Factors associated with peer victimization among Brazilian low-income adolescents

ABSTRACT

Exposure to peer aggression and bullying victimization are both expressions of peer victimization but distinct constructs among adolescents. This study examined the potential associations between peer victimization and individual/family/peer factors and assessed whether the factors associated with peer aggression differed from those related to bullying victimization. This cross-sectional study, conducted in a low-income Brazilian city characterized by poverty, inequality and violence, involved a three-stage probabilistic sampling plan that included a random selection of census units, eligible households, and the target child. Data collected from 669 in-school adolescents (11-15-years, 51.7% girls) during face-to-face confidential home interviews were analysed. The level of exposure to peer aggression was determined by the sum of the presence of 15 events (physical aggression, verbal harassment, social manipulation) occurring at different frequencies in the previous six months. Bullying victimization occurring more than once a week/most days in the previous six months was investigated after presenting a bullying victimization definition to participants which required them to feel harmed by their victimization experiences. Path analysis identified factors associated with peer aggression and bullying victimization. Suicide ideation/attempt was associated with bullying victimization, while being overweight, using alcohol (previous 12 months) and having no social support from a friend were associated with peer aggression. Community violence exposure (previous 12 months) was associated with both study outcomes. In conclusion, the fact that suicidality was associated with bullying victimization but not with peer aggression suggests that when adolescents recognize that peer victimization hurts their feelings, their mental health appears to be negatively affected.

Keywords: adolescent, bullying, aggression, risk factors

Introduction

Peer victimization at school is a worldwide problem that puts children and adolescents at risk of negative short- and long-term consequences in respect of their academic achievement (Samara et al., 2021), physical health (Schacter, 2021), and mental health (e.g., depression, anxiety, self-harm and attempted suicide) (Geoffroy et al., 2018; Koyanagi et al., 2019). In addition, since over 40% of Brazilian children and adolescents below the age of 15 live in low-income households (Fundação Abrinq, 2022), and youth from socioeconomically disadvantaged families are at greater at risk of being chronically victimized by their peers (Bowes et al., 2013), adolescents living in a low-income city can be considered a more vulnerable population for peer victimization. Therefore, investigating the impact of harmful peer aggression on adolescent mental health in Brazil is particularly important given the country social context.

Exposure to peer aggression and bullying victimization are both expressions of peer victimization. Exposure to peer aggression includes direct (physical/verbal) and indirect (social/relational) forms of aggressive behavior, while bullying victimization is characterized by the harmful intention of the perpetrator, the repetition of the aggressive behavior and a power imbalance between the aggressor and the target person, making it difficult for the victims to defend themselves (Olweus, 2013). The experiences of exposure to peer aggression and bullying victimization are often treated empirically as though they are conceptually indistinct. However, these two variables represent distinct constructs among adolescents as reported by Hellström et al. (2013) in Sweden, Söderberg and Björkqvist (2020) in Finland,

and Vieira et al. (2021) in Brazil, and each deserve special attention in relation to the potential differences in their risk and protective factors.

Risk factors for peer victimization at school include: *individual factors* - such as gender (Huang & Vidourek, 2019), being younger (Tan et al., 2019), being overweight (Koyanagi et al., 2020), using alcohol (Pengpid & Peltzer, 2019), having mental health problems such as anxiety/depression (Moore et al., 2017), delinquency (Kim et al., 2019) and hyperactivity (Rasalingam et al., 2017), reporting suicidal ideation or attempt (Holt et al., 2015; Katsaras et al., 2018), suffering maltreatment (Bowes et al., 2013), being victimized by community violence which generates peer rejection (Kelly et al., 2008) and witnessing community violence (Davis et al., 2020); *family factors* - such as maternal depression (Azeredo et al., 2017), low maternal emotional warmth (Bowes et al., 2013) and being exposed to family violence (Davis et al., 2020); and *peer factors* - such as having no close friends (Pengpid & Peltzer, 2019) and being aggressive with peers (Huang & Vidourek, 2019). Protective factors include resilience (Hinduja & Patchin, 2017), a positive perception of the school climate (Turner et al., 2014), peer support and high quality of student-teacher relationships (Huang & Vidourek, 2019).

Methodologically sound studies on the prevalence and/or factors associated with peer victimization at school are very scarce in Brazil. In 2009, the National Adolescent School-Based Health Survey investigated the prevalence of bullying victimization in the past 30 days in a representative sample of 60,973 ninth grade students from 26 State capitals and the Federal District of Brasília, and found that 5.4% (95% CI: 5.1-5.7) suffered bullying most of the time or always while 25.4% (95% CI: 24.8%-26.0%) were rarely or sometimes victimized by bullying (Malta et al., 2010). Based on the same database, the 30-day prevalence of verbal bullying occurring sometimes or more frequently was 14.2% (95% CI: 13.60-14.75) and associated factors were male gender, younger age, not living with both parents, exposure to

domestic violence, and under- or overweight (Azeredo et al., 2015). In 2012, a new survey involving another representative sample of ninth graders (n = 109,104) found a prevalence rate of bullying victimization (occurring most of the time or always) in the past 30 days of 7.2% (Malta et al., 2014).

