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Relationship between bullying with depressive symptoms and health-related quality of life among Brazilian high school students from Southern Brazil

Relação entre *bullying* com sintomas depressivos e qualidade de vida relacionada a saúde em estudantes brasileiros do ensino médio do sul do Brasil

Relación entre *bullying* y síntomas depresivos y calidad de vida relacionada con la salud en estudiantes brasileños de secundaria en el sur de Brasil

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Resumo *O objetivo é analisar as associações da vitimização e perpetração do bullying com sintomas depressivos e qualidade de vida relacionada à saúde (QVRS) em uma amostra de adolescentes brasileiros do ensino médio. Os adolescentes (n=852, 50,2% do sexo feminino, idade média: 16,4 anos) responderam a um questionário sobre sintomas depressivos elaborado a partir da Escala de Depressão do Center for Epidemiologic Studies. A QVRS foi medida através do Índice Kidscreen-10, e a informação relacionada com o bullying foi extraída de duas questões diferentes (vítimas e agressores). Foram utilizados modelos de regressão logística multinível. Os adolescentes vítimas de bullying apresentaram níveis mais altos de sintomas depressivos e uma percepção mais baixa de QVRS do que aqueles que não eram vítimas. Por outro lado, foi encontrada uma relação inversa entre os perpetradores de bullying em comparação com aqueles que não eram perpetradores. O impacto na saúde dos adolescentes varia de acordo com o seu papel em situações de bullying.*
Palavras-chave *Bullying, Qualidade de vida relacionada a saúde, Sintomas depressivos, Escolas, Comportamento do adolescente*

Abstract *The aim is to analyze the associations of bullying victimization and perpetration with depressive symptoms and health-related quality of life (HRQoL) in a sample of Brazilian high school adolescents. Adolescents (n=852, 50.2% female, mean age: 16.4 years) answered a questionnaire about depressive symptoms drawn from the Center for Epidemiologic Studies Depression Scale. HRQoL was measured using the Kidscreen-10 Index, and bullying-related information was extracted from two different questions (victims and perpetrators). Multilevel logistic regression models were used. Adolescent victims of bullying had higher levels of depressive symptoms and a lower perception of HRQoL than those who were not victims. On the other hand, an inverse relationship was found for perpetrators of bullying compared to those who were not perpetrators. Adolescents' health-related impacts varied according to their role in bullying situations.*
Key words *Bullying, Health-related Quality of life, Depressive Symptoms, Schools, Adolescent Behavior*

Resumen *El objetivo es analizar las asociaciones de victimización y perpetración de bullying con síntomas depresivos y calidad de vida relacionada con la salud (CVRS) en una muestra de adolescentes brasileños de secundaria. Los adolescentes (n=852, 50,2% mujeres, edad media: 16,4 años) respondieron a un cuestionario sobre síntomas depresivos extraído de la Escala de Depresión del Centro de Estudios Epidemiológicos. La CVRS se midió mediante el índice Kidscreen-10 y la información relacionada con el acoso se extrajo de dos preguntas diferentes (víctimas y agresores). Se utilizaron modelos de regresión logística multinivel. Los adolescentes que fueron víctimas de bullying tuvieron mayores niveles de síntomas depresivos y una menor percepción de CVRS que aquellos que no fueron víctimas. Por otro lado, se encontró una relación inversa entre los perpetradores de acoso escolar respecto a aquellos que no lo fueron. El impacto en la salud de los adolescentes varía según su papel en situaciones de bullying.*
Palabras clave *Bullying, Calidad de vida relacionada con la salud, Síntomas depresivos, Escuelas, Comportamiento adolescente*

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Introduction

Bullying is defined as aggressive behavior in which an individual is harmed by an imbalance of power[1]. It manifests in various forms, frequencies, and levels of aggression, ranging from teasing to physical abuse[2]. Common manifestations include physical (e.g., pushing and punching), verbal (e.g., teasing and threats), and emotional (e.g., shaming) aggressions[3]. Bullying has been associated with adverse health and educational outcomes in childhood and adolescence, with potential lasting effects into adulthood[4-6].

