



# Consequences of Bullying on Adolescents' Mental Health in Germany: Comparing Face-to-Face Bullying and Cyberbullying

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## Abstract

The present study explored whether face-to-face bullying (physical as well as relational), cyberbullying, and teachers' bullying have a negative impact on adolescent's mental health and whether there are gender differences. Analyses are based on a representative cross-sectional standardised survey of 10,638 students of the ninth grade of one federal state of Germany. Findings show that psychological cyberbullying is most strongly associated with poor mental health for both boys and girls. Relational bullying by classmates as well as by teachers also show a significant correlation with poor mental health. For girls, there appears to be an additional relationship between sexual cyberbullying and mental health. Physical forms of bullying were not found to be associated with mental health. Implications for research are discussed.

**Keywords** Adolescents · Bullying · Cyberbullying · Mental health · Violence

## Introduction

Bullying victimization is a serious social concern for adolescents, parents, and school official in many countries around the world. Bullying among adolescents may take several forms, including verbal (threats, insults), physical (hitting, pushing), or relational types (sabotaging social relations; Olweus 1996). Bullying is deliberate, repeated, and it is based on a higher social status, and the targets of bullying typically have difficulties defending themselves, i.e. there is an imbalance of physical or emotional power (Crick and Grotpeter 1995; Olweus 1996). Victims of bullying suffer from repeated, negative acts from their peers over a longer period of time (Olweus 1996), which can be a detriment to their mental health. A substantial body of

research support that victims of bullies suffer from internalizing problems, including depression, anxiety, and low self-esteem (Annerbäck et al. 2013; Due et al. 2005; Fisher et al. 2012; Fleming and Jacobsen 2009; Gini and Pozzoli 2013; Hepburn et al. 2012; Kim et al. 2005). Bogart et al. (2014) surveyed 4297 children in three grades (grades 5 to 10) and found that experiences in bullying is linked to poorer mental and physical health, as well as stronger symptoms of depression. Kaltiala-Heino et al. (2010) also reported from a sample of 2070 15-year-old Finnish adolescents that those who had suffered from bullying are more likely to display symptoms of depression. Takizawa et al. (2014) documented similar results in a longitudinal study. The authors evaluated data from 7771 individuals who were first interviewed in 1958, between the ages of 7 and 11, with interviews repeated until they reached the age of 50. The study found that those experienced bullying showed higher levels of psychological distress, depression, anxiety disorders, and suicidal behaviors. These effects were also present when other factors were controlled. In their meta-analysis of longitudinal research on this subject, Ttofi et al. (2011) found that the mean odds ratio for the influence of bullying on depression was 1.99 (95% CI: 1.71–2.32) and is only marginally lower when controlling for various risk factors (down to 1.74, 95% CI: 1.54–1.97).

Study findings on the link between bullying and mental health, however, have been inconsistent, particularly considering the circumstances in which boys and girls

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experience bullying. McGee et al. (2011) utilized an Australian sample to demonstrate that boys respond to bullying with aggressive behaviors while girls respond more often with somatization. A study conducted in South Korea also found that female schoolchildren who suffered from bullying are more likely to display suicidal ideations than their male counterparts (Kim et al. 2005). Further, studies from other countries reported that bullying has a stronger effect on the psychological well-being of female adolescents than on male adolescents (Carbone-Lopez et al. 2010; Gruber and Fineran 2008). These findings might be explained by gender-specific coping styles: Boys tend to externalize their negative experiences, deflect the blame, and become aggressive. Girls, on the other hand, tend to internalize such experiences, which can lead to depression and anxiety.

Study findings might also vary when types of bullying are taken into consideration. Turner et al. (2013) showed, for example, that depressive symptoms exist only for verbal bullying. When controlling for other factors, however, physical bullying did not result in higher levels of depression. Baier and Kunkel (2016) demonstrated that only relational bullying, but not physical bullying negatively affected the psychological well-being of adolescents. However, there are also inconsistent findings suggesting no differences in the impact of various types of bullying (e.g., Averdijk et al. 2011). Considering these findings, an analysis of the psychosocial impact of different types of bullying is imperative. In particular, the impact of cyberbullying requires further investigation. Cyberbullying is defined as “an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who can not easily defend him or herself” (Smith et al. 2008, p. 376). Similarly but more broader, Hinduja and Patchin (2014, p. 2) define cyberbullying as “willful and repeated harm inflicted through the use of computers, cell phones, and other electronic devices”.

