Burden of Mental Disorders and Suicide Attributable to Childhood Maltreatment: Improved Causal Inference

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Key points

Question: What proportion of mental health conditions and burden in Australia is attributable to childhood maltreatment?

Findings: Using meta-analytic estimates controlling for genetic and environmental confounding, this study finds that childhood maltreatment accounts for between 21-41% of common mental health conditions in Australia, with the highest attributable proportion for suicide attempts (41%) and self-harm (35%). Over 1.8 million cases of depressive, anxiety, and substance use disorders, 66,143 years of life lost, and 184,636 disability-adjusted life years could be prevented if childhood maltreatment was eradicated in Australia.

Meaning: Efforts to prevent child maltreatment exposure have the potential to improve mental health at a population level in Australia.

Abstract

Importance: The proportion of mental disorders and burden causally attributable to childhood maltreatment is unknown.

Objective: To determine the contribution of child maltreatment to mental health conditions in Australia, accounting for genetic and environmental confounding.

Design: Epidemiological assessment drawing on a meta-analysis of quasi-experimental studies accounting for genetic and environmental confounding between maltreatment and mental health, and three cross-sectional national surveys: the Australian Child Maltreatment Study 2023, the National Study of Mental Health and Wellbeing 2020-2022, and the Australian Burden of Disease Study 2023.

Setting & Participants: We derived causal estimates on the association between childhood maltreatment and mental health conditions from a meta-analysis of quasi-experimental studies. This was combined with the prevalence of maltreatment from the Australian Child Maltreatment Study to calculate the population attributable fraction (PAF). We applied the PAF to the number and burden of mental health conditions in Australia, sourced from two population-based nationally-representative surveys of Australians aged 16-85, to generate the number and associated burden of mental disorders attributable to child maltreatment.

Exposure: Physical abuse, sexual abuse, emotional abuse, or neglect prior to age 18.

Main outcomes and measures: Proportion and number of cases, years of life lost, years lived with disability, and disability-adjusted life years of mental health conditions (anxiety, depression, harmful alcohol and drug use, self-harm, and suicide attempt) attributable to childhood maltreatment.

Results: Meta-analytic estimates were generated from 34 studies and 54,646 participants, and applied to prevalence estimates of childhood maltreatment generated from 8,503 Australians. Childhood maltreatment accounted for a substantial proportion of mental health conditions,

ranging from 21% of depression (95% CI: 13-28%) to 41% (95% CI: 27-54%) of suicide attempts. Over 1.8 million cases of depressive, anxiety, and substance use disorders could be prevented if childhood maltreatment was eradicated. Maltreatment accounted for 66,143 years of life lost (95% CI 43,313–87,314), primarily through suicide, and 184,636 disability-adjusted life years (95% CI 109,321–252,887).

Conclusions and relevance: This study provides the first estimates of the causal contribution of child maltreatment to mental health in Australia. Results highlight the urgency of preventing child maltreatment to reduce the population prevalence and burden of mental disorders.

Introduction

Mental health conditions, including mental and substance use disorders, self-harm, and suicide, are the leading cause of disease burden globally.[1] They affect 13% of the global population and account for a third of all years lived with disability.[2] Moreover, suicide is the leading cause of death for young Australians.[3] Addressing the burden of mental health conditions is a critical public health priority.

Childhood maltreatment is a robust risk factor for mental health conditions across the life course. Childhood maltreatment includes physical, sexual, emotional abuse, emotional or physical neglect and domestic violence before the age of 18.[4,5] Systematic reviews and meta-analyses confirm strong associations between childhood maltreatment and virtually all mental health conditions.[6-8] This is alarming, given the prevalence of childhood maltreatment, which was found to be 62% in a recent, nationally-representative survey of Australian adults.[5]

