

## RESEARCH ARTICLE

# Maternal depression and bullying victimization among adolescents: Results from the 2004 Pelotas cohort study

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**Background:** Maternal depression impacts on several detrimental outcomes during a child's life course, and could increase their risk of victimization. This longitudinal study examined the association between antenatal maternal depression, postnatal trajectories, and current maternal depression and offspring bullying victimization at 11 years.

**Methods:** We included 3,441 11-year-old adolescents from the 2004 Pelotas Cohort Study. Antenatal maternal depression, postnatal trajectories, and current maternal depression data were assessed during the follow-up waves. Bullying victimization was self-reported by the adolescents. We used ordinal logistic regression to estimate the odds ratio (OR) and 95% confidence intervals (CIs), for the association between maternal depression and offspring bullying victimization.

**Results:** The most prevalent type of bullying was verbal victimization (37.9%). We observed a positive association between antenatal maternal depression, postnatal trajectories, and current maternal depression and physical bullying victimization. Maternal mood symptoms during pregnancy were associated with physical (OR = 1.30, 95%CI = 1.11–1.53), verbal (OR = 1.29, 95%CI = 1.12–1.49), and any victimization (OR = 1.22, 95%CI = 1.05–1.41). Severe current maternal depression was associated with physical (OR = 1.34, 95%CI = 1.10–1.62), social manipulation (OR = 1.29, 95%CI = 1.08–1.53), attacks on property (OR = 1.30, 95%CI = 1.08–1.57) and any victimization (OR = 1.32, 95%CI = 1.12–1.56). Regarding maternal depression trajectories, the “chronic-high” group was associated with higher risk of social manipulation, attacks on property and any victimization, than the “low” group.

**Conclusions:** Our results strengthen the evidence of association between maternal depression and offspring bullying victimization, and physical victimization appears to be the main component. Further studies are warranted to confirm our findings and to elucidate the theoretical pathways for this longitudinal association.

## KEYWORDS

adolescents, bullying, depression, victimization

## 1 | INTRODUCTION

Bullying is a major problem in the education and public health sectors. Rates of victimization may reach 32 and 60% in high- and low/middle-income countries, respectively (Currie et al., 2012; Fleming & Jacobsen, 2010). Systematic reviews support the identification of several long-term consequences of bullying, varying from common somatic and psychosomatic problems (e.g., colds and headaches), poor general health, anxiety and depression disorders, to suicidal ideation and psychotic experiences (Wolke & Lereya, 2015).

Bullying is a subtype of aggressive behavior which is repeated, intentional, and involves a power asymmetry between bully and

victim (Olweus, 1993). This behavior may take different forms, such as physical and verbal abuse, social manipulation, attacks on property, and cyberbullying (Liu & Graves, 2011). Numerous individual, relational, and contextual factors have been associated with bullying (Azeredo, Levy, Araya, & Menezes, 2015; Azeredo, Rinaldi, de Moraes, Levy, & Menezes, 2015; Bradshaw, Sawyer, & O'Brennan, 2009). However, few studies have focused on early-life factors and these have mainly been performed in high-income countries (Jansen, Veenstra, Ormel, Verhulst, & Reijneveld, 2011; Lereya & Wolke, 2013).

More recently, a life-course epidemiological approach has been suggested (Ben-Shlomo & Kuh, 2002), which associates maternal depression and bullying victimization (Zwierzynska, Wolke, & Lereya,

2013). The developmental and cognitive effects of maternal depression on offspring (Betts, Williams, Najman, & Alati, 2014, 2015; Goodman et al., 2011; Mendes et al., 2012; Narayanan & Nærde, 2016; Plant, Pariante, Sharp, & Pawlby, 2015; Santos, Matijasevich, Barros, & Barros, 2014) could increase their risk of victimization in school, rendering them easy targets for bullies (Bowes et al., 2009; Lereya & Wolke, 2013).

The link between maternal depression and victimization may be explained by both behavioral and biological factors. Depressed mothers are more likely to engage in negative parenting behavior, including abuse, neglect, and maladaptive parenting (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Plant et al., 2015; Waters, Hay, Simmonds, & van Goozen, 2014), associated with a higher risk of school victimization (Bowes et al., 2009; Lereya & Wolke, 2013; Lereya, Samara, & Wolke, 2013). Moreover, all the aforementioned parenting characteristics may increase the risk of depression and internalizing problems for their offspring. Children with these problems are more likely to have poor peer relations, including peer rejection and bullying victimization (Hong, Kral, & Sterzing, 2015; Kochel, Ladd, & Rudolph, 2012).

Another mechanism by which maternal depression might increase the risk of offspring victimization is fetal dysregulation of the hypothalamic pituitary adrenal (HPA) axis. Antenatal depression can cause an increase in HPA activity, which alters the offspring's stress response system, increasing impulsivity and aggression (Huizink, Mulder, & Buitelaar, 2004; Talge, Neal, & Glover, 2007), also associated with a higher risk of bullying victimization (Schwartz, Proctor, & Chien, 2001).

Evidence on the effects of maternal depression on bullying victimization is scarce, especially in relation to when it occurs (antenatal, postnatal, chronic). Research on the association between current maternal depression and bullying victimization is not conclusive (Bowes et al., 2009; Georgiou, 2008; Jansen et al., 2011). Although one study supports this association (Lereya & Wolke, 2013), to our knowledge, no study has evaluated the association between the chronicity of maternal depression and bullying.

Studies have also failed to adjust their analysis for important confounders, such as socioeconomic status (SES) (Lereya & Wolke, 2013), and have focused on bullying victimization as a whole, not assessing different forms of bullying for consistency (Bowes et al., 2009; Georgiou, 2008; Lereya & Wolke, 2013).

Therefore, the objectives of this study were twofold: (1) to explore the association between antenatal maternal depression, postnatal trajectories, and current maternal depression and offspring victimization by different types of bullying at 11 years; and (2) to investigate whether there is a gradient of association between maternal depression and bullying victimization according to the chronicity and severity of the depression.

## 2 | METHODS

### 2.1 | Participants

We used data from the 2004 Pelotas Cohort Study (Santos et al., 2014). Pelotas, a medium size city in the south of Brazil, has approximately

3,400,000 inhabitants. In 2004, a birth cohort study attempted to enroll all births to mothers resident in the urban area, through daily visits to the five maternity hospitals (>98% of all city deliveries). We used a structured questionnaire to interview mothers soon after delivery regarding demographic, socioeconomic, behavioral and biological characteristics, reproductive history, and health care utilization. Newborns were examined by trained fieldworkers with pediatrician supervision.