Hase et al. (2015) cross-sectional study, which consisted of 1225 adolescents, found that both face-to-face bullying and cyberbullying were associated with poorer mental health. If, however, the different types of bullying are included in a multivariate analysis, significant relationships were only found with traditional bullying, and not cyberbullying. Bonanno and Hymel (2013), on the contrary, reported from a survey of Canadian youth (grades 8 to 10) that cyberbullying is independently related to symptoms of depression and suicidal ideation. Beckman et al. (2012) on the other hand showed that face-to-face bullying and cyberbullying both have a significant impact on psychosomatic problems in Swedish teenagers (ages 13–16). The study of Perren et al. (2010), which comprised a sample of 14-year-olds from Switzerland and Australia, found that both types of bullying increased the likelihood of depressive

symptoms, similar to Landstedt and Persson’s (2014) findings. The study of Bannink et al. (2014) also found similar results with a survey of 3181 young people interviewed at two time points (at age 12.5 and at age 14.3). In addition, they drew attention to a difference in the results based on gender. When mental health at wave one was controlled, cyberbullying did not show an effect on the mental health at wave 2 for male adolescents. For female adolescents, however, mental health was shown to be influenced by cyberbullying. Similarly, Turner et al. (2013) reported that cyberbullying increased the symptoms of depression especially among girls. These findings further highlight significant gender differences on the impact of cyberbullying.

Bullying is not merely perpetuated by classmates or peers. Teachers can also bully students physically and psychologically. However, only a few studies to date have reported on teachers’ bullying. Whitted and Dupper’s (2008) study of 50 students in an alternative education setting found high rates of both physical and psychological victimization by teachers (>80%). Lower rates of teachers’ bullying were reported in a study consisting of a representative sample of school children in Israel ( $N = 17,465$ ): One-fifth of the respondents reported physical bullying by their teachers (Khoury-Kassabri 2006). In a nationally representative study conducted across Germany ( $N = 44,560$ ), Baier et al. (2009) reported that over a quarter of the students stated that they had been ridiculed by a teacher at least once in the past school year. Physical bullying by teachers was significantly less frequent (2.5% in the previous school year; Baier et al. 2009). As far as the connection with mental health is concerned, McEvoy (2005) argued that given the significant difference in power, teachers’ bullying has a particularly negative impact on the well-being of schoolchildren. Baier and Kunkel (2016) surveyed school children and found a significant relationship between teachers’ psychological bullying and poorer mental health when types of bullying by classmates were controlled. In the retrospective study by Fromuth et al. (2015) half of the 453 respondents stated that they experienced bullying by teachers at some time during their school life; additionally, many of these respondents perceived these experiences as having an adverse effect on their life. A comprehensive study conducted by Datta et al. (2017) with about 50,000 students revealed that students bullied by teachers were significantly more likely to report lower grades and negative perceptions of school climate; for example school grades are an influencing factor of mental health, this study pointed to the important role of teacher bullying for bad mental health.

On the basis of the aforementioned research, the present study addresses the following two research hypotheses: (1) Face-to-face bullying (in particular, the non-physical types of bullying), cyberbullying, and teachers’ bullying should

have a negative impact on adolescents mental health, even after all types of bullying are simultaneously included in multivariate analyses. (2) For female adolescents, a stronger association between bullying and mental health is hypothesized than for male adolescents, even after all types of bullying are simultaneously included in multivariate analyses. In addition, association between bullying and mental health is hypothesized to be identified for various indicators of mental health.

## Method

### Participants

The following analyses are based on a cross-sectional survey of ninth-graders in the German state of Lower Saxony conducted in spring of 2015 (Bergmann et al. 2017). The classes were randomly selected from all classes during the 2014–2015 school year. The aim was to survey one out of every eight classes. Since the classes vary in size from one school type to another, random sampling was done within various types of schools. The only school type not represented in the survey were special schools for children with physical disabilities.

