Adverse Childhood Experiences: A Meta-Analysis of Prevalence in Child Population Samples

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Key Points

Question: What is the prevalence of cumulative ACEs among samples of children aged 0-18 years in English-published literature?

Findings: A meta-analysis across 65 studies (490,423 children from 18 countries) revealed the prevalence was 42% with 0 ACEs, 22% with 1 ACE, 13% with 2 ACEs, 8% with 3 ACEs, and 15% with 4+ACEs. The prevalence of 4+ ACEs was higher among children in residential care, with a history of juvenile offending, and in Indigenous peoples.

Meaning: ACEs in children under 18 years are common and, in some contexts, chronic. Focused prevention, early identification, and tailored interventions are needed to reduce exposure and mitigate the impacts of ACEs.

Abstract

Importance. Exposure to Adverse Childhood Experiences (ACEs) before the age of 18yrs is a major contributor to the global burden of disease and disability.

Objective: To meta-analyze data from samples with children ≤18yrs to estimate the average prevalence of ACEs, identify characteristics and contexts associated with higher or lower ACE exposure, and explore methodological factors that might influence these prevalence estimates.

Data Sources. Studies published between January 1, 1998 and February 19, 2024 were sourced from MEDLINE, PsycINFO, CINHAL, and Embase. This study was pre-registered (PROSPERO: CRD42022348429).

Study Selection. Inclusion criteria required studies to report the prevalence of 0, 1, 2, 3, 4+ ACEs using an 8- or 10-item ACEs questionnaire (±2 items), include population samples of children ≤18yrs, and be published in English.

Data Extraction and Synthesis. Data from 65 studies, representing 490,423 children from 18 countries were extracted and synthesized using a multicategory prevalence meta-analysis.

Main Outcomes and Measures. Adverse Childhood Experiences.

Findings. The mean age of children across studies was 11.9 years (SD, 4.3yrs; range 0-18; across samples, 50.5% were female). The estimated mean prevalences were 42.3% for 0 ACEs (95%CI, 25.3-52.7%), 22.0% for 1 ACE (9.9-32.7%), 12.7% for 2 ACEs (3.8-22.3%), 8.1% for 3 ACEs (1.4-16.8%), and 14.8% for 4+ ACEs (5.1-24.8%). The prevalence of 4+ ACEs was higher among adolescents versus children (prevalence ratio, 1.16; 95%CI, 1.04-1.30), children in residential care (1.26; 1.10-1.43), with a history of juvenile offending (1.29; 1.24-1.34), and in Indigenous peoples (1.63; 1.28-2.08), as well as in studies where file review was the primary assessment method (1.29; 1.23-1.34). The prevalence of 0 ACEs was lower in questionnaire-based studies where children vs parents were informants (0.85 [0.80-0.90]).

Conclusions. ACEs are prevalent among children, with notable disparities across subject demographic characteristics and contexts. As principal antecedent threats to child and adolescent well-being that can affect later life prospects, ACEs represent a pressing global social issue. Effective early identification and prevention strategies, including targeted co-designed community interventions, can reduce the prevalence of ACEs and mitigate their severe effects, thereby minimizing the harmful health consequences of childhood adversity in future generations.

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Access to Data and Data Analysis. Ross Neville and Sheri Madigan had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Introduction

Adverse childhood experiences (ACEs), which include abuse, neglect, and family dysfunction, are strongly associated with adverse physical and mental health outcomes, such as mental illness, substance use, chronic diseases, and obesity.[1] Prolonged exposure to ACEs, coupled with a lack of supportive caregivers and/or interventions, can lead to toxic stress and potentially disrupt brain development.[2] Children experiencing ACEs may also encounter cognitive, social, and emotional challenges. These challenges often result in the adoption of risky health behaviors, such as early smoking and substance misuse,[3-5] thereby exacerbating personal health issues and increasing the risk of premature death.[6-8] Furthermore, the impact of ACEs extends beyond personal health and well-being; they can affect subsequent generations[9,10] and impose significant economic costs on local communities and even on the national scale.[11]

While meta-analyses specifically addressing the prevalence of discrete childhood abuse experiences exist (e.g., sexual abuse),[12] as do studies on retrospective ACEs recall in adult samples,[13] there is a conspicuous absence of robust estimates regarding the distribution of ACEs in samples of children 18 years or younger. Addressing this gap is crucial for several reasons. First, it is well-established that a higher cumulative ACEs score is associated with an increased likelihood of morbidity and mortality.[1,5,13-23] Thus, examining the accumulation of adverse experiences, rather than discrete abuse experiences (e.g., sexual abuse) in isolation is essential to the mitigation of severe health risks.[24] Second, most ACEs studies rely on adults' retrospective recall of ACEs from years or even decades earlier.[13] This approach not only limits the currency and accuracy of ACE estimates but also hampers our ability to implement timely and effective risk mitigation strategies in the present. Third, some organizations recommend the use of the ACEs questionnaire to increase awareness of ACEs and its impacts in pediatric care. Systematic reviews and meta-analyses serve as essential evidence-based resources that inform decision-making in public health and clinical practice, offering clinicians a meaningful context to understand an individual child's ACE score relative to a broader pediatric reference sample.