The response rate at recruitment was 99.3%. Further details of the methodology can be found elsewhere (Santos et al., 2014). All live births ( $n = 4,231$ ) were enrolled in the cohort study. Follow-up assessments were made at home at mean (SD) ages 3.0 (0.1), 11.9 (0.2), 23.9 (0.4), and 49.5 (1.7) months and at a research clinic at 6.8 (0.3) and 11.0 (0.3) years, with follow-up rates between 87 and 96%.

## 3 | MEASURES

### 3.1 | Main exposures

#### 3.1.1 | Maternal mood and depressive symptoms

Maternal mood symptoms during pregnancy were assessed in the first 24 hr after delivery (study entry), using the question: "During pregnancy, did you feel depressed or have any nervous condition?" and defined as "present" if the mother answered positively.

The Edinburgh Postnatal Depression Scale (EPDS) was used to assess maternal depressive symptoms in the postnatal period (Cox & Sagovsky, 1987). This is a self-administered, 10-item scale with each item coded on a 4-point scale between 0 (minimum) and 3 (maximum). We used a previously-validated Brazilian version of EPDS with cut-off scores of 0–9 (mild), 10–12 (moderate) and  $\geq 13$  (severe) (Santos et al., 2007). Mothers' scores on the EPDS correlated moderately over time (0.42–0.63). At each follow-up, the EPDS was applied to the mothers. The EPDS applied at the 11-year follow-up was used to determine the current maternal depression status.

#### 3.1.2 | Maternal depression trajectories

EPDS scores from 3 months to 11-year follow-up, reported by mothers, were used to identify the different trajectories of depressive symptoms through a semiparametric, group-based modeling approach (Nagin, 2005; Nagin & Tremblay, 1999). Group-based trajectory modeling is a specialized form of finite mixture modeling. Details of the steps and methods used to identify the trajectories of maternal depressive symptoms can be found in a previous publication (Matijasevich et al., 2015).

Overall, 90% of the sample population completed the EPDS at least three times. Because it was administered to a subsample of women at 3-month follow-up, 17% of mothers completed the EPDS in all follow-ups. We included 3,841 mothers with data from at least three follow-ups in the analyses.

The number and shape of trajectories were based on the best fit of the model (maximum Bayesian information criteria, BIC) and on the interpretability of the trajectories obtained (Nagin, 2005). In addition,

selection of the appropriate model was guided by the posterior probability scores for each trajectory group (i.e., the individual's probability of belonging to each of the trajectory groups). The minimum score of an average probability should be higher than 0.70 for all groups (Nagin, 2005).

In order to model trajectories of maternal EPDS scores, analyses were conducted specifying three-, four-, five-, and six-group models. BIC improved as more groups were added. The improvement observed when moving from the five-group to the six-group model was low and the five-group model emerged as the best fitting and most parsimonious model. Inspection of parameter estimates for the five-group model revealed that the constant term differed from zero for all five groups (Supporting Information Table S1).

### 3.2 | Outcome: Bullying victimization

Adolescents aged 11 self-reported the frequency of bullying victimization in the previous month through the Multidimensional Peer Victimization Scale (MPVS) (Mynard & Joseph, 2000). This is a 16-item Likert scale, validated, and divided into four victimization subscales (physical, verbal, social manipulation, and attacks on property). Possible answers were 0 = "not at all," 1 = "once," and 2 = "more than once." Scale scores were computed by summing item responses; the total scale ranged from 0 to 32, and each of the four subscales from 0 to 8. The higher the score, the more the adolescents were victimized.

In order to estimate the prevalence rates of bullying victimization, individuals who answered "more than once," in the last month, for at least one question, were classified as victims (Solberg & Olweus, 2003).

### 3.3 | Covariates

The analyses were adjusted for several factors that could potentially confound the associations between maternal depression and offspring victimization. Perinatal interviews were used to gather information on maternal and child variables: family income in the previous month (categorized in quintiles), maternal education (complete school years of formal education); maternal age (complete years); marital status, classified as single mother (single, widowed, divorced, or living without a partner) or not (married or living with a partner); mother's skin color (white or black/mixed); parity (number of previous viable pregnancies, 0, 1, and  $\geq 2$ ); planned pregnancy (yes/no), and mother smoked during pregnancy (yes/no). Child variables were recorded at birth, and comprised sex and birthweight, which were measured by hospital staff with 10 g precision pediatric scales regularly calibrated by the research team. Low birthweight was defined as under 2,500g.

## 4 | STATISTICAL ANALYSES

First, descriptive statistics of adolescents and mother's general characteristics were performed among those with missing data and without missing data (Supporting Information Table S2). The rates and types of bullying victimization were also described (Supporting

Information Table S3). Distribution of different types of bullying victimization (physical, verbal, social manipulation, attacks on property, any type) was analyzed, according to maternal and child characteristics at birth (Supporting Information Table S4).

Associations between maternal depression (antenatal, postnatal trajectories, and current depression) and bullying victimization were estimated by ordinal logistic regression models. Multiple ordinal logistic regression models were adjusted for potential confounders (family income, maternal schooling, skin color, parity, smoking during pregnancy, planned pregnancy, child sex, and low birthweight). The variable "mood symptoms during pregnancy" was considered a potential confounder only for the association between trajectories of maternal depression and bullying victimization and current maternal depression and bullying victimization.

Ordinal logistic regression was chosen because each victimization subscale and the total scale are ordered categorical variables with categories of increasing severity of values (0–8 for each victimization subscale and 0–32 for the total victimization scale). We used the proportional odds model, where parameters represent the exposure odd ratios for being in the higher  $j$  categories compared to the lowest ( $k - j$ ) categories. It is assumed that the exposure effect is the same for all category splits of the outcome variable. Findings at  $P < .05$  were considered significant.

As the proportion of missing values in our database was 19%, in order to increase efficiency in the analyses and minimize selection bias, we used multiple imputation to handle missing data problems (Enders, 2010; Royston & White, 2011; Spratt et al., 2010; Sterne et al., 2009).

The method for imputation and subsequent analysis of the file-in data involved two steps. In the first step, all variables were imputed together allowing the missing values for each variable to be predicted from all the other variables (using the "mi impute" command). Twenty imputed complete datasets were created by chained equations, with an appropriate level of randomness. Finally, to estimate the relationship between maternal depression and bullying victimization, these datasets were analyzed by ordinal logistic regression using the "mi estimate" command to obtain the estimated odds ratios (ORs) and 95% confidence intervals (CIs) by averaging the results from analysis of each of these 20 datasets using Rubin's rules. All the analyses were repeated with no imputation for missing values (complete dataset). We present the results from the multivariate multiple imputation analysis as our main results, and results from the analysis of participants with complete observed data as online Supporting Information Tables S5–S7. All analyses were performed using Stata 13.1 software.