The data presented in this article were collected in Lower Saxony, a German federal state. Every tenth German citizen live in this state (about eight million inhabitants) and it represents the German average, e.g. regarding the economical situation (unemployment rate or the number of migrants). Like in other nations, bullying is a major problem in schools in Germany and in Lower Saxony. A Germany wide representative survey conducted in 2007 and 2008 revealed that about one out of five students experienced physical violence in school at least once in the last school semester, and almost every second student reported that they were teased at least once (Baier et al. 2009).

### Procedure

A total of 672 classes were selected for the survey. Because some school directors or teachers declined to participate, the survey was administered to a total of 545 classes where 12,650 pupils were enrolled, of which 10,638 students participated in the survey. The reasons for non-participation included illness ( $n = 905$ ), missing parental consent ( $n = 434$ ), refusal ( $n = 255$ ), questionnaires with a lot of missing values or joking answers ( $n = 51$ ), and other reasons ( $n = 367$ ; e.g., doing make-up assignments or participating in school events). The response rate was 68.5%.

The distribution by school type in the sample differed only slightly from the actual distribution across the state. Students in 8.1% of the state attended a lower-level

secondary (*Hauptschule*) or a special education school in the year of the study as did 8.1% of the sample. Students in 33.4% of the state attended a college-preparatory secondary (gymnasium) as did 31.5% of the sample. Students in 58.4% of the state attended a technical secondary (*Realschule*), while they comprised 60.3% of the sample.

The average age of the sample was 14.9 years ( $SD = 0.73$ ). Males comprised 50.2% of the respondents. In addition, 24.2% had a migration background. Respondents were asked if they or their parents were born in another country and if they or their parents have citizenship in a country other than Germany. If any of these questions were answered “yes”, the respondent was categorized as having a migration background.

The survey was a criminological self-report delinquency study and focused mainly on surveying delinquent behavior (e.g., victimization by/perpetration of violent and other delinquent offences, contact with delinquent friends). In addition, short instruments were also used to measure respondents’ bullying experiences and mental health. Because different types of bullying (online and offline bullying, bullying by peers and teachers, physical and relational bullying) were measured in that comprehensive survey simultaneously, it provides a unique opportunity to conduct comparative analyses on the impact of bullying on mental health. The survey was carried out in the form of a written survey administered in classrooms by trained interviewers. They briefly described the survey to the class and were available to answer questions during the 90 min respondents were given to complete the survey. Each respondent completed the questionnaire on his or her own. A shortened questionnaire was used in special education schools for children with learning disabilities and was largely read aloud to the respondents there. Since some of the instruments analyzed below were not used in those schools, the subsequent analyses exclude these respondents.

This study was approved by the state’s educational authority. The parents of the respondents received information about the study in advance with a request that they grant written consent for their child to participate. The students were also allowed to refuse to participate in the survey, regardless of their parents’ consent. The students were first reminded that the survey was voluntary, that there would be no negative consequences for refusing to participate, and that they had the right not to answer any of the questions.

## Measures

### Independent variables

The part of the questionnaire which asked about bullying experiences in school was introduced as follows: “To what

extent is there violence or teasing in your school? We do not mean situations where kids fight or argue for fun. How many times has the following happened to you in the past year at school?" Various types of bullying (see below) were then listed. Since this was a multi-topic survey with a focus on delinquency, only a few bullying activities were recorded with short instruments. Due to limited space in the questionnaire for asking non-delinquent forms of behavior, it was not possible to use an extensive bullying inventory.

*Physical bullying by classmates* was queried in the study with the item, "I was intentionally beaten or kicked by other students" (Wilmers et al. 2002). Respondents were able to use the following scale to report the frequency of such events in the past semester: 1 = "never", 2 = "1 or 2 times", 3 = "3 to 6 times", 4 = "several times a month", 5 = "once a week", and 6 = "several times a week".

*Relational bullying by classmates* was measured with two items: "I was excluded from joint undertakings because other students wanted it that way" and "Other students have treated me as invisible and intentionally ignored me" (Baier and Kunkel 2016). The reference period and the response categories were the same as for physical bullying. The correlation between the two items was  $r = 0.51$  ( $p < .000$ ). Both items were combined to a maximum value index--i.e., the highest reported frequency was coded when both items were compared. For example, if the respondent indicated that he or she had been excluded only once or twice in the past semester, but reported being ignored on a weekly basis, the last score was used.