The first objective of this study was to conduct a systematic review and meta-analysis to estimate the distribution of ACEs (i.e., 0, 1, 2, 3, and 4 or more [4+] ACEs) from published samples of children aged 18 years and younger at the time of ACEs assessment. Given the considerable variation in ACE prevalence across the rapidly expanding literature,[25] the second objective was to conduct moderation analyses to determine if the distribution of ACEs varies among samples with differing individual, household, socioeconomic, demographic, and geographical characteristics. These moderation analyses provide much-needed nuance to the ACEs literature by examining observed disparities across sex, age, income, region, and race/ethnicity.[13,26,27]

Methods

Search Strategy

A librarian developed and executed the search strategy across MEDLINE, Embase, CINHAL, and PsycINFO. The search covered the period from January 1, 1998, the year the original ACEs study[1] was published, to February 19, 2024, with no language restrictions. We searched text fields using the phrases "adverse childhood experience" and "ACEs" (eTables 1-4). Adjacency operators and truncation symbols were used to capture variations in phrasing. This study reported using PRISMA guidelines[28] and was registered with PROSPERO (CRD42022348429).

Selection Criteria

Three coders reviewed all titles and abstracts in Covidence (agreement probability: 93%). Inclusion criteria were: reported the distribution of 0, 1, 2, 3, and 4+ ACEs; included a population sample of children ≤18 years at the time of ACEs collection; utilized the 8- or 10-ACEs questionnaire (±2 items) that included both maltreatment and family dysfunction items; published in English. Exclusion criteria were adult samples, case studies, studies reporting mean or median values without a detailed breakdown by 0, 1, 2, 3, and 4+ ACEs, and studies that combined prevalence categories (e.g., 0-1 or 1-2 ACEs). The latter two exclusions were necessary to ensure the consistency and reliability of our meta-analytic distribution specifying the discrete frequencies of ACEs. Full-text articles were subsequently reviewed by three coders (agreement probability: 91%). Discrepancies were resolved via consensus.

Data Extraction

Study and sample characteristics were extracted using a standardized coding form that included author names, publication year, sample size, unweighted ACEs counts, country and continent of participants, mean or median child age, proportion of females, proportion of participants identified as belonging to a racial/ethnic group, socioeconomic profile (low, mixed, or mid-to-high levels of household income as reported by authors of included studies), history of juvenile delinquency, placement in residential care, assessment method (questionnaire, interview, file review, mixed), and informant (parent, child, other). One coder extracted data and 20% were randomly selected and coded by a second coder (91% inter-rater reliability). Discrepancies were resolved via consensus.

Study Quality Assessment

We assessed study quality using a standardized measure[29] (eTable 5). One coder evaluated all studies for study quality, and 20% were coded for inter-rater reliability (85% intercoder agreement). Discrepancies were resolved through consensus.

Data Preparation and Analysis

Prevalence proportions for the five ACE categories (0, 1, 2, 3, and 4+) were calculated by dividing the sample count for each category by the overall study sample size. We applied the Freeman-Tukey double arcsine transformation to study estimates and their standard errors (SE) to stabilize the variances across ACE categories and properly weight the meta-analysis.[30]

We conducted a multicategory prevalence meta-analysis using MetaXL (Version 5.3, EpiGear International Pty Ltd, Queensland, Australia)[31] to estimate mean prevalence proportions. The meta-analysis was weighted by the inverse of the average variances across the five ACE categories. Between-study heterogeneity was the tau (τ) statistic.[32] Moderation analyses were performed using the 'regress' command in SAS Version 9.4 (SAS Inc, Cary, NC, USA), applying Huber-Eicker-White-sandwich error variances.[31] Categorical moderators were analyzed by calculating the ratio of the prevalence for each ACE category between different levels of the moderator. Continuous moderators were analyzed by calculating the ratio between below (mean -1 standard deviation [SD]) and above-average (mean +1SD) values for the moderator.[33]

The magnitudes of ratios representing moderating associations were evaluated using the following scale for prevalence increases: <1.11, slight; 1.11-1.43, small; 1.43-2.00, moderate; >2.00, large. The inverses of these thresholds were used for evaluating prevalence decreases: >0.90, slight; 0.90-0.70, small; 0.70-0.50, moderate; <0.50, large.[13] Magnitude thresholds for evaluating between-study heterogeneity (τ) were the square root of the thresholds for ratio increases above.[34] Sampling uncertainty was expressed as 95% confidence intervals (CI). The extent of overlap of the 95%CI with slight and substantial (i.e., small, moderate, and large) values was used to assess the level of evidence for or against the magnitude (see eTable 6).[35] Precision of estimation was deemed inadequate when the 95%CI included *both* substantial increases and decreases (i.e., ratios <0.90 and >1.11).[35]

Publication Bias, Outliers, and Influential Cases

Publication bias was assessed by inspecting funnel plots of the double arcsine prevalence versus the SE of the study-estimate prevalence proportion for each category of ACE.[31] 'Leave-one-out' analysis was conducted to identify potential influential cases.[36]

Results

Study Characteristics

In total, 21,555 non-duplicate records were identified by our search, 1,295 full-text articles were reviewed, and 65 studies met full inclusion criteria (eFigure 1). Study characteristics are displayed in Table 1. Across 65 studies, 490,423 children were represented. Studies reported data from 18 countries: 38 from North America (58.5%), 13 from Europe (20.0%), six from Asia (9.2%), four from South or Latin America (6.2%), and four from Australia and New Zealand (6.2%). The average sample age across studies was 11.9 years (SD, 4.3 years; range 0-18 years). The average percentage of female participants was 50.5%. Average percentages of participants from different racial/ethnic groups across studies were: White (51.3% across 38 studies), Black (28.9% across 30 studies), Latinx (32.5% across 28 studies), Asian (4.6% across 9 studies), and Indigenous peoples (13.0% across 7 studies). The mean study quality score was 6.3 (range 3-10; eTable 7).