To quantify the public health burden of exposure to maltreatment, population attributable fractions (PAFs) can be used. PAFs can be interpreted as the proportion of an outcome (here, mental health conditions) that are attributable to an exposure (child maltreatment) and thus could be averted if exposure was prevented. Previous literature has derived PAFs for childhood maltreatment based on estimates of the associations between maltreatment and mental health problems. For example, in a study combining two population cohorts from the Netherlands with over 10,000 adults, childhood maltreatment accounted for 30% of mood, 25% of anxiety, and 16% of substance use disorders.[9] In an synthesis of Australian studies, Moore et al., (2015) found that childhood maltreatment accounted for 16% and 23% of depressive disorders, and 21% and 31% of anxiety disorders, in males and females respectively.[10]

However, while foundational, these previous estimates omitted consideration of the causal impact of maltreatment. This is a substantial limitation given the PAF assumes the relationship between exposure and outcome is causal. Much prior research on the association between childhood maltreatment and mental disorders has not been able to account for genetic and environmental confounders, limiting our understanding of causality. Children exposed to maltreatment are more likely to experience socio-economic disadvantage, family history of mental illness, and have higher polygenic scores for mental disorders, which may confound the relationship between maltreatment and mental illness.[11] Thus, PAFs from prior literature represent the proportion of mental disorders *associated* with child maltreatment, rather than the proportion *caused by* maltreatment – likely overinflating these estimates. Disentangling the causal contribution is important in informing resource allocation for preventing mental disorders at a population level.

Quasi-experimental methods aim to estimate a causal effect using criteria other than random assignment of participants to conditions by study investigators (through, for example, a randomized controlled trial). For exposures such as childhood maltreatment, where random assignment would be highly unethical, quasi-experimental designs disentangle the effects of maltreatment from measured and/or unmeasured confounding through design and/or analytic approaches. A recently-published systematic review and meta-analysis drew on quasi-experimental studies to strengthen causal inference in the study of childhood maltreatment.[12] The authors included studies employing four categories of quasi-experimental designs, including family-based (e.g., twin or sibling differences and adoption designs), panel data (e.g., fixed-effects models), natural experiments, and propensity score-based methods. A small, causal effect of child maltreatment on mental disorders was found (Cohen's d=0.31),

which was 45% smaller than the effect size before adjusting for confounding.[12] It is therefore critical to use quasi-experimental associations to generate accurate estimates of the PAF for child maltreatment on mental disorders.

The proportion of mental disorders causally attributable to child maltreatment is currently unknown. The current study draws on three recently available national prevalence and burden of disease studies from Australia, combined with estimates derived from Baldwin et al. (2023) to approach causality, calculating the proportion, number, and burden of mental disorders in Australia attributable to childhood maltreatment.

Methods

Summary of Analytic Steps

The proportion, number, and burden of mental health disorders in Australia attributable to child maltreatment was calculated through five steps. First, an estimate of the causal relationship between maltreatment and mental disorders was extracted from a meta-analysis of quasi-experimental studies.[12] Second, the prevalence of maltreatment was extracted from the Australian Child Maltreatment Study (ACMS), a national prevalence study conducted in 2021.[5,13] Third, these were combined to calculate the PAF for each mental disorder. Next, the number of cases of mental disorders in Australia was taken from the 2020-2022 National Study of Mental Health and Wellbeing (NSMHW)[14] and estimates of burden were extracted from the 2023 Australian Burden of Disease Study.[15] Finally, the PAF was applied to the number of cases and burden of mental disorders to estimate those attributable to child maltreatment. Below we report details of each analytic step. Ethical approval and participant consent were not required for this study given the use of existing publicly-available data only.

Causal Relationships Between Child Maltreatment and Mental Health Outcomes

Estimates of the causal relationships between child maltreatment and mental health outcomes were drawn from Baldwin et al. (2023)'s meta-analysis of quasi-experimental studies. This meta-analysis accounts for co-occurring genetic and environmental risk factors, strengthening knowledge on the causal relationship between childhood maltreatment and mental disorder.

