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Posted Date: 8 March 2024

doi: 10.20944/preprints202403.0460.v1

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Article

Bullying at School, Cyberbullying, and Loneliness: National Representative Study of Adolescents in Denmark

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Abstract: Aims: The aim was to examine how loneliness was associated with bullying victimization at school and online. Methods: We used data from the Danish arm of the international Health Behaviour in School-aged Children (HBSC) study from 2022. The study population was a nationally representative sample of 11-15-year-olds who completed the internationally standardized HBSC questionnaire at school, n=5382. Multilevel logistic regression was applied to study the associations between bullying victimization and loneliness. Results: The prevalence of reporting loneliness often or very often was 9.0%; 6.3% of the sample experienced habitual bullying victimization at school and 4.8% incurred cyberbullying. There was a strong and graded association between loneliness and bullying victimization at school and cyberbullying. The associations were significant for boys and girls and the association between exposure to bullying at school and loneliness was steeper for boys than girls. The gradients were steeper for physical than cyberbullying. Students exposed to habitual bullying in both contexts had an adjusted OR (95% CI) of 11.21 (6.99-17.98) for loneliness. Conclusion: Exposure to bullying at school and cyberbullying are strongly associated with loneliness. It is important to reduce bullying at school and at the internet, and to promote effective interventions to reduce continuing loneliness.

Keywords: adolescents; bullying; victimization; cyberbullying; HBSC; loneliness

Introduction

Loneliness is a subjective feeling of isolation. It is often defined as a cognitive discrepancy between the social relations an individual wishes to have and those one perceives to have, and the affective reactions of sadness and emptiness that follow [1]. The feeling of loneliness is common in adolescence [2–4] and many adolescents will experience loneliness for short periods. The reasons may be feeling left out among peers, a change of school, parental divorce, or other adverse life events [5]. However, some adolescents experience prolonged feelings of loneliness that result from repeated failure to reconnect to others, which is a serious threat to quality of life [6–8] and academic performance [9]. A recent meta-analysis of longitudinal studies suggested that loneliness tended to remain stable from adolescence to adulthood [10]. Loneliness is also an important public health problem because it is associated with a range of health problems [1,6,11–14] and risk behaviours [15–17]. It is important to understand the precursors of loneliness to strengthen preventive efforts. The current study focuses on two potential precursors, bullying victimization at school and exposure to cyberbullying.

Bullying victimization at school is common among adolescents [2,18–21], although the prevalence has been diminishing over the past decades in Europe and North America [22,23]. There is abundant documentation for an association between exposure to bullying and adverse

psychological consequences such as poor life satisfaction [18] and mental health problems and suicidal behaviour [5,24–31]. Only few studies explore the association between loneliness and exposure to bullying. An international cross-sectional study found a strong and graded association between loneliness and exposure to bullying at school [32]. The odds ratio for loneliness was higher than 4.0 among adolescents being victimized weekly. This association was consistent across twenty-eight countries. Other cross-sectional [33–37] and prospective [38,39] studies confirm the association between loneliness and bullying victimization at school, but the effect sizes vary across studies, from small to large. The variation in effect sizes suggests a need for further studies.

Exposure to cyberbullying, sometimes labeled internet bullying, online victimization, or internet harassment, is the use of digital technologies to harass, threaten, embarrass, or target another person. This phenomenon is also common among adolescents [2,18,23,26,40,41], although the prevalence of exposure to cyberbullying is lower than exposure to bullying at school [23]. The studies that find an association between exposure to cyberbullying and loneliness [42,43] show considerable variations in effect sizes, from weak to strong. There is some doubt about the causal pathway since a few prospective studies show that loneliness is a precursor of cyberbullying rather than the reverse [44–46]. As with face-to-face, in person bullying victimization, the variation in effect sizes across studies for the association between loneliness and cyberbullying highlights the need for further studies.