## 5 | ETHICAL ASPECTS

The study protocol and all follow-ups of the 2004 Pelotas cohort studies were approved by the Medical Ethics Committee of the Federal University of Pelotas, affiliated with the Brazilian National Commission for Research Ethics (CONEP) Mothers signed an informed consent form at each follow-up, after being informed of the study objectives. At the 11-year follow-up, adolescents also signed an informed consent form.

## 6 | RESULTS

Of the 4,231 participants constituting the original cohort, 98 died in the first 11 years of life and 3,566 were interviewed at 11 years. Data about the outcome (bullying victimization) and main exposure (maternal depression) were available for 3,441 individuals (81.3% of the original cohort). Adolescents without missing data belonged to families with higher income, more educated mothers and mothers less likely to be single, multiparous or smokers. In addition, these adolescents were less likely to be low birthweight than those with missing data (Supporting Information Table S2).

Responses to each item of the MPVS according the four victimization subscales are presented in Supporting Information Table S3. At age 11 verbal victimization was the most prevalent type of bullying (37.9%; 95% CI = 36.3–40.0), followed by social manipulation (29.9%; 95%CI = 28.4–31.5), physical victimization (17.4%; 95%CI = 16.1–18.7), and attack on property (15.9% 95%CI = 14.7–17.1).

Male adolescents, low birthweight, low income family, mother with less education, non-white, multiparous, smokers, and presented mood symptoms during pregnancy, had a higher proportion of victimization as a whole (Supporting Information Table S4).

Regarding maternal depression, 24.1% of mothers had mood symptoms during pregnancy, and 16.4% had depression symptomatology at the 11-year follow-up (current depression).

Analysis of maternal depression trajectories showed the five-group model to be the best fitting and most parsimonious. Three trajectories were best represented by a cubic term, one trajectory was linear and another quadratic (Supporting Information Fig. S1). Groups 1 (low) and 2 (moderate-low), comprised 74.5% of the mothers and had EPDS scores below 10 across all time points, suggesting low depressive symptomatology. Group 3 (increasing) included 11.1% of the study women and had a consistent increase in depressive symptoms during the study period. The fourth group (decreasing), included 9.3% of the women and showed high EPDS scores in the first 2 years postpartum and a marked decrease afterwards. Group 5 (high-chronic), comprised 5.2% of the women and had high EPDS scores throughout the study period. For all five groups the average posterior probability was above the acceptable cutoff (>0.7).

Table 1 shows the associations between different types of victimization assessed at 11 years and covariates. Adolescents with low socioeconomic status (represented by lower family income and lower maternal education), whose mothers smoked in pregnancy, and those who belonged to larger families ( $\geq 2$  older siblings) and were male were more likely to be victims of all types of bullying (Table 1).

Table 2 shows the association of maternal mood symptoms during pregnancy with child peer-victimization score at 11 years. All the associations were attenuated with the inclusion of sociodemographic characteristics in the model. In the fully adjusted model, maternal mood symptoms persisted, associated with physical (OR = 1.30, 95%CI = 1.11–1.53), verbal (OR = 1.29, 95%CI = 1.12–1.49), and any victimization (OR = 1.22, 95%CI = 1.05–1.41); null associations were observed for social manipulation and attacks on property.

Table 3 shows the association of current maternal depression and child peer-victimization score at 11 years. In model 4 (fully adjusted

model), severe current maternal depression was associated with physical (OR = 1.34, 95%CI = 1.10–1.62), social manipulation (OR = 1.29, 95%CI = 1.08–1.53), attacks on property (OR = 1.30, 95%CI = 1.08–1.57), and any victimization (OR = 1.32, 95%CI = 1.12–1.56).

Maternal depression trajectories were associated with physical victimization, social manipulation, attacks on property, and any victimization, presenting a gradient from the “moderate-low” to the “chronic-high” group. Regardless of the type of victimization, the effect measure was substantially smaller after adjustment for confounding. The associations with physical and verbal victimization were attenuated and lost statistical significance in models 3 and 4 (Table 4).

## 7 | DISCUSSION

Our main finding is that maternal depression, regardless of when it occurred, consistently increased the risk for physical victimization and bullying victimization as a whole. The associations were observed after adjusting for several confounding variables. Our results differed regarding specific types of victimization in magnitude and statistical significance. Antenatal depression was a risk factor for physical and verbal victimization. The “chronic-high” group trajectory of maternal depression was a greater risk factor for physical victimization, social manipulation, and attacks on property, than the “low” group. Current maternal depression was a risk factor for physical victimization, social manipulation, and attacks on property.

To the best of our knowledge, this is the first study to assess the association between maternal depression in different periods of occurrence and different forms of bullying victimization, especially in a middle income country.

Our findings on the associations between antenatal maternal depression and risk of victimization agree with a previous study (Lereya & Wolke, 2013). Lereya and Wolke (2013) found that antenatal maternal mental health problems were predictive of peer victimization according to child report at age 8 (OR = 1.16; 95%CI 1.02–1.32), mother report at age 7 (OR = 1.32; 95%CI 1.13–1.53), age 8 (OR = 1.52; 95%CI 1.32–1.76), and age 9 (OR = 1.18; 95%CI 1.02–1.36), and teacher report at age 7 (OR = 1.29; 95%CI 1.02–1.64). Moreover, according to their results, maternal mental health problems had significant direct and indirect effects, through partner conflict and maladaptive parenting, on victimization. The direct effect is supported by the life course model sustaining the suggestion that risk factors are biologically “programmed” during critical periods of growth and development in utero or early infancy (Ben-Shlomo & Kuh, 2002).

The associations of current maternal depression and maternal depression trajectories with bullying victimization are supported by other life course models, based on cumulative differential lifetime exposure to damaging physical and social environments (Ben-Shlomo & Kuh, 2002). A depressed mother’s inability to help her child face bullying attacks could encourage victimization tendencies. Furthermore, neurotic daily behavior at home could promote low self-esteem in the child, consequently making him/her vulnerable to victimization (Olweus, 1980). Another study, testing a theoretical model by confirmatory factor analysis, described a positive correlation between

**TABLE 1** Associations of physical and verbal victimization, social manipulation, attacks on property, and any type of victimization assessed at 11 years of age with confounders ( $n = 4,231$ ) (database with multiple imputation for missing data)