We extracted separate meta-analytic estimates for the relationships between child maltreatment and anxiety, depression, harmful alcohol and drug use, self-harm, and suicide attempt, as these outcomes had corresponding Australian prevalence data. No estimates were reported for post-traumatic stress disorder, bipolar disorder, or obsessive-compulsive disorder; thus we could not calculate the contribution of maltreatment to these. Additionally, we calculated an overall estimate of the relationship between child maltreatment and anxiety, depression, and substance use disorders together, by conducting a multi-level, random effects meta-analysis on the estimates from 18 primary studies (N=36,243 participants, 54 effect sizes) examining these disorders in the Baldwin et al. (2023) review.

Prevalence of child maltreatment

The prevalence of exposure to child maltreatment was extracted from ACMS,[5,13] a nationally-representative, cross-sectional sample of 8,500 participants aged 16 years or older. Participants were recruited using random-digit dialling of mobile phones and interviewed by professional interviewers trained by a clinical psychologist and supported by computer-assisted telephone interview technology. Data was collected between April and October 2021, and constitutes the first national prevalence estimate of maltreatment in Australia. This period coincided with a long lockdown (July to October) due to Covid-19 for the two largest Australian cities, Sydney and Melbourne. The Juvenile Victimization Questionnaire-R2:

Adapted Version was used to collect data on physical, sexual, and emotional abuse, neglect (medical, physical), and domestic violence exposure during childhood. Detail regarding these definitions is presented in eMethods. To ensure consistency with the child maltreatment exposure used in Baldwin et al. (2023)'s estimates, which consisted of abuse and/or neglect, the current study extracted the prevalence of any maltreatment, but excluded those exposed only to domestic violence (8.4%).[5,13]

PAFs

Meta-analytic estimates (Cohen's ds) were converted into odds ratios (Supplementary Table 1), to generate the PAF using the below formula:

$$PAF = \frac{P * (OR - 1)}{1 + [P * (OR - 1)]}$$

where P is the prevalence of exposure and OR is the odds ratio of exposure and outcome.

Number of Cases of Disorders and Disease Burden

We extracted the number of lifetime cases of anxiety, depression, harmful alcohol and drug use, self-harm, and suicide attempt from the 2020-2022 Australian NSMHW. Data was collected from the first cohort from December 2020 to July 2021, and the second cohort from December 2021 to October 2022. These periods occurred during the first two years of the Covid-19 pandemic, although were conducted when lockdowns were not in place. The sample was recruited through the random selection of households, followed by random selection of an individual from this household aged between 16-85 years. The study collected data from 15,893 participants through face-to-face interviews. Mental disorders were assessed by trained Australian Bureau of Statistics Officers via diagnostic interview using the

World Mental Health Survey Initiative – a modified form of the World Health Organisation's (WHO) Composite International Diagnostic Interview (WMH-CIDI 3.0), which combined criteria from the DSM-IV and ICD-10. Suicide attempts were measured through self-report. Participants were asked whether they had ever seriously thought about taking their life, and those reporting yes were asked if they had ever attempted suicide.

Years of life lost (YLL), years lived with disability (YLD), and disability adjusted life years (DALY) due to anxiety, depression, alcohol disorder, drug use disorder, and suicide attempts were extracted from the 2023 Australian Burden of Disease Study.[15]

Number of Cases Attributable to Child Maltreatment

The PAF was applied to the number of cases and burden of mental disorder to derive those attributable to child maltreatment.

Sensitivity analysis

To assess the effect of a small number of primary studies included in the meta-analytic estimate for separate mental disorders, we conducted a sensitivity analysis using the overall meta-analytic estimate for any mental health problem across all 35 quasi-experimental studies.[12] We also assessed the impact of our definition of child maltreatment, conducting sensitivity analysis to broaden the prevalence to include domestic violence exposure.

Results

The prevalence of child maltreatment in Australia was 53.8%.[5] Shown in Table 1, exposure to childhood maltreatment accounted for a substantial proportion of mental health conditions, varying from 21% for depression to 41% of suicide attempts.

