



# The cost incurred by victims of bullying from a societal perspective: estimates based on a German online survey of adolescents

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## Abstract

Being a victim of bullying is linked to various social, emotional and behavioral problems potentially leading to a reduced quality of life. Furthermore, victims of bullying may cause extensive costs for society, for example by an above-average need for healthcare services. The present study was designed to quantify the costs and the loss of quality of life attributable to bullying by comparing victims with a control group of non-bullied students. A cross-sectional sample of 1293 adolescents (mean age 14.07, SD = 1.36) and their parents reported on bullying victimization, quality of life (adolescents' self-report), and annual direct (medical and non-medical) as well as indirect costs (parents' self-report) from a societal perspective (all expressed in €, year 2014 and 2015). For frequent (20.6% of our sample; costs: €8461.80 p.a.) but not occasional (13.3%; costs: €2850.06) bullying, victimization was associated with significantly higher costs compared to non-bullied adolescents (costs: €3138.00; annual difference between frequently bullied students and controls: €5323.01 p.a.;  $p = 0.008$ ). Cost drivers included increased direct medical costs, but mostly indirect costs caused by productivity losses of the parents. Self-reported quality of life of frequent victims was considerably reduced ( $T = -10.96$ ;  $p < 0.001$ ); also occasional bullying showed significantly reduced values in global quality of life ( $T = -5.73$ ;  $p < 0.001$ ). The present findings demonstrate that frequent bullying is associated with substantial cost to society and reduced quality of life of victims. This observation underscores the need for effective school-based bullying prevention and suggests a high potential of effective programs to be cost effective as well.

**Keywords** Bullying · Victimization · Cost of illness · Economics · Healthcare · Prevention

## Background

School bullying is a major social problem affecting children and adolescents in all social classes and cultures. Bullying is defined as repeated negative actions over a longer period that can be performed by a single person or group and carried out in direct or indirect form. Key criteria of bullying are the harmful intent of the perpetrator as well as an existing imbalance of power between victim and perpetrator [1]. Despite the emergence of cyberbullying, the majority of bullying among children and adolescents still takes place in school [2].

Numbers on the incidence of bullying vary considerably depending on numerous variables such as assessment tools, sampling procedures and cultures. The large-scale study "Health Behaviour in School-Aged Children", which collected data from more than 200,000 adolescents in 40 European countries, showed variations ranging from 7 to 40%.

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Overall, 26.9% of the participants were affected by bullying, as victims, perpetrators, or bully/victims [3].

The distress and suffering caused by school-based bullying are enormous, especially for the victims. Comprehensive findings on clearly elevated odds for psychosomatic symptoms [4], school absenteeism [5], depression and anxiety disorders [6], as well as self-harm and suicidal behavior [7–9] were reported. A recent meta-analysis provided convincing evidence that bullying over and above pre-existing conditions or family circumstances affects mental health [10]. Other studies used innovative designs like twin studies to provide robust evidence that being bullied contribute to mental health problems in childhood and adolescence [11, 12]. Regarding future outcomes, recent prospective studies clearly indicate an incremental contribution of bullying to the development of mental disorders in adulthood [6, 13].

### Economic consequences of bullying

However, the economic consequences of bullying are not yet fully understood. Cost of illness (COI) studies provide aggregate estimates of the burden of disease from various perspectives. If conducted from the societal perspective, they include all resources used to treat the condition and all resources lost, regardless of who bears the burden [14]. While they do not provide information on specific treatment strategies, their results can potentially yield an upper limit for what society might save through intervention [15]. Beyond information about direct medical costs (caused by consumption of resources in the health sector), a complete assessment of the costs of bullying also needs to take account of direct non-medical costs (such as cost of and time lost for travel to points of care) and of indirect costs (productivity losses attributable to bullying). “Intangible costs” (i.e., loss of quality of life and lifetime) may sometimes be included in COI studies, providing that they can be quantified appropriately [16].