Variables	Ordinal odds for higher child peer-victimization score														
	Physical victimization			Verbal victimization			Social manipulation			Attacks on property			Any victimization		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
<i>Maternal variables</i>															
Family income (quintiles)			<.001			<.001			<.001			.001			<.001
1st (poorest)	1.64	1.30–2.06		1.51	1.24–1.85		1.58	1.30–1.92		1.50	1.20–1.86		1.64	1.39–1.94	
2nd	1.64	1.32–2.04		1.67	1.40–2.01		1.51	1.26–1.82		1.56	1.27–1.92		1.83	1.54–2.16	
3rd	1.37	1.07–1.75		1.29	1.06–1.56		1.25	1.03–1.53		1.30	1.04–1.63		1.31	1.11–1.55	
4th	1.31	1.05–1.64		1.20	1.00–1.44		1.26	1.03–1.53		1.20	0.96–1.48		1.19	1.01–1.41	
5th (wealthiest)	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
Maternal education (years)			<.001			<.001			<.001			<.001			<.001
0–4	1.26	1.04–1.52		1.21	1.02–1.43		1.05	0.88–1.25		1.28	1.06–1.56		1.30	1.11–1.52	
5–8	0.75	0.65–0.87		0.77	0.68–0.87		0.77	0.68–0.88		0.79	0.68–0.91		0.75	0.67–0.84	
≥9	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
Maternal skin color			.058			.002			.066			.001			<.001
White	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
Black/mixed	1.16	1.00–1.36		1.25	1.09–1.43		1.14	1.00–1.30		1.29	1.11–1.50		1.28	1.13–1.43	
Maternal age (years)			.577			.423			.891			.319			.932
<20	1.05	0.83–1.34		0.91	0.74–1.13		1.03	0.4–1.27		1.14	0.88–1.48		1.01	0.87–1.18	
20–34	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
≥35	0.96	0.79–1.17		0.89	0.75–1.06		1.04	0.88–1.24		1.17	0.96–1.44		0.99	0.82–1.19	
Parity			.018			.001			.001			.016			<.001
0	1.01	0.85–1.21		0.82	0.71–0.96		0.86	0.74–1.00		0.99	0.83–1.17		1.16	1.02–1.32	
1	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
≥2	1.23	1.03–1.48		1.11	0.95–1.30		1.14	0.98–1.34		1.22	1.02–1.46		1.41	1.25–1.60	
Smoking during pregnancy			<.001			<.001			<.001			<.001			<.001
No	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
Yes	1.36	1.16–1.60		1.33	1.16–1.54		1.40	1.21–1.62		1.43	1.22–1.68		1.52	1.35–1.72	
Planned pregnancy			.479			.150			.710			.457			.395
No	0.95	0.82–1.09		1.10	0.97–1.24		1.02	0.90–1.16		0.95	0.83–1.09		1.00	–	
Yes	1.00	–		1.00	–		1.00	–		1.00	–		1.05	0.94–1.17	
<i>Child variables</i>															
Sex			<.001			.007			<.001			.582			.002
Male	2.10	1.83–2.41		1.19	1.05–1.35		0.74	0.65–0.84		0.96	0.85–1.10		1.00	–	
Female	1.00	–		1.00	–		1.00	–		1.00	–		1.18	1.06–1.31	
Low birthweight			.227			.229			.925			.305			.090
No	1.00	–		1.00	–		1.00	–		1.00	–		1.00	–	
Yes	1.17	0.90–1.52		1.15	0.91–1.46		1.01	0.80–1.27		1.16	0.87–1.53		1.19	0.97–1.46	

current maternal depression and child victimization (correlation = 0.33,  $P < .001$ ) (Georgiou, 2008). It corroborated our results, observing that children of depressive mothers were victimized at school significantly more than those of nondepressive mothers ( $F(206, 1) = 6.36$ ;  $P < .01$ ) (Georgiou, 2008). Although Bowes et al., 2009, found no association between maternal depression when the child was five and bullying involvement at seven (OR = 1.5; 95%CI 0.9–2.4), as these authors adjusted their analysis for child internalizing and externalizing behavior, the association might be mediated (Bowes et al., 2009), since

children of depressed mother are more likely to have internalizing and externalizing behaviors, also linked to the likelihood of being victimized (Hodges, Boivin, Vitaro, & Bukowski, 1999; Matijasevich et al., 2015).

According to the literature, children with lower social competence, lower self-esteem, higher anxiety, lack of social self-efficacy, lower self-regard and greater withdrawal are more likely to be bullied (Guerra, Williams, & Sadek, 2011; Luk et al., 2016; Meland, Rydning, Lobben, Bredablik, & Ekeland, 2010; Nation, Vieno, Perkins, & Santinello, 2008;

**TABLE 2** Association of maternal mood symptoms during pregnancy with child peer-victimization score at 11 years (database with multiple imputation for missing data)

Maternal mood symptoms during pregnancy	Ordinal odds for higher child peer-victimization score											
	Model 1			Model 2			Model 3			Model 4		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Physical victimization	1.39	1.19–1.62	<.001	1.33	1.14–1.56	<.001	1.31	1.12–1.53	.001	1.30	1.11–1.53	.001
Verbal victimization	1.38	1.19–1.59	<.001	1.33	1.15–1.54	<.001	1.30	1.12–1.50	<.001	1.29	1.12–1.49	.001
Social manipulation	1.19	1.03–1.38	.017	1.14	0.99–1.33	.071	1.12	0.96–1.29	.145	1.12	0.97–1.30	.127
Attacks on property	1.23	1.05–1.44	.011	1.18	1.01–1.39	.043	1.15	0.98–1.35	.084	1.15	0.98–1.35	.090
Any victimization	1.32	1.14–1.52	<.001	1.26	1.09–1.45	.002	1.22	1.05–1.41	.008	1.22	1.05–1.41	.008

Model 1 = crude analysis. Model 2 = Model 1 + family income and schooling. Model 3 for physical victimization, social manipulation, attacks on property and any victimization, Model 2 + maternal skin color, parity, smoking during pregnancy.

Model 3 for verbal victimization = Model 2 + maternal skin color, parity, smoking during pregnancy, and planned pregnancy.

Model 4 for physical victimization, social manipulation, and any victimization, Model 3 + child's sex.

Model 4 for verbal victimization = Model 3 + child's sex and low birthweight.

Model 4 for attacks on property = Model 3 + low birthweight.

Navarro, Yubero, & Larrañaga, 2015; Perren & Alsaker, 2006). Despite this general profile, some differences have been found regarding the way victims react to aggression; victims are not a homogeneous group, some are passive, submissive victims, and react by crying or withdrawing, while others are aggressive victims, with a negative attitude toward violence (Brockenbrough, Cornell, & Loper, 2002; Olweus, 1993). Since we did not assess aggressor status among the adolescents, we could not distinguish those who were just victims from those who were bully-victims and, therefore, were not able to better determine if maternal depression relates more to one type of victim than others.