The current study was guided by the general strain theory presented by Agnew that was originally developed to explain delinquency (Agnew, 1992), but later used to explain the impact of bullying victimization on adolescent self-harm and suicidal ideation (Hay & Meldrum, 2010; Kim et al., 2020). This theory hypothesizes that the strain (i.e., stress) related to bullying victimization leads to negative emotions such as depression and anxiety, which leads to suicidal ideation. Therefore, the current study focused on evaluating whether feelings of being harmed or hurt by the experienced peer victimization would be associated with mental health problems and suicidality. To achieve this objective, we assessed whether the factors associated with exposure to peer aggression differed from those related to bullying victimization, knowing that only bullying victimization required the adolescents to consider feeling harmed by the experienced peer victimization. This study also examined the potential associations between peer victimization in the previous six months and individual, family and peer factors among adolescents.

Methods

Study design and sampling

This was a cross-sectional study nested in a longitudinal study (Itaboraí Youth Study) that investigated a probabilistic community-based sample of 1,409 6-to-15-year-olds at baseline (response rate: 87.8%). The study was conducted in Itaboraí, a low-income medium-size city in the state of Rio de Janeiro, Southeast Brazil (218,008 inhabitants, 98% urban).

The Itaboraí Youth Study used a three-stage sampling procedure that involved a random sample of census units (107/420) using the probability proportional to size method, followed by a random sample of eligible households (15 in each selected census unit) and finally the random selection of a target child from among all eligible children in each participant household. The eligibility criteria were being a boy or a girl aged 6-15 years and residing with his/her biological, step or adoptive mother. Exclusion criteria were having an intellectual disability and the mother being younger than 18 years. More detailed information on the Itaboraí Youth Study methods can be found elsewhere (Bordin et al., 2018).

The baseline sample (n = 1,409) included 720 adolescents (11-15 years) of whom 94.4% were individually interviewed (n = 680). The current paper analyzed data reported by adolescents who had been attending school in the previous six months (n = 669).

Procedures and measures

Between February and December 2014, trained lay interviewers individually applied a questionnaire to adolescents (n = 680) and another questionnaire to mothers at home under confidential conditions (interviews were 60-90 min long).

We used two measures of peer victimization: exposure to peer aggression and bullying victimization (the study outcomes). Regarding peer aggression in the past six months, a 15-item scale investigated the occurrence of physical aggression (4 items), verbal harassment (5 items), and social manipulation (6 items) with the following possible answers: “not at all” (0), “once” (1), “more than once” (2). The level of exposure to peer aggression was determined by the sum of the 15 items (range: 0-30). The higher the score, the greater the exposure to peer aggression. Regarding bullying victimization, one question was asked to the adolescents (“How often have you been bullied in the past six months?”) after presenting them a definition of bullying victimization (“when one or more school peers are repeatedly

doing bad things to you such as name-calling, threatening, hitting, spreading rumors about you, excluding you from the group or teasing you to hurt your feelings"). This question was not restricted to the 15 peer aggression events examined previously but could be related to any type of peer victimization experienced by the study participants. Therefore, peer aggression registered the occurrence of events without considering the intention of the aggressor to harm/hurt the victim, while bullying victimization (that occurred more than once a week/most days in the previous six months vs. not at all/less than once a week) registered the occurrence of any peer aggressive events that made the participant feel harmed/hurt. Both measures did not require the existence of a power imbalance between the aggressor and the victim. In terms of the impact on the victims' mental health, we focused on "feeling harmed/hurt" as the important risk factor, and not on the victims being less powerful than the aggressors.

The two study outcomes and the potential associated factors considered are described in detail in Table 1. For instance, emotional problems, conduct problems and hyperactivity were measured by three scales from the self-rated Strengths and Difficulties Questionnaire (SDQ) for 11-to-17-year-olds (Woerner et al., 2004). Scale scores were classified in three categories: clinical, borderline, and normal. The greater the scale scores, the higher the odds of presenting a clinical disorder.

The questionnaires respectively applied to adolescents and mothers were developed by the authors of the Itaboraí Youth Study (Bordin et al., 2018) including items from existing standardized questionnaires (ex., SDQ) and items developed by the researchers (ex., bullying victimization) (Table 1). All variables of interest for this study are based on the report of the adolescents, except maternal education, maternal anxiety/depression, and the adolescent's age (registered on the mother's interview date). The supplementary figure shows the items from data collection instruments related to variables of interest for the study.

INSERT TABLE 1

Ethical considerations

All procedures performed in this study (interviews), which involved human participants, were in accordance with the ethical standards of the Brazilian National Committee for Ethics in Research (process 25000.182992/2011-76), and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. A written informed consent was obtained from the mothers confirming their voluntary participation and authorizing the participation of their son/daughter, and a written informed assent was obtained from all participating adolescents.