Publication Bias

Inspection of funnel plots revealed some evidence of publication bias for studies with standard errors of >0.6 for 0 and 4+ ACEs (23 studies). Removal of studies and reanalysis did not substantially affect the magnitude of the observed prevalences reported below (or their uncertainties; eTable 8; eFigures 2-3). Sensitivity analysis of bias ("leave-one-out") also revealed limited evidence of influential cases across categories of ACEs (eTables 10 and 11). Therefore, all 65 study estimates were retained for analysis.

Meta-Analysis

Table 2 displays the meta-analyzed mean prevalence proportions for the five categories of ACEs, predicted mean prevalence proportions at different levels of each moderator, and the number of studies used to estimate these values. The mean prevalence of the five categories of ACES was: 42.3% for 0 ACEs (95%CI, 25.3-52.7%; Figure 1), 22.0% for 1 ACE (9.9-32.7%), 12.7% for 2 ACEs (3.8-22.3%), 8.1% for 3 ACEs (1.4-16.8%), and 14.8% for 4+ ACEs (5.1-24.8%, Figure 2). The effect size representing between-study heterogeneity indicated moderate to large differences in prevalences (factor τ, 1.48 [95%CI, 1.26-1.78]). Forest plots for 0 and 4+ categories of ACEs are displayed in Figures 1 and 2, respectively (see also eFigures 4-6). Scatterplots illustrating the mean prevalence of the five categories of ACEs by publication year are displayed in eFigures 7-11.

Moderation Analyses

Ratios of prevalence proportions for the five categories of ACEs between different levels of the categorical and continuous moderators are displayed in Table 3. When compared to their respective reference groups, there was strong evidence that the prevalence of 4+ ACEs was higher in samples of children with Indigenous peoples (factor difference in prevalence, 1.63 [95%CI 1.28-2.08]) compared to samples identifying as White. No other racial/ethnic group differences were found. There was also strong evidence that the prevalence of 4+ ACEs was higher in samples of children with a history of juvenile offending (1.29 [1.24-1.34]), and in studies where file review was the primary assessment method (1.29 [1.23-1.34]).

Additionally, there was strong evidence that the prevalence of 0 ACEs was lower for children with a history of juvenile offending (0.76 [0.71-0.82]), in studies where file review was the primary assessment method (0.76 [0.70-0.81]), and in questionnaire-based studies where children were the informants rather than their parents (0.85 [0.80-0.90]). Furthermore, there was strong evidence that the precision of prevalence estimates for 0 ACEs improved over time, consistent with the increase in the number of publications (eFigure 7).

There was very good evidence that the prevalence of 4+ ACEs was higher in samples of children with a history of placement in residential care (1.26 [1.10-1.43]). Moreover, there was very good evidence that the prevalence of 0 ACEs was lower in samples of children from low-income households (0.76 [0.65-0.89]), and in samples of children with a history of placement in residential care (0.76 [0.67-0.87]).

There was good evidence that the precision of prevalence estimates for 4+ ACEs improved over time (eFigure 11). There was also evidence that the prevalence of 4+ ACEs was higher in samples of adolescents compared to children (1.16 [1.04-1.30]). There was good evidence that the prevalence of 3 ACEs was higher in samples of children with Indigenous heritage compared to White children (1.19 [1.01-1.40]), and that the prevalence of 1 ACE was lower in samples of children with Indigenous heritage compared to White children (0.86 [0.80-0.91]). There was also good evidence that the prevalence of 0 ACEs was higher in studies where the primary assessment method was a questionnaire (1.20 [1.02-1.41]) and lower in samples of children from South and Latin America (0.84 [0.74-0.94]).

Discussion

Our meta-analysis of 65 studies and 490,423 participants in 18 countries revealed that 58% of children under the age of 18 have experienced one or more ACEs (22% 1 ACE, 13% 2 ACEs, 8% 3 ACEs, 15% 4+ ACEs). A parallel meta-analysis of ACEs assessed in adult samples indicated that 60% experience one or more ACEs, with 16% reporting 4+ ACEs.[13] Thus, the rates of ACEs among children under 18 years of age at the time of assessment are comparable to adults reflecting on their childhood decades earlier. ACEs are therefore pervasive among children, especially among adolescents for whom 24.7% reported experiencing 4+ ACEs. Our findings are particularly concerning given that ACEs are a leading cause of disease burden and early mortality.[1,5]

We observed that in samples of Indigenous children, the prevalence of 4+ ACEs (84%) was much higher than the prevalence of 4+ ACEs in White samples (13%). This finding underscores the need for a more comprehensive understanding of the root causes of ACEs among Indigenous populations (e.g., historical injustices and systemic factors such as the intergenerational trauma of colonialism and genocide), and the need to advocate for meaningful systemic change.[13,26] It is important to note that in our data, the two studies with the largest proportion of Indigenous children are both Australian juvenile justice system samples. As such, this data should not be generalized to any broader Australian or North American context.

We also found that children from low-income households experienced a higher prevalence of 4+ ACEs compared to those from high-income households (19% vs 4%). This discrepancy may be attributed to financial concerns and food insecurity, which are known to increase psychological stress and relational dysfunction within families, potentially leading to an increased risk of intimate partner violence and child maltreatment.[27]

The prevalence of experiencing 4+ ACEs was also significantly higher in samples of children with a history of being in residential care (40%) and children with justice system involvement (39%). Children in residential care often have childhoods marked by adversity and trauma, which can lay the foundation for behavioral and mental health conditions that require intensive intervention.[37] Moreover, abuse experiences can lead to poor inhibitory control and self-control, as well as increased aggression.[38] These behavioral patterns put children at risk for school dropout or failure, substance use, antisocial behavior, and gang involvement, which can increase the likelihood of criminal offending.[38] Collective, these findings highlight the urgent need for collaborative and culturally informed policy development,[39] as well as upstream and culturally-sensitive programs that prevent and reduce the impact of ACEs and disrupt trajectories that can lead to residential care and justice system involvement, such as early home visitation programs, high-quality childcare, trauma-informed schools, and community-based mentorship programs.[38]