Research on different forms of bullying victimization has suggested specificities in correlates and predictors and the success of interventions may be improved by the ability to identify variations in risk factors according to the form of bullying (Solberg & Olweus, 2003). For instance, covert bullying (e.g., social manipulation) is more frequently reported by females and older students, while overt bullying (e.g., physical, verbal) is more frequently reported by males and younger students (Carbone-Lopez, Esbensen, & Brick, 2010; Smith & Madsen, 2001). Our results were more consistent with physical bullying victimization, despite associations with other forms of bullying. Previous literature only assessed bullying as a whole, preventing us from making comparisons. Nonetheless, we add evidence suggesting that physical victimization might be the underlying component responsible for the general associations found in the literature, and needs further investigation.

The strengths of this study are the use of a large prospective birth cohort with a high response rate, the use of validated measures of exposure and outcomes, the assessment of different types of bullying victimization, and the adjustment for several confounding variables.

This study has also some limitations. First, the magnitude of all associations was substantially reduced after adjustment for confounding. This highlights the importance of confounding and the hypothesis that

residual confounding could explain the associations found cannot be completely ruled out. Other studies are necessary to add evidence to the literature.

Second, although the proportion of missing values in the database was around 20%, the use of multiple imputation analysis to assess the impact of missing values resulted in effect estimates that were essentially the same as those without imputation, which provides some assurance against substantial selection bias (Royston & White, 2011; Spratt et al., 2010; Sterne et al., 2009).

Third, data on maternal depression at 3 months were only available for a subsample. Early maternal depression could be important to the trajectories of maternal mood and consequently to the association with bullying victimization. Nonetheless, similar-shaped trajectories of maternal depression were observed when the analyses were limited to the subsample with EPDS information at 3 months, suggesting this was not the case (Matijasevich et al., 2015). In addition, we used a single question for the assessment of maternal mood during pregnancy, which could be considered a limitation of the study. However, in a previous analysis with mothers from the cohort aiming to identify longitudinal patterns of maternal depression between 3 months and 6 years postpartum, women in the "high-chronic" depression trajectory group reported the highest rates of positive answers to this question (Santos et al., 2014).

We have performed several analyses to study the associations of interest, and we have included many potential confounders in these analyses. We acknowledge that these multiple comparisons might be considered by some authors a source of inflated type I error (Bland & Altman, 1995). Therefore, we performed an analysis using Bonferroni adjustments and most of the associations persisted after adjustment. There are strong epidemiological bases for not recommending multiple comparison adjustment (Greenland, 2008; Perneger, 1998; Rothman, 1990; Savitz & Olshan, 1995).

Finally, our results were drawn for a single middle-sized city and may not represent the Brazilian population as a whole.

**TABLE 3** Association of current maternal depression and child peer-victimization score at 11 years (database with multiple imputation for missing data)

Maternal depression at 11 years follow-up	Ordinal odds for higher child peer-victimization score											
	Model 1			Model 2			Model 3			Model 4		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
<i>Physical victimization</i>												
Maternal depression			<.001			.007			.053			.023
None	1.00	(reference)		1.00	(reference)		1.00	(reference)		1.00	(reference)	
Mild	1.14	0.91–1.41		1.09	0.88–1.36		1.03	0.82–1.28		1.01	0.80–1.27	
Severe	1.46	1.21–1.75		1.38	1.15–1.66		1.29	1.07–1.56		1.34	1.10–1.62	
<i>Verbal victimization</i>												
Maternal depression			<.001			.010			.108			.085
None	1.00	(reference)		1.00	(reference)		1.00	(reference)		1.00	1.07 (reference)	0.87–1.30
Mild	1.18	0.97–1.43		1.13	0.93–1.38		1.07	0.87–1.30		1.23	1.04–1.47	
Severe	1.39	1.18–1.63		1.31	1.11–1.55		1.22	1.03–1.45				
<i>Social manipulation</i>												
Maternal depression			<.001			.001			.012			.015
None	1.00	(reference)		1.00	(reference)		1.00	(reference)		1.00	(reference)	
Mild	1.29	1.05–1.57		1.24	1.01–1.51		1.19	0.97–1.47		1.20	0.97–1.47	
Severe	1.44	1.22–1.71		1.36	1.15–1.61		1.30	1.09–1.55		1.29	1.08–1.53	
<i>Attacks on property</i>												
Maternal depression			<.001			.002			.021			.020
None	1.00	(reference)		1.00	(reference)		1.00	(reference)		1.00	(reference)	
Mild	1.28	1.04–1.57		1.23	1.00–1.52		1.18	0.95–1.47		1.18	0.95–1.46	
Severe	1.44	1.21–1.73		1.37	1.14–1.64		1.30	1.08–1.57		1.30	1.08–1.57	
<i>Any victimization</i>												
Maternal depression			<.001			.001			.001			.005
None	1.00	(reference)		1.00	(reference)		1.00	(reference)		1.00	(reference)	
Mild	1.30	1.07–1.57		1.24	1.03–1.50		1.18	0.98–1.44		1.18	0.98–1.43	
Severe	1.49	1.27–1.76		1.40	1.18–1.65		1.32	1.11–1.56		1.32	1.12–1.56	

Model 1 = crude analysis.

Model 2 = Model 1 + family income and schooling.

Model 3 for physical victimization, social manipulation, attacks on property and any victimization = Model 2 + maternal skin color, parity, smoking during pregnancy and maternal mood symptoms during pregnancy.

Model 3 for verbal victimization = Model 2 + maternal skin color, parity, smoking during pregnancy, planned pregnancy and maternal mood symptoms during pregnancy.

Model 4 for physical victimization, social manipulation and any victimization = Model 3 + child's sex.

Model 4 for verbal victimization = Model 3 + child's sex and low birthweight.

Model 4 for attacks on property = Model 3 + low birthweight.

## 8 | CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH

Maternal depression is very common and has short-term and long-term negative consequences for the individual and her family, including the offspring. The high-chronic and increasing trajectories of maternal depression, which comprised 5.2 and 11.1% of mothers respectively, indicate deficiencies in the identification and treatment of this condition by the health system. Therefore, health actions in this field should be improved.

Equally highly prevalent and damaging is bullying victimization, but far less attention has been paid to this issue by middle-income

countries. In Brazil, there is no national regulation on school bullying and teachers are not trained to identify and deal with bullying behavior systematically. Preventive measures are lacking and urgently needed.