Statistical analysis

In this paper, absolute numbers of participants were unweighted (refer to the sample), while percentages were weighted (refer to the city population). Weighting was not used for the path analysis. Participants with missing data (n = 4) were excluded from the analysis. Path analysis (fully saturated model) was used to identify individual, family and peer factors associated with the two study outcomes: level of exposure to peer aggression and bullying victimization both in the previous six months. Path analysis was conducted using Mplus Version 7.4 (Muthén & Muthén, 2017) considering the shared covariance between the two study outcomes. When identifying independent variables to enter the multivariable model, we were guided by a literature review on factors associated with peer victimization as mentioned in the introduction. All potential associated factors described in Table 1 were included in the multivariable model. Statistical significance was evaluated with a significance level of 0.05.

Results

The current study interviewed 669 in-school adolescents (11-15-years; mean age ± SE: 13.01 ± 0.07 years; 51.7% girls). Table 2 presents the sample characteristics including the two study outcomes and the potentially associated factors.

INSERT TABLE 2

Path analysis multivariable model

This path analysis multivariable model had two dependent variables: exposure to peer aggression and bullying victimization. Four factors were significantly associated with exposure to peer aggression, namely: being overweight, alcohol use (past 12 months), no social support from a friend, and exposure to community violence (this included four mutually exclusive categories: victimization only, only witnessing violence, both and neither). The group with no exposure to community violence had lower peer aggression scores than the other three groups, with particularly large differences between the "both" group and the "neither" group (Table 3). Two factors were significantly associated with bullying victimization: suicidal ideation/attempt, and exposure to community violence (the "neither" group had lower scores than the group with victimization only and the group with both victimization and witnessing events, although the statistical effects were smaller in respect of bullying victimization than peer aggression) (Table 3).

INSERT TABLE 3

Discussion

The current study investigated the specific characteristics of individuals, schools, and neighborhoods that increased the likelihood of the adolescents being victimized by peers. Being overweight, alcohol use (past 12 months) and having no social support from a friend were associated with exposure to peer aggression. Reporting suicide ideation in the previous six months or having ever attempted suicide were associated with bullying victimization. Community violence exposure in the previous 12 months (being a victim only and being both a victim and a witness) was associated with both study outcomes.

Factors associated with exposure to peer aggression but not with bullying victimization

Being overweight

In our study, overweight was significantly associated with exposure to peer aggression events (physical, verbal, social) in the presence of several potential correlates. These results were compatible with review findings indicating that students who are overweight or obese suffer direct forms of peer aggression such as verbal teasing, name calling and physical violence, or experience indirect forms of peer aggression (social/relational) such as social exclusion, avoidance and being the subject of rumors (Puhl & Kim, 2013). In fact, overweight and obese students experience weight-based stigmatization from peers and teachers in educational settings (Puhl & Heuer, 2009) what increases the odds of being made fun of because of physical appearance, as demonstrated by a study conducted with 114,240 adolescents (12-15 years) living in 41 low-and middle-income countries (Koyanagi et al., 2020).

Alcohol use

Our results showed that exposure to peer aggression at school was associated with alcohol use among adolescents, confirming findings from a study conducted with in-school adolescents from five Asian countries (Pengpid & Peltzer, 2019). A possible explanation for this association is that victimized adolescents may use alcohol to relieve feelings of stress and cope with violence exposure at school independent of feeling harmed by their victimization experiences. This explanation is in accordance with the self-medication hypothesis mentioned by Hong et al. (2019) when evaluating 638 urban African American adolescents in Chicago to explore the link between exposure to peer aggression and substance use. The self-medication hypothesis proposes that victimized adolescents are likely to display internalizing problems and may turn to alcohol or drugs to reduce negative moods of emotions.

No social support from a friend

In our study, adolescents with no social support from friends were those more likely to suffer peer aggression at school. Therefore, it is reasonable to suppose that adolescents exposed to peer aggression may be those who are unpopular, socially rejected and with low social support from friends. This observation is in accordance with results from a longitudinal study that examined the differences in the levels of social status and friendship in peer victimization trajectories (Romera et al., 2021). The authors found that chronic victims maintained the lowest levels of social preference, perceived popularity and friendship over time.

A factor associated with bullying victimization but not with peer aggression events

Suicide ideation/attempt

In our study, suicide ideation/attempt was strongly associated with bullying victimization when controlling for a variety of potential correlates. This finding is in line with previous research conducted in different countries (Koyanagi et al., 2019; Baiden & Tadeo, 2020), systematic reviews and meta-analyses (Moore et al., 2017; Katsaras et al., 2018) that demonstrated that bullying victimization increases the risk for suicidal ideation and behavior. For instance, a systematic review and meta-analysis (Moore et al., 2017) found strong causal associations between bullying victimization and suicidal ideation and attempts. In this review, prospective studies provided evidence of a temporal relationship, showing that bullying victimization preceded suicide ideation and attempt. The direction of this association was consistent across different geographic regions, samples, study designs, and income levels investigated. Another systematic review and meta-analysis involving children and adolescents without predisposing factors for suicidality revealed that youth with all kinds of involvement in school bullying (victims only, bullies only, both bullies and victims) were more likely to present suicidal ideation and attempt, compared to non-involved participants (Katsaras et al., 2018). A possible mechanism to explain the association between cumulative peer victimization and suicidality is that individuals who respond to stressful situations with depressive feelings are more likely to attempt suicide as an escape from psychological distress and the negative emotions associated with it (Yildiz, 2020). A hypothesis raised by Koyanagi et al. (2019) when analyzing data from 134,229 adolescents aged 12-15 years living in 48 countries is that the association between bullying victimization and suicide attempts may be mediated by depression. This was confirmed by Cromer et al. (2019) who found evidence that cumulative victimization increases the risk for depressive symptoms which increases the risk for subsequent suicide ideation among adolescents. However, because temporal precedence is required for mediation to be tested, our cross-sectional study could not investigate the mediation effect of depressive symptoms.

