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Measuring adverse childhood experiences by interviewing children at 9 and 10 years of age: Prevalence, concordance with mother-reports, posttraumatic stress disorder symptoms, and subjective experience of being asked about adverse childhood experiences in FinnBrain Birth cohort study



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ABSTRACT

How children experience the screening of adverse childhood experiences (ACEs) is little studied. Moreover, the similarity between parental and child reports is unknown. We interviewed 9-year-olds (a subsample of the FinnBrain Birth Cohort Study; $N = 344$) by using the Pediatric ACEs and Related Life Events Screener questionnaire (PEARLS; covering 10 traditional ACEs and 7 expanded items). Furthermore, we asked about the subjective harm caused by ACEs, posttraumatic stress disorder (PTSD) symptoms, and

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Child interview
 Concordance between child- and mother-
 reports
 Feelings about the interview

how the children experienced the interview. The mothers ($N = 348$) filled out the PEARLS youth questionnaire that provided a parental report on ACEs. In total, 39.2% of children self-reported zero ACEs, and the corresponding percentage for mother-reports was 30.2%. In addition, 7.8% of children reported having been exposed to ≥ 4 (of 17 possible) ACEs, which is an often-used cutoff score for adverse health outcomes. The corresponding percentage for mother-reports was higher at 14.7%. There was low concordance between mother- and child reports in cases where ACEs did happen 4.9% of children with at least 1 ACE reported PTSD symptoms. In general, 1.7% of children felt that it was difficult to answer the questions, whereas 78.6% felt that it was easy. Negative feelings (e.g., anxiety, depression) related to the interview were reported by 0.9% to 1.4% of the children. In addition, 2% reported only negative feelings, whereas 80% reported only positive feelings. The prevalence of ACEs at 9 and 10 years of age in the FinnBrain Birth Cohort was comparable to that in many retrospective adult studies in European general populations. The prevalence of PTSD symptoms was low and was not clearly linked to the number of self-reported ACEs. The observation that most children found the interview to be easy, neutral, or positive is encouraging, whereas the uneasiness of few children at the interview needs to be acknowledged.

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Introduction

Adverse childhood experiences (ACEs) traditionally refer to sources of significant stress to which children may be exposed. Literature typically defines ACEs as multiple forms of physical, sexual, and emotional abuse, neglect, exposure to violence between parents or caregivers, and other serious household stressors; such as parental substance abuse and mental illness occurring before 18 years of age (Bellis et al., 2023; Felitti et al., 1998). Conventional ACEs scales ask about 10 adverse experiences—mostly based on experiences in the household (e.g., parental separation, abuse, neglect)—with a resulting count score ranging from 0 to 10 ACEs (see Felitti et al., 1998). However, there are expanded versions of ACEs scales that include other factors, such as neighborhood violence and/or bullying, discrimination, and housing instability (Cronholm et al., 2015; Finkelhor et al., 2013, 2015).

The developing brain and other physiological systems of young children are highly sensitive to input from their social environment, and ACEs have the potential to influence a range of human physiological systems, for example, harm healthy development through excessive activation of the stress response system (Gilbert et al., 2015; Green et al., 2010). A landmark study by Felitti et al. (1998) reported a strong dose-dependent association between the cumulative number of ACEs and an array of poor health and behavioral outcomes in adulthood. This finding was also confirmed by a recent meta-analysis (Hughes et al., 2017). In addition, an increased number of ACEs have also been associated with health risk behaviors and mental health problems occurring in adolescence (Garrido et al., 2018), physiological disruptions (i.e., alterations in immune function and increases in inflammatory markers; e.g., Danese & McEwen, 2012; Hughes et al., 2017), chronic disease development, and premature mortality (Brown et al., 2009; Sanderson et al., 2021). In many studies, exposure to ≥ 4 ACEs has been considered a cutoff for significant health risk (Hughes et al., 2017), but some studies suggest that any ACEs may influence mental health already in adolescence (Negriff, 2020). Hence, the assessment of ACEs in childhood, before the onset of high-cost disorders, could aid in the identification of individuals at risk for trauma, chronic and toxic stress responses, and consequent ill health.

Globally, around half of adults have been exposed to at least 1 ACE (Hughes et al., 2017), and comparable proportions were reported in a meta-analysis pooling data from Europe (42.2% of participants having at least 1 ACE) and North America (58.4%) in low-risk populations (Bellis et al., 2019). Similarly, a study of 18,747 students aged 18 to 25 years in 13 European countries found that approximately half of the students had experienced at least 1 ACE and around 25% had suffered multiple ACEs (Wood et al., 2023). One U.S. study found that 47.9% of a representative sample of children aged 0 to 17 years ($N = 95,677$) had experienced at least 1 ACE (Bethell et al., 2014), and in another nationally representative, nonclinical sample 35% of children had experienced 1 or 2 ACEs and 11% of children had experienced 3 or more (Sacks et al., 2014).

