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Associations between childhood trauma and childhood psychiatric disorders in Brazil: a population-based, prospective birth cohort study

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Summary

Background Childhood trauma is a proposed transdiagnostic risk factor for psychopathology, but epidemiological evidence from low-income and middle-income countries (LMICs) is scarce. We investigated associations between trauma and child psychiatric disorders in a birth cohort in Brazil.

Methods The 2004 Pelotas Birth Cohort is an ongoing, population-based, prospective birth cohort, including all hospital births occurring between Jan 1 and Dec 31, 2004, in the city of Pelotas, Brazil. When the children were aged 6 and 11 years, trained psychologists administered the Development and Well-Being Assessment clinical interview to caregivers to assess current child psychiatric disorders (anxiety disorders, mood disorders, ADHD and hyperactivity disorders, and conduct and oppositional disorders), and lifetime trauma exposure (ie, experiencing or witnessing life-threatening events) including interpersonal and non-interpersonal events. Analyses used multiple imputation and logistic regression models.

Findings Of 4263 live births, 4231 children were included in the study sample, and 4229 (2195 [51.9%] boys and 2034 [48.1%] girls; 2581 [61.7%] with White mothers and 1600 [38.3%] with Black or mixed race mothers) were included in the imputed analyses. 1154 (34.3%) of 3367 children with complete data at age 11 years had been exposed to trauma by that age. After adjusting for confounders, at age 6 years, trauma was associated with increased odds of anxiety disorders (adjusted odds ratio 1.79 [95% CI 1.33–2.42]) and any psychiatric disorder (1.59 [1.22–2.06]), and at age 11 years, with any psychiatric disorder (1.45 [1.17–1.79]) and all four specific diagnostic classes of anxiety disorders (1.47 [1.04–2.09]), mood disorders (1.66 [1.08–2.55]), ADHD and hyperactivity disorders (1.47 [1.01–2.13]), and conduct and oppositional disorders (1.76 [1.19–2.61]). Interpersonal trauma and non-interpersonal trauma were each associated with increased odds of multiple psychiatric disorders, even when adjusting for their co-occurrence.

Interpretation A considerable mental health burden associated with childhood trauma is already evident by middle childhood in this sample from Brazil. Evidence-based efforts to reduce the incidence of childhood trauma in Brazil and address its consequences are urgently needed.

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Introduction

Diagnostic classification systems define trauma as comprising exposure to events that are extremely threatening or horrifying (ICD-11), or involve actual or threatened death, serious injury, or sexual violence (DSM-5). Trauma can include events that are directly experienced by the individual, are witnessed happening to someone else, or happen to a loved one (eg, serious injury or sudden death of a parent). Trauma exposure is common in childhood,¹ when it can have substantial adverse consequences for developmental trajectories.² Importantly, childhood trauma has been proposed as a key transdiagnostic risk factor for psychopathology,³ being associated with almost half of all childhood-onset psychiatric disorders.⁴ Such observations have led to

childhood trauma being considered as a leading preventable cause of mental illness. Nonetheless, epidemiological evidence relating to trauma exposure and risk for psychiatric disorders in children is limited, and major gaps exist in the understanding of trauma-related psychopathology, especially across geographical locations and different types of trauma.

For adults, there is strong empirical support for non-specific associations between childhood trauma and increased risk of several psychiatric disorders, suggesting that there are general trauma-linked mechanisms underlying multiple forms of adult psychopathology.^{4,5} However, equivalent evidence from youth samples is limited and findings are mixed, with some studies identifying particularly strong associations for conduct

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For the Portuguese translation of the abstract see Online for appendix 1

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Research in context

Evidence before this study

Research has established substantial associations between childhood trauma and later mental ill-health, but population-based evidence during childhood is scarce, and there are major gaps in our knowledge relating to generalisability across geographical locations and types of trauma. We searched PubMed on Oct 9, 2021, with no restrictions on language or publication date, using the following search strategy: ((child*[Title/Abstract] AND (adversit*[Title/Abstract] OR trauma[Title/Abstract])) OR "adverse childhood"[Title/Abstract] OR ((interpersonal[Title/Abstract] OR non-interpersonal[Title/Abstract]) AND (adversit*[Title/Abstract] OR trauma[Title/Abstract]))) AND ("psychiatric disorder*[Title/Abstract] OR psychopathology[Title/Abstract]). We sought population-based studies investigating associations of childhood trauma exposure across a broad range of psychiatric disorders. 21 relevant studies were identified, of which just four used youth samples, the remainder examining the consequences of childhood trauma in adulthood. The evidence from youth samples is mixed, with some studies showing strong associations for specific disorder classes and others showing transdiagnostic effects. Furthermore, most studies focus on childhood adversity in general rather than trauma specifically, and mainly in the family context. Understanding of the consequences of trauma exposure including events beyond family-related exposures (eg, non-interpersonal traumas) is therefore limited. Finally, we found only one study using a representative sample of young people from a low-income or middle-income country (Mexico), even though children living in such countries are disproportionately more likely to experience traumatic events than children from high-income countries.

Added value of this study

Our study uses a population-based cohort in Brazil, a middle-income country, to show associations between childhood trauma and a broad range of psychiatric disorders in middle childhood, and contrasting associations for interpersonal versus non-interpersonal trauma. Trauma exposure was relatively common, with 34·3% of children being exposed by age 11 years. At age 6 years, trauma exposure was associated with increased odds of psychiatric disorder overall and with anxiety disorders in particular. By age 11 years, childhood trauma was associated with increased odds of all four disorder classes examined: anxiety disorders, mood disorders, ADHD and hyperactivity disorders, and conduct and oppositional disorders. Both interpersonal trauma and non-interpersonal trauma were associated with multiple disorder classes, even when adjusting for their co-occurrence, with children exposed to interpersonal trauma being at particularly high risk.