Victims of school-based bullying are frequent users of mental healthcare services. Kumpulainen et al. [17] showed that 24% of bully/victims had been in contact with mental health professionals, compared to 13% from a non-bullied control group. Conversely, Fosse [18] showed that of 160 adults seeking mental healthcare, 50% reported bullying victimization as children or adolescents. Dyer and Teggart [19] reported even higher proportions. Among adolescent patients, 58% reported experiences of school-based bullying in the past few months, and 63% agreed with the statement that bullying is a medium to high important reason for seeking mental healthcare. Data from the 1958 British Birth Cohort Study on 9242 participants showed that those children who were frequently bullied were more likely to use mental health services in childhood and adolescence (odds ratio, OR 2.53) as well as in midlife (OR 1.30) [20]. Finally, analyses of the Finnish Nationwide Birth

Cohort Study ( $n=5034$ ) found independent associations of treatment of any psychiatric disorder (aged 16–29 years) with frequent exposure to bullying (at age of 8 years). This association was especially strong for depression [21]. To the best of our knowledge, empirical data about the direct medical costs of bullying were not obtained in any of these studies and robust information on these costs is currently not available at all.

### Prevention in school

Central causes and sustaining mechanisms of bullying can be positively influenced by school-based preventive programs [22]; in particular, whole-school approaches, including all students and teachers, seem to be promising [23]. A recent meta-analysis confirmed the overall effectiveness of primary prevention programs [24]: Altogether, a reduction of bullying by 20% could be achieved; single programs like the Olweus Bullying Prevention Program had much larger effects. Currently, the few existing cost–benefit studies of school-based bullying prevention used estimates instead of empirical data about the four required parameters: incidence and costs of bullying as well as costs and effect of the program [25–27]. Consequently, the overall positive cost effectiveness of bullying prevention so far has to be regarded as an estimate rather than an evidence-based fact. Nevertheless, a recent report on the cost effectiveness of the KiVa Program [28] looked at the potential costs that may be averted for children aged 7 until the age of 50 through the implementation of KiVa in their primary school. The costs for the program were taken from a microcosting study in Wales; evidence on effectiveness was taken from the previous KiVa evaluations in Finland. The incidence of bullying in schools was based on the observed data in the Welsh pilot evaluation. The study distinguished between short-term and long-term costs of bullying, and—from a societal perspective—revealed a return on investment of £1.58 and £146.78, respectively, for every £1 invested.

### Aims of the present study

The present study aimed to measure, from a societal perspective, the excess costs attributable to being a bullying victim, by comparing victims of bullying with a control group of non-bullied students (primary objective). Secondary objectives of the study were to conduct subgroup analyses by severity of bullying and to compare quality of life in the study (sub)groups.

### Methods

A cross-sectional survey was conducted among adolescents aged 12–16 years and their caregivers. Information about bullying experiences (independent variable, adolescents’

self-report) and quality of life (dependent variable, adolescents' self-report), healthcare costs (dependent variable, parents' self-report) and sociodemographic variables was collected.

## Recruitment and procedure

To obtain a representative sample from the Rhine-Neckar region, catchment areas were divided into three categories according to their population: cities, district towns and little towns/villages. Randomly chosen registration offices of two cities, four district towns and 15 little towns/villages provided address information of potential research participants (families with 12–16 year old adolescents). A random sample of  $N=10,000$  was invited by mail to participate in the survey. Participants (adolescents and parents) were assessed anonymously and online using the Software LimeSurvey from June to September 2014 (first cohort) via self-report questionnaires. The participation rate was 10.09% ( $n=1007$ ). To obtain a larger sample, a second cohort was invited to take part in the survey and data were collected from May to July 2015. This resulted in an overall response rate of 7.38% and a total sample size of  $n=1293$ .

