–7 out of 10 (Supplementary Table S3).

Several types of ACEs were assessed by these studies (Table 2). Thirty-two studies (57 %) covered a range of several adverse components. However, among the other studies that measured one or more individual ACEs, sexual abuse (24 studies) and physical abuse (20 studies) were the most common (Supplementary Fig. S2). Regarding problematic health outcomes, the studies assessed the conditions of

several problematic mental and physical health issues (Table 2) and their association with ACEs (Supplementary Table 4). Further details of the study design and brief results of our all reviewed articles are presented in Supplementary Table S4.

3.3. Variations in ACEs measurement tools

We found different studies used different tools to measure ACEs. However, 15 (27 %) studies used the ACEs questionnaires developed by the CDC-Kaiser Study²⁴ described in an article by Felitti et al.,¹⁴ and 12 (21 %) studies used ACEs questionnaires developed by Bernstein et al.^{81,82} Two studies used ACEs questionnaires by WHO (ACE-IQ),¹ ACEs questionnaires by Turner et al.,⁸³ and a modified version of the Diagnostic and Statistical Manual (DSM-III-R) of the American Psychiatric Association.⁸⁴ A few studies used multiple tools to develop the questionnaires used in the study. Twelve studies developed their own questionnaires to assess the ACEs or did not mention the source from which they adapted the questionnaires. The detailed list of ACE measuring tools and their usage across studies is summarised in Supplementary Table S5.

3.4. Associations between different ACEs and health outcomes

Except one, all the studies included in this review showed significant associations between ACEs and different problematic health outcomes in the Indigenous population (Supplementary Table S4). After