Whereas many prevalence reports have been obtained in retrospect in adulthood or from registries, or parents have reported on behalf of their children, some studies have also collected ACEs data directly from children using questionnaires. These studies suggest that a significant percentage of children report being exposed to at least 1 adverse experience. In Abrahamyan et al. (2022), 96.1% of the child participants in a Portuguese longitudinal birth cohort study self-reported exposure to at least 1 ACE at the 10-year follow-up. In a Chinese study (children aged 10–14 years; $N = 1700$), 77.76% of the participants reported experiencing at least 1 ACE (Zuo et al., 2021). In conclusion, there is inconsistency between prospective and retrospective prevalence estimates, and to get a broader view of the prevalence of ACEs in childhood, it is important to collect data from both the children and the caregivers and to examine the concordance between the reports.

Prior to developing best practices in ACEs screening, it is critical to understand child experiences of screening. Various methods have been developed to assess ACEs in children, but these assessments serve mostly for the purpose of caregiver reporting. A review of 14 existing ACEs scales, 3 of which allowed child reporting, concluded that the methods are rather similar and are appropriate for both individual and family studies in population-based and clinical research (Bethell et al., 2017). Previous studies on caregiver emotional response following ACEs screening obtained results suggesting low or infrequent reports of negative affect (Gillespie & Folger, 2017; Long et al., 2022). In one study, higher ACEs scores correlated with increased affective response (both positive and negative) when a more detailed item-level response screening format was used versus reporting the mere number of ACEs to which the children had been exposed (Long et al., 2022). Evidence on assessing ACEs in adults also suggests that they may find dialogue about ACEs to be empowering (Gallop et al., 1995). Although no reports exist on children's experiences, these results from adult studies are encouraging and indicate that ACEs screening may enhance openness when discussing difficult issues and may generate positive feelings in individuals through being understood and connected with service providers (e.g., Long et al., 2022).

Although ACEs can significantly negatively affect development and health, the strength of this effect can vary, and individuals' experiences and responses to adversity likely depend on a range of factors. These include several protective factors, such as the existence of supportive relationships, positive childhood experiences, better coping skills and executive functions, and access to other forms of resources and support (Bethell et al., 2014; Traub & Boynton-Jarrett, 2017; Zetino et al., 2020). Post-traumatic stress disorder (PTSD) is a mental disorder that may develop in some children and adolescents after exposure to traumatic events, including incidents that involve serious harm to self or others and include accidents, natural disasters, sexual or physical trauma, and violence. According to current prevalence estimates, 10% of children under 18 years of age are diagnosed with PTSD, with girls four times more likely than boys to develop the disorder. Children with both ACEs and PTSD symptoms may require more intensive support and integrated clinical services (Miller-Graff & Howell, 2015), and therefore it is important to screen not only the number of ACEs but also the subjective feelings about the experience, the harm that the individual has experienced due to the exposure, and the possible PTSD symptoms that may accompany ACEs.

In the current study, we measured ACEs by interviewing 9- and 10-year-olds about their ACEs using the Pediatric ACEs and Related Life Events Screener (PEARLS; Koita et al., 2018) questionnaire as a basis for the interview. First, we assessed 10 traditional ACE categories on experiences of abuse, neglect, and household challenges as well as 7 expanded categories indicating, for example, exposure to discrimination, housing instability, community violence, physical illness/disability of a caregiver, and forced separation from a caregiver. Next, the interview probed the subjective harm of the ACEs

and possible PTSD symptoms (intrusive memories, attempts to suppress, nightmares, disturbed sleep, and irritability). Following this, we asked the children to report how they felt about the interview. Lastly, the mothers filled out the PEARLS questionnaire concerning their children's exposures to allow direct comparisons between child- and parent-reports. An interview style was chosen over a questionnaire format to reduce miscommunication and assist the young children in understanding the questions. Moreover, we wanted to make sure that children felt safe when reporting potentially sensitive events they have encountered and for us to be able to intervene if needed.

Method

Participants

The study participants were part of the ongoing FinnBrain Birth Cohort Study (<https://www.finn-brain.fi>), which is a general population-based pregnancy cohort ($N = 3808$ mothers, their children, and $N = 2623$ fathers or other partners) that includes a nested case-control design ($N = 1000$ mothers reporting high vs. low levels of prenatal depressive, anxiety and/or pregnancy-related anxiety symptoms) to study the effects of maternal prenatal distress on childhood development (Karlsson et al., 2018). The participants for the main cohort were recruited from the catchment area of the former South-West Finland Hospital District in during 2012 to 2015. The original recruitment for the study took place at the first trimester ultrasound at the 12th gestational week. A total of 66% of expecting mothers contacted about the study (3808/5790) and 2624 fathers/partners decided to participate. Families who have actively participated in the FinnBrain measurements and other intense follow-up sessions were invited to participate in the intensive developmental follow-up assessment. The longitudinal data collection included parent-reported questionnaires on parent and child background and health, and the data were then linked with the relevant registries. Parents had self-reported factors, such as educational level and psychiatric symptoms, and completed the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) and Symptom Checklist-90 (SCL-90/anxiety subscale; Derogatis et al., 1973). The joint ethics committee of the University of Turku and Turku University Hospital granted permission for the FinnBrain Birth Cohort Study and for all its follow-up phases. The protocol of this study was reviewed and accepted by the joint ethics committee of the University of Turku and Turku University Hospital. The studies were carried out in line with the Declaration of Helsinki.