## Measures

### Bullying

Experiences of bullying within the last three months were measured using the “Forms of Bullying-Scale” (FBS) [29]. The FBS was developed for adolescents aged 12–15 years. Only the subscale victimization was used for the present analyses. The 10 items of the FBS (subscale victimization) are answered on a five-point scale (1 = “this did not happen to me”, 2 = “once or twice”, 3 = “every few weeks”, 4 = “about once a week”, and 5 = “several times a week or more”), from which a global score can be formed. Finally, the following three categories were made: no bullying (maximum “once or twice”), occasional bullying (“every few weeks”) and frequent bullying (at least “once a week”).

### Costing

We collected information on resource utilization and expenditures related to the main categories of cost, using a micro-costing approach from the societal perspective. Accordingly, we calculated costs (expressed in Euro for year 2014) by combining quantity of resource use and unit cost information for all relevant cost categories, i.e., costs arising from the use of resources within the health care sector (direct medical costs), costs related to medical interventions outside the health care sector itself (direct non-medical costs), and productivity losses due to bullying-related absenteeism

as well as reduced working hours of parents or caregivers (indirect costs). Impaired quality of life (sometimes referred to as “intangible cost”) was not monetarized.

For many types of resource use, unit costs from societal perspective for recent years were available from published sources [30–32], which had been calculated in line with internationally accepted health economic standards reflecting the opportunity cost principle [16, 33, 34]. Cost data for years prior to 2014 were inflated using the consumer price index (CPI) [35].

We selected 25 types of cost (see Table 1), which might be affected by being a victim of bullying and grouped them into the following three categories:

**Direct medical costs** To capture the true societal opportunity costs of outpatient medical care, costs of healthcare providers that had been calculated using data from the German Statutory Health Insurance were subsequently adjusted for the higher reimbursement rates of private health insurance companies.

Outpatient medical treatment, either due to accidents or due to illness, was calculated by multiplying the number of pediatrician visits reported by parents with the cost per visit from a societal perspective, which was set at €35.85 after inflating the unit cost reported for 2011 [31, 32]. For sensitivity analyses, we also used the lower cost per visit to general practitioners of €20.14 (2014) and the higher one for surgeons of €45.30 (2014). Similarly, after inflation of data for year 2011, inpatient treatment was valued at €601.24 (2014) per day in a general ward and at €1,396.58 (2014) per day in an intensive care unit [31, 32].

Psychotherapy costs were calculated in a similar way, resulting after inflating the value of year 2011 in an estimate of €81.52 (2014) per session [31, 32]. Counseling costs were assumed to amount to €111.88€ (2014), again after inflating the value for year 2011. This was based on an empirical cost study comprising a total of 24 points of service provision, which generated evaluable data on resource use and cost [30]. In the absence of more specific information, other therapeutic interventions were assumed to cost €39.72 (2014) per session, applying the average cost of logo therapy and occupational therapy [31, 32].

Medication costs were computed using number of daily doses consumed as reported by parents, multiplied with official ex-pharmacy list prices [36] per defined daily dose (DDD).

**Direct non-medical costs** Travel expenses, which arose due to the need for medical care for accidents or for diseases of the child, were collected as follows: Cost of travel by car was valued at €0.30/km, which is the going rate used by German tax authorities. For both public and private transportation (other than by car), costs were assessed