Factors associated with both exposure to peer aggression and bullying victimization

Exposure to community violence

In our study, being a victim of community violence (particularly in combination with witnessing events) was associated with both study outcomes. Our findings are in line with previous research that revealed an association between bullying victimization and exposure to community violence as a victim (Kelly et al., 2008) or a witness (Davis et al., 2020). It is possible that adolescents living in disadvantaged, stressful and dangerous neighborhoods become accustomed to community violence victimization and therefore perceive violence in other environments, such as schools, to be normal. According to Hong and Espelage (2012), depending on the characteristics of the neighborhood environment, it can negatively influence how youth interact with their peers at school. Because schools are embedded in neighborhoods, an unsafe neighborhood environment can promote bullying behavior due to inadequate adult supervision or negative peer influences. When looking at possible mechanisms to explain the relationship between exposure to community violence and peer victimization at school, individual difficulties such as deficits in emotion regulation and social maladjustment with peers must be considered. For instance, Kelly et al. (2008) followed up 199 children living in economically distressed urban neighborhoods for two consecutive school years. The authors observed that violent victimization in the community predicted later peer rejection after accounting for the effects of initial levels of peer rejection, while peer rejection predicted later victimization in the community. In order to explain this bi-directional relationship between community violence victimization and rejection, Kelly et al. (2008) raised a hypothesis regarding the mediating role of deficits in emotion regulation but did not investigate it. They speculated if rejected children may be at a higher risk for

community violence victimization because of their personal attributes such as aggression, impulsivity, and emotional dysregulation, being possible that these personal attributes lead children to become rejected by their peers and to seek out dangerous situations in the community.

Study strengths and limitations

The strengths of the current study include the rigorous methods used to select a probabilistic community-based sample of adolescents; the high participation rate among the eligible individuals; the use of interviews to collect data given that a significant proportion of the participants could have had difficulty reading a self-administered questionnaire; the use of two different measures of exposure to peer victimization at school (exposure to peer aggression events, bullying victimization); differentiating victimization from witnessing community violence; and using a path analysis multivariable model to examine a variety of individual, family and peer factors potentially associated with peer victimization among low-income adolescents. However, some limitations of the study must be recognized such as the cross-sectional design of the study which prevented the establishment of causal effects between associated factors and peer victimization, and the investigation of potential mediators since temporal precedence is required for mediation to be tested.

Conclusion and recommendations

Factors associated with exposure to peer aggression (which does not require feeling harmed by the victimization experiences) differed to some extent from the factors associated with bullying victimization (which requires feeling harmed by the victimization experiences). The fact that suicidality was associated with bullying victimization but not with peer aggression suggests that when adolescents recognize that peer victimization hurts their

feelings, their mental health appears to be negatively affected. Therefore, educators, health professionals and public health researchers should be aware of the importance of including harm as the central aspect of the definition of peer victimization in order to identify the adolescents who will be at greater risk for suicide ideation and attempt. These adolescents will need attention in terms of further evaluation, follow-up and even treatment by mental health professionals.

Peer victimization in schools is observed in different countries around the world independent of local culture characteristics. In Brazil, the Unified National Health System provides free access to health services for the entire Brazilian population, and users are mainly people with low education and income (Ribeiro et al., 2006) who cannot afford private health plans. However, victims of harmful peer aggression deserve greater attention in the Public Health System since violence victimization continues to be overlooked and under-addressed, despite its deleterious consequences to the mental health of adolescents. Furthermore, because studies on peer victimization are still scarce, research efforts on prevalence, risk factors and effective interventions should be encouraged in the country.

Declaration of competing interest

The authors report no conflict of interest.

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Table 1. Variables of interest for the study: instruments applied, and definitions adopted.