Data collection

Data on children's ACEs were collected as part of a larger 9-year-old measurement point (launched in 2022 with intended completion in 2025), which includes several study visits/sub-studies ranging from neuropsychological and language development assessment to brain imaging and biological sample collection.

The Early-Life Stress Exposures and Cardiovascular Health study visit included anthropometric measurements, abdominal ultrasounds to assess cardiometabolic health, and several different questionnaires, including the ACEs reporting (see "ACEs data collection and PTSD symptoms" section). The study visits were planned in accordance with a trauma-informed care approach that acknowledges the need to understand a patient's life experiences in order to deliver needed care. The data collection started in Fall 2022 and will continue until October 2025. Here, we report the results of the first 344 child interviews.

Recruitment

All participants were recruited by telephone. The parents received detailed information about the study visit arrangements and content; the materials to be presented to the child were sent to the participating families for obtaining their consent in advance. The parents were also informed about the handling of the possible accidental findings in ultrasonography and concerns raised by questionnaire scores or ACEs interviews. Moreover, they were informed about the staff's obligation to contact any

relevant authorities by Finnish legislation and the Child Welfare Act (<https://www.finlex.fi/fi/lain-saadanto/saadaskaannokset/2007/eng/417>) in cases of acute and/or severe concern about children's safety or well-being. A study visit was scheduled for those family members who were the cohort study participants (i.e., mothers, spouses, and children) and wanted to attend. In cases where children refused to participate, parents could still do so.

A specially trained pair of employees met with the families attending the study visit. The ACEs interview team consisted of four psychology master's students and a research coordinator (S.S.). Interview training included basic knowledge of Trauma-Informed Practice (TIP) (Bellis et al., 2023). The study visit was designed to be as safe, predictable, and customizable as possible. Children were greeted and interviewed in their preferred language (Finnish or Swedish, the two official languages of Finland).

Every visit began with both verbal and illustrated information about the content of the visit aiming to both obtain the informed consent of participants and increase their sense of control and agency. The visit's program was designed to function in parallel for children and parents so that when the parents were having their ultrasonography, the children went with the interviewer to a different floor for the ACEs interview. Likewise, when the children had their ultrasonography, the parents filled out the questionnaires. This method was deemed both efficient and reliable for collecting the ACEs data from children.

After briefly revisiting the program, informed consent was obtained from all attending family members. In the event where only one of two legal guardians attended, consent was required from the other guardian in advance via e-mail, text message, or phone call. At the end of the visit, all participating families received a leaflet of "Tips for Parents," which included a short summary about how to discuss difficult themes with children (Juusola, 2021). The leaflet also included tips for coping with intense feelings and the contact information of the researcher responsible for the interview (E-L.K.).

ACEs data collection and PTSD symptoms

Information on ACEs was collected by PEARLS (Koita et al., 2018). Parental data of their childrens ACEs were collected during the visit as part of a set of questionnaires using the REDCap software (<https://www.project-redcap.org>). We used the PEARLS youth version as a basis for the child interview and the parental questionnaire report. PEARLS covers the 10 traditional ACE categories (i.e., physical and emotional abuse and neglect and significant dysfunction of the household), and the expansion contained 7 questions about other important risk factors of toxic stress (i.e., hardship or major negative life events in children's living environments). Due to the young age of the participating children, we added a question about dating/romantic partners ("Have you ever been in a romantic relationship?") before asking about verbal or physical abuse or intimidation in relationships. However, dating was rare in the sample, and this question was not used in maternal reports, so we chose not to include these data in our current analysis.

The children attended the interview situation without a parent being present in the room. The children's responses during the interview were saved to an electronic form created with REDCap. If the children responded "yes" to any PEARLS item, it prompted additional questions, such as children's age at the time of exposure, the recurrence of the event (monthly/weekly/daily), and the estimated subjective harm on a 10-cm scale on which the children selected a point to show the level of harm or disturbance.

In cases where there was even one "yes" response to PEARLS items, children were asked about the scariness of the event. If the children deemed any event scary, the interview continued with mapping possible PTSD symptoms, such as recurrent memories, thoughts, or images, suppression of thoughts, nightmares, or other sleep disturbances, and irritability or angry outbursts (yes/no/not known). If PTSD symptoms were reported, children were also asked to rate the degree of effect the experience had on school life or relationships with friends and family (not at all/only a little/quite a lot/very much).