There are reasons why there might be differences in the associations between loneliness and face-to-face, in person bullying and loneliness and cyberbullying. For example, Van den Eijnden et al. 2014 [46] emphasizes that findings from research on bullying at school cannot automatically be transferred to cyberbullying because these two phenomena differ in important ways: Cyberbullying via the internet has a much higher accessibility of the target than bullying during school hours. Cyberbullying can reach a much larger audience than bullying at school and may remain visible for a long time for the victim and the audience, potentially resulting in longer-lasting negative effects, e. g. on loneliness. A study covering six North European countries showed little overlap between bullying at school and cyberbullying suggesting that the two may be different phenomena [18]. It is, therefore, important to analyze which kind of exposure is closest associated with loneliness and to analyze the association between loneliness and double exposure (to bullying at school and cyberbullying). Only a few studies focus on such combined effects, and they found that higher rates of loneliness among adolescents who were exposed to bullying in both contexts [33]. Van den Eijnden et al. [46] suggest that the two kinds of bullying are mutually reinforcing, i. e. that being exposed to bullying in one context increases the risk of being exposed in the other. Studies about the association between exposure to bullying and loneliness use different reference periods which makes comparisons difficult [42]. A few studies suggest that the association between loneliness and exposure to bullying varies by sex and age group [35,45,47] and Landstedt & Persson [26] suggest more focus on this issue.

There is a need for further exploration of the association between loneliness and exposure to bullying which includes both kinds of bullying and which uses identical reference periods for the measurement of exposure. The aim of this study was to examine how loneliness was associated with exposure to bullying at school, to cyberbullying, and to combinations of bullying at school and cyberbullying.

Methods

The Study

We used data from the Danish arm [48] of the international Health Behaviour in School-aged Children (HBSC) study [2,49]. This cross-sectional school survey conducted in 2022 included a nationally representative sample of three age groups, 11-, 13- and 15-year-olds, recruited from a random sample of schools drawn from a complete list of public and private schools in Denmark. In each school we invited all students in the fifth, seventh and ninth grade (corresponding to the three age groups) to participate and complete the internationally standardized HBSC questionnaire in the classroom [50]. The participation rate among students, calculated as percentage of students enrolled in the participating classes who completed the questionnaire, was 69.0%, n=5,823. A minority of

students (n=419) did not answer the question about loneliness and were excluded. The final study population included students with data about loneliness, exposure to both kinds of bullying, and important control variables, n=5,382 (92.4% of eligible students).

Measurements

The study used one item for the measurement of loneliness, “Do you feel lonely?” (never, sometimes, often, very often). We dichotomized the responses into no (never, sometimes) and yes (often, very often) to separate students with prolonged feelings of loneliness from students with less severe and more transient feelings of loneliness or a complete absence. This single-item measure and the more elaborated University of California Los Angeles (UCLA) Loneliness Scale showed remarkably similar patterns of association with health, sleep, and scholastic self-beliefs [6,9]. Mund et al. [52] showed that such a direct single-item measure correlated highly with other measures of loneliness. Furthermore, interviews with adolescents about their understanding and perceptions of loneliness indicate that this question have good face validity [53]. These findings suggest that the measure is valid for the purpose of our study.

We measured exposure to bullying at school by the item “How often have you been bullied at school in the past couple of months?” with the response options 1) “I have not been bullied at school in the past couple of months”, 2) “It has only happened once or twice”, 3) “Two to three times a month”, 4) “About once a week” and 5) “Several times a week”. Students who did not answer the question (n=130) were included in the non-exposed category. Kyriakides et al. [54] showed that students’ reports about bullying victimization to bullying at school were trustworthy. The measurement of cyberbullying used the item “In the past couple of months how often have you been cyberbullied (e. g. someone sent mean instant messages, email or text messages about you; wall postings; created a website making fun of you; posted unflattering or inappropriate pictures of you online without permission or shared them with others)?” with the same response options and with 138 students who did not answer the question included in the non-exposed category. The descriptive analyses separated habitual exposure (response options 3-5, at least two to three times a month) from less exposure (response option 1-2) because it is habitual bullying which has severe consequences for future mental health [28]. Finally, we constructed a combined measure of exposure to habitual bullying at school and cyberbullying with four categories, 1) not exposed to any bullying, 2) exposed to cyberbullying but not bullying at school, 3) exposed to bullying at school but not cyberbullying and 4) exposed to both kinds of bullying.

The analyses included four socio-demographic control variables: sex; age group (11-, 13- and 15-year-olds); origin (native Danish, descendants of immigrants, immigrants, 24 unclassifiable students excluded) based on items about the student’s, the father’s, and mother’s country of birth; and socioeconomic status. Socioeconomic status was measured by eight items: “Does your father/mother have a job?”, “If no, why does he/she not have a job?”, “If yes, please say in what place he/she works (for example: hospital, bank, restaurant)” and “Please write down exactly what job he/she does there (for example: teacher, bus driver)”. The research group coded the answers in accordance with the Danish Occupational Social Class (OSC) measure from I (high) to V (low) [55]. We added OSC VI for economically inactive parents who received unemployment benefits, disability pension or other kinds of transfer income, similarly based on students’ responses. Most students (81.6%) provided sufficient information for the coding of OSC, and students with insufficient information were labelled “unclassifiable.” Schoolchildren in these age categories can report their parents’ occupation with a high agreement with parents’ own information [56–59]. Pförtner et al. [60] showed that OSC is an appropriate variable for studies of social inequality in adolescents’ health. Each participant was categorized by the highest-ranking parent into four levels of family OSC: High (I-II, e.g., professionals and managerial positions), middle (III-IV, e.g., technical and administrative staff, skilled workers), unclassifiable, and low (V, unskilled workers and VI, economically inactive).