*Physical bullying by teachers* was queried with the item, "I was hit by one of my teachers." The items, "A teacher made fun of me in front of other students" and "A teacher was quite mean to me" were equated to *psychological bullying by a teacher* ( $r = 0.58$ ,  $p < 0.000$ ; Baier and Kunkel 2016). Respondents were able to answer all three statements with frequency options listed above. Both items were combined to a maximum index.

In addition to school bullying, questions were asked about students' experiences in *cyberbullying*. The relevant section was introduced as follows: "Teasing takes place not just at school, but also online. How many times has the following happened to you in the past year at school?" Based on Sitzer et al. (2012), six statements were provided and the students were asked to indicate the frequency of occurrence as above. *Psychological cyberbullying* was queried with the following four items: "I have been made fun of, insulted, cursed, or threatened online", "Rumors and negative gossip about me has been spread online", "Someone has posted my private messages, confidential information, or photos/videos of me online to make fun of me or to harm my reputation" and "I have been excluded from an online group by someone" ( $\alpha = 0.77$ ). Two items were also used to measure *sexual cyberbullying*: "Someone

has sent me unwanted photos or videos of naked persons or has wanted to talk with me about sex" and "Someone has told me to engage in sexual acts against my will online (e.g., undressing in front of a webcam)" ( $r = 0.49$ ). The four items concerning psychological cyberbullying and the two items concerning sexual cyberbullying were combined to a maximum index. This can also be explained by the explanatory factor analysis shown below.

### Dependent variables

Mental health was assessed with two short scales: the Patient Health Questionnaire (PHQ-4; Löwe et al. 2010) and the Somatic Symptom Scale (SSS-8; Gierk et al. 2014). The PHQ-4 contains four items, two of which measured depression (e.g., "Little interest or pleasure in activities over the past two weeks") and two generalized anxiety (e.g., "Nervousness, anxiety, or tension in the past two weeks"). Responses ranged from 0 = not at all to 3 = almost every day. Responses of the items are then totaled to give a score ranging from 0 to 12. The internal consistency of the scale in the survey has a Cronbach's alpha of 0.78. In the SSS-8, eight items measure the occurrence of various physical symptoms in the past seven days (e.g., abdominal pain or digestive problems, back pain). Responses range from 0 = not at all to 4 = very strong. Three responses are then totaled to give a score ranging from 0 to 32. The internal consistency of the scale in the survey has a Cronbach's alpha of 0.79. In the present study, mental health was recorded on self-reported symptoms of depression and on psychosomatic complaints.

### Control variables

In addition to the migration background, the analyses also included three control variables which represent three key areas of socialization for adolescents and are likely to be connected to their mental health (see Carter et al. 2007; Chu et al. 2010; Currie et al. 2012; Konu et al. 2002; Oberle et al. 2011). School performance was assessed by taking the average of the *grades* received by each respondent on his or her last report card in the subjects German, mathematics, history, and biology (1 = "very good" to 6 = "failing"). The Cronbach's alpha for the four items was 0.74. Peer group relationships were assessed with a questionnaire on *perceived social support* (F-SozU; Kliem et al. 2015). This contains six items (e.g., "I know several people with whom I like to do things"). The available options ranged from 1 = "not at all" to 5 = "describes me exactly." The assumption is that the adolescent would answer such items with regards to relationships among their peer group. The reliability of the scale has a Cronbach's alpha of 0.81. Relationships to their family is represented by an index variable

**Table 1** Confirmatory factor analysis

Variable	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Physical bullying by classmates	Beaten or kicked					0.98	
Relational bullying by classmates	Excluded from joint undertakings		0.85				
	Treated me as invisible		0.81				
Psychological bullying by teacher	A teacher made fun of me			0.87			
	A teacher was quite mean to me			0.88			
Physical bullying by teacher	Hit by one of my teachers						0.99
Psychological cyberbullying	Made fun of, insulted, cursed, or threatened online	0.79					
	Rumors and negative gossip has been spread online	0.83					
	Posted private messages, confidential information, or photos/videos	0.71					
	Excluded from an online group	0.56	0.47				
Sexual cyberbullying	Photos or videos of naked persons				0.81		
	Engage in sexual acts against my will online				0.87		
Eigenvalue		3.49	1.46	1.30	0.97	0.96	0.87

mapping the presence of three *negative family experiences* (0 = “no negative experiences” to 3 = “three negative experiences”). These were identified as (a) the separation or divorce of one’s biological parents; (b) the experience of severe physical violence by at least one parent (“hit me with something,” “hit me with his or her fist or kicked me,” and “beat me up”); and (c) growing up in an impoverished situation (at least one parent currently unemployed and/or is receiving welfare benefits).