**Table 1** Resource utilization and associated costs from a societal perspective

	Resource use [units]				Cost/unit [€]	Cost [€, 2014]				
	Mean	SD	Min	Max		Mean	SD	Min	Max	
<b>Direct medical costs</b>										
Accidents of the child: outpatient treatment <sup>a</sup>	0.75	3.71	0	48	35.85	26.95	133.00	0	1720.80	
Accidents of the child: inpatient treatment <sup>b</sup>	0.08	1.02	0	20	601.24	46.50	615.10	0	12,024.80	
Accidents of the child: inpatient intensive treatment <sup>b</sup>	0.01	0.22	0	8	1396.58	8.64	310.71	0	11,172.64	
Illness of the child: outpatient treatment <sup>a</sup>	2.25	8.60	0	160	35.85	80.74	308.31	0	5736.00	
Illness of the child: inpatient treatment <sup>b</sup>	0.18	1.93	0	32	601.24	109.74	1163.33	0	19,239.68	
Illness of the child: inpatient intensive treatment <sup>b</sup>	0	0	0	0	1396.58	0	0	0	0	
Individual psychotherapy <sup>a</sup>	1.91	11.88	0	200	81.52	156.10	968.46	0	16,304.00	
Psychotherapy in groups <sup>a</sup>	0.22	2.91	0	48	81.52	18.16	236.91	0	3912.96	
Counseling services <sup>a</sup>	0.34	2.38	0	36	111.88	38.42	266.30	0	4027.68	
Other therapy <sup>a</sup>	1.47	9.15	0	144	69.87	74.31	456.13	0	5968.64	
Medication <sup>c</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	256.53	3955.15	0	132,538.70	
<b>Direct non-medical costs</b>										
Travel expenses due to diseases of the child: own car <sup>d</sup>	79.43	345.66	0	6000	0.30	23.83	103.70	0	1800.00	
Travel expenses due to diseases of the child: public transport <sup>e</sup>	0.02	0.15	0	1	169.42	4.06	74.67	0	2616.00	
Travel expenses due to diseases of the child: time spent <sup>f</sup>	7.16	34.02	0	600	22.45	160.78	763.75	0	13,470.00	
Travel expenses due to accidents of the child: own car <sup>d</sup>	25.32	198.81	0	6000	0.30	7.60	59.64	0	1800.00	
Travel expenses due to accidents of the child: public transport <sup>e</sup>	0.01	0.09	0	1	193.82	1.65	39.58	0	1380.00	
Travel expenses due to accidents of the child: time spent <sup>f</sup>	2.71	26.10	0	600	22.45	60.78	585.92	0	13,470.00	
Private lessons <sup>f</sup>	14.94	36.30	0	390	16.30	234.11	606.57	0	7800.00	
After school care <sup>f</sup>	24.25	265.34	0	8736	3.91	57.09	501.07	0	9600.00	
<b>Indirect costs</b>										
Reduction in working hours of mother <sup>e</sup>	0.01	0.10	0	1	32,366.50	300.39	3104.78	0	32,366.50	
Illness mother <sup>b</sup>	2.52	12.96	0	240	254.16	640.81	3293.90	0	60,998.40	
Reduction in working hours of father <sup>e</sup>	<0.01	0.07	0	1	32,366.50	150.19	2200.54	0	32,366.50	
Illness father <sup>b</sup>	3.49	21.01	0	240	254.16	886.12	5340.80	0	60,998.40	

<sup>a</sup>Number of treatments/visits<sup>b</sup>Number of days<sup>c</sup>No declaration of units possible because of the heterogeneity of individual medication<sup>d</sup>Kilometers<sup>e</sup>Yes/no<sup>f</sup>h

directly in monetary units. Time spent by parents for accompanying their child traveling to and from a point of service provision was valued at €22.45/h (2014), reflecting our estimate of the opportunity cost of leisure time [37]. The value was calculated on the basis of the average net income per hour (€16.20/h in Germany, 2014) plus the corresponding contributions to mandatory social insurance schemes. Finally, we added the costs for private lessons (costs per hour (max. 50€/h) × hours per week (max. 10) × 39 weeks of school) and after-school care of children (costs per month (max. 25€/h) × 12 months) at the rates reported by parents, after some plausibility checks and exclusion of outliers.

**Indirect costs** Our estimates of the indirect costs associated with bullying were based on the human capital approach. Such costs arise when parents (mother, father, or both) either reduce or entirely give up their participation in the labor market. We assessed the productivity loss resulting from a reduction of working hours by 50% and short-term absenteeism in the same way, i.e., by calculating a fully loaded average labor cost from the employer perspective at €31.77€ per hour or €254.16 per working day, based on data provided by the German Statistical Office for year 2013 [35].