Statistical Procedures

We used SAS version 9.4 for the analyses. The first step was crosstabulations and use of chi²-test for homogeneity. The second step was multilevel (PROC GLIMMIX) logistic regression analyses to examine the associations between loneliness and the exposure variables, adjusted for sex, age group, origin and OSC. We also conducted stratified logistic regression analyses to examine whether the pattern of associations was similar for boys and girls and in the three age groups.

Results

The overall prevalence of loneliness was 9.0%. Table 1 shows that loneliness was significantly more prevalent among girls vs. boys, 15-year-olds vs. 11-year-olds, immigrants vs. Danish origin, and students from lower vs. higher OSC. The proportion exposed to bullying at school at least a couple of times per month was 6.3%, significantly more prevalent among girls, 11-year-olds vs. 15-year-olds, immigrants vs. Danish origin, and students from lower vs. higher OSC. The proportion exposed to cyberbullying at least a couple of times per month was 4.8%, and not significantly related to any of the sociodemographic variables. The variable that combined exposure to habitual bullying at school and cyberbullying classified the students into four categories: 4867 (90.4%) were not exposed to any bullying, 175 (3.3%) were exposed to cyberbullying but not bullying at school, 259 (4.8%) were exposed to bullying at school but not cyberbullying and 81 (1.5%) were exposed to both kinds of bullying. These figures suggest that there is little overlap between exposure to the two types of bullying since most of the students who were exposed to bullying in one context were unexposed in the other context.

Table 1. Loneliness and exposure to bullying at school and cyberbullying by sociodemographic variables.

	Pct. lonely often or very often	Pct. exposed to bullying at school ^a	Pct. exposed to cyberbullying ^a
Sex			
Boys (n=2659)	5.5	5.3	3.5
Girls (n=2723)	12.4 *	7.1 *	4.1
Age groups			
11-year-olds (n=1896)	7.0	7.3	4.9
13-year-olds (n=1943)	10.1	6.9	5.3
15-year-olds (n=1543)	10.0 *	4.3 *	4.0
Origin			
Native Danish (n=4857)	8.6	6.1	4.7
Descendants of immigrants (n=325)	10.8	7.7	4.3
Immigrants (n=200)	16.0 *	10.5 *	7.0
Occupational Social Class			
High (n=2369)	7.7	5.4	4.1
Medium (n=1717)	8.8	6.6	5.0
Unclassifiable (N=849)	10.7	6.1	5.3
Low (N=447)	13.4 *	10.5 *	6.7
Total (n=5382)	9.0	6.3	4.8

^a Defined as habitual bullying, i. e. at least 2-3 times per month * *p* < 0.01.

Table 2 shows a strong and graded association between loneliness and exposure to bullying. Even among students with low exposure to bullying (once or twice in the past couple of months), the odds ratio (OR) for loneliness was significantly elevated compared to non-exposed students. The OR (95% CI) for loneliness was 11.58 (7.21-18.61) among students exposed to bullying at school several times a week. The corresponding figure for exposure to cyberbullying was 5.79 (3.37-9.86). Finally,

the OR for loneliness among the few students exposed to both kinds of bullying was 10.80 (6.87-16.97). Table 2 also shows that the OR estimates changed little when adjusted for sociodemographic control variables. Separate analyses for boys and girls and the three age groups showed a significant association between loneliness and the three measures of bullying in every sub-group (not shown in table). The association between exposure to bullying at school and loneliness was steeper for boys than girls, manifested by a statistically significant interaction term between sex and exposure to bullying at school, $p=0.0165$.

Table 2. OR (95% CI) for loneliness often or very often by exposure to bullying and covariates.