A degree of involvement in bullying has been shown to be commonplace among young people, with a report by the United Nations Educational, Scientific, and Cultural Organization showing that 32% of surveyed children worldwide reported being victims of bullying in the previous month[4], with prevalence ranging from 22.8% in Central America to almost 50% in Sub-Saharan Africa. Although several reports and research studies have focused on victims, the impact of bullying on adolescents' health may differ among victims, perpetrators, and bully-victims (those who are both victims and perpetrators). Victims of bullying often report adverse health outcomes such as self-harm, anxiety, headaches, sleep problems, and low self-esteem[5,7]. Conversely, perpetrators and bully-victims may experience low educational attainment, externalizing problems, and illicit drug misuse[5,8].

Previous studies have shown that adolescents who have been bullied are more susceptible to developing mental problems such as depression[5,9]. A review of studies involving Latino adolescents in English-speaking countries found a statistically significant relationship between bullying and depression in all included studies[10]. Another study involving adolescents reveals that those who are victims of bullying are more likely to develop depression compared to those who are not victims. In addition, those who simultaneously play the roles of victim and aggressor are even more likely to develop depressive symptoms[11]. However, the role of adolescents in bullying situations may be related to mental health outcomes according to different pathways which are not well understood. For example, although victims of bullying are more likely to withdraw from social activities to avoid further victimization and peer rejection[12], bullying perpetration may be used as a mean of self-affirmation among peers or to achieve greater social status and popularity[7,13]. Moreover, the effect of bullying on metal health are expected to extent to other related outcomes, such as health-related quality of life (HRQoL), which reflects subjective perceptions in various dimensions of life[14-16].

HRQoL is multidimensional and differs from measures of mental ill-health that often focus on the presence of specific disease or disorder symptoms[17]. In addition, bullying has various forms of aggression (e.g. physical, verbal and emotional aggression), which can affect HRQoL through different physical, psychological, emotional, and social domains[18,19]. Although systematic review studies have identified that adolescent victims of bullying have lower HRQoL scores, with more affected domains such as physical and psychological well-being, social relationships (parents), and the school environmentt[20], caution is advised due to the lack of evidence on the possible effects according to the different roles of bullying related to the HRQoL of adolescents, especially in low- and middle-income countries, such as Brazil[20,21].

Brazil has one of the highest homicide rates in the world, with higher rates of violence even among high school students[22], often aggravated by social inequalities and racism[23] Despite the uniqueness of the groups of aggressors, victims or victim-aggressors, the evidence on the association with negative mental health outcomes in highly unequal countries like Brazil is scarce[24]. Currently, the evidence investigating bullying with mental health outcomes is concentrated in high-income countries[17,25,26]. Despite advances in research in Latin American countries, there is still a scarcity of studies carried out in low- and middle-income environments, especially with outcomes such as depressive symptoms and health-related quality of life[27,28]. Considering that the prevalence and possible detrimental health effects of bullying victimization and perpetration vary in different realities, the present study aimed to analyze the associations between bullying victimization and perpetration and depressive symptoms and HRQoL in a sample of Brazilian high school adolescents.

Methods

Study design and population

This study analyzed cross-sectional data from the Longitudinal Study of the Lifestyle of Adolescents (ELEVA). The ELEVA study aimed to investigate lifestyle factors and health out-

comes among public high school students that offered integrated courses with professional college-level programs within the mesoregion of Grande Florianópolis, located in southern Brazil. Three suitable schools affiliated with the Federal Institutes of Technological Education of Santa Catarina (IFSC) were identified and included in the study. Baseline data collection took place between August and December 2019. A census approach was employed, wherein all students present in the schools during the data collection period were deemed eligible and were invited to participate in the study. All students who attended classes during the data collection period were invited to participate (n=1,269). Inclusion criteria were enrollment in the first, second, or third year of high school. The exclusion criterion was the presence of any injury that could impair participation in data collection. Of these students, 1,010 returned the assent and consent forms signed by themselves and their legal guardians, and participated in the study. This project was approved by the Ethics Committee in Research with Human Beings of the Universidade Federal de Santa Catarina (protocol number: 3,168,745). More information about ELEVA can be found on the study website (https://eleva.ufsc.br/en/).

Measurements

The variables used in the present study were measured using an online questionnaire hosted on the SurveyMonkey® platform, which could be answered using electronic devices provided by the researchers or on students' devices. The average response time was 24 min. The complete questionnaire is available online (https://eleva.ufsc.br/en/questionario/).