**Intangible costs** The KIDSCREEN-27 [38] was used for the assessment of health-related quality of life (HRQL). Its

27 items form five dimensions: physical well-being, psychological well-being, autonomy and parent relation, social support and peers, and school environment. We did not translate impaired quality of life into monetary units.

## Statistical analyses

Differences between categorical variables were analyzed using Chi<sup>2</sup> tests; linear regressions were calculated for continuous variables. Due to differences in the distribution of age, gender and type of school between our sample and the state-wide average of pupils, we used post-stratification to correct for potential sampling bias. For each of the 40 strata resulting from every combination of four school types, five age groups, and gender, frequency weights were calculated to be able to generalize the results to the corresponding population of pupils in the state. Data were analyzed using Stata 14.

## Results

### Sample description

In all, 1293 adolescents and their caregivers participated in the study. Mean age of the participants was 14.07 years (SD=1.36, range 12–16 years). For a more detailed description of the sample, please see Table 2, which also gives a comparison of our sample with the population of Baden-Württemberg aged 12–16 years ( $n=500,055$ ). The resulting mean weights of this comparison are the basis for the post-stratification described above. Please note that all subsequent data are weighted for gender, age and school type.

### Prevalence of bullying victimization

Using the “victimization” global score, the sample showed the following group distribution: 66.08% of the participants were not affected by bullying, 20.64% were victims of occasional bullying, and 13.28% were victims of frequent bullying.

In the next step, the impact of potential covariates on the variable “victimization” was examined. A significant effect was found for gender: girls more often reported being a victim of bullying compared to boys ( $F(1.99, 2574.41)=10.50$ ,  $p<0.001$ ). No significant influence was found for age ( $F(7.58, 9789.48)=7.58$ ,  $p=0.05$ ) and type of school ( $F(5.19, 6700.98)=5.19$ ,  $p=0.09$ ).

### Costs of bullying victimization

The average economic healthcare costs per individual were distributed to the three bullying categories as follows:

**Table 2** Sample description and comparison with the underlying population of Baden-Württemberg

	<i>n</i>	% of sample	% of population <sup>a</sup>
Age			
≤ 12	200	15.47	20.69
13	295	22.81	21.17
14	275	21.27	22.21
15	261	20.19	21.11
≥ 16	262	20.26	14.82
Gender			
Male	642	49.65	51.45
Female	651	50.35	48.55
School type			
A-level <sup>b</sup>	782	60.48	37.69
B-level <sup>c</sup>	348	26.91	34.95
C-level <sup>d</sup>	88	6.81	19.17
Others <sup>e</sup>	75	5.80	8.19

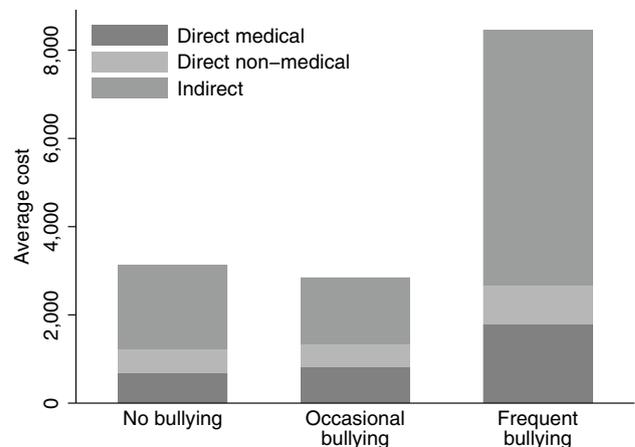
<sup>a</sup>Of Baden-Württemberg aged 12–16

<sup>b</sup>Gymnasium (leading to the Abitur)

<sup>c</sup>Realschule (leading to the Mittlere Reife)

<sup>d</sup>Hauptschule

<sup>e</sup>E.g., comprehensive school, special school or Waldorf school



**Fig. 1** Average healthcare costs per year (in Euro; €) per adolescent, separated by bullying categories

€3,138.78 per year for non-bullied adolescents (95% CI=€2446.11–€3831.45), €2850.06 per year for occasional victims (95% CI=€2108.38–€3591.73), and €8461.76 per year for frequent victims (95% CI=€4627.61–€12295.91). Figure 1 illustrates this distribution, separated by bullying categories:

For more details, Table 3 informs about the weighted means of the three different group of costs (direct medical, direct non-medical and indirect).