	Pct. lonely	Crude OR (95% CI)	Adjusted OR (95% CI)
Sex			
Boys (n=2659)	5.5	1 (ref.)	1 (ref.)
Girls (n=2723)	12.4	2.41 (1.97-2.95)	2.47 (2.02-3.03) ^a
Age groups			
11-year-olds (n=1896)	7.0	1 (ref.)	1 (ref.)
13-year-olds (n=1943)	10.1	1.52 (1.21-1.93)	1.62 (1.28-2.05) ^a
15-year-olds (n=1543)	10.0	1.50 (1.17-1.92)	1.59 (1.24-2.04) ^a
Origin			
Native Danish (n=4857)	8.6	1 (ref.)	1 (ref.)
Descendants of immigrants (n=325)	10.8	1.23 (0.84-1.78)	1.11 (0.76-1.64) ^a
Immigrants (n=200)	16.0	1.98 (1.32-2.91)	1.70 (1.13-2.56) ^a
Occupational Social Class			
High (n=2369)	7.7	1 (ref.)	1 (ref.)
Medium (n=1717)	8.8	1.16 (0.93-1.46)	1.17 (0.93-1.47) ^a
Unclassifiable (N=849)	10.7	1.44 (1.10-1.88)	1.56 (1.19-2.06) ^a
Low (N=447)	13.4	1.81 (1.32-2.49)	1.77 (1.27-2.46) ^a
Bullied at school:			
Not bullied (n=4373)	6.0	1 (ref.)	1 (ref.)
Once or twice (n=669)	15.8	2.92 (2.29-3.72)	3.11 (2.42-3.99) ^b
2-3 times a month (n=156)	29.5	6.37 (4.41-9.20)	6.46 (4.41-9.45) ^b
About once a week (n=109)	33.0	7.63 (5.01-11.62)	8.10 (5.24-12.51) ^b
Several times a week (n=75)	42.7	11.34 (7.04-18.27)	11.37 (6.94-18.64) ^b
Cyberbullied:			
Not bullied (n=4541)	6.9	1 (ref.)	1 (ref.)
Once or twice (n=585)	17.4	2.84 (2.22-3.62)	2.75 (2.14-3.54) ^b
2-3 times a month (n=130)	26.2	4.65 (3.08-7.01)	4.79 (3.13-7.32) ^b
About once a week (n=59)	27.1	5.06 (2.81-9.12)	5.44 (2.97-9.98) ^b
Several times a week (n=67)	29.9	5.79 (3.38-9.94)	7.65 (4.37-13.39) ^b
Combined measure:			
Not habitually bullied (n=4867)	6.9	1 (ref.)	1 (ref.)
Only cyberbullied (n=175) ^c	19.7	3.21 (2.17-4.76)	3.67 (2.45-5.50) ^b
Only bullied at school (n=259) ^c	30.1	5.68 (4.26-7.59)	5.66 (4.20-7.64) ^b
Both kinds of bullying (n=81) ^c	44.4	10.63 (6.74-16.75)	11.21 (6.99-17.98) ^b

^a Sex, age group, origin, and occupational social class mutually adjusted. ^b Adjusted for sex, age group, origin, and occupational social class. ^c Defined as habitual bullying, i. e. at least 2-3 times per month.

Discussion

Key Findings

There were five key findings: First, there was a strong and graded association between loneliness and exposure to bullying in both contexts, at school and online, even after adjustment for sex, age group, origin, and socioeconomic status. The association between bullying at school and loneliness

was significantly steeper for boys than girls. Second, even a low exposure to bullying more than doubled the likelihood of loneliness. Third, students exposed to bullying in both contexts had around ten times higher OR for loneliness, which is an extraordinarily strong association. Fourth, the significant and graded association between loneliness and exposure to bullying appeared among boys and girls and in all three age groups. Fifth, the modest overlap between exposure to bullying at school and cyberbullying, and the observation that the two kinds of bullying showed different patterns of association with sociodemographic variables, suggest that the two kinds of bullying are qualitatively different phenomena.

The prevalences of loneliness and exposure to bullying resemble findings from other recent studies of adolescents from North-Western Europe [2,3,6,21,22,51,61]. Our finding of an association between loneliness and being victim to both kinds of bullying confirm other studies [32–39], but the association between bullying and loneliness was extraordinary strong in our study. The finding is also consistent with the many studies which document a strong association between exposure to bullying and a broad range of mental health problems [5,24,25,27–32,62,63].