After the ACEs interview with additional questions, children were instructed to fill out a feedback form concerning their experiences on the interview. Children were informed that researchers would use their responses for future studies on how children respond to this interview format and that their

feedback would be used by the study team to refine and continuously improve the visits. The feedback form included, for example, the following questions: “How was it to answer the interview questions?”; “Did you understand the interviewer's questions?”; “Did the interviewer understand your answers?”; “How was the interview situation?”; “How did you feel during the interview?”; and “Additional feedback or thoughts on how to improve the visit?” It has been previously reported that children typically give short feedback when answering surveys (The Finnish Child Victim Survey; [Ellonen & Pösö, 2011](#)). To probe for additional details on children's feelings about the interview, we included items from [Ellonen and Pösö's \(2011\)](#) classified response options (i.e., anxious, frightening, depressing, weird, boring, and fun).

At the end of the visit, children got to say something about their plans/program for the rest of the day. They were also asked to choose a sticker and “place it on the spot where you would like to find yourself one day” on a colorful world map on the interview room's wall. These actions aimed to return children to their own everyday life after the possible recall of adverse experiences.

Statistical analyses

SPSS Statistics 28.0 (IBM Corp., Armonk, NY, USA) was used for statistical analyses. We used descriptive statistics to report the prevalence of ACEs as reported by the children and mothers and the prevalence of PTSD symptoms in children. Details on how the children evaluated the interview situation were also compiled for the analysis.

Results

By the time of reporting, we had aimed to contact 705 families about the possibility of attending the visit, and of these families 627 (89%) were reached. Of this contacted sample, 441 (70%) booked a visit and 362 completed the visit with available data before this reporting (including 330 mother-child dyads, 18 child interview data without maternal questionnaire data, and 14 maternal questionnaire data without child interview data). The attending mothers were older (mean age = 31.50 vs. 30.11 years, independent samples *t* test, $p < .001$) and more highly educated (chi square, $p < .001$) as compared with the non-participating mothers who we aimed to recruit. The attending mothers did not differ in their self-reported depression (EPDS mean score = 5.27 vs. 4.97, $p = .263$) or anxiety (SCL-90/anxiety subscale mean score = 3.63 vs. 3.49, $p = .571$) compared with mothers who refused to participate at the child age of 9 years (data collected as part of the whole cohort questionnaire data in the same year). Here, we report the results of the visit for 344 children and 330 mother-child pairs. Of the sample, 44 mothers were “case mothers” reporting high levels of prenatal distress, 103 were “control mothers” reporting low levels of distress during pregnancy, and the rest were neither cases nor controls in the original case-control design of the main cohort. The children at 9 years of age did not differ in their self-reported total ACEs sum (children of case vs. control mothers, ACEs mean = 1.55 vs. 1.08, respectively, Wilcoxon signed-rank test, $p = .243$). The mother-reported ACEs sum differed as a function of mothers' case-control status, with case mothers reporting higher levels of ACEs (Wilcoxon signed-rank test, mean = 2.78 vs. 1.39, $p < .001$).

Prevalence of child- and mother-reported ACEs

The prevalence of the child- and mother-reported ACEs is presented in [Table 1](#). Of the children, 39.2% reported no ACEs, whereas 2.3% reported ≥ 4 traditional ACEs. The corresponding numbers for maternal reports were 30.2% and 7.5% (≥ 4 of 10 traditional ACEs).

When all 17 ACEs were considered, 7.8% of children self-reported ≥ 4 ACEs and 14.7% of mothers reported their children to be exposed to ≥ 4 ACEs. Hence, mothers reported higher prevalence of ACEs in their children as compared with child self-reports.

The prevalence of different ACEs (item by item) in the sample as reported by children and mothers is presented in [Table 2](#).

Table 1

Characteristics of the sample and prevalence of child- and mother-reported cumulative ACEs (traditional, expanded, and total sum) in the sample.

Children, background (N = 344)		
Age at interview in years [mean (range)] (Missing data; n = 6)		10.32 (9.26–11.80)
Biological sex assigned at birth (female / male)		171 (49.7%) / 173 (50.3%)
Children, self-reported ACEs		
Traditional ACEs (out of 10 possible)	0	202 (58.7%)
	1	94 (27.3%)
	2–3	40 (11.6%)
	≥4	8 (2.3%)
Expanded ACEs (out of 7 possible)	0	195 (56.7%)
	1	99 (28.8%)
	2–3	50 (14.5%)
Sum of all ACEs (out of 17 possible)	0	135 (39.2%)
	1	97 (28.2%)
	2–3	85 (24.7%)
	≥4	27 (7.8%)
Any PTSD symptom		17 (4.9%)
Mothers (N = 348), background		
Education	Secondary level	93 (26.7%)
	Vocational degree	90 (25.9%)
	University degree	144 (41.4%)
	Missing	21 (6.0%)
Maternal-reported child ACEs		
Number of traditional ACEs (out of 10 possible)	0	130 (37.4%)
	1	105 (30.2%)
	2–3	87 (25.0%)
	≥4	26 (7.5%)
Number of expanded ACEs (out of 7 possible)	0	231 (66.4%)
	1	78 (22.4%)
	2–3	38 (10.9%)
	≥4	1 (0.3%)
Sum of all ACEs (out of 17 possible)	0	105 (30.2%)
	1	87 (25.0%)
	2–3	105 (30.2%)
	≥4	51 (14.7%)