Implications of all the available evidence

Our findings support transdiagnostic models of the effects of childhood trauma exposure. There is an urgent need to understand the underpinnings of the associations between trauma and negative mental health outcomes and to identify mechanisms that could be harnessed to protect against the harmful effects of childhood trauma exposure. Clinicians, particularly from low-income and middle-income countries, should be aware that trauma exposure is already common in middle childhood, and that children exposed to trauma might present diverse diagnostic profiles, including internalising and externalising disorders.

and oppositional disorders⁶ or anxiety and mood disorders,⁷ but others reporting no diagnostic specificity.^{8,9} Notably, these studies focused on adolescents and even less is known about the pattern of associations in younger children exposed to trauma. Given that substantial changes occur in the incidence of specific mental disorders across development, epidemiological studies in childhood can provide crucial insight into the generality versus specificity of links between trauma and psychopathology, but such evidence is currently lacking.

A second limitation of current knowledge is that much of the existing epidemiological evidence relates to childhood adversity in general, mainly in the family context (eg, parental mental illness), as opposed to childhood trauma specifically.^{4-6,8,10,11} Although most, if not all, traumatic events occurring in childhood can also be classified as childhood adversities, the opposite is not necessarily true. Common measures of childhood adversity do not capture the full range of traumatic events that might be relevant to psychopathology, such as indirect trauma exposure (eg, learning about harm to a loved one), and they often focus on interpersonal traumas

(eg, events inflicted by another person) but not non-interpersonal traumas (eg, severe accidents). Compared with non-interpersonal trauma, interpersonal trauma has been associated with higher rates of some disorders (eg, post-traumatic stress disorder [PTSD]),¹² potentially due to more substantial negative consequences for factors such as perceived level of threat, trust, shame, and relationship formation.¹³ Epidemiological studies of children, investigating trauma types beyond those occurring in the family, are needed to understand the full picture of the adverse mental health outcomes associated with childhood trauma exposure.

Third, the majority of population-based studies have relied on retrospective self-reports in adulthood of childhood trauma exposure.^{4,5,10,11} Retrospective and prospective reports of childhood adversities show poor agreement and might identify groups of individuals exposed to trauma with partially distinct risk pathways to psychopathology, requiring different preventive and treatment strategies.¹⁴ Furthermore, although false positives in adult retrospective reports of childhood adversities are thought to be rare,¹⁵ there is some evidence

that effect sizes increase with the length of the recall period, suggesting recall bias.⁴ Thus, studies relying on retrospective data might have overestimated the effects of childhood trauma on psychopathology.

Finally, most studies have been conducted in high-income countries, mainly in the USA, and population-based evidence from low-income and middle-income countries (LMICs) is scarce. Using a representative sample of Mexican adolescents aged 12–17 years, Benjet and colleagues reported largely non-specific associations between maladaptive family functioning and a wide range of childhood psychiatric disorders.⁸ By contrast, using a nationally representative sample of adults in South Africa, Slopen and colleagues¹¹ observed mainly associations between family-related childhood adversities and anxiety disorders, suggesting some diagnostic specificity. However, the focus on family functioning gives an incomplete picture regarding the effects of childhood trauma, because traumatic events outside of the family environment are largely ignored. This evidence gap is highly problematic, considering that almost 90% of the world's children live in LMICs,¹⁶ with a disproportionate risk of experiencing traumatic events compared with children from high-income countries.¹⁷

We aimed to address these research gaps using data from a population-based, prospective birth cohort from Brazil, a middle-income country. Specifically, we aimed to examine associations between lifetime trauma exposure and risk for psychiatric disorders at ages 6 and 11 years, investigating disorder-specific versus transdiagnostic associations across major diagnostic groups, and associations between psychiatric disorders and interpersonal trauma versus non-interpersonal trauma.

Methods

Study design and population

The 2004 Pelotas Birth Cohort is an ongoing, population-based, prospective birth cohort, including all hospital births occurring between Jan 1 and Dec 31, 2004, in the city of Pelotas, Brazil, to mothers resident in Pelotas. Participating children were assessed at birth and when the child was aged 3, 12, 24, and 48 months, and 6 and 11 years. Cohort profiles have been published previously.^{18,19} Assessments were approved by the Federal University of Pelotas Medical School Research Ethics Committee and parents provided written informed consent. More details on the study setting are described in appendix 2 (p 1).

Procedures

The Development and Well-Being Assessment (DAWBA) interview was administered to primary caregivers when the children were aged 6 and 11 years by trained psychologists. Training for the administering psychologists (approximately 40 h) was provided by an experienced child psychiatrist and a psychologist with a background in epidemiological assessment, comprising teaching on the principles and practicalities of administering the DAWBA

and experience of conducting the interviews in a clinical setting. Weekly supervision of the administering psychologists was provided throughout data collection by the training psychiatrists and psychologists. The primary caregiver was always the mother if she lived with the child and was capable of understanding and answering study questions; otherwise, another main caregiver with whom the child lived was interviewed.

Child lifetime trauma exposure was assessed using the PTSD section of the DAWBA. Caregivers were asked whether the child was ever exposed to items on a checklist: interpersonal traumas, specifically being victim of an attack or threat, physical abuse, sexual abuse, rape, domestic violence, witnessing an attack on a family member or friend, or learning about an attack on a family member or close friend (the last item assessed in children aged 11 years only); non-interpersonal traumas, specifically being in a serious accident, fire, or disaster (eg, earthquake), witnessing a serious accident or sudden death, or hearing about a serious accidental injury to a loved one (the last item assessed in children aged 11 years only); and other severe trauma, an additional item capturing exposure to events not covered by the checklist. We used responses to index trauma exposure up to age 6 years and up to age 11 years (coded as present or absent). We also coded interpersonal trauma and non-interpersonal trauma as present or absent on the basis of the checklist; there were no data available to classify events endorsed under the other severe trauma item in these categories; therefore, they were not captured under these trauma subtypes.