STUDY VARIABLES*	INSTRUMENT	DEFINITION
Adolescent sex	Questionnaire applied to adolescents (item developed by the researchers).	Self-reported sex (boy vs. girl).
Adolescent age (years)	Questionnaire applied to mothers (item developed by the researchers).	Adolescent age on the mother's interview date (continuous variable).
Being overweight	Item 55 from the Youth Self-Report (YSR): "I am overweight" (Bordin et al., 2013).	Possible answers: "not true" (0), "somewhat or sometimes true" (1), "very true or often true" (2). Answers 1 and 2 identified overweight adolescents. A dichotomous variable was used in the path analysis (yes vs. no).
Negative perception of the school climate	Questionnaire applied to adolescents (item developed by the researchers).	Adolescents were asked: "In your opinion, is the school environment good for you?" Possible answers: "no" (0), "yes" (1).
Alcohol use	Questionnaire applied to adolescents (items developed by the researchers). First, a card was presented to the adolescents illustrating the definition of one dose of the alcoholic beverages most used by adolescents in Brazil. One can of beer, one glass of draft beer (350 ml), one glass of wine (90 ml), a small glass (30 ml) of vodka or cachaça (a liquor distilled from sugar cane) and a small bottle of an ice beverage, are all considered one dose, containing nearly 10-12 g of alcohol (Pinsky et al., 2010).	Adolescents were asked: "In the last 12 months, have you drunk at least one dose of any alcoholic beverage?" Possible answers: "no or never tried alcohol" (0), "yes" (1).
Adolescent-reported emotional problems, conduct problems and hyperactivity	The Brazilian version of the self-rated Strengths and Difficulties Questionnaire (SDQ) for 11-to-17-year-olds is a screening instrument to identify adolescents at risk for mental disorders [psychometric properties discussed by Woerner et al. (2004)]. Three variables (emotional problems, conduct problems, hyperactivity) were derived from the respective SDQ scales. Scale scores are classified in three categories: clinical, borderline, and normal. The greater the scale scores, the higher the odds of presenting a clinical disorder.	Emotional problem, conduct problem and hyperactivity scale scores in the clinical range according to pre-established cut-off points based on normative data from large population-based studies conducted in the United Kingdom (details at www.sdqinfo.org) since Brazilian cut-offs are not available. Three dichotomous variables were used in the path analysis (clinical vs. borderline/normal). See the supplementary figure for scale items.
Suicide ideation and/or having ever attempted suicide	Item 91 from the Youth Self-Report (YSR): "I think about killing myself" (Bordin et al., 2013), combined with one question about suicide attempts from the research questionnaire applied to adolescents.	Possible answers: "not true" (0), "somewhat or sometimes true" (1), "very true or often true" (2). Answers 1 and 2 identified suicide ideation. Adolescents were also asked: "Have you ever tried to kill yourself?" Possible answers: "no" (0), "yes" (1). A dichotomous variable was used in the path analysis: yes (suicide ideation in the past six months and/or having ever attempted suicide) vs. no (no suicide ideation and never attempted suicide).
Exposure to peer aggression at school	A 15-item scale included selected and modified items from the Arora's "My Life in School" checklist (Arora, 1994). An exploratory factor analysis found a 3-factor solution corresponding to three latent factors (physical aggression, verbal harassment, social manipulation). In Norway, a confirmatory factor analysis supported the scale	This scale investigated the occurrence of 15 events in the past six months: physical aggression (4 items); verbal harassment (5 items); and social manipulation (6 items). See the supplementary figure for scale items. Possible answers for all items: "not at all" (0), "once" (1), "more than once" (2). The level of exposure to peer aggression was determined by the sum of the 15 items (range: 0-30). The

	3-factor structure with the same latent variable interpretations (Rønning et al., 2004).	higher the score, the greater the exposure to peer aggression. Path analysis identified variables associated with peer aggression (study outcome).
Bullying victimization at school	After defining bullying victimization (when one or more school peers are repeatedly doing bad things to you such as name-calling, threatening, hitting, spreading rumors about you, excluding you from the group or teasing you to hurt your feelings), one question was asked: "How often have you been bullied in the past six months?" This question was not restricted to the 15 peer aggression events examined previously but could be related to any type of peer victimization experienced by the respondents.	Possible answers for this question: "not at all" (0), "less than once a week" (1), "more than once a week" (2), "almost every day" (3). A dichotomous variable was used in the path analysis as a study outcome (more than once a week/most days vs. not at all/less than once a week).
Severe physical punishment by parents	Brazilian version of the World Studies of Abuse in the Family Environment (WorldSAFE) Core Questionnaire (Bordin et al., 2009).	A scale of 8 items investigated severe physical punishment by one or both parents. See the supplementary figure for scale items. Possible answers for all items: "no" (0), "yes" (1). The number of positive items was used in the path analysis (range: 0-8).
Exposure to violence in the community: victimization and witnessed events that occurred outside school and home	Investigation of 8 topics (beatings and muggings, forced entry, being chased, arrests, threats, knife attacks, shootings, sexual molestation) selected from the Survey of Exposure to Community Violence – Self Report Version, developed at the National Institute of Mental Health by Richters and Saltzman (1990). Differently from the original Self Report Version, two separate items investigated beatings and muggings, and two new items were added (being around a shoot-out and suffering death threats).	Two scales of 11 items respectively investigated victimization and witnessed events in the past 12 months. See the supplementary figure for scale items. Possible answers for all items: "no" (0), "yes" (1). The variable "exposure to community violence" used in the path analysis included four mutually exclusive categories: victimization only, witnessing only, both and neither (reference category).
Social support	Questionnaire applied to adolescents (items developed by the researchers). Three separate questions investigated social support from an adult, a teacher and a friend.	Questions: (1) Do you have an adult you can count on if you really need help?, (2) Do you have a teacher you trust in, who you can ask for help or advice?, (3) In your group of friends, do you have anyone you can count on if you really need help? Possible answers: "no" (0), "yes" (1). Three dichotomous variables were used in the path analysis (no vs. yes).
Perceived parental rearing style: emotional warmth	Egna Minnen Beträffande Uppfostran – child version (EMBU-C): 33 items were selected from the Spanish version (Castro et al., 1993) and translated to Brazilian Portuguese from the original English version for adults (Perris et al., 1980) and adapted to be comprehensible for young adolescents (11-15 years). In our sample, a factor representing emotional warmth emerged from exploratory factor analysis (Cronbach's alpha = 0.89). The Brazilian version of EMBU-C has 20 items (13 for emotional warmth).	13 EMBU-C items evaluated parental emotional warmth. See the supplementary figure for scale items. Possible answers for all items: "never" (0), "occasionally" (1), "often" (2), "always" (3). The total score (sum of scores of items 1, 7, 9, 12, 14, 16, 20, 21, 24, 27, 29, 31 and 33) was used in the path analysis (range: 0-39).
Resilience	The Resilience Scale for Adolescents (READ), developed by Hjemdal and Friborg (Hjemdal et al., 2006; Von Soest et al., 2010) includes 28 exclusively positively phrased items that describe thoughts and feelings. In our sample, according to confirmatory factor analysis, the final model with 24 items (items 1, 4, 8 and 28 were	24 READ-Short Version items evaluated resilience. See the supplementary figure for scale items. Possible answers for all items: "I do not agree at all" (1), "I disagree" (2), "I do not agree or disagree" (3), "I partially agree" (4), "I totally agree" (5). The higher the scale total score, the higher the level of resilience.