Note. ACEs, adverse childhood experiences; PTSD, posttraumatic stress disorder.

The item-by-item direct comparison of how mothers and children in the same family reported on ACEs is presented in Table 3. As can be seen, the family-level concordance was high in cases where ACEs did not happen, but more important it was low in cases where ACEs had happened. That is, the number of mother–child dyads that disagreed on whether an ACE had occurred consistently exceeded the number of dyads in which the mother and child both agreed that “yes, the given ACEs happened.” The exceptions were questions that depicted a rare event (parental incarceration) or a common event (parental separation). Of note, the children reported higher prevalence of physical abuse incidents and neighborhood violence and/or bullying, whereas the mothers were more likely than children to endorse parental mental illness, children to have felt unsupported, unloved, or unprotected, or children witnessing interparental conflict or violence.

The Spearman correlations of the ACEs counts between the mother- and child-reports in the same family were low to moderate: traditional ACEs $\rho = .430, p < .001$; extended ACEs $\rho = .202, p < .001$; total sum $\rho = .408, p < .001$.

Table 2
Prevalence of different ACEs (item by item) in the sample as reported by children and mothers.

PEARLS interview/questionnaire Items, traditional ACEs	Child-reported		Mother-reported	
	No	Yes	No	Yes
1. Have you ever lived with a parent/caregiver who went to jail/prison?	342 (99.4%)	2 (0.6%)	346 (99.4%)	2 (0.6%)
2. Have you ever felt unsupported, unloved, and/or unprotected?	326 (94.8%)	18 (5.2%)	307 (88.2%)	41 (11.8%)
3. Have you ever lived with a parent/caregiver who had mental health issues? (for example, depression, schizophrenia, bipolar disorder, PTSD, or an anxiety disorder)	332 (96.5%)	12 (3.5%)	250 (71.8%)	98 (28.2%)
4. Has a parent/caregiver ever insulted you, humiliated you, or put you down?	332 (96.5%)	12 (3.5%)	311 (89.4%)	37 (10.6%)
5. Has your biological parent or any caregiver ever had, or currently has, a problem with too much alcohol, street drugs, or prescription medications use?	334 (97.1%)	10 (2.9%)	321 (92.2%)	27 (7.8%)
6. Have you ever lacked appropriate care by any caregiver? (for example, not being protected from unsafe situations or not being cared for when sick or injured, even when the resources were available)	338 (98.3%)	6 (1.7%)	340 (97.7%)	8 (2.3%)
7. Have you ever seen or heard a parent/caregiver being screamed at, sworn at, insulted, or humiliated by another adult? Or have you ever seen or heard a parent/caregiver being slapped, kicked, punched, beaten up, or hurt with a weapon?	286 (83.1%)	58 (16.9%)	211 (60.6%)	137 (39.4%)
8. Has any adult in the household often or very often pushed, grabbed, slapped, or thrown something at you? Or has any adult in the household ever hit you so hard that you had marks or were injured? Or has any adult in the household ever threatened you or acted in a way that made you afraid that you might be hurt?	318 (92.4%)	26 (7.6%)	339 (97.4%)	9 (2.6%)
9. Have you ever experienced sexual abuse? (for example, has anyone touched you or asked you to touch that person in a way that was unwanted, or made you feel uncomfortable, or has anyone ever attempted to have, or actually had, oral, anal, or vaginal sex with you)	343 (99.7%)	1 (0.3%)	346 (99.4%)	2 (0.6%)
10. Have there ever been significant changes in the relationship status of your caregiver(s)? (for example, a parent/caregiver got a divorce or separated or a romantic partner moved in or out)	272 (79.1%)	72 (20.9%)	279 (80.2%)	69 (19.8%)
Items, expanded ACEs				
11. Have you ever seen, heard, or been a victim of violence in your neighborhood, community, or school? (for example, targeted bullying, assault, or other violent actions, war, or terrorism)	233 (67.7%)	111 (32.3%)	272 (78.2%)	76 (21.8%)
12. Have you experienced discrimination? (for example, being hassled or made to feel inferior or excluded because of your race, ethnicity, gender identity, sexual orientation, religion, learning differences, or disabilities)	278 (80.8%)	66 (19.2%)	292 (83.9%)	56 (16.1%)
13. Have you ever had problems with housing? (for example, being homeless, not having a stable place to live, moved more than two times in a six-month period, faced eviction or foreclosure, or had to live with multiple families or family members)	338 (98.3%)	6 (1.7%)	341 (98.0%)	7 (2.0%)
14. Have you ever worried that you did not have enough food to eat or that food would run out before you or your parent/caregiver could buy more?	339 (98.5%)	5 (1.5%)	343 (98.6%)	5 (1.4%)
15. Have you ever been separated from your parent or caregiver due to foster care or immigration?	343 (99.7%)	1 (0.3%)	346 (99.4%)	2 (0.6%)
16. Have you ever lived with a parent/caregiver who had a serious physical illness or disability?	334 (97.1%)	10 (2.9%)	334 (96.0%)	14 (4.0%)
17. Have you ever lived with a parent or caregiver who died?	339 (98.5%)	5 (1.5%)	343 (98.6%)	5 (1.4%)

