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Prevalence and co-occurrence of Adverse Childhood Experiences: a school-based survey in Rio de Janeiro

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Abstract *This study aimed to estimate the prevalence of categories of adverse childhood experiences (ACE) among high school students in Rio de Janeiro, investigate the ACE co-occurrence profile, and examine the distribution of exposure to ACE according to individual, family, socioeconomic, and school characteristics. A cross-sectional study was conducted with 681 individuals selected using a complex random sampling design. Exposure to ACE categories was identified using a cross-culturally adapted version of the Childhood Trauma Questionnaire (CTQ) and direct questions. We calculated prevalence and correlation between ACE pairs and determined the co -occurrence profile of childhood adversities. The findings reveal that the most common adversities were emotional abuse and neglect and biparental family dissolution. Seventy percent of the sample reported having been exposed to at least one ACE and 9% had been exposed to four or more. Around 20% of respondents reported exposure to abuse and neglect and 9% to the co-occurrence of abuse, neglect, and absence of at least one parent during childhood. The most vulnerable subgroups were girls and respondents who were born to teenage mothers, not living with both parents, studying at public schools, and from low-income families. The high prevalence and co-occurrence profile of ACE reveals the need for wide-ranging intersectoral policies designed to prevent adverse childhood experiences and provide victim support.*

Key words *Child abuse, Neglect, Violence, Adolescence*

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Introduction

Adverse childhood experiences (ACE) are defined not only as acts of perpetration or omission that result in harm, potential for harm, or threat of harm to a child, but also a series of other contextual conditions, such as household dysfunction and domestic violence, parental drug or alcohol abuse, separation or divorce, and parental death[1,2]. Adverse experiences are often co-occurring, meaning that the child may be exposed to various consecutive or simultaneous adversities. Studies indicate that the greater the number of adverse experiences, the greater the negative effect on the individual's development[1-4].

The prevalence of ACE in high, medium, and low-income countries is high across all continents[2,5-8]. However, rates vary according to the conceptual definition adopted, method used to detect adversities, and sample characteristics[9,10]. Socioeconomic and cultural factors, such as levels of inequality and employment and gender stereotypes, also have an important influence on prevalence[11,12]. For example, a study conducted in 21 countries in 2010 documented that 66.2% of respondents in low-income countries reported at least one ACE, compared to 59.3% in high-income countries, while the prevalence of co-occurrence of four ACE was 3.1% and 5.0%, respectively[2].

Literature on this topic is scarce in Brazil. A study conducted in 2016 with adults living in São Paulo and 38 surrounding municipalities showed that 53.6% of respondents had experienced adversity at least once during childhood or adolescence[13], while a study in Pelotas in the State of Rio Grande do Sul undertaken in the same year showed that 85% adolescents aged up to 18 years had been exposed to at least one ACE and that 7.1% of girls and 3.2% of boys reported four or more adversities[6].

This issue is particularly relevant given the various negative health consequences of continuous cumulative exposure to ACE. These consequences may arise during childhood, in the form of sleep disorders[14], cognitive developmental delay[15], and other physical health problems[16], adolescence, in the form of alcohol and drug use[17], involvement in violence[18], and early onset of sexual activity and practice of unsafe sex[5,19], and adulthood, in the form of alcohol and drug abuse[20], unsafe sexual behavior[5], and both mental and physical health problems[21,24], including depression[22,23] and cardiovascular problems[25].

Harmful consequences during adolescence extend beyond health problems. At school, for example, children exposed to family traumas have greater difficulty adapting and show diminished interest in the classroom and higher suspension and expulsion rates due to aggressive behavior, which can ultimately lead to school dropout[26,27]. School can also be a stage for some types of ACE, such as bullying, rejection, and isolation by peers[28,29]. On the other hand, schools are well suited to promote prevention, detection, intervention, and provide support for children and adolescents who experience such situations. In this regard, schools can develop strategies designed to support and develop resilience and coping skills, so that children and adolescents feel protected, encouraged, and engaged in the transformation process[26,27].