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D). The instrument has been widely used in studies with adolescent samples[29,30], and has been validated for Brazilian adolescents[31]. The validation process included translation and back-translation from English to Brazilian-Portuguese, and criterion validity assessing the scale's accuracy for the depressive disorder diagnosis (sensitivity=1.0; specificity=0.75)[31]. The instrument comprises 20 items, with items measured on a 4-point Likert scales that reflect the mood and feelings of the participants (e.g., "I felt I was just as good as other people" and "I thought my life had been a failure") within the past week. Item's responses range from "Rarely or none of the time (less than one day)" to "Most or all of the time (5-7 days)." Each response received a score from 0 to 3 and was summed into an overall score ranging from 0 to 60, with higher scores indicating a higher level of depressive symptoms.

HRQoL was measured using the Kidscreen-10 Index[32], and Gwet's coefficient of agreement ranged from 0.54–0.88, which was previously validated for Brazilian adolescents[33]. The instrument reflects the respondents' perceptions and feelings related to their overall HRQoL. The instrument comprises 10 items measured using a 5-point Likert scale with answers related to the intensity (not at all, slightly, moderately, very, extremely), or frequency (never, rarely, sometimes, almost always, always) of perceptions within the past week. Responses were weighted according to the scoring system provided by the KIDSCREEN group and were used to calculate the index. The HRQoL index was reported as t-values ranging from 0 to 100, with higher scores indicating better HRQoL[34].

To assess information related to bullying, the participants answered two different questions. The first was related to bullying victimization, written as follows: *"In the last 30 days, how often have any of your classmates ridiculed, mocked, made fun of, intimidated, or teased you to such an extent that you were hurt, bothered, upset, offended or humiliated"* with five possible responses on a Likert scale (ranging from never to always). The second question was related to bullying perpetration, measured by the question, *"In the last 30 days, have you punched, scoffed, mocked, bullied, or teased one of your schoolmates so much that he was hurt, upset, offended, or humiliated?"* with two possible responses: yes and no. These questions were based on the Brazilian National School-based Health Survey (PeNSE), and were used in previous research on Brazilian adolescents[35-37]. Reliability was tested in the pilot sample of the ELEVA study (n=100 [complete case analysis]; 68% girls; 16.3±0.99 years old). Gwet's Agreement Coefficients were 0.79 and 0.78 for the questions on bullying victimization and bullying perpetration, respectively.

Sociodemographic factors such as sex (male and female), age (full years), maternal education (incomplete elementary school [0-8 years], elementary school [8-10 years], high school [at least 11 years], college [at least graduated], or unknown), and participants' work status (yes or no) were assessed.

Statistical analysis

Participant characteristics were described using means and standard deviations for continuous variables and absolute and relative frequencies for categorical variables. Multivariable multilevel linear regression models were applied to analyze the associations of bullying victimization and perpetration (exposure) with depression symptoms and HRQoL (outcomes). All exposure variables and sociodemographic factors were simultaneously included in both models, with one for each outcome. The second set of models was fitted with the interaction term between bullying victimization and perpetration to evaluate the multiplicative effects of both exposures on outcomes. The clustering structure of the data, with students (Level 1) nested within schools (Level 2), was considered by including a random intercept for schools. The model assumptions of residual normality and homoscedasticity were assessed. Collinearity was evaluated using the variance inflation factor (VIF), and an outlier inspection was performed. The residuals were found to be slightly skewed. Thus, a bootstrapping procedure was applied to estimate normal-corrected confidence intervals (CI) from 2,000 resamples. The results were expressed as coefficients (β) and their respective 95%CI. All statistical analyses were performed using Stata version 15 (Stata Corp., College Station, Texas, USA).

Table 1. Sample characteristics. Santa Catarina, Brazil, 2019.

Variables	Mean	±SD
Age (years)	16.4	±1.1
Depressive symptoms (CES-D score [0-60])	21.1	±11.2
Health-related quality of life (Kidscreen score [0-100])	40.6	±6.5
	n	**%**
Sex		
Male	424	49.8
Female	428	50.2
Maternal Education		
Incomplete elementary school	83	9.7
Elementary school	73	8.6
High school	311	36.5
College	359	42.1
Unknown	26	3.1
Currently Working		
No	685	80.4
Yes	167	19.6
Bullying Role		
None	454	53.3
Victim only	316	37.1
Perpetrator only	25	2.9
Bully-victim	57	6.7

Source: Authors.