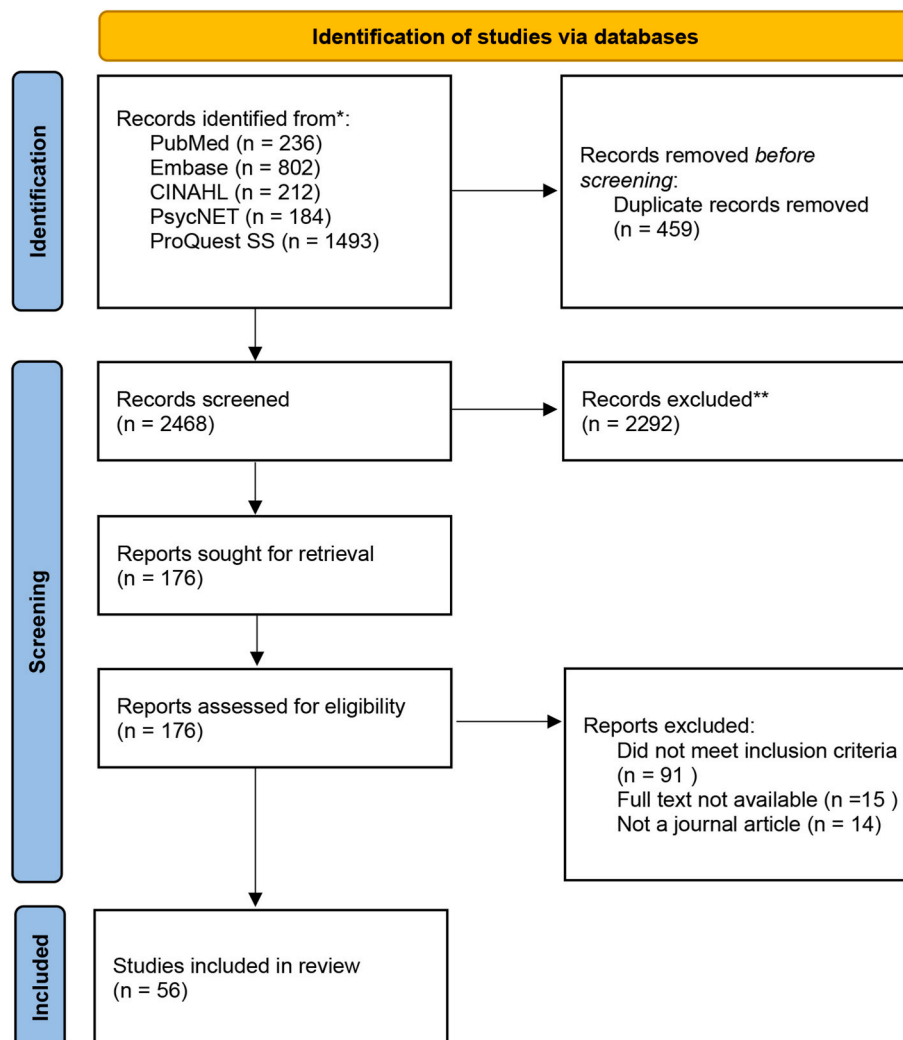


Fig. 1. PRISMA flow chart for search and selection of studies for inclusion.

Table 2
Types of ACEs and problematic health outcomes.