Given the high prevalence of ACE, its serious health consequences and other effects during adolescence, and the lack of studies on this issue in Brazil, further research would seem appropriate to gain a better understanding of this problem in the country. The aims of this study were therefore to: 1) estimate the prevalence of different categories of ACE (emotional, physical, and sexual abuse; emotional and physical neglect; parental death or loss of contact with parents; and biparental family dissolution during childhood); 2) investigate the co-occurrence profile of these ACE; and 3) analyze the distribution of events according to individual and socioeconomic characteristics, family structure, and type of school.

Methods

Study design and background

We conducted a cross-sectional, school-based study with second-year high school students attending both public and private schools in Rio de Janeiro's administrative region IX RA. This region encompasses four neighborhoods (Maracanã, Vila Isabel, Andaraí, and Grajaú) and, according to the most recent census data, had a population of 190,000 inhabitants, including approximately 17,000 children and 22,000 adolescents, and per capita income of 3.6 minimum salaries in 2010[30].

Source population, sample size, and sampling strategy

The source population consisted of 1.470 second-year high school students attending five public schools and seven private schools in

2016 and distributed across 52 classes. The participants were selected using a complex random sampling design, where the sample was stratified according to type of school (public or private) and type of class (daytime or evening). The participating classes were selected using probability proportional to school size. All students in the selected classes were invited to participate in the study. The following equation was used to calculate sample size:

$n - Z^2_{1-\alpha/2} P(1-P)/d^2$, where α is the significance level, Z is the normal distribution quantile, P is the expected prevalence of the main outcome of interest in the background study (violence in loving relationships), and d is the margin of error, adopting the following values: $\alpha = 0.05$, $P = 0.25$, and $d = 0.05$. The sample size was initially multiplied by two to allow the results to be stratified by gender[31]. The background study included 721 individuals. For the purposes of the present study, 21 individuals were excluded because they were aged 20 years and over and 21 because they were indigenous or Asian (14 and 7, respectively), due to the small number of participants from these race/skin color groups, resulting in a final sample of 681 students.

Data collection and assessment instruments

The data were collected between September 2016 and February 2017 by a previously trained team using a multi-thematic questionnaire that was self-administered in the classroom.

Adverse childhood experiences

We assessed the occurrence of the following categories of ACE based on Felitti et al.[1] and Kessler et al.[2]: emotional, physical, and sexual abuse; emotional and physical neglect; parental death or loss of contact with parents; and biparental family dissolution[2]. The definitions we used for emotional, physical, and sexual abuse were based on those proposed by the World Health Organization (WHO) in its World Report on Violence and Health[32], while the definitions of emotional and physical neglect were based on those proposed by Bernstein and Fink[33]. Adverse experiences of abuse and neglect were assessed using the *Questionário Sobre Traumas na Infância* (QUESI)[34], a cross-culturally adapted version of the Childhood Trauma Questionnaire (CTQ)[33]. The QUESI consists of five five-item subscales addressing the types of violence mentioned above and a three-question minimalization/denial scale for detecting individuals who may be underreporting traumatic events. The questions are answered on a five-point scale (never; rarely; sometimes; often; very often). Respondents were considered to have been exposed to the type of violence addressed by the subscale when he/she answered "rarely", "sometimes", "often", or "very often" to at least one of the items.

Occurrence of parental death or loss of contact with parents during childhood was assessed using the questions "Is your father alive?" and "Is your mother alive?", where the possible answers were "yes", "no", and "I don't know/I have lost contact (with my mother/father)/I never met (my mother/father)". The respondents that gave a negative answer to these questions or reported that they had lost contact with their parents before 10 years of age were considered to have experienced these adversities. Respondents who reported not living with their parents up to the age of 10 were considered to have been exposed to the ACE biparental family dissolution.