Results

A total of 852 (16.4±1.1 years, 50% females) adolescents had complete data for all outcome and exposure variables and were included in this study. Almost 44% of students reported being victims of bullying within 30 days prior to data collection, and approximately 10% students reported being perpetrators of bullying against their peers (Table 1). In addition, about 7% of respondents characterized themselves as bully-victims within the sample.

The associations between bullying involvement and depressive symptoms are presented in Table 2. No joint associations were observed, as the interaction term between bullying perpetration and victimization did not improve the model (Model 2 vs. Model 1; Wald p-value=0.391). Thus, conclusions were drawn based on Model 1. Students who were victims of bullying within the last 30 days had higher scores for depressive symptoms than those who reported not being victims of bullying (β=4.66; 95%CI: 3.17;6.16). In contrast, students who perpetrated bullying against their peers had lower depressive symptom scores than those who did not (β=-2.66; 95%CI: -4.74;-0.58).

The associations between involvement in bullying situations and HRQoL are shown in Table 3. Including the interaction term between bullying perpetration and victimization improved the model (Model 2 versus Model 1, Wald p-value=0.027), and it revealed that the association between bullying victimization and HRQoL is dependent on whether students were perpetrators or not. Students who were victims of bullying had lower HRQoL levels (β=-3.06 95%CI: -3.94;-2.18), while no association was observed between being a bully and HRQoL (β=-0.60, 95%CI: -2.59;1.40). However, a multiplicative effect was observed for being both a victim and perpetrator of bullying (β=2.78, 95%CI: 0.32;5.25). Thus, the lower HRQoL among students who were victims of bullying may be nullified when victims were also perpetrators (β=[-3.06 - 0.60 + 2.78]=-0.87, 95%CI: -2.31;0.57), due to higher HRQoL among bul-

Table 2. Associations between involvement in bullying situations with depressive symptoms among high school students (n=852). Santa Catarina, Brazil, 2019.

Variables	Model 1	Model 2[a]
	β (95%CI)	β (95%CI)
Being a perpetrator	**-2.66 [-4.74; -0.58]**	-1.42 [-4.78; 1.95]
Being a victim of bullying	**4.66 [3.17; 6.16]**	**4.82 [3.23; 6.41]**
Being a perpetrator * Being a victim of bullying	_	-1.85 [-6.07; 2.38]
Intercept	23.29 [11.64; 34.94]	23.25 [11.57; 34.94]

Notes: [a]Model 2 was specified precisely as Model 1 plus the interaction term between being a victim and being a perpetrator (additive effect). Models were adjusted by sex, age, maternal education and Currently Working; CI: Confidence Intervals.

Source: Authors.

Table 3. Associations between involvement in bullying situations with HRQoL among high school students (n=852). Santa Catarina, Brazil, 2019.

Variables	Model 1	Model 2 [a]
	β (95%CI)	β (95%CI)
Being a Perpetrator	**1.28 [0.09; 2.46]**	-0.60 [-2.59; 1.40]
Being a Victim of Bullying	**-2.82 [-3.65; -1.99]**	**-3.06 [-3.94; -2.18]**
Being a Perpetrator * Being a Victim of Bullying	_	**2.78 [0.32; 5.25]**
Intercept	46.02 [39.75; 52.29]	46.07 [39.77; 52.38]

Note: [a]Model 2 was specified precisely as Model 1 plus the interaction term between being a victim and being a perpetrator (additive effect). Models were adjusted by sex, age, maternal education and Currently Working; CI: Confidence Intervals.

Source: Authors.

ly-victims than those who were only victims (β=[-0.60 + 2.78]=2.18, 95%CI: 0.74;3.63).

Discussion

This study investigated the relationship between involvement in bullying situations with depressive symptoms and HRQoL among Brazilian high school students. We observed that the associations between bullying and health outcomes varied according to the participant's role in bullying situations (i.e., victims, perpetrators, or bully-victims). While bullying perpetration was associated with lower levels of depressive symptoms and higher levels of HRQoL; being a bullying victim was associated with higher levels of depressive symptoms and lower levels of HRQoL than those who were not victims. These findings demonstrate that involvement in bullying situations, either as victim or perpetrators, can trigger future health problems related to depressive symptoms and HRQL among Brazilian adolescents.