By hypothesizing that maternal depression might increase the risk of victimization, we do not suggest that mothers should be blamed for victimization entirely, or even primarily. Many factors contribute to victimization, and therefore, a broad theoretical framework should be used to better understand bullying. Moreover, although parental behavior at home or exposure to depression in utero, may sometimes initiate a chain of events that increases their child's vulnerability to victimization by peers, other individuals, relational and school factors,

**TABLE 4** Association of maternal depression trajectories with child peer-victimization score (database with multiple imputation for missing data)

	Ordinal odds for higher child peer-victimization score							
	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<i>Physical victimization</i>								
Maternal depression trajectories	$P < .001$		$P = .008$		$P = .129$		$P = .151$	
Group 1 "low"	1.00	(reference)	1.00	(reference)	1.00	(reference)	1.00	(reference)
Group 2 "moderate low"	1.29	1.08–1.53	1.25	1.05–1.49	1.20	1.00–1.44	1.18	0.98–1.41
Group 3 "decreasing"	1.26	0.95–1.66	1.16	0.88–1.54	1.06	0.80–1.42	1.04	0.78–1.39
Group 4 "increasing"	1.49	1.18–1.88	1.40	1.10–1.77	1.27	0.99–1.63	1.24	0.96–1.59
Group 5 "chronic high"	1.78	1.29–2.47	1.63	1.17–2.27	1.39	0.98–1.97	1.44	1.01–2.04
<i>Verbal victimization</i>								
Maternal depression trajectories	$P < .001$		$P = .007$		$P = .170$		$P = .127$	
Group 1 "low"	1.00	(reference)	1.00	(reference)	1.00	(reference)	1.00	(reference)
Group 2 "moderate low"	1.17	1.01–1.35	1.13	0.98–1.31	1.09	0.94–1.26	1.09	0.94–1.26
Group 3 "decreasing"	1.51	1.20–1.89	1.41	1.12–1.77	1.28	1.01–1.63	1.28	1.00–1.62
Group 4 "increasing"	1.45	1.19–1.78	1.36	1.11–1.67	1.24	1.01–1.53	1.24	1.00–1.53
Group 5 "chronic high"	1.40	1.04–1.89	1.28	0.95–1.74	1.08	0.78–1.49	1.09	0.79–1.50
<i>Social manipulation</i>								
Maternal depression trajectories	$P < .001$		$P = .001$		$P = .017$		$P = .012$	
Group 1 "low"	1.00	(reference)	1.00	(reference)	1.00	(reference)	1.00	(reference)
Group 2 "moderate low"	1.25	1.08–1.45	1.21	1.04–1.40	1.18	1.02–1.38	1.20	1.03–1.40
Group 3 "decreasing"	1.44	1.15–1.80	1.33	1.06–1.66	1.27	1.00–1.60	1.28	1.01–1.62
Group 4 "increasing"	1.61	1.30–1.99	1.51	1.22–1.86	1.43	1.15–1.78	1.45	1.17–1.81
Group 5 "chronic high"	1.60	1.18–2.18	1.46	1.07–1.99	1.32	0.95–1.84	1.30	0.94–1.81
<i>Attacks on property</i>								
Maternal depression trajectories	$P < .001$		$P < .001$		$P = .004$		$P = .002$	
Group 1 "low"	1.00	(reference)	1.00	(reference)	1.00	(reference)	1.00	(reference)
Group 2 "moderate low"	1.30	1.09–1.55	1.27	1.07–1.51	1.24	1.04–1.48	1.24	1.04–1.48
Group 3 "decreasing"	1.27	0.98–1.65	1.19	0.91–1.55	1.13	0.86–1.48	1.13	0.86–1.49
Group 4 "increasing"	1.58	1.25–1.99	1.48	1.17–1.88	1.39	1.09–1.78	1.40	1.10–1.78
Group 5 "chronic high"	2.11	1.55–2.89	1.95	1.42–2.68	1.78	1.27–2.48	1.78	1.28–2.49
<i>Any victimization</i>								
Maternal depression trajectories	$P < .001$		$P < .001$		$P = .029$		$P = .033$	
Group 1 "low"	1.00	(reference)	1.00	(reference)	1.00	(reference)	1.00	(reference)
Group 2 "moderate low"	1.26	1.10–1.44	1.22	1.06–1.39	1.18	1.02–1.35	1.17	1.02–1.34
Group 3 "decreasing"	1.50	1.19–1.89	1.37	1.08–1.74	1.26	1.00–1.61	1.26	0.99–1.60
Group 4 "increasing"	1.55	1.24–1.93	1.44	1.16–1.80	1.33	1.06–1.67	1.32	1.06–1.66
Group 5 "chronic high"	1.82	1.36–2.44	1.64	1.22–2.19	1.41	1.04–1.90	1.41	1.04–1.91

Model 1 = crude analysis.

Model 2 = Model 1 + family income and schooling.

Model 3 for physical victimization, social manipulation, attacks on property and any victimization = Model 2 + maternal skin color, parity, smoking during pregnancy and maternal mood symptoms during pregnancy.

Model 3 for verbal victimization = Model 2 + maternal skin color, parity, smoking during pregnancy, planned pregnancy and maternal mood symptoms during pregnancy.

Model 4 for physical victimization, social manipulation and any victimization = Model 3 + child's sex.

Model 4 for verbal victimization = Model 3 + child's sex and low birthweight.

Model 4 for attacks on property = Model 3 + low birthweight.

may contribute to or prevent this high risk for children at school (Smith & Madsen, 2001).

Our results strengthen the evidence on the association between maternal depression and offspring bullying victimization, and physical victimization appears to be the main component. Nonetheless, several theoretical pathways for this causal link need to be tested. Future research should address these theoretical pathways in order to identify ways of breaking this cycle of victimization.