All confounders were assessed at birth and were based on maternal self-report, unless otherwise stated, including child sex, maternal relationship status, maternal race or ethnicity, maternal smoking, maternal alcohol consumption, maternal education, family income, maternal depression (at 12 months postpartum, measured using the self-reported Edinburgh Postnatal Depression Scale), and previous child mental health symptoms (from when the child was aged 48 months, assessed using subscales from the parent-reported Child Behaviour Checklist), including aggressive behaviour, being anxious or depressed, attention problems, rule-breaking behaviour, somatic complaints, social problems, thought problems, and withdrawn or depressed. Full assessment details are in appendix 2 (p 1).

Outcomes

Current psychiatric disorders were assessed via the DAWBA interview with caregivers, and were split into four categories: anxiety disorders (separation anxiety disorder, specific phobia, social phobia, generalised anxiety disorder, PTSD, panic disorder, agoraphobia, obsessive-compulsive disorder, and body dysmorphic disorder); mood disorders (depression, bipolar disorder, and disruptive mood dysregulation disorder); ADHD and hyperactivity disorders; and conduct and

See Online for appendix 2

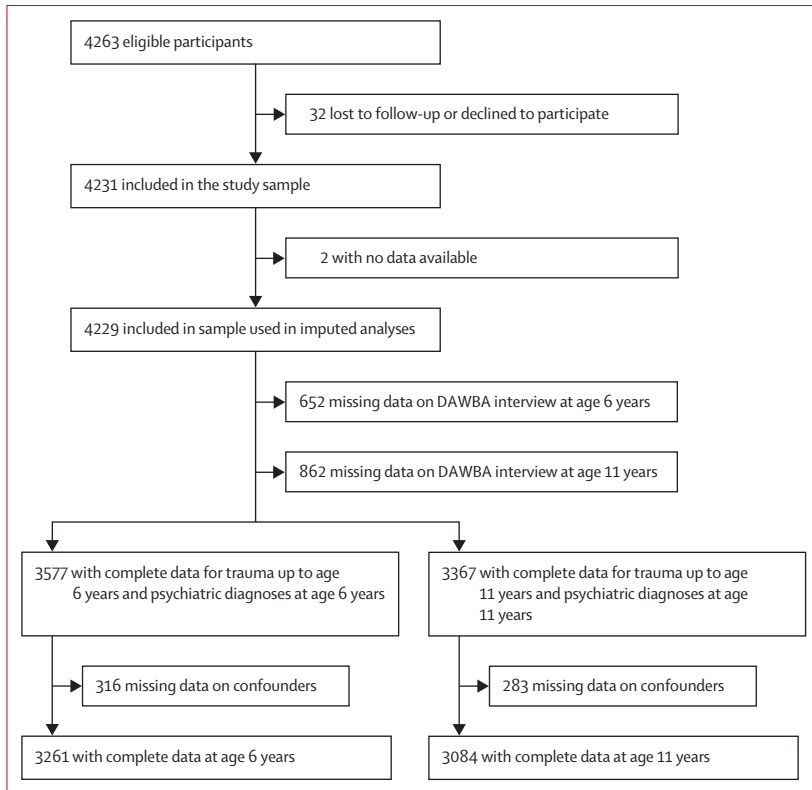


Figure: Study profile
DAWBA=Development and Well-Being Assessment.

	Total sample	Trauma		OR (95% CI) or r (p value)
		Unexposed	Exposed	
Binary variables				
Female	1665/3444 (48.3%)	1067/2213 (48.2%)	598/1231 (48.6%)	1.01 (0.88-1.17)
Male	1779/3444 (51.7%)	1146/2213 (51.8%)	633/1231 (51.4%)	0.99 (0.86-1.14)
Maternal race or ethnicity: Black or mixed race	1281/3406 (37.6%)	795/2187 (36.4%)	486/1219 (39.9%)	1.16 (1.00-1.34)
Maternal race or ethnicity: White	2125/3406 (62.4%)	1392/2187 (63.6%)	733/1219 (60.1%)	0.86 (0.74-1.00)
Maternal smoking (yes)	928/3444 (26.9%)	530/2213 (23.9%)	398/1231 (32.3%)	1.52 (1.30-1.78)
Maternal alcohol consumption (yes)	111/3444 (3.2%)	58/2213 (2.6%)	53/1231 (4.3%)	1.67 (1.12-2.49)
Maternal relationship status (single, divorced, or widowed)	542/3444 (15.7%)	329/2213 (14.9%)	213/1231 (17.3%)	1.20 (0.99-1.45)
Continuous variables				
Family income, BRL	794.4 (1083.2)	831.8 (1138.4)	727.1 (972.9)	0.05 (0.0045)
Maternal education, years	8.1 (3.4)	8.2 (3.4)	7.9 (3.3)	0.05 (0.0055)
Maternal depression (0-30)	7.2 (5.0)	6.7 (4.8)	8.0 (5.4)	0.15 (<0.0001)

Data are n (%) or mean (SD), except where otherwise stated. Based on complete data for each set of variables as per listwise deletion. BRL=Brazilian real (2.89 BRL=1 USD in January, 2004, when recruitment of the families commenced). OR=odds ratio. r=correlation coefficient.

Table 1: Sample characteristics and comparisons according to trauma exposure status at age 11 years

oppositional disorders. Additionally, we created a category for any psychiatric disorder, which included the aforementioned diagnoses in addition to less frequent disorders (eating disorders, psychotic disorders, mutism, attachment disorders, undifferentiated anxiety or depression disorder, and other disorders). Disorders were coded as present if diagnostic criteria from either DSM-IV (aged 6 years), DSM-5 (aged 11 years), or ICD-10 (both ages) were met. A second psychologist independently assessed 10% of clinical assessments.