Demographic and socioeconomic variables

For the variable skin color, we used the categories adopted by the Brazilian Institute of Geography and Statistics (IBGE). The variable family structure encompassed information about the age of the mother at the respondent's birth and who the adolescent was living with at the time of the interview. To characterize the socioeconomic status of the adolescent's family, we used the mother's level of education and family purchasing power, based on the 2015 version of the Standard Economic Classification Criteria adopted by the Brazilian Association of Market Research Companies[35]. The remaining variables are self-explanatory and presented in Table 1.

Data analysis

Data analysis took into account the complex sampling design. Prevalence of ACE was calculated for the overall sample and subgroups divided according to individual, family, and socioeconomic characteristics and school type. The ACE co-occurrence profile was determined by counting the number of childhood adversities and measuring the degree of correlation between pairs of adversities. As the variables were dichotomous (yes/no), we used Kendall's tau, recommended for ordinal variables and suitable for small samples[36]. The co-occurrence profile was presented graphically using a Venn diagram, grouping the experiences into three groups: abuse (emotional and/or physical and/or sexual), neglect (emotional and/or physical), and absence

of at least one parent (parental death or loss of contact with parents and/or biparental family dissolution). We applied the chi-squared (χ^2) test for homogeneity to identify statistically significant differences between the subgroups, adopting a significance level of 0.05. The analyses were performed using Stata 15[37].

Ethical issues

The background study was approved by Rio de Janeiro State University's Research Ethics Committee (certificate number 48107514.2.0000.5282) and by the Department of Education. An informed consent form was signed by the students and their parents/guardians.

Results

Table 1 shows that the proportion of boys and girls in the sample was similar. The majority of the sample were white and over 70.0% of the mothers were aged between 20 and 35 years at the respondent's birth. Over half of the sample did not live in a biparental family at the time of the interview. The majority of the mothers had a low level of education and around 70.0% of the sample were from families in the upper and middle-income classes (A and B) and 1.0 % from the low-income class (E). The majority of the respondents attended daytime classes in private schools.

The most frequently reported categories of ACE were emotional abuse, emotional neglect, and biparental family dissolution (Table 2). The prevalence of emotional abuse was higher among girls than boys. With respect to maternal education, the prevalence of this category of ACE was highest in respondents whose mothers had a medium level of education. The prevalence of physical abuse was higher in respondents who did not live with both parents and those whose mothers had a medium level of education. The prevalence of sexual abuse was higher among girls than in boys. The prevalence of emotional neglect was higher in respondents born to teenage and older mothers, those who did not live with their parents, and those who studied in the evening. The prevalence of physical neglect was highest among respondents studying at public schools, those studying in the evening, and those whose families were from low-income classes (D and E).

Around 70% of the sample reported exposure to at least one category of ACE (Table 3), with

Table 1. Study sample characteristics. School-based survey, administrative region IX RA, Rio de Janeiro, RJ.

Sample characteristics	n*	expn **	%	(95% CI)
Individual characteristics				
Sex				
Female	367	676	53.2	(46.8-59.5)
Male	314	594	46.8	(40.4-53.2)
Skin color				
White	325	679	53.7	(46.1-61.2)
Black	116	189	14.9	(12.1-18.3)
Brown	236	395	31.3	(25.7-37.5)
Family structure				
Mother's age at birth				
Up to 19 years	96	158	13.4	(10.5-16.9)
20–35 years	473	866	73.3	(66.3-79.3)
35 years and over	64	157	13.3	(7.90-21.5)
Living situation				
With mother and father	297	563	44.6	(41.0-48.2)
Just with mother or father	222	436	34.5	(31.5-37.8)
With mother and stepfather/ with father and stepmother	112	192	15.2	(12.9-17.8)
Other	46	71.4	5.65	(4.09-7.70)
Socioeconomic characteristics				
Maternal education level				
Low (0-8 years)	407	661	54.4	(46.2-62.2)
Medium (9-12 years)	77	167	13.7	(11.4-16.3)
High (>12 years)	162	389	32.0	(25.1-39.9)
Income class				
A	91	208	17.5	(13.6-22.2)
B	321	655	55.1	(51.4-58.7)
C	204	313	26.3	(21.7-22.1)
D-E	11	14	1.2	(0.60-2.30)
School characteristics				
Type of school				
Public	373	458	36.0	(31.3-41.2)
Private	308	653	64.0	(58.8-68.8)
Type of class				
Daytime	583	1159	91.3	(89.1-93.1)
Evening	98	110	8.70	(6.94-10.9)