Shown in Table 2 and Figure 1, mental disorders are responsible for over 655,000 DALYs. Suicide attempts had the largest share of YLL. Anxiety disorders bear the greatest overall disease burden and the highest YLD. The greatest burden of disease attributable to childhood maltreatment was for suicide attempt, with over 63,000 DALYs. Childhood maltreatment accounted for over 52,000 DALYs through anxiety disorders, and over 35,000 through depressive disorders. Overall, maltreatment was responsible for over 66,000 YLL and 118,000 YLD, culminating in over 184,000 DALYs in Australia.

Sensitivity analyses using the overall meta-analytic estimate for any mental health condition are presented in Supplementary Tables 2-3. Maltreatment accounted for 29% of all mental disorders and 189,987 DALYs. Sensitivity analyses including domestic violence exposure are shown in Supplementary Tables 4-5. This resulted in slightly higher PAFs, ranging from 23% for depressive disorders to 45% for suicide attempts, and 202,493 DALYs.

Discussion

This study provides the first estimates of the proportion of mental health conditions in Australia that can be attributed to childhood maltreatment. Close to a quarter of depressive, anxiety, and substance use disorders, or 1.8 million cases, could be prevented if exposure to child maltreatment was eradicated. PAFs were highest for suicide attempts (41%) and self-harm (35%), and more modest for depression (21%). For perspective, tobacco smoking accounts for 24% of cancers in US men[16] and hypertension accounts for 23% of heart attacks globally[17]. Child maltreatment was found to account for over 184,000 years of healthy life lost through mental ill-health in Australia.

This study extends previous estimates of PAFs by incorporating, for the first time, improved causal inference to estimate the contribution of child maltreatment to mental health, controlling for genetic and environmental confounding factors, and by using recent, nationally-representative prevalence estimates of child maltreatment in Australia. Surprisingly, our PAFs align with previous reports,[10] despite the meta-analytic estimate generated from quasi-experimental studies being 45% smaller than that from non-quasi-experimental studies.[12] This is due to the high prevalence of maltreatment (53.8%) found in the ACMS, compared to previous prevalence estimates of between 13-22%.[10] Thus, while the causal effect generated from the meta-analysis of quasi-experimental studies is small, the high prevalence of both childhood maltreatment and mental disorders in the population result in a large mental health burden attributable to child maltreatment. Estimates are specific to Australia, and other countries, particularly low- and middle-income countries, may benefit from replicating the current study with regionally-specific prevalence estimates to generate an accurate picture of the mental health burden attributable to childhood maltreatment.

We found variation in the PAFs depending on the type of mental health condition, ranging from 21% of depression to 41% of suicide attempt. The particularly strong association and PAFs between childhood maltreatment and suicidal behaviours, compared to depression, is supported by previous literature.[18-20] While depression is a risk factor for suicide attempt,[21] not all suicide is linked to clinically significant depression, nor is suicide a straightforward effect of having depression.[22] Altogether, greater investment of resources upstream to the prevalent and early drivers of suicide attempt, such as childhood maltreatment, may be a promising path forward for suicide prevention.

Findings suggest that addressing childhood maltreatment has the potential to avert millions of cases of mental disorders in Australia, and should be used to inform more efficient allocation of resources. Current mental health-related spending in Australia and other high-income countries disproportionately targets treatment for mental health outcomes rather than prevention.[23] While budgetary allocations for mental health treatment are critical, this spending misses a vital opportunity to substantially improve population health. Focusing on prevalent, upstream drivers such as childhood maltreatment as root causes of ill-health and directing resources, funding, and attention to preventing exposure may more effectively address disease burden at the population level. Moreover, while the present study focused on mental disorders, maltreatment is associated with numerous other central drivers of population morbidity and mortality, such as cardiovascular disease and diabetes; thus, the total contribution of maltreatment to population health is likely much greater.