Note. ACEs, adverse childhood experiences; PEARLS, Pediatric ACEs and Related Life Events Screener.

Table 3Item-by-item comparison of individual ACEs between mothers and children in the same family ($N = 330$ mother-child dyads).

PEARLS interview/questionnaire Items, traditional ACEs	Dyad members both reported No	Dyad members both reported Yes	Dyad mom said Yes but child said No	Dyad mom said No but child said Yes
1. Have you ever lived with a parent/caregiver who went to jail/prison?	327 (99.1%)	1 (0.3%)	1 (0.3%)	1 (0.3%)
2. Have you ever felt unsupported, unloved, and/or unprotected?	280 (84.8%)	7 (2.1%)	33 (10.0%)	10 (3.0%)
3. Have you ever lived with a parent/caregiver who had mental health issues? (for example, depression, schizophrenia, bipolar disorder, PTSD, or an anxiety disorder)	229 (69.4%)	7 (2.1%)	89 (27.0%)	5 (1.5%)
4. Has a parent/caregiver ever insulted you, humiliated you, or put you down?	287 (87.0%)	2 (0.6%)	32 (9.7%)	9 (2.7%)
5. Has your biological parent or any caregiver ever had, or currently has, a problem with too much alcohol, street drugs, or prescription medications use?	297 (90.0%)	4 (1.2%)	23 (7.0%)	6 (1.8%)
6. Have you ever lacked appropriate care by any caregiver? (for example, not being protected from unsafe situations or not being cared for when sick or injured, even when the resources were available)	318 (96.4%)	0 (0.0%)	6 (1.8%)	6 (1.8%)
7. Have you ever seen or heard a parent/caregiver being screamed at, sworn at, insulted, or humiliated by another adult? Or have you ever seen or heard a parent/caregiver being slapped, kicked, punched, beaten up, or hurt with a weapon?	180 (54.5%)	36 (10.9%)	94 (28.5%)	20 (6.1%)
8. Has any adult in the household often or very often pushed, grabbed, slapped, or thrown something at you? Or has any adult in the household ever hit you so hard that you had marks or were injured? Or has any adult in the household ever threatened you or acted in a way that made you afraid that you might be hurt?	300 (90.9%)	3 (0.9%)	5 (1.5%)	22 (6.7%)
9. Have you ever experienced sexual abuse? (for example, has anyone touched you or asked you to touch that person in a way that was unwanted or made you feel uncomfortable, or has anyone ever attempted to have, or actually had, oral, anal, or vaginal sex with you)	327 (99.1%)	0 (0.0%)	2 (0.6%)	1 (0.3%)
10. Have there ever been significant changes in the relationship status of your caregiver(s)? (for example, a parent/caregiver got a divorce or separated or a romantic partner moved in or out)	258 (78.2%)	59 (17.9%)	9 (2.7%)	4 (1.2%)
Items, expanded ACEs				
11. Have you ever seen, heard, or been a victim of violence in your neighborhood, community, or school? (for example, targeted bullying, assault, or other violent actions, war, or terrorism)	184 (55.8%)	32 (9.7%)	39 (11.8%)	75 (22.7%)
12. Have you experienced discrimination? (for example, being hassled or made to feel inferior or excluded because of your race, ethnicity, gender identity, sexual orientation, religion, learning differences, or disabilities)	231 (70.0%)	16 (4.8%)	37 (11.2%)	46 (13.9%)
13. Have you ever had problems with housing? (for example, being homeless, not having a stable place to live, moved more than two times in a six-month period, faced eviction or foreclosure, or had to live with multiple families or family members)	318 (96.4%)	1 (0.3%)	6 (1.8%)	5 (1.5%)
14. Have you ever worried that you did not have enough food to eat or that food would run out before you or your parent/caregiver could buy more?	321 (97.3%)	1 (0.3%)	4 (1.2%)	4 (1.2%)
15. Have you ever been separated from your parent or caregiver due to foster care or immigration?	327 (99.1%)	0 (0.0%)	2 (0.6%)	1 (0.3%)
16. Have you ever lived with a parent/caregiver who had a serious physical illness or disability?	307 (93.0%)	1 (0.3%)	13 (3.9%)	9 (2.7%)
17. Have you ever lived with a parent or caregiver who died?	324 (98.2%)	4 (1.2%)	1 (0.3%)	1 (0.3%)

Note. ACEs, adverse childhood experiences; PEARLS, Pediatric ACEs and Related Life Events Screener.