Choice of primary measure

The Development and Well-Being Assessment (DAWBA) is a well validated clinical interview, which was designed to generate DSM-IV, DSM-5, and ICD-10 psychiatric diagnoses for children aged 5-17 years.²⁰ The DAWBA is widely used and has been translated into more than 25 languages, including Portuguese.²¹ It has shown good reliability in population-based samples in Brazil,²¹ and has been used previously in children aged 11 years in the 1993 Birth Cohort Study, an earlier epidemiological study in the same city.²² The DAWBA can be accessed after payment of a fee.

Statistical analysis

We used binary logistic regression analysis to examine associations between childhood trauma and presence or absence of the diagnostic classes of anxiety disorders, mood disorders, ADHD and hyperactivity disorders, and conduct and oppositional disorders, in addition to the category of any psychiatric disorder. We examined previous trauma exposure (present or absent) reported at age 6 years in relation to disorder status at age 6 years; and trauma reported at age 6 or 11 years in relation to disorder status at age 11 years. Additionally, we examined separate interpersonal trauma codes and non-interpersonal trauma codes up to age 11 years in relation to diagnosis at age 11 years (not completed at 6 years due to low frequencies). All analyses were adjusted for the aforementioned confounders. The regression models examining interpersonal trauma and non-interpersonal trauma up to age 11 years were additionally adjusted for the co-occurrence of these trauma categories by including both exposure types in the same model. In sensitivity analyses, we examined whether associations between childhood trauma and psychiatric diagnoses were similar when excluding the non-specified other severe trauma category. Additionally, to make full use of the longitudinal design, we examined associations between childhood trauma at age 6 years and psychiatric diagnoses at age 11 years, to test possible causal influence of trauma exposure on child psychopathology.

Descriptive statistics were based on complete data at age 6 and 11 years. When examining associations between trauma and psychiatric disorders, we addressed

	Total sample	Any trauma		Interpersonal trauma		Non-interpersonal trauma	
		No	Yes	No	Yes	No	Yes
Children aged 6 years							
Total number of children with complete data*	3577	3137 (87.7%)	440 (12.3%)	3397 (95.0%)	180 (5.0%)	3401 (95.1%)	176 (4.9%)
Any psychiatric disorder	584 (16.3%)	468 (14.9%)	116 (26.4%)	529 (15.6%)	55 (30.6%)	542 (15.9%)	42 (23.9%)
Anxiety disorders	317 (8.9%)	244 (7.8%)	73 (16.6%)	276 (8.1%)	41 (22.8%)	294 (8.6%)	23 (13.1%)
Mood disorders	46 (1.3%)	34 (1.1%)	12 (2.7%)	41 (1.2%)	5 (2.8%)	43 (1.3%)	3 (1.7%)
ADHD and hyperactivity disorders	94 (2.6%)	80 (2.6%)	14 (3.2%)	85 (2.5%)	9 (5.0%)	87 (2.6%)	7 (4.0%)
Conduct and oppositional disorders	94 (2.6%)	77 (2.5%)	17 (3.9%)	81 (2.4%)	13 (7.2%)	89 (2.6%)	5 (2.8%)
Children aged 11 years							
Total number of children with complete data†	3367	2213 (65.7%)	1154 (34.3%)	2876 (85.4%)	491 (14.6%)	2822 (83.8%)	545 (16.2%)
Any psychiatric disorder	439 (13.0%)	237 (10.7%)	202 (17.5%)	337 (11.7%)	102 (20.8%)	334 (11.8%)	105 (19.3%)
Anxiety disorders	143 (4.3%)	74 (3.3%)	69 (6.0%)	106 (3.7%)	37 (7.5%)	104 (3.7%)	39 (7.2%)
Mood disorders	107 (3.2%)	52 (2.4%)	55 (4.8%)	76 (2.6%)	31 (6.3%)	78 (2.8%)	29 (5.3%)
ADHD and hyperactivity disorders	135 (4.0%)	71 (3.2%)	64 (5.5%)	104 (3.6%)	31 (6.3%)	101 (3.6%)	34 (6.2%)
Conduct and oppositional disorders	120 (3.6%)	54 (2.4%)	66 (5.7%)	83 (2.9%)	37 (7.5%)	91 (3.2%)	29 (5.3%)

Data are n (%). *Complete data refers to data for all trauma exposure variables up to age 6 years and psychiatric diagnoses at age 6 years. †Complete data refers to all trauma exposure variables up to age 11 years and psychiatric diagnoses at age 11 years.

Table 2: Prevalence of current psychiatric diagnoses at ages 6 and 11 years according to previous trauma exposure status

missingness using multivariate imputation by chained equations with 100 imputed data sets (appendix 2 p 1). Reported analyses were based on imputed data; effect estimates based on complete case analysis (at age 6 years and 11 years) are shown in appendix 2 (pp 4–5). Statistical analyses were done using RStudio, version 1.3.1056.

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Of 4263 live births, 4231 (99.2%) children were included in the study sample, and 4229 (2195 [51.9%] boys and 2034 [48.1%] girls; 2581 [61.7%] with White mothers and 1600 [38.3%] with Black or mixed race mothers; figure) were included in the imputed analyses. At child age 11 years, of 3572 interviewed caregivers, 3478 (97.1%) were mothers. There were complete data for 3577 children aged 6 years and 3367 children aged 11 years (figure). Sample characteristics, according to trauma exposure at age 11 years, are presented in table 1. In the 10% of clinical assessments that were assessed by a second psychologist, the inter-rater agreement ranged from 91.2% (any psychiatric disorder) to 72.7% (ADHD and hyperactivity disorders).