* Study population (without considering sample weights). ** Expanded sample using sample weights.
95% CI: 95% Confidence Interval. Income class = Brazil's Standard Economic Classification Criteria.

Source: Survey of Vulnerable Rape and Other Violence against Adolescents and Young Females, 2015.

Table 2. Prevalence of the different categories of adverse childhood experiences by sociodemographic characteristics. School-based survey, administrative region IX RA, Rio de Janeiro, RJ.

Sample characteristics	EA	PA	SA	EN	PN	PDLC	BFD
	%*	%*	%*	%*	%*	%*	%*
Total sample	41.7	16.8	10.5	35.2	16.7	5.10	24.3
Sex							
Female	46.8**	17.7	14.3**	36.0	15.1	5.00	25.2
Male	35.8	15.8	6.16	34.2	18.5	5.18	23.3
Skin color							
White	45.9	15.3	12.5	35.9	16.0	4.62	25.2
Black	40.0	17.0	8.94	31.1	18.5	7.59	21.2
Brown	36.2	19.6	7.89	35.2	16.9	4.70	24.6
Mother's age at birth							
Up to 19 years	47.4	22.7	8.74	43.9**	19.8	7.89	30.9
20 to 35 years	39.2	16.3	10.2	32.4	17.0	3.60	21.2
35 years and over	56.9	14.3	18.1	47.0	12.3	1.84	26.1
Living situation							
With mother and father	36.5	12.4**	9.37	26.6**	15.4	-	-
Only with mother/father	47.1	19.6	9.82	41.0	15.6	7.55**	40.8**
Mother and stepfather/father and stepmother	46.6	23.1	14.8	41.9	20.4	7.34	52.9
Other	40.2	18.6	12.3	51.7	22.7	24.0	38.1
Maternal education							
Low (0-8 years)	36.7**	13.9**	10.0	36.0	17.0	4.30	19.5
Medium (9-12 years)	51.7	31.0	12.3	45.2	10.5	1.40	30.2
High (>12 years)	47.1	15.7	11.0	29.7	18.0	4.10	26.5
Income class							
A	51.5	16.8	10.8	31.2	19.3	4.02	25.7
B	42.0	15.9	12.0	36.2	12.6	4.65	23.4
C	38.5	19.4	8.89	36.0	17.6	4.81	24.0
D-E	23.6	26.6	0.00	51.2	54.1	11.9	20.3
Type of school							
Public	38.0	18.5	8.01	35.1	22.2**	6.63	20.9
Private	43.9	15.9	11.8	35.3	13.6	4.18	26.2
Type of class de aula							
Daytime	42.7	17.0	10.7	34.1	15.2**	4.83	24.6
Evening	32.1	15.0	7.73	46.2	32.2	7.39	21.2

EA = emotional abuse; PA = physical abuse; SA = sexual abuse; EN = emotional neglect; PN = physical neglect; PDLC=Parental death or loss of contact with parents; BFD= Biparental family dissolution.
* Estimated prevalence considering sample weights. ** P-value <0.05. 95% CI = 95% Confidence Interval.
Income class = Brazil's Standard Economic Classification Criteria.

Source: Survey of Vulnerable Rape and Other Violence against Adolescents and Young Females, 2015.

prevalence decreasing with increasing numbers of cumulative ACE. With respect to the number of cumulative ACE, most respondents reported exposure to two or more categories of adversities and almost 10.0% reported four or more categories. Respondents born to teenage or older mothers tended to report a higher number of categories of ACE. The prevalence of exposure to ACE was lower in adolescents living with both parents.