Our results indicated that the prevalence of 4+ ACEs was substantially higher in studies using file review (39%) methodology compared to questionnaires (7%). This discrepancy may partly stem from the nature of samples surveyed in file review studies, which often rely on records from social services.[40] Such records are likely to disproportionately represent children experiencing ACEs or other psychosocial difficulties who are referred to social services. Additionally, file reviews typically draw from multiple sources (e.g., child, caregivers, siblings, teacher,), providing a potentially more comprehensive and objective account of a child's ACEs.[41] In contrast, ACEs questionnaires rely on potentially incomplete awareness or deliberate nondisclosure of ACEs.

Our analysis revealed strong evidence that the prevalence of 0 ACEs was higher in studies where the ACEs questionnaire was completed by parents versus children. We suspect this may be partially attributed to the disproportionate representation of parent informants in larger population-based and nationally representative studies. In such studies, one would typically expect a higher prevalence of 0 ACEs compared to at-risk or clinical subpopulations.

Lastly, our analyses revealed strong evidence that the precision of estimation for the prevalence of 0 ACEs improved over time, based on publication year. This, along with the narrowing of confidence intervals for each of the five ACE categories, represents an important development in our scientific understanding of childhood adversity over the last decade.

Although systematic screening for ACEs has become increasingly common in practice settings, empirical evidence supporting such screening is scant,[42,43] and the practice is rigorously debated.[44,45] The implementation of trauma-informed approaches to care, with or without the use of the ACEs questionnaire[46,47] is essential for safeguarding the well-being of children and families navigating the complexities of ACEs within various systems of care. Research demonstrates that the implementation of trauma-informed care within organizations can improve staff knowledge, attitudes, and behaviors related to ACEs and also impact client outcomes such as shifts in patient perceptions of patient-provider rapport, as well as reduced risk of recurring hospitalizations.[48] That said, the limited research in this area has focused almost exclusively on trauma-informed care in adult populations. Thus, research is needed to identify how to adapt trauma-informed care for diverse children and ensure such care is delivered in a culturally safe way to various income, ethnic, and racial populations.

Limitations

Several limitations should be noted. First, although our study inclusion criteria were initially broad to capture global data, only 18 countries are represented, most of which represent less than 10% of children worldwide.[49] In addition, there is a paucity of studies with samples from the LGBTQIA2+ community, who have been shown to experience higher ACEs than cisgender, heterosexual youth.[50] With a wealth of ACEs-related research now available from general population samples, it is critical to turn our attention to advancing understanding of the prevalence and impacts of ACEs on minoritized groups. Second, when more than the conventional 10-ACE items are assessed, prevalence estimates are impacted.[51] Thus, to attain a reliable meta-analytic distribution of ACEs, our inclusion criterion specified the use of the 8- or 10-item ACE Questionnaire (±2 items), which is based on initially developed and adapted versions of the measure. Thus, studies with adaptations would have been excluded. Moreover, we could not include studies that combined, for example, 1-2 or 2-3+ ACEs, as discrete frequencies were required for analyses. Altogether, our inclusion criteria may have resulted in the exclusion of some studies. Third, a limitation of the ACEs frequency count score is that it does not take into account the timing, severity, and chronicity of ACEs. Lastly, publication year is an imperfect proxy for the year of data collection, which is rarely reported in method sections. Consequently, we were unable to examine the date of data collection as a moderator of prevalence estimates.

Conclusions

This systematic review provides cross-study estimates of the prevalence of ACEs in child population samples and reveals that approximately 6 of 10 children experienced at least one ACE before reaching the age of 18 years. This study highlights the urgent need for both culturally-informed policies and culturally-sensitive strategies to mitigate the prevalence and impact of ACEs on future generations.

Figure Legends

Figure 1. Forest Plot Representing the Prevalence of 0 ACEs.

Square data markers represent individual study prevalence estimates. Square size represents the individual study's weighting the meta-analysis. Error bars represent 95%CIs for these individual study prevalence estimates. The diamond data marker represents the likely range for the pooled mean prevalence of 0 ACEs across studies.

Abbreviations: ACE, adverse childhood experience; Prev, prevalence; CI, confidence interval.

Figure 2. Forest Plot Representing the Prevalence of 4+ ACEs.

Square data markers represent individual study prevalence estimates. Square size represents the individual study's weighting the meta-analysis. Error bars represent 95%CIs for these individual study prevalence estimates. The diamond data marker represents the likely range for the pooled mean prevalence of 4+ ACEs across studies.

Abbreviations: ACE, adverse childhood experience; Prev, prevalence; CI, confidence interval.