SL	Authors & year	ACEs	Health outcome
1	Burnette et al., 2017 ²⁶	Abuse, neglect, household dysfunction	Depressive symptoms
2	Kong et al., 2018 ²⁷	Childhood maltreatment	Intimate partner violence (IPV)
3	Roh et al., 2015 ²⁸	Childhood abuse, neglect, household dysfunction	Depressive symptoms
4	Pro et al., 2020 ²⁹	Physical abuse, psychological, sexual, household dysfunction	Physical IPV
5	Ye et al., 2014 ³⁰	Family dysfunction, Abuse (Physical, verbal, sexual)	Physical health, Mental health,
6	Ward et al., 2022 ³¹	ACEs	Cognitive disability
7	John-Henderson et al., 2020 ³²	ACEs	Inflammatory markers (IL-6 and CRP)
8	Elm et al., 2020 ³³	ACEs	Depression, Anxiety Disorder (GAD)
9	Tanner et al., 2022 ³⁴	Childhood Adversities,	Physical, mental, emotional, & spiritual health
10	Koss et al., 2003 ³⁵	ACEs	Alcohol dependence
11	Kunitz et al., 1998 ³⁶	Physical abuse, sexual abuse	Conduct Disorder
12	Yuan et al., 2014 ³⁷	Physical abuse, neglect; sexual abuse, emotional abuse	Alcohol misuse
13	de Ravello et al., 2008 ³⁸	Physical abuse & neglect, sexual abuse dysfunctional family	Mental health, IPV, criminal behaviour, conviction
14	Bernards et al., 2019 ³⁹	Childhood adversities	Depression/Anxiety
15	Brownridge et al., 2017 ⁴⁰	Physical abuse, sexual abuse, exposure to violence, exposure & child abuse.	IPV
16	Duran et al., 2004 ⁴¹	Emotional, physical, and sexual Abuse; Emotional & physical neglect	Mood disorder, substance abuse, anxiety disorders, post-traumatic stress disorder (PTSD)
17	McQuaid et al., 2014 ⁴²	Childhood trauma	Depressive symptoms
18	Nasir et al., 2021 ⁴³	Childhood trauma	PTSD
19	Meyers et al., 2018 ⁴⁴	Physical & sexual abuse, sexual abuse and parental violence	Alcohol Use Disorder (AUD), Cannabis Use Disorder(CUD), Tobacco Use Disorder (TUD)
20	Valdez-Santiago et al., 2013 ⁴⁵	Child abuse (humiliation and blows)	IPV
21	Libby et al., 2004 ⁴⁶	Childhood physical and sexual abuse	Lifetime AUD
22	Libby et al., 2005 ⁴⁷	Childhood physical and sexual abuse	Lifetime depressive, PTSD, GAD
23	Hamelin et al., 2009 ⁴⁸	Childhood sexual abuse	Adult binge drinking
24	Hamelin et al., 2010 ⁴⁹	Childhood sexual abuse (CSA)	Adult sexual health
25	Easton et al., 2019 ⁵⁰	Childhood sexual abuse (CSA)	Depression
26	Radford et al., 2017 ⁵¹	Childhood stress/trauma	Later life mental health outcomes
27	John-Henderson et al., 2020 ³²	Childhood trauma	Sleep quality
28	Eriksen et al., 2018 ⁵²	Emotional, Physical, and sexual violence	Mental health
29	Dagley et al., 2012 ⁵³	violence, sexual abuse, family problems	Adult intimate relationship satisfaction and depression
30	Rowland et al., 2021 ⁵⁴	Childhood trauma	Depressive symptoms
31	Moon et al., 2016 ⁵⁵	ACEs	Depressive symptoms
32	Robin et al., 1997 ⁵⁶	Sexual abuse	Psychiatric disorders
33	Brockie et al., 2018 ⁵⁷	ACEs	Mental health, Physical health,
34	Schluter et al., 2011 ⁵⁸	Physical abuse and Physical punishment	IPV
35	Brockie et al., 2015 ⁵⁹	Physical, emotional, sexual abuse; physical & emotional neglect	Depressive symptoms, PTSD, poly-drug use and Suicide attempt
36	Radford et al., 2019 ⁶⁰	ACEs	All cause Dementia
37	Roh et al., 2019 ⁶¹	ACEs	Depressive symptoms
38	Ross et al., 2015 ⁶²	Sexual and physical abuse	Alcohol and drug use problems
39	Evans-Campbell et al., 2006 ⁶³	Childhood physical abuse	Depression, Anxiety, HIV risk
40	Hobfoll et al., 2002 ⁶⁴	Physical and sexual abuse	Depressive mood, Anger, Partner sexual risk, STDs
41	Pearce et al., 2021 ⁶⁵	Emotional, physical, & sexual abuse; emotional & physical neglect,	Sexually Transmitted Infection (STI), Substance misuse
42	Grossman et al., 1991 ⁶⁶	Physical abuse, sexual abuse	Suicide attempt(s)
43	Yuan et al., 2006 ⁶⁷	Physical abuse, sexual abuse	Adult physical & sexual assault
44	Kunitz et al., 1999 ⁶⁸	Physical abuse, sexual abuse	Conduct disorder
45	Elm et al., 2021 ⁶⁹	Physical, emotional, and contact sexual abuse, physical neglect, AUD, incarcerated household member,	Depressive symptoms, Psychiatric disorders
46	Stefanescu et al., 2023 ⁷⁰	ACEs	Poor physical health, and mental health,
47	Munoz et al., 2024 ⁷¹	ACEs	Mental Disorders
48	Telfar et al., 2023 ⁷²	Sexual abuse, physical punishment, and neglect	Depression and anxiety disorder
49	Rowland et al., 2023 ⁷³	Childhood trauma	Depressive symptoms
50	Jones et al., 2023 ⁷⁴	ACEs	IPV coercive control
51	Danyluck et al., 2022 ⁷⁵	ACEs	Sleep impairment
52	Goldstein et al., 2023 ⁷⁶	ACEs	Prenatal and postpartum depression; preterm and low birth weight
53	Helmus et al., 2023 ⁷⁷	Child sexual abuse	Mental health issues
54	John-Henderson et al., 2023 ⁷⁸	ACEs	Cardiometabolic and mental health
55	Edwards et al., 2024 ⁷⁹	ACEs	Intimate partner abuse (IPA)
56	Granheim et al., 2023 ⁸⁰	Childhood violence	Suicidal behaviour and other mental health issues

summarising the findings of all studies, it showed that the presence of ACEs was associated with having one or more health problems (Fig. 2). These health problems are mainly related to poor physical, mental, sexual health, substance disorders, or IPV (Fig. 2). The majority of studies (38 out of 56) considered different aspects of mental health as

problematic health outcomes than the physical health problems associated with ACEs. Eight studies assessed the associations of ACEs with some components of both physical and mental health.^{30,34,57,63,64,70,76,78}