Table 4 shows that the majority of correlations between pairs of ACE were positive and statistically significant, indicating once again a tendency towards cumulative categories of ACE. It is interesting to note that there was a positive correlation between the three categories of abuse and between these categories and the two neglect categories. However, there was no correlation between the categories of abuse and parental death

Table 3. Number of adverse childhood experiences according to sample characteristics. School-based survey, administrative region IX RA, Rio de Janeiro, RJ.

Sample characteristics	0 ACE	1 ACE	2 ACE	3	4+ EAI	P-valor
	ACE	4+ ACE	P-value	%*	%*	
	%*	%*	%*	%*	%*	
Total sample	29.2	28.0	17.7	16.3	8.9	
Sex						0.599
Female	28.6	26.0	18.6	16.4	10.3	
Male	29.9	30.5	16.6	16.2	7.14	
Skin color						0.624
White	29.2	24.9	18.1	18.6	9.22	
Black	26.4	34.1	19.9	12.7	6.84	
Brown	30.7	29.6	15.8	14.5	9.41	
Mother's age at birth						**0.007**
Up to 19 years	24.5	29.8	16.1	10.5	19.1	
20 to 35 years	29.9	31.0	17.9	14.1	6.99	
35 years and over	28.0	11.7	17.9	35.2	7.07	
Living situation						**0.000**
With mother and father	44.2	28.0	14.7	9.15	3.93	
Only with mother/father	18.0	28.2	20.4	24.1	9.37	
Mother and stepfather/father and stepmother	17.0	25.7	22.3	16.0	18.9	
Maternal education						0.217
Low (0-8 years)	33.3	28.7	16.3	13.6	8.10	
Medium (9-12 years)	15.4	27.0	27.9	20.8	8.89	
High (>12 years)	28.3	28.7	15.0	19.9	8.12	
Income class						0.845
A	26.3	24.9	18.1	21.6	9.13	
B	31.0	27.1	18.0	15.5	8.36	
C	29.8	29.9	16.0	14.2	10.0	
D-E	19.6	30.2	7.83	34.0	8.31	
Type of school						0.800
Public	30.0	28.9	17.3	14.0	9.70	
Private	28.8	27.3	17.9	17.6	8.40	
Type of class						0.696
Daytime	29.5	27.6	18.1	16.0	8.73	

* Estimated prevalence with sample weights. 95% CI = 95% Confidence Interval.
Income class = Brazil's Standard Economic Classification Criteria.
0 ACE = individuals not exposed to any adverse experience; 1 ACE= individuals exposed to only one adverse experience; 2 ACE= individuals exposed to two adverse experiences; 3 ACE= individuals exposed to three adverse experiences; 4+ ACE: individuals exposed to four or more adverse experiences.

Source: Survey of Vulnerable Rape and Other Violence against Adolescents and Young Females, 2015.

or loss of contact with parents and biparental family dissolution. In contrast, emotional neglect showed a positive correlation with biparental family dissolution. Finally, biparental family dissolution was positively correlated with parental death or loss of contact with parents.

Figure 1 presents the ACE co-occurrence profile. The findings show that only 30.0% of the sample reported not having been exposed to any of the ACE investigated, while 35.0% of respondents reported exposure to two or three groups of adversities (abuse, neglect, and absence of at least one parent).

Tabela 4. Correlação de Kendall entre pares de Experiências Adversas na Infância por categorias na amostra. Inquérito de base escolar IX RA do município do Rio de Janeiro, RJ.

	AE	AF	AS	NE	NF	MPCG	DFB
AE	1,0000						
AF	0,2192**	1,0000					
AS	0,2193**	0,1378**	1,0000				
NE	0,3874**	0,1475**	0,2079**	1,0000			
NF	0,0944*	0,1003*	0,1288**	0,2029**	1,0000		
MPCG	-0,0210	-0,0549	0,0604	0,0066	0,0729	1,0000	
DFB	0,0586	0,0684	0,07453	0,0932*	-0,0001	0,3159**	1,0000

AE=Abuso Emocional; AF=Abuso Físico; AS=Abuso Sexual; NE=Negligência Emocional; NF=Negligência Física; MPCG=Morte ou perda de contato com os genitores; DFB= Dissolução da família biparental. * P-valor <0.05. ** P-valor <0.01. Estimador: Tau-b de Kendall.