The prevalences of current psychiatric diagnoses at ages 6 and 11 years according to previous trauma exposure status are shown in table 2. Up to age 6 years, of the 3577 children with complete data, 440 (12.3%) had experienced a traumatic event. When trauma

	Any trauma up to age 6 years		Any trauma up to age 11 years	
	OR (95% CI)	p value	OR (95% CI)	p value
Unadjusted				
Any psychiatric disorder	2.08 (1.65–2.64)	<0.0001	1.78 (1.46–2.17)	<0.0001
Anxiety disorders	2.33 (1.76–3.08)	<0.0001	1.83 (1.31–2.56)	0.0005
Mood disorders	2.83 (1.43–5.60)	0.0029	2.11 (1.40–3.16)	0.0003
ADHD and hyperactivity disorders	1.20 (0.66–2.16)	0.55	1.82 (1.28–2.58)	0.0008
Conduct and oppositional disorders	1.59 (0.92–2.75)	0.093	2.35 (1.62–3.40)	<0.0001
Adjusted (confounders)				
Any psychiatric disorder	1.83 (1.43–2.34)	<0.0001	1.58 (1.29–1.93)	<0.0001
Anxiety disorders	2.09 (1.57–2.79)	<0.0001	1.62 (1.16–2.28)	0.0053
Mood disorders	2.33 (1.16–4.71)	0.018	1.89 (1.25–2.85)	0.0026
ADHD and hyperactivity disorders	1.02 (0.56–1.85)	0.96	1.64 (1.14–2.35)	0.0071
Conduct and oppositional disorders	1.22 (0.70–2.15)	0.48	1.98 (1.35–2.90)	0.0005
Adjusted (confounders and CBCL subscales at age 48 months)				
Any psychiatric disorder	1.59 (1.22–2.06)	0.0005	1.45 (1.17–1.79)	0.0007
Anxiety disorders	1.79 (1.33–2.42)	0.0001	1.47 (1.04–2.09)	0.029
Mood disorders	1.79 (0.86–3.75)	0.12	1.66 (1.08–2.55)	0.020
ADHD and hyperactivity disorders	0.82 (0.43–1.54)	0.53	1.47 (1.01–2.13)	0.042
Conduct and oppositional disorders	0.90 (0.48–1.68)	0.74	1.76 (1.19–2.61)	0.0049

Based on imputed data (N=4229). Confounders include child sex, maternal smoking, maternal relationship status, maternal alcohol consumption, maternal race or ethnicity, maternal education, maternal depression, and family income. CBCL subscales include aggressive behaviour, anxious or depressed, attention problems, rule-breaking behaviour, somatic complaints, social problems, thought problems, and withdrawn or depressed. CBCL=Child Behaviour Checklist. OR=odds ratio.

Table 3: Associations between any trauma exposure up to age 6 years and psychiatric diagnoses at age 6 years, and any trauma exposure up to age 11 years and psychiatric diagnoses at age 11 years

subtypes were examined, 154 (4.3%) participants reported only interpersonal trauma, 150 (4.2%) were exposed to only non-interpersonal trauma, and

	Interpersonal trauma at age 11 years		Non-interpersonal trauma at age 11 years	
	OR (95% CI)	p value	OR (95% CI)	p value
Unadjusted				
Any psychiatric disorder	1.96 (1.52-2.53)	<0.0001	1.79 (1.38-2.32)	<0.0001
Anxiety disorders	2.25 (1.51-3.34)	<0.0001	2.11 (1.43-3.10)	0.0002
Mood disorders	2.68 (1.71-4.20)	<0.0001	2.13 (1.33-3.42)	0.0017
ADHD and hyperactivity disorders	1.82 (1.18-2.81)	0.0067	1.73 (1.14-2.63)	0.0099
Conduct and oppositional disorders	2.66 (1.78-3.98)	<0.0001	1.64 (1.07-2.51)	0.023
Adjusted (confounders)				
Any psychiatric disorder	1.71 (1.32-2.22)	<0.0001	1.62 (1.24-2.12)	0.0004
Anxiety disorders	1.99 (1.34-2.97)	0.0007	1.94 (1.31-2.88)	0.0010
Mood disorders	2.32 (1.46-3.67)	0.0004	1.90 (1.17-3.07)	0.0092
ADHD and hyperactivity disorders	1.58 (1.02-2.46)	0.041	1.59 (1.03-2.45)	0.036
Conduct and oppositional disorders	2.18 (1.43-3.30)	0.0003	1.39 (0.89-2.16)	0.14
Adjusted (confounders and CBCL subscales at 48 months)				
Any psychiatric disorder	1.59 (1.21-2.11)	0.0011	1.55 (1.18-2.05)	0.0018
Anxiety disorders	1.79 (1.20-2.69)	0.0046	1.82 (1.23-2.71)	0.0031
Mood disorders	2.13 (1.31-3.47)	0.0025	1.83 (1.12-2.99)	0.016
ADHD and hyperactivity disorders	1.43 (0.90-2.28)	0.13	1.56 (1.00-2.44)	0.052
Conduct and oppositional disorders	1.99 (1.27-3.10)	0.0026	1.34 (0.85-2.11)	0.21
Adjusted (confounders, CBCL subscales, and other types of trauma)				
Any psychiatric disorder	1.44 (1.07-1.92)	0.019	1.40 (1.04-1.87)	0.024
Anxiety disorders	1.54 (1.01-2.35)	0.047	1.60 (1.05-2.42)	0.027
Mood disorders	1.86 (1.12-3.09)	0.016	1.50 (0.91-2.49)	0.11
ADHD and hyperactivity disorders	1.27 (0.79-2.05)	0.33	1.45 (0.92-2.29)	0.11
Conduct and oppositional disorders	1.94 (1.21-3.11)	0.0062	1.08 (0.66-1.76)	0.77

Based on imputed data (N=4229). Confounders include child sex, maternal smoking, maternal relationship status, maternal alcohol consumption, maternal race or ethnicity, maternal education, maternal depression, and family income. CBCL subscales include aggressive behaviour, anxious or depressed, attention problems, rule-breaking behaviour, somatic complaints, social problems, thought problems, and withdrawn or depressed. CBCL=Child Behaviour Checklist. OR=odds ratio.