### Data Analyses

In a first step, an explanatory factor analysis was calculated using SPSS (v. 24) to check whether the bullying items represent six distinguishable factors. This is then followed by the results of univariate and bivariate analyses (Pearson’s  $r$ ), which were also calculated using SPSS. Multivariate analyses were then performed by using linear multilevel modeling, using MPlus 7.4 (Muthén and Muthén 1998). Multilevel modeling is necessary because the respondents were surveyed in their classes. The independence of the responses of individual students can therefore not be assumed, a fact which must be taken into account when calculating standard errors. Using the MLR estimator recommended by Muthén and Muthén (1998), the multilevel models were calculated; only variables at the student level and not the class level were included in the analyses. In order to examine gender-specific relationships between experiences of bullying and mental health, the models were also calculated separately for male and female respondents.

### Results

Data on bullying were collected with a total of twelve items which were then combined into six indices. An explanatory factor analysis requesting six factors confirms the index formation (see Table 1). The six factors had Eigenvalues between 3.49 and 0.87. One item (online exclusion from the group) showed a substantial cross load on another factor; all of the other items do not (when  $\lambda \geq .40$ ). The four items on psychological cyberbullying loaded on the first factor; the items on relational bullying loaded on the second; while the items on psychological teacher bullying loaded on the third. The individual items on physical classmate bullying and on physical teacher bullying each loaded on their own factor.

The means of the six bullying variables as well as of the dependent and control variables are shown in Table 2. The means of the bullying variables indicate that psychological cyberbullying is reported most frequently ( $M = 1.70$ ), followed by psychological teacher bullying ( $M = 1.45$ ), and relational classmate bullying ( $M = 1.39$ ). The lowest average for physical teacher bullying ( $M = 1.02$ ) indicates that there are only very few respondents who reported having experienced such behavior on the part of their teachers.

Both the mean of the PHQ-4 and the mean of the SSS-8 shows that depression/anxiety and physical symptoms were rather low ( $M = 2.85$  and  $8.78$ , respectively). However, the entire range of responses for both variables (from 0 to 12 and 0 to 32, respectively) was used, indicating that some respondents reported very high levels of depression, anxiety, or physical symptoms.



With regards to the control variables, the respondents showed on average better grades than worse ( $M = 3.01$ ), perceived a high level of support ( $M = 4.08$ ), and reported less than one negative family experience ( $M = 0.51$ ).

Table 3 reports the bivariate relationships among the study variables. The highest correlation was found between the two dependent variables ( $r = 0.56$ ). All of the other

variables correlated at no more than  $r = 0.37$ . The problem of multicollinearity was therefore negligible in the analyses. The six bullying variables correlated positively with each other, while the correlations with physical bullying (classmates and teachers) were small. Relational classmate bullying and psychological cyberbullying were the most highly correlated.

When the correlations between the bullying variables and the dependent variables are considered, almost identical results were obtained on both the PHQ-4 and the SSS-8. The highest correlations were with psychological cyberbullying, followed by relational classmate bullying, sexual cyberbullying, and psychological teacher bullying. There was no correlation between the physical teacher bullying and the PHQ-4 or SSS-8.

With regards to the control variables, there were close correlations between mental health and both perceived support, as well as negative family experiences. Table 3 also shows that male respondents reported much better mental health than the female respondents.

Table 4 reports the results of various linear multilevel analyses on the dependent variables PHQ-4 and SSS-8. In the first model of each, only the bullying variables were considered, while the second models took into account the control variables. The second model was also calculated separately for female and male respondents.