Source: Survey of Vulnerable Rape and Other Violence against Adolescents and Young Females, 2015.

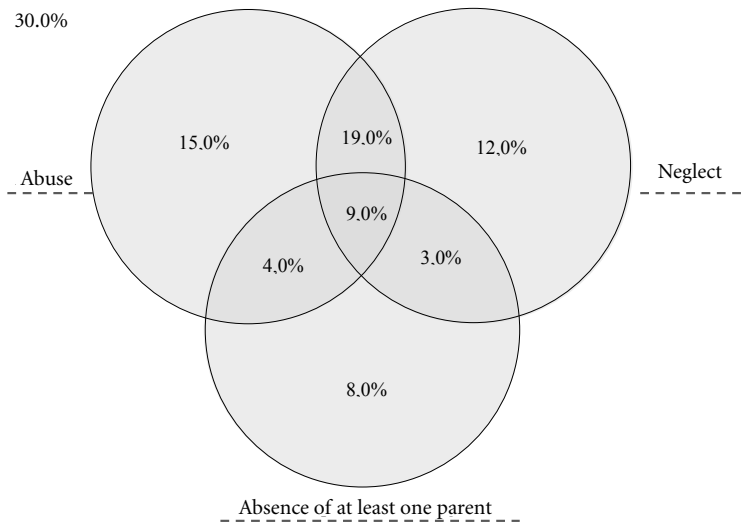

Figure 1. Co-occurrence of adverse childhood experiences. School-based survey, administrative region IX RA, Rio de Janeiro, RJ.

Note: Abuse (emotional and/or physical and/or sexual), neglect (emotional and/or physical) and absence of at least one parent (parental death or loss of contact with parents and/or biparental family dissolution).

Source: Survey of Vulnerable Rape and Other Violence against Adolescents and Young Females, 2015.

Discussion

Children's and adolescents' rights are enshrined by the United Nations Declaration of the Rights of the Child (1959) and Convention on the Rights of the Child[38]. Brazil's Statute of the Child and Adolescent (ECA) states in article 5 that *No child or adolescent shall be subject to any form of neglect, discrimination, exploitation, violence, cruelty and oppression*[39]. However, our findings show that a large part of respondents reported being the victim of different types of violence, suggesting that these rights are not being upheld for many of the children and adolescents in Rio de Janeiro. It is

also notable that a large proportion of respondents reported parental death or loss of contact with parents and high cumulative numbers of categories of adversities, making this population particularly vulnerable to the short, medium, and long-term consequences of ACE.

Whether isolated or co-occurring, the high prevalence of ACE is even more worrying given that – in contrast to the majority of studies, which examine adverse events between the age of zero and 19 years – this study was restricted to adversities experienced up to the age of 10, since studies have shown that this is the most sensitive period for these experiences[40,41]. By including adolescence in the recall period, studies not only increase the likelihood of occurrence of events, but also broaden the range of categories of experiences investigated including those that occur mostly during adolescence, such as bullying, rejection and physical aggression by peers, and dating violence[42]. Thus, it is assumed that if we had widened the recall period to include adolescence, prevalence would have been even higher.

As mentioned above, it is interesting to note the high prevalence of emotional abuse and neglect and biparental family dissolution among the seven categories of ACE investigated. Emotional abuse was the most frequently reported category and prevalence was particularly high among girls and respondents born to teenage mothers. Previous studies have also shown that the prevalence of this type of abuse is higher among girls, which may be linked to strict, controlling, overprotective, or chaotic family environments[32,43-45]. Higher prevalence of exposure to ACE among respondents born to teenage mothers has also been highlighted by other authors, who suggested that this may linked to lack of provision of psychosocial support to teenage mothers[43].