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## CONFLICT OF INTEREST

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## REFERENCES

- Azeredo, C., Rinaldi, A., de Moraes, C., Levy, R., & Menezes, P. (2015). School bullying: A systematic review of contextual-level risk factors in observational studies. *Aggression and Violent Behavior, 22*, 65–76. Retrieved from <https://doi.org/10.1016/j.avb.2015.04.006>
- Azeredo, C. M., Levy, R. B., Araya, R., & Menezes, P. R. (2015). Individual and contextual factors associated with verbal bullying among Brazilian adolescents. *BMC Pediatrics [Electronic Resource], 15*, 1–11. Retrieved from <https://doi.org/10.1186/s12887-015-0367-y>
- Ben-Shlomo, Y., & Kuh, D. (2002). A life course approach to chronic disease epidemiology: Conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology, 31*(2), 285–293.
- Betts, K. S., Williams, G. M., Najman, J. M., & Alati, R. (2014). Maternal depressive, anxious, and stress symptoms during pregnancy predict internalizing problems in adolescence. *Depression and Anxiety, 31*(1), 9–18. Retrieved from <https://doi.org/10.1002/da.22210>
- Betts, K. S., Williams, G. M., Najman, J. M., & Alati, R. (2015). The relationship between maternal depressive, anxious, and stress symptoms during pregnancy and adult offspring behavioral and emotional problems. *Depression and Anxiety, 32*(2), 82–90. Retrieved from <https://doi.org/10.1002/da.22272>
- Bland, J. M., & Altman, D. G. (1995). Multiple significance tests: the Bonferroni method. *BMJ, 310*, 170.
- Bowes, L., Arseneault, L., Maughan, B., Taylor, A., Caspi, A., & Moffitt, T. E. (2009). School, neighborhood, and family factors are associated with children's bullying involvement: A nationally representative longitudinal study. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(5), 545–553. Retrieved from <https://doi.org/10.1097/CHI.0b013e31819cb017>
- Bradshaw, C. P., Sawyer, A. L., & O'Brennan, L. M. (2009). A social disorganization perspective on bullying-related attitudes and behaviors: The influence of school context. *American Journal of Community Psychology, 43*(3–4), 204–220. Retrieved from <https://doi.org/10.1007/s10464-009-9240-1>
- Brockenbrough, K. K., Cornell, D. G., & Loper, A. B. (2002). Aggressive attitudes among victims of violence at school. *Education and Treatment of Children, 25*(3), 273–287.
- Carbone-Lopez, K., Esbensen, F.-A., & Brick, B. T. (2010). Correlates and consequences of peer victimization: Gender differences in direct and indirect forms of bullying. *Youth Violence and Juvenile Justice, 8*(4), 332–350. Retrieved from <https://doi.org/10.1177/1541204010362954>
- Cox, J. H., & Sagovsky, J. M. R. (1987). Detection of postnatal depression: Development of the 10 item Edinburgh postnatal depression scale. *British Journal of Psychiatry, 150*, 782–786.
- Currie, C., Zanotti, C., Morgan, A., Currie, D., Looze, M. d., Roberts, C., ... Barnekow, V. (2012). *Social determinants of health and well-being among young people. Health behaviour in school-aged children (HBSC) study. International report from the 2009/2010 survey*. Copenhagen, Denmark: WHO Regional Office for Europe.
- Enders, C. K. (2010). *Applied missing data analysis*. New York, London: Guilford Press.
- Fleming, L. C., & Jacobsen, K. H. (2010). Bullying among middle-school students in low and middle income countries. *Health Promotion International, 25*(1), 73–84. Retrieved from <https://doi.org/10.1093/heapro/dap1046>.
- Georgiou, S. N. (2008). Bullying and victimization at school: The role of mothers. *British Journal of Educational Psychology, 78*(Pt 1), 109–125. Retrieved from <https://doi.org/10.1348/000709907x204363>
- Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review, 14*(1), 1–27. Retrieved from <https://doi.org/10.1007/s10567-010-0080-1>
- Greenland, S. (2008). Multiple comparisons and association selection in general epidemiology. *International Journal of Epidemiology, 37*, 430–434.
- Guerra, N. G., Williams, K. R., & Sadek, S. (2011). Understanding bullying and victimization during childhood and adolescence: A mixed methods study. *Child Development, 82*(1), 295–310. Retrieved from <https://doi.org/10.1111/j.1467-8624.2010.01556.x>
- Hodges, E. V. E., Boivin, M., Vitaro, F., & Bukowski, W. M. (1999). The power of friendship: Protection against an escalating cycle of peer victimization. *Developmental Psychology, 35*(1), 94–101. Retrieved from <https://doi.org/10.1037/0012-1649.35.1.94>
- Hong, J. S., Kral, M. J., & Sterzing, P. R. (2015). Pathways from bullying perpetration, victimization, and bully victimization to suicidality among