A comparison of models 1 and 2 shows that for both dependent variables, correlations diminished when the

**Table 2** Univariate analysis

	<i>M</i>	<i>SD</i>	Range	Valid answers
Physical bullying by classmates	1.23	0.62	1–6	10,502
Relational bullying by classmates	1.39	0.86	1–6	10,498
Psychological bullying by teacher	1.45	0.87	1–6	10,502
Physical bullying by teacher	1.02	0.27	1–6	10,493
Psychological cyberbullying	1.70	0.96	1–6	10,484
Sexual cyberbullying	1.28	0.75	1–6	10,473
Patient Health Questionnaire (PHQ-4)	2.85	2.59	0–12	10,263
Somatic Symptom Scale (SSS-8)	8.78	6.07	0–32	10,324
Bad grades	3.01	0.70	1–6	10,344
Perceived social support	4.08	0.78	1–5	10,268
Negative family experiences	0.51	0.71	0–3	10,625
Male gender	0.50	0.50	0–1	10,618
Migration background	0.24	0.43	0–1	10,338

**Table 3** Correlations among the study variables

	1	2	3	4	5	6	7	8	9	10	11	12
Relational bullying by classmate	—											
Psychological bullying by teacher	.22***	—										
Physical bullying by teacher	.06***	.17***	—									
Psychological cyberbullying	.37***	.24***	.05***	—								
Sexual cyberbullying	.16***	.16***	.06***	.33***	—							
Bad grade	.01	.11***	.01	.06***	.04***	—						
Perceived social support	-.18***	-.08***	-.04***	-.12***	-.07***	-.13***	—					
Negative family experiences	.11***	.07***	.02*	.15***	.12***	.13***	-.15***	—				
Male gender	-.14***	.03**	.07***	-.11***	-.12***	.08***	-.08***	-.05***	—			
Migration background	.01	.07***	.05***	.06***	.04***	.09***	-.07***	.14***	-.02	—		
Patient Health Questionnaire	.29***	.19***	.00	.31***	.21***	.09***	-.29***	.20***	-.27***	.06***	—	
Somatic Symptom Scale	.23***	.19***	.00	.31***	.23***	.11***	-.18***	.21***	-.32***	.10***	.56***	—

\* $p < .05$

\*\* $p < .01$

\*\*\* $p < .001$

**Table 4** Multi-level linear regression analyses

	Patient Health Questionnaire				Somatic Symptom Scale			
	Model 1	Model 2	Model 2 female	Model 2 male	Model 1	Model 2	Model 2 female	Model 2 male
Physical bullying by classmates ( $z$ )	−0.008	0.023*	0.026	0.037*	−0.015	0.033**	0.032*	0.053**
Relational bullying by classmates ( $z$ )	0.182***	0.107***	0.087***	0.126***	0.113***	0.046***	0.046**	0.029
Psychological bullying by teacher ( $z$ )	0.087***	0.090***	0.113***	0.079***	0.101***	0.103***	0.123***	0.104***
Physical bullying by teacher ( $z$ )	−0.040	−0.029*	−0.010	−0.034	−0.034***	−0.020*	0.001	−0.020
Psychological cyberbullying ( $z$ )	0.198***	0.158***	0.170***	0.160***	0.206***	0.162***	0.189***	0.152***
Sexual cyberbullying ( $z$ )	0.101***	0.064***	0.075***	0.028	0.134***	0.091***	0.121***	0.039*
Bad grades ( $z$ )		0.046***	0.060***	0.024		0.076***	0.087***	0.065***
Perceived social support ( $z$ )		−0.240***	−0.294***	−0.190***		−0.139***	−0.179***	−0.103***
Negative family experiences ( $z$ )		0.090***	0.098***	0.077***		0.106***	0.112***	0.105***
Male gender		−0.264***	—	—		−0.317***	—	—
Migration background		0.001	−0.010	0.012		0.040***	0.044**	0.037*
ICC	0.014	0.009	0.013	0.021	0.016	0.009	0.017	0.023
Explained variance	0.152	0.277	0.273	0.151	0.140	0.268	0.242	0.110
Number of students	9589	9589	4872	4717	9628	9628	4893	4735
Number of classes	509	509	507	506	509	509	507	506

Estimator: MLR, standardized coefficients shown,  $z$  grand mean centered

control variables were considered. However, significant correlations remained significant when controlled for further variables. This indicates that the bullying variables had their own effect on mental health.