While it seems reasonable that exposure to bullying might increase the feeling of loneliness, it remains to determine whether bullying is solely a direct precursor for loneliness, or whether bullying victimization and loneliness are both determined by some other contextual factors, e. g. the school environment. Bullying should be understood as a behaviour deeply rooted in the school's socio-environmental context. For instance, negative school-perceptions among students [63] and staff [64] and a school-environment where teachers ignore or dismiss bullying [65] are strongly associated with bullying. Further, a negative school-environment, where students perceive their peers and teachers as unsupportive, is strongly associated with loneliness [36]. Therefore, it is likely that some of the association between bullying and loneliness is due to a common causal factor: a negative school-environment.

Methodological Issues

The strength of the study is the large and nationally representative study population, and the robustness of the applied measurements. Further, that the reference time for the measurement of exposure to bullying in the two contexts were similar: The last couple of months. There are important limitations as well. One is the cross-sectional design which limits the insight into causality. This limitation is particularly important because there are indications of opposite pathways: Some longitudinal studies show that exposure to bullying at school predicts loneliness [38,39] while other studies suggest that loneliness predicts cyberbullying [44–46].

The study may suffer from selection bias. The participation rate among pupils was high (69.0%) but it is likely that students who were frequently bullied and/or felt lonely were more absent from school and therefore not participated in the study. This could result in an underestimation of the prevalence of exposure to bullying and the prevalence of loneliness among adolescents. If there is an underestimation of both exposure and outcome, the analyses could potentially also underestimate the association between exposure to bullying and loneliness.

The applied measurement of loneliness required the individual to identify and label him- or herself as lonely, which may be perceived as a social stigma [6,53]. This may be the reason our study identified fewer lonely adolescents than studies using multi-item measures such as the UCLA scale, which does not mention the term lonely. Eccles et al. [6] found a high correlation between the one-item measure and the multi-item UCLA scale. Therefore, we do not expect that our single-item measure of loneliness invalidates the finding of an association between loneliness and exposure to bullying.

Implications

From a research point of view, it is important to seek information from prospective studies. It is still an open question whether loneliness predicts cyberbullying or the other way round. The long-term adverse consequences of bullying at school are serious and well documented [5,24,25,27–31] whereas we need more insight into the long-term consequences of cyberbullying. Another priority is

to learn more about factors which modify the associations between loneliness and exposure to bullying because modifying factors may guide future intervention programs. A potential modifier is social capital at school [66]. Schnepf et al. 2023 [36] suggest that we need more information about the role the school environment plays for generating loneliness. They also suggest that we need to know more about what schools can do to protect adolescents from feeling lonely.

The findings suggest that interventions against loneliness in adolescence are needed. Such interventions are feasible and often effective [51]. Interventions in the school-environment is a way for decreasing loneliness, in particular interventions which promote a more cooperative climate between students and improve teachers' support of their students [36]. The findings also underline the importance of implementing bullying prevention interventions at school. The school is an ideal setting for interventions as it is a breeding place for both bullying and loneliness. It is possible to target the entire adolescent population in the school setting and there is solid documentation for the effect of interventions against bullying at school [67–69]. There is less insight into interventions against cyberbullying. According to van den Eijnden et al. 2014 [46] it seems crucially important to teach adolescents and parents about the risks of cyberbullying, and to provide them with tools on how to interpret and deal with such experiences. Cosma et al. [23] likewise suggest, that we need a more holistic perspective to public health programs and policies which address bullying more broadly, rather than focusing on behaviours that happen in a particular context.

Conclusions

Exposure to bullying at school and cyberbullying are strongly associated with loneliness. It is important to reduce bullying at school and at the internet, and to promote effective interventions to reduce continuing loneliness.

Author Contributions: All authors contributed to the conceptualization and planning of the study. MTD, BEH and KRM acquired the data; BEH analysed the data; BEH and KRM wrote the first draft of the paper. All authors contributed to revision, editing, and approval of the final manuscript.

Funding: The Danish Health Authority provided financial support, Case No. 03-9999-595.

Ethics approval and informed consent: The study complied with national legislation about ethical approval, consent, and data protection. The study was approved by the Research Ethics Committee at the University of Southern Denmark, Case No. 10.622. We asked the school board as the parents' representatives, the principal, and the students' council in each of the participating schools to approve the study. Prior to the study, the parents' received an electronic link to a short video with information about the study and that participation was voluntary and confidential. The parents also received an electronic link by which they could reject their child's participation in the study. Prior to the data collection, the students viewed a short video providing information about the study, emphasizing that participation was voluntary and confidentially.

Data availability: Applications to access the dataset should be sent to the Primary Investigator of the Danish HBSC Study, Dr. Katrine Rich Madsen, krma@sdu.dk.

Conflicts of interest: The authors have no conflicts of interest to declare.

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