A significant difference in the healthcare costs was found between non-bullied youth and victims of frequent bullying

(cost difference = €5322.98, 95% CI = €1409.25–€9236.70,  $p=0.008$ ). Analyses of the three different groups of healthcare costs revealed that this significant difference based on differences between the direct medical as well as indirect costs of frequent victims and control group. No difference occurred between non-bullied youth and victims of occasional bullying (cost difference = –€288.72, 95% CI = –€1298.18 to €720.73,  $p=0.58$ ).

Finally, we tested for gender as a possible moderator of the association between healthcare cost and victimization. No significant interaction of gender and victimization could be found ( $p=0.48$ ).

### Bullying victimization and HRQL

The relationship between bullying victimization and HRQL showed a different pattern. Here, analyses revealed significant differences between all three bullying groups on each of the five dimensions of the KIDSCREEN ( $p<0.001$ ). Table 4 informs about the means of the five dimensions of HRQL, separated by bullying categories, as well as about the significant differences.

### Discussion

In summary, our data show that victims of frequent bullying have significantly elevated healthcare costs, driven by their elevated direct medical as well as indirect costs. Furthermore, all victims of bullying show considerably reduced quality of life. Thus, the data provide a first empirical contribution to the cost–benefit analysis of school bullying

prevention in Germany. However, due to the low response rate, caution is advised in generalizing the results (see “Limitations” below).

The incidence of victimization of 33.92% (20.64% occasional and 13.28% frequent bullying) was high when compared to previous German data [39], but comparisons may likely be influenced by the fact that other studies used different assessment tools with different cutoffs for the definition of bullying. Victims of frequent bullying had higher healthcare costs than non-bullied adolescents (about 5,300 € more per year), and indirect costs represented nearly three quarters of the total cost difference. The impact of indirect costs clearly implies that the economic burden of bullying affects the economy of whole families rather than only the healthcare sector. This is in line with previous findings on healthcare costs (e.g., incurred by conduct disorder), where lost employment for parents and elevated care-giving time were main cost drivers [40].

Occasional bullying, with a frequency of “every few weeks” below the wide-used cutoff by Dan Olweus, was not related to elevated healthcare costs. However, quality of life was already reduced in victims of occasional bullying. This is in line with other research papers on the topic [41, 42] as well as previous data of our research group that confirmed psychological problems including self-harm already for victims of incidental bullying [8]. Information on school environment, which is key in relation to bullying victimization and also for this age group, could also derived by our measure of quality of life, as it forms one out of the five dimensions of the KIDSCREEN-27. The stated significant differences between all three bullying groups on that subscale again showed an impact of bullying already on an occasional

**Table 3** Average healthcare costs per year (in Euro; €) per adolescent, separated by bullying categories

Group of costs	Victimization	Costs (€)	95% CI	$p$ (no)*	$p$ (nf)*	$p$ (of)*
Direct medical	None	685.13	417.01–953.25	0.57	0.02	0.05
	Occasional	822.86	429.44–1216.28			
	Frequent	1792.65	894.63–2690.67			
Direct non-medical	None	545.29	364.95–725.63	0.84	0.18	0.14
	Occasional	522.15	396.09–648.20			
	Frequent	873.70	423.95–1323.45			
Indirect	None	1908.37	1299.84–2516.89	0.35	0.02	<0.01
	Occasional	1505.05	908.50–2101.60			
	Frequent	5795.41	2641.18–8949.63			
Total	None	3138.78	2446.11–3831.45	0.58	<0.01	<0.01
	Occasional	2850.06	2108.38–3591.73			
	Frequent	8461.76	4627.61–12295.91			