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Table 1. Characteristics of Included Studies																			
	N	N of ACEs											Race/Ethnicity Moderators						
Source	**Total**	**0**	**1**	**2**	**3**	**4+**	**Age (years)[a]**	**Female (%)**	**Country**	**Income**	**Assessment Method**	**ACE Items[b]**	**White**	**Black**	**Latinx**	**Asian**	**Indigenous**	**Juvenile offending**	**Residential Care**
Ali (2016)[52]	12	1	2	3	1	5	14-18	50.0	USA	Mid/High	Questionnaire (Child)	10	66.7		25.0	8.3			
Andrzejewski et al (2023)[53]	231	122	41	21	7	40	2-17	37.8	USA	Mixed	Questionnaire (Parent)	10	76.4						
Anthony et al (2019)[54]	374	161	13	17	25	158	0-9	45.0	UK	Mid/High	File Review	10	93.0						Yes
Anyigbo et al (2024)[55]	209540	130090	43152	17320	8687	10291	0-17	49.0	USA	Mixed	Questionnaire (Parent)	9	52.0	13.0	25.0				
Barrios-Acosta et al (2017)[56]	130	34	35	28	16	17	1-11	44.7	Colombia	Low	Questionnaire (Parent)	10							
Bisset (2023)[57]	57	1	8	7	12	29	NR	NR	UK	NR	File Review	10							
Boccio et al (2022)[58]	20125	6294	3940	2751	2246	4894	14-18	50.3	USA	NR	Questionnaire (Child)	10	42.0	22.7	30.0				
Brinkerhoff (2018)[59]	319	226	45	13	14	21	10-14	46.2	USA	Mid/High	Questionnaire (Other)	10							
Brumley et al (2021)[60]	99	25	26	19	12	17	13-16	50.0	USA	Low	Questionnaire (Child)	9	3.0	87.0	2.0	3.0			
Chapple et al (2021)[61]	3444	271	529	648	640	1356	NR	48.4	USA	Low	Interview (Parent)	8	18.0	49.1					
Clarke (2018)[62]	170	17	28	32	35	58	12-18	59.4	USA	Low	Questionnaire (Child)	10	5.9	28.8	58.8				
Clements-Nolle et al (2022)[63c]	5328	2360	1266	813	458	431	NR	53.6	USA	Mixed	Questionnaire (Child)	6	35.4	4.8	41.3				
Cohen & Choi (2022)[64]	10117	4364	2973	1522	710	548	13-18	48.7	USA	NR	Interview (Child)	10	65.5	15.1	14.4				
Cortes Hidalgo et al (2022)[65]	3008	889	803	520	361	435	9-11	50.4	Netherlands	NR	Mixed	12	65.8						
Cortright (2021)[66]	78026	12378	11268	12125	11945	30310	12-17	24.7	USA	NR	File Review	9	60.1	26.0				Yes	
Craig et al (2020)[67]	3508	423	513	527	545	1500	14-18	85.1	USA and Canada	Mixed	Questionnaire (Child)	10	80.0	4.1	8.3	4.5	6.1		
Derck et al (2023)[68]	399	275	65	24	19	16	0-18	45.1	USA	Mixed	Questionnaire (Parent)	10	30.8	49.4	4.8				
DiGangi & Negriff (2020)[69]	5897	4771	790	195	82	59	3-13	NR	USA	NR	Questionnaire (Parent/Child)	10							
Garduno (2022)[70]	555	356	109	44	34	12	11-17	50.5	USA	Low	Questionnaire (Child)	8		38.7	61.3				
Garrido et al (2018)[71]	515	66	191	151	73	34	9-11	48.0	USA	NR	Mixed	6	48.0	27.2	47.2	4.1	9.9		Yes
Gayle Smith (2023)[72]	105	0	2	14	34	55	8-16	51.4	USA	Low	File Review	10	5.7	66.7	16.2	2.9			Yes
Gordon et al (2022)[73]	2066	193	293	300	316	964	9-18	35.0	USA	NR	File Review	10	45.5	25.8	12.4	1.1	4.1		Yes
Hall et al (2018)[74]	120	4	11	7	9	89	11-17	0.0	USA	NR	File Review	10	88.0	6.0					Yes
Hanc et al (2022)[75]	503	264	120	64	25	30	6-12	47.5	Poland	Mid/High	Questionnaire (Parent)	8							
Helton et al (2022)[76]	1880	207	489	507	320	357	0-15	48.0	USA	Low	Interview (Parent)	10	40.0	22.0	30.0				
Iob et al (2022)[77]	3873	921	1008	797	536	611	0-18	59.9	UK	NR	Questionnaire (Parent/Child)	7							
Keesler et al (2021)[78]	655	216	126	67	64	182	NR	56.7	USA	NR	Questionnaire (Child)	10							
Koball et al (2021)[79]	1286	415	230	157	151	333	0.5-17	49.0	USA	NR	Questionnaire (Parent)	10	96.5						
Kovacs-Toth et al (2023)[80]	764	418	172	88	37	49	12-17	59.4	Hungary	NR	Questionnaire (Child)	10							
Kuhlman et al (2023)[81]	80	9	27	15	12	17	12-15	45.0	USA	Mixed	Interview (Parent)	9	77.5	8.8	35.0	8.8			