Model 2 of the PHQ-4 confirms that psychological cyberbullying had the strongest correlation of all the bullying variables ( $\beta = 0.158$ ): The higher the frequency reported, the higher the likelihood that the respondents would also report symptoms of depression and anxiety. Relational classmate bullying, psychological teacher bullying, and sexual cyberbullying showed somewhat weaker correlations in the same direction. Very weak correlations existed for physical classmate bullying ( $\beta = 0.023$ ) and physical teacher bullying ( $\beta = -0.029$ ). The negative correlation shown for physical teacher bullying indicated an increase in psychological health with increased bullying (and vice versa).

The results of Model 2 for the SSS-8 were almost identical. Here, too, when comparing all of the bullying variables, the most strongly correlated was psychological cyberbullying ( $\beta = 0.162$ ). Physical classmate bullying as well as the physical teacher bullying showed rather weak correlations, and the coefficient for physical teacher bullying was once again negative. Compared to the PHQ-4

model, the correlation with relational classmate bullying was weaker.

The models differentiated by gender give similar coefficients for girls and boys, with the exception of sexual cyberbullying. For girls, sexual cyberbullying correlated with both the PHQ-4 and the SSS-8. For boys, however, there was no correlation with the PHQ-4 and only a weak correlation with the SSS-8.

Regarding the control variables, findings of the bivariate analyses were largely confirmed. Poor school performance and negative family experiences were associated with poorer mental health, whereas higher levels of perceived support and being male correlated with better mental health. Respondents with a migration background showed slightly higher values on the SSS-8. For male respondents, all of the coefficients for the control variables were lower than for the female respondents.

## Discussion

The present study examined whether face-to-face bullying, cyberbullying, and teachers' bullying have a negative impact on adolescents mental health, even after all types of

bullying are simultaneously considered. The study also hypothesized that there would be a stronger association between bullying and mental health for female adolescents than for male adolescents, even after all types of bullying are simultaneously considered.

Our findings suggested that psychological cyberbullying was the most important influencing factor of mental health for both boys and girls, which partially supported past findings (Goebert et al. 2011; Suzuki et al. 2012) and our research hypothesis. This is not surprising, given that adolescents spend a considerable amount of time in the social media, which can reinforce profound psychosocial outcomes, such as depression and anxiety (see O’Keeffe et al. 2011). Psychological, or relational bullying was the second most highly correlated with mental health for both classmate and teachers’ bullying, which was also consistent with past research (see Archer and Coyne 2005, for a review; Chester et al. 2017; Thomas et al. 2016) and the study hypotheses. In addition, for psychological bullying, students who experienced bullying by their teachers displayed higher somatization (see Hansen et al. 2012, for a review), which seems to indicate that victims of teachers’ bullying can be affected neurologically.

Third most important is the link between sexual cyberbullying and mental health outcomes, but only for girls, which is also somewhat congruent with the literature on sexual bullying (e.g., Fredland 2008). Girls are more likely than boys to be sexualized (see Shute et al. 2008) and are targets of gender-based harassment, sexual comments, and sexual assault (Fredland 2008).

Moreover, the present study findings indicate that physical bullying by classmates showed a rather low effect on mental health, particularly for boys. Males have been considered to be the aggressive sex and have found to exhibit significantly higher levels of aggression than females (Coie and Dodge 1998). Thus, it is plausible that because boys are more likely than girls to be involved in physical bullying and other forms of physical confrontations (Espelage et al. 2000; Varjas et al. 2009), they might be less likely than girls to be psychologically distressed when they are physically bullied by their classmates.

On the other hand, for physical bullying by teacher, a small contradictory effect was found in the overall models. It is conceivable that unlike victims of bullying by classmates, those bullied by a teacher might receive sympathy from other students, which can possibly increase their social status in their classroom.