Our results indicate that adolescent victims of bullying had more depressive symptoms, which is in line with previous evidence[38,39]. Studies with children and adolescents have shown that being a victim of bullying during adolescence is significantly associated with higher depressive symptoms[26,40,41]. A longitudinal study found that students who were victims of bullying during adolescence (between ages 15 and 18) reported more depressive symptoms at age 28 than those who were not bullied[42]. Bullying victimization is also a possible predictor of subsequent mental health-related problems (i.e., depressive disorders, anxiety, loneliness, and suicidal ideas)[7,43].

In the present study, bullying perpetrators had lower depressive symptoms than those who did not bully their peers, which contrasts with the literature that reported elevated levels of depressive symptoms among youth who described themselves as being perpetrators against their peers[44,45]. In a representative sample of American adults, those with a history of bullying had significantly higher rates of depressive symptoms than those who had not bullied others during adolescence[25]. Longitudinal studies have suggested that this relationship may predict subsequent depressive symptoms over the life course as well[46,47]. Chronic exposure to bullying may be needed throughout the transition

to adulthood for victims and perpetrators to experience its adverse effects, which cannot be observed in cross-sectional studies.

Our results showed that being a victim of bullying was associated with lower HRQoL. Similarly, previous cross-sectional research showed that victims of bullying tend to have worse HRQoL than those who were not bullied[17,48,49]. For example, a Norwegian study found lower HRQoL among children and adolescents who were victims of bullying than among their non-bullied peers[50]. Taken together, bullying victimization may be related to lower HRQoL and adverse effects related to social and psychological well-being that may persist into adulthood and thus should be prevented[17,48].

We found null associations between being a bullying perpetrator and HRQoL compared to those who were not perpetrators. However, adolescents who considered themselves victims of bullying had a lower HRQoL compared to those who were not involved in bullying situations. This shows that our results corroborate the evidence showed that Dutch schoolchildren victims of bullying had significantly lower HRQoL scores than those who were not involved in bullying[51]. Similarly, a study carried out in Spain with 12,285 adolescents found that bullying victims had consistently lower HRQoL scores, especially when compared to those who were not involved in bullying situations[49]. However, individuals who played the role of aggressors and victims (bully-victims) had a higher quality of life compared to those who were not involved in bullying situations. One possible explanation for this result is that the adolescents who were victims reacted through the perpetration of bullying (i.e. victims classified as reactive, responding to bullying with aggression rather than isolation and withdrawal)[52]. In Brazil, this situation has been aggravated by the country's high rates of violence[53], significant social inequality, and the fragility of the education system (PISA)[54]. These factors impose additional challenges to socialization and amplify adverse childhood experiences. Chronic exposure to violence in the community, for example, affects cognition and problem-solving skills in children and adolescents, thus shaping defense strategies[24,55]. These circumstances may influence the way individuals behave in bullying situations[22]. However, it is important to note that this hypothesis is speculative and requires further investigation. To better understand these differences, we must consider contextual variations between countries, including levels of violence, social inequality, and exposure to Adverse Childhood Experiences.

The strengths of this study include the analysis of likely undesirable effects on adolescent mental health and well-being as a result of exposure to bullying situations. All variables were obtained from instruments adapted and validated for the pediatric population. In addition, our study used standardized questionnaires to measure depressive symptoms and HRQoL among adolescents. However, our study has some limitations. First, its cross-sectional design may limit the identification of causality in the results, requiring further research through a longitudinal design. Second, the self-report measures used are vulnerable and subject to memory and social desirability biases on the part of the participants. The assessment of bullying did not include questions that differentiated the types of behaviors (e.g., physical, psychological, or cyberbullying) in their entirety, thus restricting the identification of those involved in a more detailed manner. It is suggested that future studies obtain qualitative information about bullying, thus helping to elucidate the possible relationships between exposure variables, and HRQoL and depressive symptoms among Brazilian adolescents.

Conclusion

The findings of the present study indicate that victims of bullying have increased depressive symptoms and lower HRQoL. Considering the negative effects of bullying victimization on adolescent well-being and the likelihood of adverse health outcomes in later life, efforts toward bullying prevention are required. Efforts may include creating clear rules for coexistence and systematic strategies for conflict mediation. Conversely, we found that students who bullied their peers had lower levels of depressive symptoms and higher HRQoL. The reasons for these associations need to be explored further in prospective studies.

Collaborations

All authors of this research paper participated directly in the planning, execution, and/or analysis of the study.

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