Leban & Gibson (2020)[82]	1911	242	403	401	383	482	9-15	49.6	USA	NR	Interview (Parent)	6	14.3	36.9	45.0				
Lee et al (2020)[83d]	2957	2283	398	153	69	54	NR	56.9	Korea	Mid/High	Questionnaire (Child)	10							
Lin & Chiao (2022)[84]	2293	290	612	607	410	374	13-15	47.7	Taiwan	NR	Questionnaire (Parent/Child)	9							
Liu et al (2021)[85]	158	16	41	25	33	43	3-17	47.9	USA	Mixed	Interview (Parent/Child)	10	17.8	17.2	60.1				
Loomis et al (2019)[86]	26	11	7	3	3	2	3-5	53.8	USA	Low	Interview (Parent)	7	15.4	11.5	92.3				
Lugo-Candelas et al (2020)[87]	2120	416	612	470	285	337	5-15	48.3	USA	Mixed	Interview (Parent/Child)	11			100.0				
Malvaso et al (2019)[88]	2045	103	225	287	380	1050	10-18	15.6	Australia	NR	File Review	9					27.0	Yes	
Manning (2022)[89]	147	18	14	24	17	74	14-18	38.8	USA	Low	Questionnaire (Child)	8	2.8	71.0	45.5	6.9	2.8		
Marryat & Frank (2019)[90]	3119	1093	1087	612	233	94	8.00	48.4	UK	Mixed	Mixed	7	96.5						
Matsuura et al (2013)[91]	366	273	46	19	9	19	15-18	100.0	Japan	NR	Questionnaire (Child)	9						Yes	
McKelvey et al (2019)[92]	1335	251	406	372	199	107	1-3	49.1	USA	Low	Mixed	10	38.9	34.0	22.7				
Mercera et al (2024)[93e]	123	6	17	23	25	52	12-18	38.2	Netherlands	NR	File Review	10							
Myat Zaw et al (2022)[94]	6167	3386	867	601	415	898	13-18	53.5	Bangkok	Mixed	Questionnaire (Child)	11							
Myran et al (2023)[95]	5888	2691	2014	704	249	230	13-17	51.2	Norway	Mid/High	Questionnaire (Child)	8							
Nunez et al (2024)[96]	7538	1650	1832	1621	1142	1293	NR	48.7	Chile	NR	Questionnaire (Child)	11							
Olah et al (2023)[97]9	228	17	51	41	27	92	12-17	54.2	Hungary	NR	Questionnaire (Child)	10							Yes
Pammenter et al (2022)[98]	344	37	40	48	40	179	NR	0.0	Australia	NR	File Review	9	60.4[f]				41.0[g]	Yes	
Peh et al (2022)[99]	65	0	4	13	15	33	9-18	46.2	Singapore	NR	Questionnaire (Other)	10							Yes
Reuben et al (2016)[100]	950	394	309	123	64	60	15	48.0	New Zealand	NR	Mixed	10	93.0						
Robles et al (2019)[101]	65680	32773	14937	6631	3564	7775	6-17	48.4	USA	Mixed	Interview (Parent)	9	72.8	10.0	12.3				
Roque-Lopez et al (2021)[102]	44	0	1	1	4	38	13-16	100.0	Colombia	NR	Questionnaire (Child)	10							Yes
Saadi et al (2023)[103]	11229	6360	3208	1112	424	125	9-10	47.8	USA	NR	Mixed	8	53.4	14.9	16.3	1.9	0.3		
Santoro et al (2016)[104]	139	77	28	12	8	14	12-18	44.9	India	NR	Questionnaire (Child)	10							
Schilling et al (2019)[105]	87	54	19	11	3	0	5-7	53.0	USA	Low	Interview (Parent)	7	10.0	15.0	70.0				
Sherry et al (2020)[106]	636	445	151	31	6	3	12-16	80.0	USA	NR	File Review	10	79.0	8.0					
Siego et al (2021)[107]	784	196	125	184	135	144	14-18	100.0	Peru	Low	Interview (Child)	9							
Spratt et al (2018)[108]	22	4	7	5	3	3	8-18	81.8	UK	NR	Interview (Child)	10	100.0						
Steinke et al (2018)[109]	111	8	19	13	13	58	11-18	0.0	USA	Low	Questionnaire (Child)	10	59.5	30.6	12.6				Yes
Swedo et al (2020)[110]	10546	4201	2414	1340	898	1693	13-18	50.1	USA	NR	Questionnaire (Child)	10	83.6	5.8	4.3				
Thompson (2023)[111]	55	10	18	9	5	13	13-18	50.9	USA	NR	Questionnaire (Child)	10	16.4	74.6	1.8				
Vervoort-Schel et al (2021)[112]	134	19	37	15	30	33	2-17	33.6	Netherlands	NR	File Review	10							Yes
Vink et al (2019)[113]	644	352	152	70	28	42	9-13	53.3	Netherlands	NR	Questionnaire (Child)	10							

Walsh et al (2019)[114]	5562	2624	1657	804	334	143	4.50	50.0	New Zealand	NR	Interview (Parent)	8							
Warren (2024)[115]	132	11	30	21	18	52	11-18	100.0	USA	NR	Questionnaire (Child)	10						Yes	
Whiteside-Mansell et al (2019)[116]	3652	1216	1045	712	369	310	4.00	49.8	USA	Low	Interview (Parent)	10	41.0	43.4	15.6				

Abbreviations: ACE, adverse childhood experience; N, overall study sample size; NR, not reported; UK, United Kingdom; USA, United States of America.
[a]Age range of study participants was reported in most cases. The school year(s) of the study participants was reported in a small number of cases (listed as age not reported above).
[b]Number of items used in the ACEs questionnaire in that study.
[c]Middle school sample.
[d]Elementary and middle school sample.
[e]Alternative educational facility (Setting 3) sample.
[f]Percentage of White participants reported for sexual offence sample.
[g]Percentage of Indigenous participants reported for non-sexual offence sample.