Table 4: Interpersonal trauma and non-interpersonal trauma up to age 11 years and psychiatric diagnoses at age 11 years

26 (0.7%) were exposed to both trauma types. A further 132 (3.7%) participants were exposed to other severe trauma (appendix 2 p 2).

By age 11 years, of 3367 children with complete data, 1154 (34.3%) children had been exposed to trauma, including 282 (8.4%) exposed to only interpersonal trauma, 336 (10.0%) exposed to only non-interpersonal trauma, and 209 (6.2%) exposed to both trauma types. A further 556 (16.4%) children were exposed to non-specified other severe trauma (appendix 2 p 2).

For children age 6 years, when adjusting for confounders and mental health symptoms at age 48 months in the analysis of childhood trauma up to age 6 years and psychiatric diagnoses at age 6 years, children exposed to trauma had higher odds of developing anxiety disorders (adjusted OR 1.79 [95% CI 1.33-2.42], p=0.0001) and any psychiatric disorder (1.59 [1.22-2.06], p=0.0005), compared with children who were not exposed to trauma (table 3). Trauma was not associated with an increase in the odds of mood disorders, ADHD

and hyperactivity disorders, or conduct and oppositional disorders (table 3).

For children age 11 years, when adjusting for confounders and mental health symptoms at age 48 months in the analysis of childhood trauma up to age 11 years and psychiatric diagnoses at age 11 years, trauma exposure was associated with increased odds of all four specific diagnostic classes: anxiety disorders (adjusted OR 1.47 [95% CI 1.04-2.09], p=0.029), mood disorders (1.66 [1.08-2.55], p=0.020), ADHD and hyperactivity disorders (1.47 [1.01-2.13], p=0.042), and conduct and oppositional disorders (1.76 [1.19-2.61], p=0.0049), as well as any psychiatric disorder (1.45 [1.17-1.79], p=0.0007; table 3).

Analyses of interpersonal and non-interpersonal trauma subtypes focused on mental health at age 11 years due to low exposure frequencies at age 6 years (table 2). Interpersonal trauma was associated with increased odds of anxiety disorders, mood disorders, and conduct and oppositional disorders, as well as any psychiatric disorder, after adjusting for confounders and mental health symptoms at age 48 months (table 4). When additionally accounting for co-occurring non-interpersonal trauma, these associations were retained, albeit slightly attenuated (table 4). Non-interpersonal trauma was associated with increased odds of anxiety disorders, mood disorders, and any psychiatric disorder, after adjusting for confounders and previous mental health symptoms (table 4). The associations for anxiety disorder and any psychiatric disorder were retained, albeit slightly attenuated, when additionally controlling for co-occurring interpersonal trauma (table 4). Non-interpersonal trauma was not associated with conduct and oppositional disorders or ADHD and hyperactivity disorders in adjusted analyses (table 4).

In sensitivity analyses, we tested associations between childhood trauma and psychiatric diagnoses when excluding the non-specified other severe trauma item. Effect sizes were almost identical to those for the main analyses, but at age 11 years, 95% CIs crossed zero for associations between trauma exposure and mood disorders and ADHD and hyperactivity disorders (appendix 2 p 3). Additionally, analyses using complete case data were similar to those using imputed data (appendix 2 pp 4-5).

Finally, to establish temporality, we examined whether childhood trauma up to age 6 years was associated with psychiatric diagnoses at 11 years. Models adjusted for confounders showed increased odds of any psychiatric disorder at age 11 years (OR 1.45 [95% CI 1.10-1.91]), mood disorders (1.84 [1.11-3.03]), ADHD and hyperactivity disorders (1.73 [1.12-2.69]), and conduct and oppositional disorders (1.68 [1.05-2.69]), but not anxiety disorders (1.20 [0.74-1.93]). We additionally adjusted for psychological disorder status on the DAWBA at age 6 years and conclusions were unchanged (appendix 2 p 7).

Discussion

We examined associations between childhood trauma and childhood psychiatric disorders using data from a Brazilian birth cohort study in which more than one in three children were exposed to trauma by age 11 years. By age 6 years, trauma exposure was associated with increased odds of anxiety disorders and any psychiatric disorder, even after adjusting for previous mental health symptoms at age 48 months and key confounders. By age 11 years, trauma exposure was additionally associated with the occurrence of mood disorders, ADHD and hyperactivity disorders, and conduct and oppositional disorders. Interpersonal trauma and non-interpersonal trauma were each associated with increased odds of psychiatric disorders at age 11 years, even when accounting for their co-occurrence. However, more robust effects were observed in association with interpersonal trauma exposure than non-interpersonal trauma.

Trauma exposure was common among children in our sample, increasing from 12·3% at age 6 years to 34·3% at age 11 years. By comparison, 1231 (15·9%) of 7745 children from a representative UK birth cohort had experienced trauma up to age 10 years, with exposure being assessed via the same caregiver diagnostic interview used here, albeit with some administrative differences.²³ It is possible that childhood trauma is more prevalent in Brazil due to relatively low levels of socioeconomic prosperity and one of the highest levels of income inequality globally, both of which are associated with major risk factors for trauma (eg, violent crime).²⁴ However, standardised approaches to measuring childhood trauma across studies are needed to support robust, country-level comparisons of rates of trauma exposure.