The data presented also corroborate the findings of other studies documenting that respondents who did not live with both parents reported higher frequency of physical abuse. In this regard, evidence shows that the main perpetrators of violence tend to be step-parents or family members such as uncles and aunties, grandparents or cousins living with the child in the absence of parents[32,46]. Previous studies have also reported that the prevalence of this category of abuse is higher in families with low levels of maternal education, suggesting that this may be linked to poor maternal argumentation skills for conflict resolution and lack of knowledge of other disciplinary practices. The belief that parenting practices should include acts of physical violence when necessary and situations of intense hostility also contribute to the high prevalence of this problem[32,47,48].

The high prevalence of sexual abuse is also notable. Although sexual abuse was the least frequent category of ACE among respondents, it is important to stress that this problem has serious mental and physical health consequences. Consequences also extend to other spheres of life, resulting in academic performance problems, unwanted pregnancy, and reduced productivity at work, among other problems[32,49,50]. The prevalence of exposure to this category of ACE was also higher among girls, who are the main victims of a macho, patriarchal and adult-centered culture, which is also expressed in family power structure and organization. These social determinants mean that girls are not only the main victims of sexual abuse, but also remain silent and fail to seek help, perpetuating victimization[6,32,51,52].

Prevalence of emotional neglect was particularly high among respondents that did not live with both parents, corroborating the findings of other studies[32,53]. Prevalence of exposure to physical neglect was higher among respondents from families in the low-income classes and public school students attending evening classes, corroborating previous studies that reported higher prevalence of this problem among families with lower socioeconomic status. In these families, difficulty in providing for the child's physical needs may be the result of financial difficulties, long working hours, large families, and mental health problems, which are more frequent in this subgroup[32,53,54]. While physical neglect may often be linked to poverty and social vulnerability, it is important to bear in mind that it may also be the result of lack of parenting skills in providing for the child's basic needs (health, education, affection, nutrition, shelter, and safety) among parents who have the financial means to meet these needs[32].

The prevalence of parental death or loss of contact with parents in the present study was lower than that that reported by previous studies in Brazil, probably because the latter used a longer recall period including adolescence[2,6,7,13]. However, this issue warrants special attention because it is one of the most difficult losses during childhood and can have a profound negative impact on emotional and affective life[55,56]. Although biparental family dissolution may not necessarily have a negative impact on the child's life, single-parent families tend to have lower per capita income and lower levels of parental monitoring,

meaning that children are more vulnerable to psychosocial and economic risks[57,58]. Acrimonious separation may be a source of feelings of abandonment and rejection, sometimes resulting in parental alienation and a lot of pain and suffering due to loss of contact with one of the parents[59,60]. Although family recomposition may ease these effects, it can also create new challenges for the child. The child's sense of not belonging to the new family because of the feeling that he/she is betraying one of the biological parents by creating a bond with his/her parent's new partner is just one example of these challenges[61].

In addition to the high prevalence of different categories of ACE, categories may often co-occur, aggravating the adverse effects of these experiences on child development. It is notable that the prevalence of high cumulative numbers of categories of adversities was high in respondents born to teenage mothers and those not living with both parents. The fact that teenage pregnancy rates tend to be higher in disadvantaged groups and that teenagers are unprepared for motherhood contributes to cumulative adverse experiences among this subgroup[62,63]. The higher cumulative numbers of adversities among adolescents from single-parent families or those living with step-parents may be associated with the fact that children growing up in these households are more likely to be exposed to maltreatment[32,64].