PTSD symptoms

PTSD symptoms due to ACEs were reported by 4.9% of children. Specifically, 2.9% reported one symptom of five possible symptoms, 0.9% reported three symptoms, and 0.6% reported all five symptoms. Both of the children who reported five PTSD symptoms self-reported exposure to 1 ACE, and their mothers reported 3 and 4 ACEs.

Feelings about the interview

On a scale with alternatives of “difficult,” “easy,” and “cannot say,” 1.5% reported the answering of questions being difficult, 75.6% reported it being easy, and 22.9% could not say.

Of the 1.7% of children who reported only negative feelings about the interview, 2 of them self-reported ≥ 4 ACEs. Fully 80.0% reported only positive feelings about the interview, and 18.3% reported both negative and positive feelings.

Of 27 children who reported ≥ 4 ACEs, 2 reported the situation being anxiety-provoking and 2 reported it being depressing. Of these 4 children, 2 reported one PTSD symptom and the others reported none. On the other hand, of these 27 children, 16 reported the interview being “OK” and 10 reported it being “good.”

Discussion

In this study, we collected data on 9- and 10-year-old children's exposure to ACEs by interviewing the children and their mothers with a questionnaire containing the same questions in a longitudinal cohort of the general population. The ACEs instrument, PEARLS (Koita et al., 2018), included the 10 original ACE categories and an assessment of 7 additional life events as possible sources for a toxic stress response. The prevalence of ACEs at 9 and 10 years of age seems to be rather comparable to previous adult studies in Europe, although direct comparisons are difficult due to varying methods between studies in quantifying ACEs (see, e.g., Table 1 in Bellis et al., 2019). In our study, 41.3% of children reported exposure to at least one ACE when 10 traditional ACEs were taken into account and 59.6% did so when 17 ACEs questions are used (Bellis et al., 2019; Hughes et al., 2017). The corresponding numbers for mother-reports were 62.6% and 68.5% and thus were higher than the child self-reports. The number of children reporting at least 1 ACE exposure was still lower as compared with previous studies using child self-reports, which may be due to cultural differences (Zuo et al., 2021) or participants belonging to the general population versus a minority sample (Mersky et al., 2013).

A previous study using the PEARLS questionnaire, which collected data on the children's ACEs from the caregivers, found that item-level data—where each adversity is recorded as “yes” or “no”—yielded lower prevalence rates compared with aggregate-level response data, where responses are recorded as a total count (e.g., “How many of the following has your child experienced?”) (Long et al., 2022). Similar results were detected in an adult sample investigating parental ACEs within the context of an outpatient pediatric clinic (Gillespie & Folger, 2017). Hence, it may be that the children in our study were more reluctant to report ACEs exposures in detail (i.e., answering yes/no item by item), leading to lower prevalence as compared with previous studies, and would be more open to report the cumulative number of ACEs without uncovering the specific exposure types. On the other hand, this kind of method might be cognitively taxing for children aged 9 years, and therefore a more detailed reporting may be a better choice. In addition, the parents accompanied the children to the study visit, and although they were in separate spaces, the children might have felt intimidated to report ACEs.

In this study, the item-wise concordance between child- and mother-reports was good in cases where ACEs did not happen but was low in cases where they did happen. In other words, there was more disagreement than agreement between the “yes” answers of the mothers and those of the children. In addition, the mothers reported that the number of ACEs was higher than what the children reported. For instance, mothers reported more items related to caregiver health and behavior, such as mental health, alcohol or substance use problems, and verbal insulting or physical violence toward

a parent. The sum of mother- and child- reported ACEs in the same family were also only low to moderately correlated. The correlation was slightly stronger between the traditional ACEs sums as compared with the extended ACEs sums. This may imply that the children were not aware of all the events in the family or could not understand or recall them. In addition, mothers may overestimate the number of ACEs, that is, when reporting more incidents of children being unsupported, unloved, and/or unprotected and being put down or insulted by parents. One can speculate that this sort of overestimation may be due to maternal sensitivity to children's transient reactions or mothers' own projection of negative feelings caused by actions of other family members or partners. Finally, if the mothers are perpetrating the harm, it may cause deviation in reporting of the events. On the other hand, children reported more physical violence and violence in the neighborhood. This highlights that both parental and child self-reports may build a more complete picture of the overall ACEs, although it is uncertain how the discrepancy between the child- and mother-reports should affect the child outcomes.