Crucially, trauma exposure in childhood was associated with about 1·8 times the odds of any psychiatric disorder at age 6 years and just over 1·6 times the odds at age 11 years, when adjusted for confounders. Associations were also found when adjusting for mental health symptoms at age 48 months, with trauma exposure still being associated with approximately 1·5 times the odds of any psychiatric disorder at both ages. We also established longitudinal associations between trauma and mental health outcomes, with trauma up to age 6 years being associated with increased odds of disorder at 11 years, after adjusting for confounders. Comparisons with similar studies are difficult, owing to differences in study characteristics and methodological approaches. For example, using representative samples of adolescents from the USA and Mexico, two studies focusing on maladaptive family functioning reported broadly similar effect sizes.^{6,8} By contrast, focusing on childhood trauma, Copeland and colleagues reported effect sizes 3 times the size of those found in the current study in a sample of US youth.⁷ Nevertheless, the current study based on prospective data from a middle-income country demonstrates the importance of trauma exposure for understanding child psychopathology.

Analyses of major diagnostic groupings indicated that at age 6 years, mainly anxiety disorders were elevated in children exposed to trauma, whereas at age 11 years, associations with childhood trauma were evident across all categories of psychiatric disorders examined. This broadening of associations with development might partially reflect developmental trends—some anxiety disorders (eg, simple phobias and separation anxiety) show a peak age at first onset in early childhood,²⁵ whereas other disorders peak in adolescence or young adulthood.²⁶ Such trends might also have contributed to the unexpected decline seen in the prevalence of current anxiety disorders between age 6 and 11 years in our sample. It will be important to re-examine associations between trauma and mental health outcomes in the Pelotas cohort at older ages, to provide a comprehensive picture of possible effects in the current sample. Notably, we found no evidence of differential associations between trauma and mental health outcomes by diagnostic group, supporting a transdiagnostic model of the associations between trauma exposure and mental health problems.³ Clinical attention to trauma as a possible causal influence in diverse presentations of psychopathology among children in LMICs is warranted.

We also examined interpersonal trauma versus non-interpersonal trauma up to age 11 years, finding that after adjusting for their co-occurrence, each was uniquely associated with increased odds of any psychiatric disorder. Additionally, interpersonal trauma was associated with anxiety disorders, mood disorders, and conduct and oppositional disorders, and non-interpersonal trauma was associated with anxiety disorders. These indicators of possible specificity require replication; previous studies have found interpersonal trauma to be a particular risk factor for some specific disorders (eg, PTSD).⁹ Nonetheless, our findings highlight the independent associations that interpersonal trauma and non-interpersonal trauma exposure each have with psychiatric disorders emerging during childhood, and the crucial need to ensure that both of these trauma types are consistently captured in epidemiological studies.

The results of our study should be interpreted in the context of the Pelotas population, which comprises predominantly urban residents, has lower gross domestic product per capita, and has a higher than average income inequality than the Brazilian national average (appendix 2 p 1). A single city cohort might not capture the considerable socioeconomic variation that is present in Brazil, and it is notable that trauma tends to be more frequent in contexts of socioeconomic deprivation. The study was also not adequately powered to conduct sex-specific analyses, and future studies testing whether findings generalise across sexes are needed.

The following limitations should also be considered in interpreting the findings of our study. First, clinical interviews were conducted only with caregivers, and previous research has shown limited agreement between

self-reports and caregiver reports for both childhood trauma and psychopathology.^{27,28} Reliance on caregivers could result in under-reporting of some traumas (eg, sexual abuse) and disorders (eg, PTSD), possibly diminishing the strength of associations, or could introduce single informant bias, inflating associations between trauma and mental health outcomes. Second, we were unable to consider the frequency or severity of traumatic experiences or to determine at what age trauma exposure occurred, with the latter particularly limiting our ability to make causal inferences. The longitudinal associations observed between trauma at age 6 years and disorders at age 11 years partially address this concern. Nonetheless, we cannot rule out that associations between trauma and mental health outcomes reflect unmeasured or residual confounding (eg, due to shared genetic risk or parental mental health problems) rather than causal effects of trauma on child mental health.

In conclusion, our findings suggest that associations between trauma and mental disorder are already present by age 6 years and hold across multiple diagnostic groupings by age 11 years. Effects of both interpersonal trauma and non-interpersonal trauma were identified. Clinicians, particularly from LMICs, should be aware that trauma exposure is already common in middle childhood, and that these children might present diverse diagnostic profiles. Furthermore, policy makers are advised to develop violence and maltreatment prevention programmes, considering the potential impact of interpersonal trauma specifically. In Pelotas, a city-led intervention programme (*Pacto Pelotas pela Paz*) to reduce violence and crime is currently under evaluation. If such programmes prove effective, it will be crucial to establish whether they also reduce the childhood mental health burden of trauma.

Contributors

AB and AM accessed and verified the data in the study. AB, SLH, GF, AM, and GH designed the analysis plan. JM contributed to the analysis plan. AB coded the trauma variables. AB and GH performed the statistical analyses. All authors interpreted the data. AB, SLH, GF, AM, GH, and JM drafted the manuscript. ISS, LTR, TNM, and AJDB revised the manuscript. All authors had access to all the data in the study and had final responsibility for the decision to submit for publication.

Declaration of interests

We declare no competing interests.

Data sharing

Applications to use the data can be made by contacting the researchers of the 2004 cohort (see <http://www.epidemiologia-upel.org.br/site/content/faculty/> for a list of key faculty members) and completing the application form (<http://www.epidemiologia-upel.org.br/site/content/studies/formularios.php>). A list of administered questionnaires at each timepoint can be accessed online (http://www.epidemiologia-upel.org.br/site/content/coorte_2004-en/questionnaires.php). Researchers with successful applications will receive a dataset including the requested variables and unique participant IDs.