Emotional neglect was the category that showed the strongest correlation with the other categories of adverse experiences, with the relationship being particularly pronounced with the abuse categories (emotional, physical and sexual abuse) and physical neglect. Some authors[11,65] suggest that, in addition to the co-occurrence of abuse and neglect perpetrated by parents/guardians being common, neglect may open the way to other forms of child abuse outside the family because the child is not fully protected[66,67]. Lack of care, affection and protection, combined with different forms of abuse perpetrated during childhood precisely by those who should be providing a safe and healthy environment has negative short, medium, and long-term consequences, including physical injury, low self-esteem, difficulties in building social relationships, aggressive behavior, isolation, and mental health problems[66,67]. The situation is even more worrying considering that, besides neglect and abuse, almost 10% of the sample also reported the absence of at least one parent. This may further reduce the child's emotional security and negatively affect parental monitoring and the household budget, potentially jeopardizing child development even further[55,56].

Another point that warrants highlighting is the characteristics of the respondents who reported not being exposed to any of the categories of ACE. As mentioned above, the subgroups that seem to be most protected or least prone to ACE were respondents who were not born to teenage mothers and those living with both parents. In this regard, other studies highlight that a protective family environment, characterized by involved parents, parental monitoring of friends and activities, and residing in a safe neighborhood, is associated with more favorable health outcomes and reduced exposure to ACE[68,69].

It is also important to highlight that schools are well suited for tackling the problem of ACE. They play a particularly important role in the early detection of cases, reporting situations that warrant action from the child protection services, providing support for the children and adolescents and their families, and in developing strategies designed to support and develop resilience and coping skills[70].

This study has some limitations. First, we did not investigate certain adversities, such as household dysfunction and parental mental health problems, alcohol and drug abuse, and imprisonment. Second, since the study was school-based, the sample may not include more severe situations with a higher cumulative number of categories of adversities that resulted in school dropout. Certainly, the inclusion of the above adverse experiences and adolescents who have dropped out of school would have increased the prevalence of ACE.

However, our study also has a number of strengths. First, we used a representative sample of high school students attending public and private schools in an administrative region of Rio de Janeiro with similar socioeconomic and demographic characteristics to most of the city, meaning that our research findings may be generalized to a wider population. Secondly, the QUESI is recognized internationally as having good psychometric properties. Furthermore, the fact that the questionnaires were self-administered avoided the embarrassment and unease of answering sensitive questions, thus contributing to the validity of the prevalence of ACE. Another strength is the fact that the interviews were conducted with adolescents rather than adults (as is the case with most studies investigating this topic) thus minimizing the time gap between event occur-

rence and recall and reducing memory bias[13]. Our study is also innovative insofar as it presents the ACE co-occurrence profile, as opposed to the majority of previous studies, which are restricted to counting the cumulative number of categories of ACE to which individuals are exposed.

There are significant differences in the prevalence of ACE observed by our study and that reported by other relevant studies. We believe that these disparities are due to the following main reasons: differences in the categories of ACE investigated by this study and the definitions used for the categories; the use of different assessment instruments to identify exposure to ACE and different recall period; and differences in the socioeconomic characteristics and vulnerability of study samples. These differences should be taken into account when comparing our results with the findings of other studies.

Conclusion

Our findings indicate that the prevalence of exposure to at least one category of ACE and to co-occurring adversities was high, corroborating previous national and international studies that show high prevalence of abuse, neglect and other childhood adversities and a strong correlation between different categories of experiences. Cumulative ACE aggravate the negative effects of experiences on health, behavior, emotional development, sociability, academic and professional performance, and many other aspects necessary to live a full and meaningful life. In light of the above, it is vital to develop intersectoral policies designed to prevent ACE, paying special attention to measures aimed at reducing all types of violence against children and providing support to families where children are exposed violence. In this regard, it is important to take a network-based approach, promoting close cooperation between different services and sectors in order to foster the physical and emotional development of children exposed to adversities and improve their academic performance and social integration, thus breaking the cycle of adverse experiences across generations.

Collaborations

L Stochero was responsible for the data analysis and writing of the paper, CL de Moraes was responsible for the study design, writing and critical analysis of the paper, ES Marques, ME Reichenheim and ST Taquette were responsible for the article writing and critical review final, EB dos Santos and DL Pacheco for reviewing the data analysis.

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