Table 2. Prevalence Estimates of Five Categories of Adverse Childhood Experiences						
		Prevalence (95%CI)				
Moderators	**k**	**0 ACES**	**1 ACE**	**2 ACES**	**3 ACES**	**4+ ACES**
Overall mean	65	42.3 (25.3-52.7)	22.0 (9.9-32.7)	12.7 (3.8-22.3)	8.1 (1.4-16.8)	14.8 (5.1-24.8)
Sex						
Female	78	48.2 (25.3-71.5)	22.0 (17.0-27.4)	10.2 (7.3-13.6)	5.6 (2.0-11.0)	10.0 (0.8-27.7)
Male	78	40.0 (19.0-63.1)	21.2 (16.1-26.3)	12.7 (9.3-16.6)	8.3 (3.5-14.9)	13.9 (2.6-32.2)
Age						
Child (<12 years)	17	46.7 (36.8-56.7)	24.7 (21.3-28.1)	11.9 (8.7-15.5)	6.1 (4.1-8.4)	7.6 (3.4-13.4)
Adolescent (≥12 years)	29	27.5 (15.5-41.4)	18.8 (14.3-23.7)	14.3 (12.6-16.0)	11.4 (7.8-15.6)	24.7 (12.9-38.9)
Region						
North America	38	46.5 (27.8-65.8)	20.1 (17.7-22.6)	10.7 (7.9-13.9)	9.0 (6.3-12.2)	11.9 (3.3-24.9)
Europe	13	36.0 (27.6-44.9)	29.0 (24.8-33.5)	15.6 (12.2-19.3)	8.0 (4.7-12.2)	8.7 (4.1-14.8)
South America and Latin America	4	22.1 (21.3-22.8)	23.4 (21.1-25.7)	21.6 (21.1-22.0)	15.3 (14.8-15.7)	17.5 (16.6-18.4)
Asia	6	52.0 (30.5-73.2)	16.1 (11.8-20.8)	10.9 (5.6-17.7)	7.0 (3.2-12.1)	10.5 (4.3-19.0)
Australia and New Zealand	4	33.1 (12.1-58.5)	24.4 (15.3-34.9)	14.2 (13.8-14.6)	8.7 (4.1-14.7)	11.3 (0.1-37.5)
Racial-ethnic group						
White	38	45.4 (22.8-69.0)	20.0 (14.8-25.8)	10.5 (7.5-14.0)	6.6 (2.5-12.4)	13.1 (1.9-32.0)
Black	30	31.0 (15.4-49.1)	28.3 (17.1-41.0)	14.3 (12.3-16.4)	11.0 (7.8-14.6)	22.8 (12.4-35.2)
Latinx	28	49.5 (32.5-66.5)	24.8 (22.2-27.4)	11.7 (8.5-15.4)	5.6 (2.4-9.9)	6.7 (1.0-17.8)
Indigenous peoples	7	NE	2.0 (0.0-9.9)	13.7 (4.9-26.0)	26.5 (8.7-49.6)	84.1 (27.0-95.9)
Household income						
Low	14	19.7 (8.8-33.6)	22.4 (16.3-29.2)	20.7 (17.5-24.0)	14.4 (10.6-18.6)	18.6 (7.0-34.1)
Mid-to-high	6	56.4 (36.5-75.3)	24.9 (12.2-40.3)	9.2 (5.2-14.2)	3.8 (2.6-5.1)	4.1 (2.0-6.9)
History of:						
Juvenile offending	5	15.5 (14.5-16.5)	14.4 (14.1-14.6)	15.5 (15.4-15.6)	15.4 (15.2-15.6)	39.2 (38.3-40.1)
Placement in residential care	10	11.2 (6.3-17.2)	15.5 (9.7-22.3)	14.7 (10.5-19.4)	14.3 (12.0-16.8)	40.2 (26.8-54.3)
Assessment method						
Questionnaire	34	55.8 (45.3-66.0)	20.6 (19.8-21.4)	9.5 (7.5-11.6)	5.3 (3.5-7.4)	7.1 (3.6-11.8)
Interview	14	43.8 (34.6-53.3)	23.9 (21.7-26.1)	12.3 (9.1-15.8)	6.8 (4.7-9.2)	11.5 (8.9-14.3)
File review	11	15.7 (14.6-16.8)	14.3 (14.0-14.7)	15.3 (14.8-15.8)	15.2 (14.8-15.6)	39.0 (37.8-40.2)
Informant (Questionnaire)						
Child	23	37.4 (29.0-46.2)	21.0 (17.9-24.4)	13.4 (11.2-15.6)	9.2 (7.0-11.8)	16.4 (10.3-23.6)
Parent	7	61.8 (61.2-62.5)	20.6 (20.5-20.6)	8.3 (8.2-8.4)	4.2 (4.1-4.3)	5.0 (4.7-5.3)
Informant (Interview)						
Child	4	41.5 (37.1-46.1)	28.3 (25.2-31.6)	15.6 (13.9-17.3)	7.7 (5.8-9.8)	6.2 (4.1-8.8)
Parent	10	44.8 (34.2-55.7)	23.2 (21.6-24.8)	11.6 (8.6-15.0)	6.6 (4.3-9.3)	12.1 (9.3-15.3)
Study quality						

Below average (Mean -1SD)	65	41.4 (13.9-72.2)	16.8 (13.6-20.3)	10.7 (6.3-16.1)	8.1 (2.7-16.1)	18.3 (3.2-42.1)
Above average (Mean +1SD)	65	51.8 (26.8-76.2)	26.3 (22.1-30.7)	11.8 (7.8-16.5)	5.5 (1.8-11.1)	4.6 (0.0-18.0)

Abbreviations: ACES, adverse childhood experiences; CI, confidence interval; k, number of study- or sample-estimates used to estimate the given prevalence; NE, not estimable; SD, standard deviation.