Importantly, there are effective interventions to prevent childhood maltreatment.[24] These include home visitation programs by trained personnel to provide support to parents, such as Nurse Family Partnership, which has shown reduced occurrence of child abuse at 15-years post-intervention, as well as other adversities commonly present in the lives of children which are linked to mental health concerns, such as high parental conflict, household arrests, and parental unemployment.[24-27] Moreover, parent education programs that improve knowledge and promote warm, consistent, and responsive parenting show moderate meta-analytic effect sizes in preventing child maltreatment,[24] and returns of $13.82 to the Australian economy for each dollar invested.[28]

However, interventions must be combined with broader initiatives addressing the structural and systemic determinants of child maltreatment. Individuals and families as the source of

responsibility has dominated the narrative, resulting in most maltreatment prevention strategies focusing on individual behaviour change. While these are important, widespread, sustainable solutions to preventing child maltreatment necessitate broader policy-driven prevention. Policies to alleviate stress experienced by families, such as paid parental leave, affordable childcare, or income support, better enable parents to responsively attend to their children, and show empirical support in reducing maltreatment exposure. For example, expansion of state-funded health insurance to millions of low-income adults in the US was associated with significant reductions in referrals to Child Protective Services for neglect, compared to states who did not participate, adjusting for confounders.[29] Increases in the generosity of economic support policies, including the Earned Income Tax Credit, state minimum wage, and Low-Income Housing Tax Credit are associated with lower rates of neglect and physical abuse.[30-32] The introduction of state paid parental leave policies was significantly associated with reductions in hospital admissions for paediatric abusive head trauma.[33] Timely access to subsidised child care and state policies to ensure continuous coverage for child health insurance were associated with reduced child maltreatment investigations.[34] These policies additionally appear to reduce the likelihood of other childhood adversities, such as parental mental ill-health[35], which is strongly linked to offspring mental health concerns. Coupled with the findings of the current study, this suggests that addressing the societal and economic conditions that give rise to child maltreatment may have a substantial benefit in preventing mental disorders at a national level.

Several limitations should be considered when interpreting these findings. First, while the prevalence of exposure and outcome reflect nationally-representative Australian data, the meta-analytic estimates were derived from several countries, and thus estimates may differ from the true effect in the Australian population. However, almost all samples included in the

meta-analysis were from high-income, OECD countries (Australia, UK, USA, Western Europe); thus substantial variation is unlikely. Second, some meta-analytic estimates for specific mental disorder outcomes relied on a limited number of primary quasi-experimental studies (e.g., self-harm, two studies; drug use, three studies), potentially affecting their accuracy. Third, as with all meta-analytic estimates, heterogeneity in study design, or how primary studies measure child maltreatment and mental health (e.g., symptoms or disorders), may introduce discrepancies in estimates. However, substantial differences are unlikely, with results of sensitivity analyses that adjusted for measurement of mental health and child maltreatment revealing similar results. Similarly, sensitivity analysis conducted by Baldwin and colleagues (2023) revealed the meta-analytic estimates did not differ by the type of quasi-experimental method, prospective versus retrospective reporting of maltreatment, self-report or other reporter, longitudinal versus cross-sectional assessment, sex, age at mental health assessment, overall study quality, or any individual study. Thus, the meta-analytic estimates reported herein do not appear to be substantially influenced by measured differences in study design, however we cannot rule out the influence of other untested factors. Fourth, due to a lack of available data, we couldn't assess whether the length of follow-up between exposure and outcome influenced the associations. Moreover, the prevalence of maltreatment in the ACMS is higher than previous estimates, influencing our PAFs. The definitions of maltreatment used in ACMS are more inclusive than used previously; for example, sexual abuse included non-contact exposure and perpetration by any person (not restricted to adults), in contrast to the commonly-used Adverse Childhood Experiences questionnaire. Thus, ACMS may capture experiences of maltreatment that have previously been overlooked. Additionally, the ACMS assessed maltreatment via retrospective reports, which tend to estimate a higher prevalence of maltreatment and identify largely different groups of individuals compared to prospective measures.[36] This may be in part due to retrospective