	removed) was suggested to be the best (READ-Short Version).	The total score was used in the path analysis (range: 24-120).
Maternal education	Questionnaire applied to mothers (item developed by the researchers).	Mothers were asked to choose one of five categories for years of schooling: 0-3 years, 4-7 years, 8-10 years, complete high school or incomplete college, and complete college. Maternal education was dichotomized as 0-7 years (basic education not completed) and 8 or more years of schooling. This dichotomous variable was used in the path analysis (0-7 years vs. 8+ years).
Maternal anxiety/depression	The Self-Reporting Questionnaire (SRQ-20) (World Health Organization, 1994) is a screening instrument to identify anxiety/depression.	See the supplementary figure for SRQ-20 items. Possible answers for all items: “no” (0), “yes” (1). The sum of items results in a total score ranging from 0 to 20. In Brazil, a total score > 7 identifies anxiety/depression among women (de Jesus Mari & Williams, 1986). A dichotomous variable was used in the path analysis (total score > 7 vs. 0-7).

* All variables are based on the report of adolescents except maternal education, maternal anxiety/depression, and adolescent’s age (registered on the mother’s interview date).

Table 2. Sample characteristics (n = 669).

VARIABLES OF INTEREST FOR THE STUDY	N	WEIGHTED % (95% CI)
Study outcomes		
Exposure to peer aggression in the past six months (scores)[a]		
0	376	58.1 (52.9 – 63.0)
1-5	214	29.5 (25.4 – 33.9)
6-10	52	7.4 (5.2 – 10.3)
11-15	17	3.2 (1.9 – 5.4)
> 15	10	1.9 (0.9 – 3.9)
Bullying victimization in the past six months[b]	37	5.5 (3.7 – 8.0)
Potentially associated factors		
Adolescent male sex	327	48.3 (43.8 – 52.7)
Adolescent younger age (11-12 years)	259	38.0 (33.4 – 42.7)
Being overweight[c]	119	16.0 (12.8 – 19.9)
Negative perception of the school climate[d]	93	16.4 (13.2 – 20.2)
Alcohol use[e]	65	10.6 (7.6 – 14.5)
Clinical emotional problems (SDQ)	70	11.5 (8.6 – 15.2)
Clinical conduct problems (SDQ)	91	13.8 (10.5 – 18.0)
Clinical hyperactivity (SDQ)	75	9.8 (7.5 – 12.7)
Suicidal ideation (past six months)[c] and/or ever attempted	42	6.4 (4.5 – 9.1)
Any severe physical punishment by parents[e]	75	12.4 (9.2 – 16.4)
Exposure to community violence[e]		
Victimization only	30	4.6 (2.7 – 7.7)
Witnessing only	92	11.4 (8.5 – 15.3)
Both	65	9.4 (6.7 – 13.1)
Neither	482	74.5 (68.4 – 79.8)
No social support from		
Adult	51	8.3 (5.9 – 11.7)
Teacher	173	25.1 (20.8 – 30.0)
Friend	61	9.3 (7.0 – 12.4)
Low maternal education (0-7 years)	356	51.8 (45.6 – 58.0)
Maternal anxiety/depression (SRQ total score > 7)	157	25.0 (21.1 – 29.3)
Parental emotional warmth total score (13 items, range: 0-39)		Mean ± SD: 32.0 ± 7.0
Resilience total score (24 items, range: 24-120)		Mean ± SD: 107.7 ± 12.7

Notes: Absolute numbers of participants are unweighted (refer to the sample), and percentages are weighted (refer to the city population). All variables are based on the report of adolescents except maternal education, maternal anxiety/depression, and adolescent's age (registered on the mother's interview date). CI = Confidence interval; SDQ = Strengths and Difficulties Questionnaire; SRQ = Self-Reporting Questionnaire.