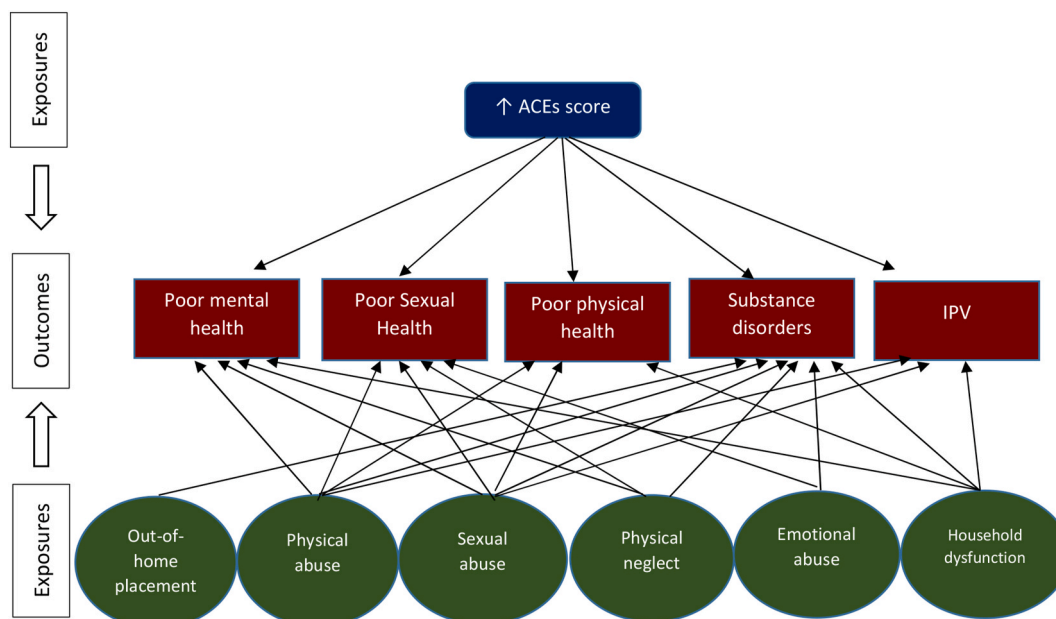


Fig. 2. Associations between different ACEs and health outcomes.

3.5. Association with poor mental health

Depressive symptoms, one of the most common mental health indicators, were found to be significantly high among the Indigenous people in North America who had experienced ACEs.^{30,26,28,50,55,61} Studies showed that anxiety and depressive symptoms increased with the number of ACEs.³³ A similar association was reported among the Indigenous people in Canada,^{34,39,42} and in Australia.^{51,54} ACEs are found to be associated with all causes of Dementia (e.g., Alzheimer's disease) in later life.^{51,85} The risk was also found to be higher for other mental health illnesses such as Post-Traumatic Stress Disorders (PTSD),^{41,43,56,59} cognitive disability,³¹ Conduct disorders,^{36,68} and amount of suicide attempt(s)^{38,66} among the Indigenous population.

3.6. Association with poor physical health

Only three studies out of 45 reviewed articles measured physical health outcomes associated with ACEs. Ye Dailin et al., assessed the association between some non-communicable diseases and ACEs.³⁰ The study reported that ACEs incurred the risk of developing Chronic Obstructive Pulmonary Disease (COPD) in later life by more than two-fold compared to children who had experienced no ACEs.³⁰ However, a Canadian study did not find any significant association between ACEs and overall physical health (prevalence ratio: 0.98, 95 % CI: 0.93, 1.04).³⁴