- school-aged youth: A review of the potential mediators and a call for further investigation. *Trauma, Violence and Abuse*, 16(4), 379–390. Retrieved from <https://doi.org/10.1177/1524838014537904>
- Huizink, A. C., Mulder, E. J., & Buitelaar, J. K. (2004). Prenatal stress and risk for psychopathology: Specific effects or induction of general susceptibility? *Psychological Bulletin*, 130, 115–142.
- Jansen, D. E. M. C., Veenstra, R., Ormel, J., Verhulst, F. C., & Reijneveld, S. A. (2011). Early risk factors for being a bully, victim, or bully/victim in late elementary and early secondary education. The longitudinal TRAILS study. *BMC Public Health [Electronic Resource]*, 11, 440–440. Retrieved from <https://doi.org/10.1186/1471-2458-11-440>
- Kochel, K. P., Ladd, G. W., & Rudolph, K. D. (2012). Longitudinal associations among youth depressive symptoms, peer victimization, and low peer acceptance: An interpersonal process perspective. *Child Development*, 83(2), 637–650. Retrieved from <https://doi.org/10.1111/j.1467-8624.2011.01722.x>
- Lereya, S. T., Samara, M., & Wolke, D. (2013). Parenting behavior and the risk of becoming a victim and a bully/victim: A meta-analysis study. *Child Abuse and Neglect*, 37(12), 1091–1108. Retrieved from <https://doi.org/10.1016/j.chiabu.2013.03.001>
- Lereya, S. T., & Wolke, D. (2013). Prenatal family adversity and maternal mental health and vulnerability to peer victimisation at school. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 54(6), 644–652. Retrieved from <https://doi.org/10.1111/jcpp.12012>
- Liu, J., & Graves, N. (2011). Childhood bullying: A review of constructs, concepts, and nursing implications. 28(6), 556–568.
- Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*, 20(5), 561–92. Retrieved from [https://doi.org/10.1016/S0272-7358\(98\)00100-7](https://doi.org/10.1016/S0272-7358(98)00100-7)
- Luk, J. W., Patock-Peckham, J. A., Medina, M., Terrell, N., Belton, D., & King, K. M. (2016). Bullying perpetration and victimization as externalizing and internalizing pathways: A retrospective study linking parenting styles and self-esteem to depression, alcohol use, and alcohol-related problems. *Substance Use and Misuse*, 51(1), 113–125. Retrieved from <https://doi.org/10.3109/10826084.2015.1090453>
- Matijasevich, A., Murray, J., Cooper, P. J., Anselmi, L., Barros, A. J., Barros, F. C., & Santos, I. S. (2015). Trajectories of maternal depression and offspring psychopathology at 6 years: 2004 Pelotas cohort study. *Journal of Affective Disorders*, 174, 424–431. Retrieved from <https://doi.org/10.1016/j.jad.2014.12.012>
- Meland, E., Rydning, J. H., Lobben, S., Bredablik, H. J., & Ekeland, T. J. (2010). Emotional, self-conceptual, and relational characteristics of bullies and the bullied. *Scandinavian Journal of Public Health*, 38(4), 359–367. Retrieved from <https://doi.org/10.1177/1403494810364563>
- Mendes, A. V., Loureiro, S. R., Crippa, J. A., de Meneses Gaya, C., Garcia-Esteve, L., & Martin-Santos, R. (2012). Mothers with depression, school-age children with depression? A systematic review. *Perspectives in Psychiatric Care*, 48(3), 138–148. Retrieved from <https://doi.org/10.1111/j.1744-6163.2011.00318.x>
- Mynard, H., & Joseph, S. (2000). Development of the multidimensional peer-victimization scale. *Aggressive Behavior*, 26(2), 169–178.
- Nagin, D. (2005). *Group-based modeling of development*. Cambridge, MA: United States of America.
- Nagin, D., & Tremblay, R. E. (1999). Trajectories of boys' physical aggression, opposition, and hyperactivity on the path to physically violent and non-violent juvenile delinquency. *Child Development*, 70(5), 1181–1196.
- Narayanan, M. K., & Nærde, A. (2016). Associations between maternal and paternal depressive symptoms and early child behavior problems: Testing a mutually adjusted prospective longitudinal model. *Journal of Affective Disorders*, 196, 181–189. Retrieved from <https://doi.org/10.1016/j.jad.2016.02.020>
- Nation, M., Vieno, A., Perkins, D. D., & Santinello, M. (2008). Bullying in school and adolescent sense of empowerment: An analysis of relationships with parents, friends, and teachers. *Journal of Community and Applied Social Psychology*, 18(3), 211–232. Retrieved from <https://doi.org/10.1002/casp.921>
- Navarro, R., Yubero, S., & Larrañaga, E. (2015). Psychosocial risk factors for involvement in bullying behaviors: Empirical comparison between cyberbullying and social bullying victims and bullies. *School Mental Health*, 7(4), 235–248. Retrieved from <https://doi.org/10.1007/s12310-015-9157-9>
- Olweus, D. (1980). Familial and temperamental determinants of aggressive behavior in adolescent boys: A causal analysis. *Developmental Psychology*, 16, 644–660.
- Olweus, D. (1993). *Bullying at school: What we know and what we can do*. Oxford, UK: Blackwell.
- Perren, S., & Alsaker, F. D. (2006). Social behavior and peer relationships of victims, bully-victims, and bullies in kindergarten. *Journal of Child Psychology and Psychiatry*, 47(1), 45–57. Retrieved from <https://doi.org/10.1111/j.1469-7610.2005.01445.x>
- Perneger, T. V. (1998). What's wrong with Bonferroni adjustments. *BMJ*, 316(7139), 1236–1238.
- Plant, D. T., Pariante, C. M., Sharp, D., & Pawlby, S. (2015). Maternal depression during pregnancy and offspring depression in adulthood: Role of child maltreatment. *British Journal of Psychiatry*, 207(3), 213–220. Retrieved from <https://doi.org/10.1192/bjp.bp.114.156620>
- Rothman, K. J. (1990). No adjustments are needed for multiple comparisons. *Epidemiology*, 1, 43–46.
- Royston, P., & White, I. R. (2011). Multiple imputation by chained equations (MICE): Implementation in stata. *Journal of Statistical Software*, 45(4), 1–20.
- Santos, I. S., Barros, A. J., Matijasevich, A., Zanini, R., Chrestani Cesar, M. A., Camargo-Figuera, F. A., ... Victora, C. G. (2014). Cohort profile update: 2004 Pelotas (Brazil) Birth Cohort Study. Body composition, mental health and genetic assessment at the 6 years follow-up. *International Journal of Epidemiology*, 43(5), 1437–1437a–f. Retrieved from <https://doi.org/10.1093/ije/dyu144>
- Santos, I. S., Matijasevich, A., Barros, A. J., & Barros, F. C. (2014). Antenatal and postnatal maternal mood symptoms and psychiatric disorders in pre-school children from the 2004 Pelotas Birth Cohort. *Journal of Affective Disorders*, 164, 112–117. Retrieved from <https://doi.org/10.1016/j.jad.2014.04.033>
- Santos, I. S., Matijasevich, A., Tavares, B. F., Barros, A. J., Botelho, I. P., Lapolli, C., ... Barros, F. C. (2007). Validation of the Edinburgh Postnatal Depression Scale (EPDS) in a sample of mothers from the 2004 Pelotas Birth Cohort Study. *Cadernos De Saude Publica*, 23(11), 2577–2588.
- Savitz, D. A. & Olshan, A. F. (1995). Multiple comparisons and related issues in the interpretation of epidemiologic data. *Am J Epidemiol.*, 142, 904–908.
- Schwartz, D., Proctor, L., & Chien, D. (2001). The aggressive victim of bullying: Emotional and behavioral dysregulation as a pathway to victimization by peers. In J. Juvonen & S. Graham (Eds.), *Peer harassment in school: The plight of the vulnerable and victimized*. New York: Guilford Press, pp. 147–174.
- Smith, P. K. S., & Madsen, K. (2001). Characteristics of victims of school bullying: Developmental changes in coping strategies and skills. In J. Juvonen & S. Graham (Eds.), *Peer harassment in school: The plight of the vulnerable and victimized*. New York: Guilford Press, pp. 332–349.

- Solberg, M. E., & Olweus, D. (2003). Prevalence estimation of school bullying with the Olweus Bully/Victim Questionnaire. *Aggressive Behavior, 29*(3), 239–268. Retrieved from <https://doi.org/10.1002/ab.10047>
- Spratt, M., Carpenter, J., Sterne, J. A., Carlin, J. B., Heron, J., Henderson, J., & Tilling, K. (2010). Strategies for multiple imputation in longitudinal studies. *American Journal of Epidemiology, 172*(4), 478–487. Retrieved from <https://doi.org/10.1093/aje/kwq137>
- Sterne, J. A., White, I. R., Carlin, J. B., Spratt, M., Royston, P., Kenward, M. G., ... Carpenter, J. R. (2009). Multiple imputation for missing data in epidemiological and clinical research: Potential and pitfalls. *BMJ, 338*, b2393.
- Talge, N. M., Neal, C., & Glover, V. (2007). Antenatal maternal stress and long-term effects on child neurodevelopment: How and why? *Journal of Child Psychology and Psychiatry and Allied Disciplines, 48*(3–4), 245–261. Retrieved from <https://doi.org/10.1111/j.1469-7610.2006.01714.x>
- Waters, C. S., Hay, D. F., Simmonds, J. R., & van Goozen, S. H. (2014). Antenatal depression and children's developmental outcomes: Potential mechanisms and treatment options. *European Child and Adolescent Psychiatry, 23*(10), 957–971. Retrieved from <https://doi.org/10.1007/s00787-014-0582-3>
- Wolke, D., & Lereya, S. T. (2015). Long-term effects of bullying. *Archives of Disease in Childhood, 100*(9), 879–885. Retrieved from <https://doi.org/10.1136/archdischild-2014-306667>
- Zwierzynska, K., Wolke, D., & Lereya, T. S. (2013). Peer victimization in childhood and internalizing problems in adolescence: A prospective longitudinal study. *Journal of Abnormal Child Psychology, 41*(2), 309–323. Retrieved from <https://doi.org/10.1007/s10802-012-9678-8>

## SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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