[a] Sum of the scale 15 items (outcome in the path analysis multivariable model),

[b] Occurring more than once a week or most days in the previous six months (outcome in the path analysis multivariable model),

[c] Variables derived from the Youth Self-Report (YSR) that have 1 missing value,

[d] Variable that has 2 missing values,

[e] Past 12 months.

Table 3. Factors associated with exposure to peer aggression and bullying victimization in the past six months according to path analysis model results (n = 665).

FACTORS	PEER AGGRESSION[a]					BULLYING VICTIMIZATION[b]				
	Estimate	S.E.	Est./S.E.	p	Standardized coefficient	Estimate	S.E.	Est./S.E.	p	Standardized coefficient
Adolescent sex (boy vs. girl)	0.455	0.263	1.732	0.083	0.132	0.081	0.206	0.393	0.694	0.072
Adolescent age (years)	-0.207	0.110	-1.890	0.059	-0.082	-0.145	0.098	-1.477	0.140	-0.176
Being overweight[e] (yes vs. no)	**0.813**	**0.319**	**2.545**	**0.011**	0.237	0.305	0.248	1.229	0.219	0.270
Negative perception of the school climate[f] (yes vs. no)	0.404	0.366	1.102	0.270	0.117	0.164	0.292	0.562	0.574	0.145
Alcohol use[c] (yes vs. no)	**1.123**	**0.393**	**2.861**	**0.004**	0.327	-0.014	0.328	-0.044	0.965	-0.013
Mental health (SDQ: clinical vs. borderline/normal)										
Emotional problems	0.395	0.375	1.053	0.292	0.115	0.475	0.283	1.680	0.093	0.421
Conduct problems	0.140	0.346	0.404	0.686	0.041	-0.024	0.313	-0.076	0.939	-0.021
Hyperactivity	0.225	0.381	0.591	0.555	0.066	0.073	0.320	0.227	0.821	0.064
Suicide ideation[d,e] and/or ever attempted (yes vs. no)	0.381	0.475	0.802	0.423	0.111	**0.749**	**0.326**	**2.300**	**0.021**	0.663
Severe physical punishment by parents[c,g]	-0.165	0.232	-0.710	0.478	-0.024	-0.100	0.271	-0.370	0.712	-0.044
Exposure to community violence[c] (vs. neither)										
Victimization only	**2.224**	**0.519**	**4.285**	**<0.001**	0.647	**0.805**	**0.410**	**1.966**	**0.049**	0.713
Witnessing only	**1.113**	**0.455**	**2.446**	**0.014**	0.324	0.570	0.304	1.877	0.061	0.504
Both	**3.795**	**0.314**	**12.070**	**<0.001**	1.104	**0.638**	**0.295**	**2.162**	**0.031**	0.565
Social support from (no vs. yes)										
Adult	-0.129	0.521	-0.247	0.805	-0.037	-0.073	0.424	-0.172	0.864	-0.064
Teacher	0.024	0.309	0.077	0.938	0.007	-0.082	0.257	-0.317	0.751	-0.072
Friend	**1.407**	**0.387**	**3.637**	**<0.001**	0.409	0.421	0.313	1.343	0.179	0.373
Maternal education (0-7 years vs. 8+ years)	0.142	0.274	0.518	0.604	0.041	-0.070	0.224	-0.315	0.753	-0.062
Maternal anxiety/depression (SRQ total score > 7 vs. 0-7)	-0.015	0.285	-0.052	0.958	-0.004	0.210	0.240	0.873	0.383	0.185
Parental emotional warmth total score	-0.023	0.019	-1.190	0.234	-0.046	0.006	0.020	0.301	0.763	0.037
Resilience total score	-0.017	0.011	-1.516	0.130	-0.063	-0.010	0.010	-1.008	0.314	-0.115

Notes: Boldface indicates statistical significance ($p < 0.05$); Estimate = Unstandardized regression coefficient; S.E. = Standard error; Est./S.E. = Z test statistic (Mplus computes p-values based on the standard normal distribution/Z distribution); p = Two-tailed p-value; SDQ = Strengths and Difficulties Questionnaire; SRQ = Self-Reporting Questionnaire.

[a] Sum of the scale 15 items,

[b] That occurred more than once a week/most days in the previous six months vs. not at all/less than once a week,

[c] Past 12 months,

[d] Past six months,

[e] Variables derived from the Youth Self-Report (YSR) that have 1 missing value,

[f] Variable that has 2 missing values,

[g] Number of parental behaviors (0-8).

Supplementary figure. Items from data collection instruments related to variables of interest for the study.