Table 3. Moderation of Prevalence Estimates of Five Categories of Adverse Childhood Experiences

	Ratio (95%CI)[a]				
Moderators	**0 ACES**	**1 ACE**	**2 ACES**	**3 ACES**	**4+ ACES**
Sex[b]	1.06 (0.85-1.32)	1.01 (0.95-1.07)	0.98 (0.94-1.02)	0.98 (0.91-1.04)	0.97 (0.81-1.15)
Age[c]	0.87 (0.77-0.98)	0.95 (0.91-1.00)	1.02 (0.99-1.06)	1.05 (1.01-1.09)	1.16 (1.04-1.30) ↑
Region[d]					
North America	1.07 (0.97-1.24)	0.97 (0.93-1.01)	0.96 (0.93-1.00)	0.98 (0.94-1.02)	1.01 (0.91-1.12)
Europe	0.93 (0.81-1.07)	1.07 (1.03-1.12)	1.04 (1.00-1.08)	1.01 (0.96-1.06)	0.97 (0.88-1.07)
South America and Latin America	0.84 (0.74-0.94) ↓	1.02 (1.00-1.05)	1.10 (1.07-1.13)	1.08 (1.04-1.12)	1.05 (0.96-1.15)
Asia	1.05 (0.87-1.26)	0.96 (0.92-1.02)	1.00 (0.94-1.06)	1.00 (0.95-1.05)	0.99 (0.89-1.10)
Australia and New Zealand	0.91 (0.74-1.13)	1.03 (0.95-1.12)	1.03 (1.00-1.06)	1.02 (0.96-1.08)	1.00 (0.83-1.19)
Racial-ethnic group					
Black	0.90 (0.74-1.10)	1.07 (0.96-1.18)	1.03 (1.00-1.07)	1.04 (0.99-1.10)	1.09 (0.93-1.27)
Latinx	1.03 (0.85-1.25)	1.04 (0.99-1.09)	1.01 (0.97-1.05)	0.99 (0.94-1.08)	1.00 (0.88-1.14)
Indigenous peoples	NE	0.86 (0.80-0.91) ↓	1.03 (0.94-1.13)	1.19 (1.01-1.40) ↑	**1.63 (1.28-2.08)** ↑
Household income[f]	**0.76 (0.65-0.89)** ↓	0.98 (0.87-1.11)	1.10 (1.05-1.16) ↑	1.10 (1.06-1.14) ↑	1.14 (1.02-1.28) ↑
History of:[g]					
Juvenile offending	**0.76 (0.71-0.82)** ↓	0.94 (0.93-0.95)	1.05 (1.03-1.07)	1.09 (1.07-1.11)	**1.29 (1.24-1.34)** ↑
Placement in residential care	**0.76 (0.67-0.87)** ↓	0.96 (0.90-1.01)	1.03 (0.99-1.08)	1.07 (1.03-1.11)	**1.26 (1.10-1.43)** ↑
Assessment method[h]					
Questionnaire	1.20 (1.02-1.41) ↑	1.01 (0.97-1.06)	0.96 (0.93-1.00)	0.95 (0.90-1.01)	0.87 (0.76-1.00)
Interview	0.98 (0.83-1.16)	1.04 (1.01-1.07)	1.01 (0.97-1.06)	1.00 (0.95-1.05)	0.99 (0.88-1.11)
File review	**0.76 (0.70-0.81)** ↓	0.94 (0.93-0.95)	1.05 (1.02-1.07)	1.09 (1.07-1.11)	**1.29 (1.23-1.34)** ↑
Informant					
Questionnaire[i]	**0.85 (0.80-0.90)** ↓	1.00 (0.98-1.03)	1.05 (1.03-1.07)	1.05 (1.03-1.07)	1.11 (1.05-1.17)
Interview[j]	0.98 (0.90-1.06)	1.04 (1.01-1.07)	1.04 (1.00-1.07)	1.01 (0.98-1.04)	0.95 (0.92-0.98)
Study quality[k]	1.07 (0.83-1.40)	1.08 (1.04-1.13)	1.01 (0.95-1.07)	0.98 (0.91-1.05)	0.88 (0.74-1.06)
Publication year	**1.42 (1.15-1.76)** ↑	1.00 (0.93-1.09)	0.92 (0.83-1.02)	0.90 (0.77-1.05)	0.74 (0.56-0.98) ↓

Abbreviations: ACES, adverse childhood experiences; CI, confidence interval; NE, not estimable; ↑, arrows indicate effects where there was at least good evidence of a substantial moderating association (i.e., where the chances of a substantial moderating association was >75% but <95%); **bold** text indicates effects where there was very good or strong evidence of a substantial moderating association (i.e., where the chances of a substantial and slight moderating association were respectively >95% and <5%).

[a]Moderating associations were calculated by taking the ratio of the prevalence proportion for different levels of categorical variables and below and above average values for continuous variables. Magnitude thresholds for interpreting the confidence limits of ratios representing prevalence decreases: >0.90, slight; <0.90-0.70, small; 0.70-0.50, moderate; <0.50, large. Thresholds for increases: <1.11, slight; 1.11-1.43, small; 1.43-2.00, moderate; >2.00, large.

[b]Prevalence proportion for females divided by the corresponding prevalence for males.

[c]Prevalence proportion for samples of adolescents divided by the corresponding prevalence for samples of children.

[d]Prevalence proportion for studies from a given country divided by the prevalence proportion for studies from other countries.

[e]Prevalence proportion for a given racial-ethnic group divided by the corresponding prevalence for White participants.

[f]Prevalence proportion for samples from low-income households divided by the corresponding prevalence for samples from mid-to-high income households.

[g]Prevalence proportion for samples of participants with a history of offending or criminality divided by the prevalence for samples of participants without such profiles.

[h]Prevalence proportion for studies of ACEs using a given methodology divided by the prevalence proportion for studies using other methodologies.

[i]Prevalence proportion for studies of ACEs using a child-reported questionnaire methodology divided by the prevalence proportion for studies using a parent-reported questionnaire methodology.
[j]Prevalence proportion for studies of ACEs using a child-reported interview methodology divided by the prevalence proportion for studies using a parent-reported interview methodology.
[k]Prevalence proportion for studies with above average values (mean +1 standard deviation) of this continuous moderator divided by the corresponding mean for studies with below average values (mean -1 standard deviation).