3.7. Association with poor sexual health

Four studies investigated the association between ACEs and adult sexual health including the risk of Sexually Transmitted Diseases (STDs). A study conducted in New Caledonia reported that Childhood Sexual Abuse (CSA) increases the risk of sexually transmitted infections, non-consensual sexual intercourse with an intimate partner and experience of adult sexual violence.⁴⁹ CSA also increased the risk of HIV infection by 28 times (odds ratio: 28.44, 95 % CI: 3.33, 243.28)⁶³ as well as the risk of Hepatitis C Virus (HCV) infection (odds ratio: 1.67, 95 % CI: 1.05, 2.66).⁶⁵ Sexual health was also found to be associated with physical or emotional childhood abuse. Women who were physically or emotionally abused in their childhood had approximately five times greater risk of having a sexually transmitted disease in their lifetimes than women who did not experience these adverse events.⁶⁴

3.8. Association with substance use disorders

Childhood abuse significantly increases the risk of developing substance use disorders in adulthood. We found alcohol use disorders were the most common substance misuse among Indigenous people with ACEs.^{37,35,44,46,48} ACEs were also associated with drug abuse (OR: 3.44, 95 % CI: 1.75, 7.03),⁶² Cannabis Use Disorder (OR: 1.38, 95 % CI: 1.26, 1.47), and Tobacco Use Disorder (OR: 1.32, 95 % CI: 1.25, 1.38)⁴⁴ in adulthood.

3.9. Association with intimate partner violence (IPV)

Several studies reported that experience of childhood maltreatment was positively associated with the likelihood of becoming a victim of IPV later in life.^{29,27,40,45,58} A Canadian study showed that a history of childhood abuse in female partners increases the risk of IPV about three times (OR: 3.48, 95 % CI: 2.48, 4.89). However, another Canadian study failed to identify a statistically significant association between ACEs and IPV.⁴⁰

4. Discussion

To the best of our knowledge, this is the first systematic review of literature on ACEs and problematic health outcomes over the life course of Indigenous populations in the global context. Our review found 56 studies, two-thirds from the USA, and all reported associations between different ACEs and problematic health outcomes. The studies measured several types of ACEs, such as physical abuse, sexual abuse, physical neglect, psychological abuse, family dysfunction, and some studies also assessed a composite score considering multiple ACEs. Studies found a strong association between ACEs and different problematic health outcomes. However, most studies evaluated various mental health, sexual health, and substance use as problematic health outcomes due to ACEs.

In our study, we found the tools for ACEs measurements were quite diverse. Although the majority of studies used ACEs questionnaires from the CDC-Kaiser study/Felitti et al., 1998,^{14,24} or Questionnaires by Bernstein et al., 1994, 1998, 2003,⁸¹ none of the tools were developed from co-design process involving Indigenous people. The ACEs questionnaire in CDC-Kaiser study was designed by adapting several questions from various tools such as the Conflicts Tactics Scale, questions from the 1988 National Health Interview Survey, and questions from the

Behavioural Risk Factor Surveys.¹⁴ Although the questionnaire developed by Bernstein et al. is more comprehensive, comprising 70 items categorized into four factors: physical abuse, emotional abuse, emotional neglect, sexual abuse, and physical neglect,⁸¹ additional forms of trauma often experienced by Indigenous populations include racism, bullying and harassment, community violence, natural disasters (e.g., bushfires, floods), refugee trauma, homelessness, the death of a family member, out-of-home placement, and school bullying.⁸⁶ One or more of these traumas may occur during childhood and can be considered ACEs, and are not included in traditional ACE questionnaires. Although, ACE items reflect universal human values, and the mechanistic pathways of their toxic impact may be similar across Indigenous and non-Indigenous populations, the measurement of ACE items and their meanings may vary within Indigenous communities. Unlike in non-Indigenous populations, some ACE items are very common and might be well tolerated within Indigenous communities.

Furthermore, research with Indigenous populations require specific considerations due to their distinct cultural backgrounds, and tools should be developed from a co-creation process involving Indigenous people. Co-design or co-creation in Indigenous health research is important as it ensures cultural relevance, ethical integrity, and community empowerment.⁸⁷ We should also consider the aspects of cultural variability (by locations, countries, tribes etc.) to develop the tools. Thus, considering ACEs as a sensitive life event, Indigenous-specific tools for measuring ACEs should be co-developed with Indigenous communities that can capture trauma events related to their unique history and cultural context.