ADOLESCENT-REPORTED MENTAL HEALTH PROBLEMS

Emotional problems based on the Strengths and Difficulties Questionnaire (SDQ) (www.sdqinfo.org)

- I get a lot of headaches, stomach-aches or sickness
- I worry a lot
- I am often unhappy, down-hearted or tearful
- I am nervous in new situations. I easily lose confidence
- I have many fears, I am easily scared

Conduct problems based on the Strengths and Difficulties Questionnaire (SDQ) (www.sdqinfo.org)

- I get very angry and often lose my temper
- I usually do as I am told
- I fight a lot. I can make other people do what I want
- I am often accused of lying or cheating
- I take things that are not mine from home, school or elsewhere

Hyperactivity based on the Strengths and Difficulties Questionnaire (SDQ) (www.sdqinfo.org)

- I am restless, I cannot stay still for long
- I am constantly fidgeting or squirming
- I am easily distracted, I find it difficult to concentrate
- I think before I do things
- I finish the work I'm doing. My attention is good

ADOLESCENT-REPORTED EXPOSURE TO VIOLENCE

Exposure to peer aggression at school (Rønning et al., 2004)
(events occurring more than once in the past six months)

Physical aggression

- Another pupil has tried to kick him/her
- Another pupil has threatened him/her
- Another pupil has tried to trip him/her up
- Another pupil has tried to hit him/her

Verbal harassment

- Another pupil has called him/her names
- Another pupil has teased him/her
- Another pupil has teased him/her about his/her family
- Another pupil has teased him/her because he/she was different
- Another pupil has tried to hurt his/her feelings

Social manipulation

- Another pupil has ganged up on him/her
- Another pupil has tried to make him/her hurt other people
- Another pupil has tried to get him/her into trouble
- Another pupil has made him/her do something he/she didn't want to
- Another pupil has threatened to tell on him/her
- Another pupil has told a lie about him/her

Exposure to violence at home (Bordin et al., 2009)
(severe physical punishment by one or both parents occurring at least once in the past 12 months)

- Being hit with an object (e.g. stick, broom, cane, belt)
- Being kicked
- Being choked by putting hands (or something else) around his/her neck
- Being smothered with hand or pillow
- Being burned, scalded or branded
- Being beaten
- Being threatened with a knife or gun
- Being harmed with a knife or gun

Exposure to violence in the community (Richters & Saltzman, 1990)
(victimization events occurring outside home and school at least once in the past 12 months)
(witnessed events = seeing this happening with another person)

- Being mugged

Someone has broken into or tried to force their way into the house/apartment when he/she was there
Being chased by gangs or individuals
Being picked-up, arrested or taken to the precinct by the police
Being threatened by someone with serious physical harm
Suffering death threats
Being beaten-up
Being attacked or stabbed with a knife
Being around a shoot-out
Being shot
Being sexually molested by someone much older than him/her

ADOLESCENT-REPORTED PROTECTIVE FACTORS

Perceived parental rearing style: emotional warmth (Brazilian version of EMBU-C) (Castro et al., 1993; Perris et al., 1980)

My parents show that they like me through the way they behave and what they say
If things do not go well for me, my parents try to comfort me and support me to move on
If I have something difficult to do, I feel that my parents support me
I feel that my parents like me
I think my parents respect my opinions
I feel that my parents want to be together with me
My parents try to do things so that I have fun and learn things
My parents often pay me compliments
When I'm sad, I can count on my parents to comfort me
My parents accept me the way I am
My parents usually participate with me in things I like to do
I think there is love and affection between my parents and I
My parents usually hug me

Resilience (READ-Short) (Hjemdal et al., 2006; Von Soest et al., 2010)

I function better when I know what I want
My friends and family often support me
In my family, we have the same opinion about what are the important things in life
It's easy for me to make people feel good around me
I know how to get where I want in life
My friends stand together
I feel good when I'm with my family
It's easy for me to make new friends
When it is impossible to change something, I forget about it and don't worry anymore
I know how to use my time to do what I need to do
My friends and family really care about me
In my family, we have the same opinion about almost everything
It's easy for me to talk to people I've just met
I think I'm good at what I do
In my family, we have some habits that make our daily routine easier
I always have someone to help me when I need help
When I have to choose from several options, I almost always know how to choose what is best for me
Even when very bad things happen, my family thinks that the future will be all right
I always talk about interesting things
Believing in me helps me overcome tough times
In my family, we support each other
I always find something to say to comfort people when they are sad
I usually see the positive side even in bad things
In my family, we like to do things together

MOTHER-REPORTED ANXIETY/DEPRESSION

Maternal anxiety/depression based on the Self-Reporting Questionnaire (SRQ) World Health Organization, 1994)

Do you often have headaches?
Is your appetite poor?

Do you sleep badly?
Are you easily frightened?
Do your hands shake?
Do you feel nervous, tense or worried?
Is your digestion poor?
Do you have trouble thinking clearly?
Do you feel unhappy?
Do you cry more than usual?
Do you find it difficult to enjoy your daily activities?
Do you find it difficult to make decisions?
Is your daily work suffering?
Are you unable to play a useful part in life?
Have you lost interest in things?
Do you feel that you are a worthless person?
Has the thought of ending your life been on your mind?
Do you feel tired all the time?
Do you have uncomfortable feelings in your stomach?
Are you easily tired?