measures identifying more “true cases” of maltreatment than prospective measures, particularly for maltreatment types that are likely to be hidden in childhood, such as sexual abuse. Therefore, while it is likely that the PAFs would be lower if a prospective, rather than retrospective assessment was used to measure maltreatment (due to lower prevalence of maltreatment), this would not necessarily reflect greater accuracy. Furthermore, while associations between retrospective reports of maltreatment and mental health can be inflated by recall bias,[37] in the current study, retrospective reports from ACMS were used only to assess the prevalence of maltreatment, and not associations with mental health. Thus, our findings are unlikely to be unduly influenced by the retrospective reporting used in the ACMS. Finally, sampling and procedures from the studies used to extract prevalence of the exposure and outcome could have influenced the results of the current study. The NSMHW was a household-based survey, and those not living in households, such as those in institutions or who were homeless were not contacted. Thus, the NSMHW likely underestimates the prevalence and mental health conditions in Australia. In contrast, while the ACMS used a mobile phone-based sampling frame, and an estimated 99% of Australians use a mobile phone, the response rate for ACMS was very low (4%). While the survey was weighted to match the demographic characteristics of the Australian population, unmeasured factors affecting participation may have influenced the results.

In conclusion, the current study leverages recent, nationally-representative data and quasi-experimental, meta-analytic effect sizes to report the contribution of child maltreatment to mental health conditions in Australia. Our findings show that child maltreatment accounts for over 184,000 years of healthy life lost through mental ill-health, and that 1.8 million cases of mental health problems could be prevented if exposure to child maltreatment was eradicated.

This highlights the urgency of efforts to prevent child maltreatment to reduce the population prevalence and burden of mental disorders.

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Table 1. Population attributable fractions (PAFs) and number of cases of lifetime mental disorders attributable to child maltreatment in Australia.

Outcome	**Population prevalence (%)**	**Number of cases in population**	**PAF for child maltreatment (95% CI)**	**Number of cases attributable to child maltreatment (95% CI)**
Any mental disorder(s)[a]	42.9	8,514,700	0.22 (0.16 – 0.28)	1,854,809 (1,385,314 - 2,384,790)
Any anxiety disorder	28.8	5,709,100	0.24 (0.13 – 0.34)	1,346,572 (714,530 – 1,939,580)
Depressive disorder	11.7	2,317,300	0.21 (0.13 – 0.28)	483,744 (311,895 – 649,027)
Alcohol use disorder	17.8	3,535,000	0.27 (0.16 – 0.37)	959,180 (575,133 – 1,316,954)
Drug use disorder	5.8	1,147,200	0.32 (0.14 – 0.48)	370,514 (165,194 – 549,985)
Self-harm	8.7	1,700,000	0.39 (0.21 – 0.48)	660,597 (354,881 – 931,135)
Suicide attempt	4.9	968,100	0.41 (0.27 – 0.54)	399,025 (262,682 – 523,938)

[a] Includes anxiety disorders, depressive disorders, substance use disorders (alcohol and/or other drugs).

Table 2. Disease burden associated with lifetime mental disorders in Australia attributable to child maltreatment.

Outcome	**Total YLLs**	**Total YLDs**	**Total DALYs**	**YLLs attributable to child maltreatment (95% CI)**	**YLDs attributable to child maltreatment (95% CI)**	**DALYs attributable to child maltreatment (95% CI)**
Any anxiety disorder	167	219,468	219,635	40 (22 – 57)	52,672 (28,531-74,619)	52,712 (28,553-74,676)
Depressive episode	435	166,736	167,171	91 (57 – 122)	35,015 (21,676-46,686)	35,106 (21,732-46,808)
Alcohol use disorders	8,372	52,857	61,230	2,260 (1,340 – 3,098)	14,271 (8,457-19,557)	16,532 (9,797-22,655)
Drug use disorder	1,236	50,117	51,353	396 (173 – 593)	16,037 (7,016-24,056)	16,433 (7,189-24,649)
Suicide attempt	154,527	1,212	155,739	63,356 (41,722–83,445)	497 (327-654)	63,853 (42,050-84,099)
Total	164,737	490,390	655,128	66,143 (43,313–87,314)	118,493 (66,007-165,573)	184,636 (109,321-252,887)