We were also interested in the possible PTSD symptoms that sometimes, but not always, accompany trauma or maltreatment events. In our sample, the number of children suffering from PTSD symptoms was low, and there was no clear link between the number of ACEs and PTSD symptoms. This may imply that some children are resilient in the face of ACEs, but it also underscores the need to screen for PTSD symptoms at the same time when ACEs are recorded. The PTSD symptoms should be identified and acknowledged immediately, whereas the emergence of other sequelae of ACEs may be part of a longer process.

The study visit and the interview were designed to be as comfortable as possible for the children. Children were encouraged to ask for clarification whenever needed and to dictate the pace of the interview. Based on our interviewing experience, even children as young as those in our study can be asked about ACEs given that most of our sample, even those with ACEs, reported neutral or even positive feelings related to the interview. However, because the interview provoked negative feelings in a few participants, it may be useful to reserve time to support those children who might have felt uncomfortable in being interviewed about ACEs. This further creates an opportunity for a validating and supportive encounter. Whether there are ACEs that need to be discussed with the parents or the authorities, children likely benefit from knowing beforehand about a transparent handling protocol. One benefit of interviewing the children themselves about ACEs is that they may feel empowered and have a sense of higher self-efficacy when discussing topics about themselves (Bandura, 1978; Cehrdes & Mauz, 2020; Ellonen & Pösö, 2011). Hence, the positive feedback received by a large sample of the children with ACEs was encouraging and motivating for future research.

Although many countries have invested in ACE studies to understand the extent and impact of ACEs in their populations (Bellis et al., 2019), previous studies have mainly relied on the use of cross-sectional retrospective data from adults to identify ACEs and establish the associations between ACEs and adverse health outcomes. In addition, studies conducted in childhood use mainly parent-reported data on child ACEs, which may also be biased or differ from the experiences of the children. According to the World Health Organization, cohort studies and longitudinal studies in children would provide a better understanding of children's life experiences and help to further identify which ACEs cause the most harm and which factors across the life course can offer the most protection (Bellis et al., 2023). Due to the nature of our prospective experimental design, the FinnBrain Cohort Study has good potential to link ACEs with other variables, such as later health and behavioral outcomes. Our approach also makes it possible to directly compare the effect of child- and parent-reports of ACEs on later health outcomes. Finally, it may be important to ask the children to report about their ACEs again at later time points of our longitudinal follow-up as well as when they are adults. A previous meta-analysis of 16 studies reported the agreement between prospective and retrospective measures of childhood maltreatment to be poor, although it was better when conducted via interviews versus questionnaires (Baldwin et al., 2019). In addition, ACEs reported in childhood versus adulthood may differentially predict adulthood health problems (Olsen et al., 2024). In conclusion, it seems that different reporters (mother vs. child) and different time frames (prospective vs. retrospective) both may identify different groups of individuals. Our longitudinal follow-up of the same children may shed more light on the developmental pathways to risk and resilience.

Limitations

The sample was a low-risk general population sample. Those recruited were given the option to opt out of the study, and 33% of the contacted families declined to participate. The mothers who took part in the study had differences in demographics than the ones who declined to take part; they were somewhat older and better educated than the ones who decided not to participate. This may have led to a small bias in the number of ACEs. Although the catchment area of the study was limited to one specific region, the study population was well-representative of this age group in South-West Finland (Karlsson et al., 2018).

Conclusions

In this study, we showed that (a) the prevalence of ACEs in our general population-based cohort study is comparable to that in most European adult studies; (b) concordance between child- and mother-reports on ACEs is low in cases where ACEs did happen, and mothers report somewhat higher prevalence of ACEs than their children; (c) in the majority of cases, the interview is experienced as positive or neutral by participants, but when the number of ACEs is high, it may generate unpleasant feelings in children; and (d) the prevalence of PTSD symptoms was low in the sample and could not be clearly linked to the number of ACEs in the current study.

CRedit authorship contribution statement

Eeva-Leena Kataja: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Jetro J. Tuulari:** Writing – review & editing, Writing – original draft, Conceptualization. **Linnea Karlsson:** Writing – review & editing, Writing – original draft, Resources. **Susanne Sinisalo:** Writing – review & editing, Writing – original draft, Data curation. **Tuomo-Artturi Autere:** Software, Data curation. **Laura Perasto:** Methodology, Formal analysis, Data curation. **Aino Juusola:** Writing – original draft, Methodology, Conceptualization. **Essi Salama:** Writing – original draft, Methodology. **Anna-Katariina Aatsinki:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Hasse Karlsson:** Writing – review & editing, Writing – original draft, Resources.

Data availability

The authors do not have permission to share data.

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