The associations between ACEs and problematic health outcomes in non-Indigenous populations are well established.^{15,88} In our review, we found a strong association between ACEs and different problematic health outcomes in the Indigenous populations. However, our review found that most studies focused on mental health issues (Depression, Dementia, Suicidal Attempts, Conduct Disorders and IPV as outcomes), sexual health and substance use in Indigenous population. The authors may have been inclined to measure these health issues due to ACEs as there is considerable evidence that exposure to adverse childhood events impacts mental health in adulthood.^{89,90} Particularly, emotional abuse and neglect during childhood can cause significant harm to developmental processes, having a lasting impact on adulthood's mental health.⁸⁹

ACEs also have a significant impact on physical health. If we consider the ACEs pyramid,⁹¹ ACEs lead to disruption in neurodevelopment, followed by social, emotional and cognitive impairment, the adoption of health-risk behaviours and eventually, disease and disability.⁹¹ The burden of physical health problems, especially non-communicable diseases, is immense among Indigenous populations. Several studies from the USA, Canada, Australia and New Zealand reported a relatively high prevalence of Diabetes, Hypercholesterolemia, Hypertension and other physical risk factors are higher in Indigenous people than in their non-Indigenous counterparts.⁹² However, our review revealed that only four studies with mixed results investigated the association between ACEs and chronic diseases (including cardiovascular, lung, and diabetes), and overall physical health in Indigenous population.^{30,32,34,57}

Indigenous people are disproportionately affected by several physical and mental health problems and the gap between Indigenous and non-Indigenous populations remains substantial. These significant health disparities in Indigenous population may be partly explained by the long-term association between ACEs and adult health risk behaviours, health status, and diseases.⁹

The high prevalence of ACEs and their strong associations with adverse health outcomes in these communities underscore the need for targeted interventions and policies aimed at mitigating the long-term effects of childhood adversity while promoting resilience and healing. Although the prevalence of ACEs is high in Indigenous populations, they also demonstrate higher rates of resilience⁹³ and positive childhood experiences.⁹⁴ These positive experiences, along with other resilience

factors, help mitigate the impact of ACEs and reduce the risk of developing problematic health outcomes.⁹⁴ Resilience factors serve as protective barriers that help individuals adapt, heal, and thrive despite childhood adversity, ultimately reducing the likelihood of developing mental and physical health issues.⁹⁵ Therefore, fostering resilience through participation in Indigenous practices, family support, and social connectedness is essential for coping with the adverse effects of ACEs.⁹⁶

The main limitation of our review is the methodological variations among studies in assessing ACEs. These variations may impact the estimated prevalence of ACEs in the respective populations and their effects on health outcomes. They also prevent us from conducting a pooled estimation to quantify the risk of specific ACEs on problematic health outcomes. Although this was a global review, we did not find any articles focused on Indigenous populations in Asia and Africa, despite their presence in these regions.

5. Conclusion

Our review identified several studies worldwide that examined ACEs and their associations with problematic health outcomes in Indigenous populations. Significant methodological variability was observed across the reviewed studies, with differing tools used for ACE measurement. Although the studies focused on Indigenous populations, none employed tools specifically designed for measuring ACEs in Indigenous communities which warrants to develop Indigenous-specific ACE measurement tools. Several studies reported a high prevalence of different ACEs among Indigenous populations, which poses a significant risk for developing various problematic health outcomes, mainly mental health issues in adulthood. Despite the high burden of physical health problems in Indigenous populations, the assessment of ACEs as risk factors for developing several physical health issues was limited which needs more research. Moreover, the elevated prevalence of ACEs and their strong associations with adverse health outcomes in these communities underscore the need for targeted interventions and policies aimed at mitigating the long-term effects of childhood adversity while promoting resilience and healing.

Author statements

Ethical approval

Not required, since this is a systematic review.

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Competing interests

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2025.105724>.

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