In terms of the control variables, the study found that social support was correlated with better mental health especially for girls, which is consistent with literature on social support and mental health (e.g., Stice et al. 2004). Social support can also buffer the negative mental health outcomes of bullying victimization, which is congruent with

past research findings (e.g., Rigby 2000). Future studies might consider the differential effects of social supports from parents, teachers, and peers on the link between bullying victimization and psychosocial outcomes in adolescents. On the contrary, negative family experiences was correlated with decreased mental health regardless of gender. Considering that family is the primary arena of socialization, adolescents who are exposed to negative family environment can become vulnerable to disruptions in psychosocial functioning (Repetti et al. 2002), regardless of gender. And finally, lower grades was found to be associated with mental health problems, particularly for girls. Empirical studies have reported that academic achievement and mental health often go hand-in-hand (Roester et al. 1999). For girls, as they are more likely than boys to experience internalizing problems and psychosocial distress, academic achievement can possibly be a protective factor that is related to better mental health functioning.

Nearly identically correlations are found for both measures of mental health. In other words, the study found that bullying is related to depressive symptoms and somatization, which is compatible with study findings on bullying and mental health (Annerbäck et al. 2013, Due et al. 2005, Fisher et al. 2012, Fleming and Jacobsen 2009, Gini and Pozzoli 2013, Hepburn et al. 2012, Kim et al. 2005). Psychosocial functioning of adolescents is often undermined by frequent experiences in bullying in school by their peers, classmates, and also their teachers (Rigby 2000).

## Limitations

Several limitations of the present study are worth mentioning. First is the research design, which is cross-sectional and thus difficult to establish causality as a result. Second limitation is the study sample, which was confined to adolescents in Lower Saxony, Germany; thus, it is difficult to establish whether the study findings are generalizable to German adolescents in other regions. The third limitation is the measure of physical bullying by classmates and by teachers. Physical bullying was measured in each case with a single item, whereas relational and psychological bullying was measured by at least two items. Future studies might consider additional items to better capture physical bullying by classmates and teachers. Hence, the results presented here for the one-item bullying measures should be interpreted with caution. Fourth, the measures of mental health outcomes only included depression, generalized anxiety, and somatization (Patient Health Questionnaire and the Somatic Symptom Scale). It is important that future research analyses other forms of internalizing as well as externalizing problems as consequences of bullying, such as low self-esteem, suicidal or aggressive behavior – comparing again girls and boys because it can be assumed that boys show



consequences of bullying more often by externalizing behavior. Fifth, the rather long survey time of about 90 min might have a negative impact on the quality of the answers of the pupils. However, the analyses presented here may be less affected by this: The questions on mental health were placed at the beginning of the questionnaire, the questions on bullying right in the middle. On the other side, more research is necessary about the impact of survey length on answering behavior, especially for children and adolescents. Last, future studies should also include measures of further types of bullying that were not measured in the survey but that are propable important for mental health, e.g. sexual bullying based on sexual orientation or gender identification.

### Implications for Future Research

These limitations aside, the present study findings have implications for future research on adolescents' experiences in bullying. Various types of bullying victimization were strongly correlated with negative depression and somatization. Thus, scholars especially in Germany might longitudinally explore and test potential mediators (e.g., lower academic performance) and moderators (e.g., social supports from parents and peers) on this association, which can also have implications for practice. Moreover, the presence of migrant adolescents in German school districts have increased over the years (e.g., Blossfeld et al. 2016, p. 144). Because migrant adolescents are more vulnerable to bullying victimization, scholars might also consider gathering more comprehensive data to examine the link between various types of bullying victimization and mental health outcomes in migrant adolescents.

In summary, empirical evidence suggest that adolescents who experience bullying are at an elevated risk of mental health problems. Findings from the present study highlight a critical need for developing and implementing intervention and prevention strategies in German schools. Prevention and intervention efforts need to consider various types of bullying behaviors by adolescents (e.g., physical bullying, relational aggression, cyberbullying), as well as bullying perpetrated by teachers.

### Data Availability

The data are not available now because the research project is not completed. However, the data can be requested from the first author.

**Author Contributions** D.B.: designed and executed the study and did the data analyses. J.S.H. collaborated with the data analyses and the writing and editing of the manuscript. S.K. and M.C.B. designed and

executed the research project in that the data were collected, and they assisted by the data analyses and editing of the manuscript.

### Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethical Approval** This article does not contain any studies with animals performed by any of the authors. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (no IRB approval by an University was necessary to conduct the study in Germany).

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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