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References

- McLaughlin KA, Koenen KC, Hill ED, et al. Trauma exposure and posttraumatic stress disorder in a national sample of adolescents. *J Am Acad Child Adolesc Psychiatry* 2013; **52**: 815–830.e14.
- Lippard ETC, Nemeroff CB. The devastating clinical consequences of child abuse and neglect: increased disease vulnerability and poor treatment response in mood disorders. *Am J Psychiatry* 2020; **177**: 20–36.
- McLaughlin KA, Colich NL, Rodman AM, Weissman DG. Mechanisms linking childhood trauma exposure and psychopathology: a transdiagnostic model of risk and resilience. *BMC Med* 2020; **18**: 96.
- Green JG, McLaughlin KA, Berglund PA, et al. Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: associations with first onset of DSM-IV disorders. *Arch Gen Psychiatry* 2010; **67**: 113–23.
- Kessler RC, McLaughlin KA, Green JG, et al. Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *Br J Psychiatry* 2010; **197**: 378–85.
- McLaughlin KA, Greif Green J, Gruber MJ, Sampson NA, Zaslavsky AM, Kessler RC. Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. *Arch Gen Psychiatry* 2012; **69**: 1151–60.
- Copeland WE, Keeler G, Angold A, Costello EJ. Traumatic events and posttraumatic stress in childhood. *Arch Gen Psychiatry* 2007; **64**: 577–84.
- Benjet C, Borges G, Méndez E, Fleiz C, Medina-Mora ME. The association of chronic adversity with psychiatric disorder and disorder severity in adolescents. *Eur Child Adolesc Psychiatry* 2011; **20**: 459–68.
- Lewis SJ, Arseneault L, Caspi A, et al. The epidemiology of trauma and post-traumatic stress disorder in a representative cohort of young people in England and Wales. *Lancet Psychiatry* 2019; **6**: 247–56.
- Benjet C, Borges G, Medina-Mora ME. Chronic childhood adversity and onset of psychopathology during three life stages: childhood, adolescence and adulthood. *J Psychiatr Res* 2010; **44**: 732–40.
- Slopen N, Williams DR, Seedat S, Moomal H, Herman A, Stein DJ. Adversities in childhood and adult psychopathology in the South Africa Stress and Health Study: associations with first-onset DSM-IV disorders. *Soc Sci Med* 2010; **71**: 1847–54.
- Alisic E, Zalta AK, van Wesel F, et al. Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: meta-analysis. *Br J Psychiatry* 2014; **204**: 335–40.
- Freyd JJ. *Betrayal trauma: the logic of forgetting childhood abuse*. Cambridge, MA: Harvard University Press, 1998.
- Baldwin JR, Reuben A, Newbury JB, Danese A. Agreement between prospective and retrospective measures of childhood maltreatment: a systematic review and meta-analysis. *JAMA Psychiatry* 2019; **76**: 584–93.
- Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *J Child Psychol Psychiatry* 2004; **45**: 260–73.

- 16 UNICEF. The state of the world's children 2005: childhood under threat. <https://www.unicef.org/reports/state-worlds-children-2005> (accessed June 7, 2022).
- 17 WHO. World report on violence and health, 2002. <https://www.who.int/publications/i/item/9241545615> (accessed June 7, 2022).
- 18 Santos IS, Barros AJD, Matijasevich A, Domingues MR, Barros FC, Victora CG. Cohort profile: the 2004 Pelotas (Brazil) birth cohort study. *Int J Epidemiol* 2011; **40**: 1461–68.
- 19 Santos IS, Barros AJD, Matijasevich A, et al. Cohort profile update: 2004 Pelotas (Brazil) Birth Cohort Study. Body composition, mental health and genetic assessment at the 6 years follow-up. *Int J Epidemiol* 2014; **43**: 1437–37a-f.
- 20 Goodman R, Ford T, Richards H, Gatward R, Meltzer H. The Development and Well-Being Assessment: description and initial validation of an integrated assessment of child and adolescent psychopathology. *J Child Psychol Psychiatry* 2000; **41**: 645–55.
- 21 Fleitlich-Bilyk B, Goodman R. Prevalence of child and adolescent psychiatric disorders in southeast Brazil. *J Am Acad Child Adolesc Psychiatry* 2004; **43**: 727–34.
- 22 Anselmi L, Fleitlich-Bilyk B, Menezes AMB, Araújo, Rohde LA. Prevalence of psychiatric disorders in a Brazilian birth cohort of 11-year-olds. *Soc Psychiatry Psychiatr Epidemiol* 2010; **45**: 135–42.
- 23 Haag K, Fraser A, Hiller R, Seedat S, Zimmerman A, Halligan SL. The emergence of sex differences in PTSD symptoms across development: evidence from the ALSPAC cohort. *Psychol Med* 2020; **50**: 1755–60.
- 24 Nivette AE. Cross-national predictors of crime: a meta-analysis. *Homicide Stud* 2011; **15**: 103–31.
- 25 Beesdo-Baum K, Knappe S. Developmental epidemiology of anxiety disorders. *Child Adolesc Psychiatr Clin N Am* 2012; **21**: 457–78.
- 26 Solmi M, Radua J, Olivola M, et al. Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. *Mol Psychiatry* 2022; **27**: 281–95.
- 27 Cooley DT, Jackson Y. Informant discrepancies in child maltreatment reporting: a systematic review. *Child Maltreat* 2022; **27**: 126–45.
- 28 De Los Reyes A, Augenstein TM, Wang M, et al. The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychol Bull* 2015; **141**: 858–900.