\*n no bullying, o occasional bullying, f frequent bullying

**Table 4** Self-reported HRQL, separated by bullying categories

Dimension of quality of life	Victimization	Mean	95% CI	<i>p</i> (no)*	<i>p</i> (nf)*	<i>p</i> (of)*
Physical well-being	None	51.65	50.93–52.37	<0.01	<0.01	<0.01
	Occasional	47.87	46.60–49.14			
	Frequent	44.13	42.17–46.08			
Psychological well-being	None	53.51	52.78–54.25	<0.01	<0.01	<0.01
	Occasional	47.85	46.65–49.05			
	Frequent	40.56	38.94–42.19			
Autonomy and parent relation	None	55.75	55.06–56.44	<0.01	<0.01	0.30
	Occasional	49.92	48.60–51.23			
	Frequent	48.80	47.12–50.49			
Social support and peers	None	52.48	51.81–53.15	<0.01	<0.01	<0.01
	Occasional	49.00	47.73–50.28			
	Frequent	44.74	42.61–46.87			
School environment	None	53.58	52.88–54.27	<0.01	<0.01	<0.01
	Occasional	49.24	48.19–50.30			
	Frequent	44.07	42.53–45.61			

\**n* no bullying, *o* occasional bullying, *f* frequent bullying

level. An objective measure of educational outcomes in the form of school grades unfortunately is not included in our data. This would be a reasonable addition for future studies on that topic. The collected data on quality of life was not included in the healthcare costs in the form of intangible costs because a meaningful transferring in monetary terms would be required.

To date, very little data are available on the economic burden of bullying or other social or psychological problems among children and adolescents, and available data are hard to compare because of different sources of information, small numbers of cases, differences in healthcare systems, high comorbidities and different methodologies used to assess costs [43]. Nevertheless, a short overview shall be given here on annual costs of depression and Attention Deficit Hyperactivity Disorder (ADHD); two mental disorders common in youth and comparable to bullying concerning their broad and long-lasting impact. In the US, annual costs related to depression in children are amounted to \$3792 compared to children with other mental health conditions (\$1421) and children with no mental health condition (\$754) [44]. Another study reported an even more extreme proportion with an expenditure of depressed children of \$2229 per year compared to \$160 for children with no psychiatric diagnosis [45]. Data of the US Panel Study of Income Dynamics investigated the long-term economic costs of psychological problems during childhood, mostly depression. Large effects were found

on the ability of affected children to work as adults: almost a 2-month reduction in weeks worked per year resulted in lower earnings of \$4094 per year [46]. German data are available for the economic burden caused by ADHD. Schöffski et al. [47] specified the direct medical costs of ADHD in the year 2002 of €630 per patient. Additionally, direct medical costs for patients with ADHD exceed those of matched controls by a factor of > 2.5 according to the administrative data analyses in the year 2003 [48]. Reported direct medical costs of ADHD in the US are even higher, varying between \$790 and \$5518 depending on the underlying study [15]. But these relatively low costs neither do consider the elevated risk for accidents, substance abuse and productivity losses that ADHD patients show in adolescence and adulthood, nor do they comprise the subsequent productivity losses in the family [49]. Therefore, Pelham et al. [15] made an attempt to integrate other types of costs in their review (education, parental work loss, and juvenile justice), which resulted in annual costs for a child/adolescent with ADHD of \$14,576; which is many times higher than the estimations based on direct medical costs only.

Our data are well in line with the findings reported above: the annual costs of bullying of €5323 are above the pure direct medical costs of depression and ADHD and under the comprehensive attempt of Pelham et al. [15] for ADHD. Long-term nationally representative epidemiologic studies would be needed for calculating

representative estimates of the economic burden of bullying. These should include costs to a wide range of groups, including the healthcare sector, schools, social services, and families [16].

It would be interesting to know whether the healthcare costs of victims of bullying would be different if derived in a group of younger children. Using the data from the Finnish Nationwide Birth Cohort Study, Sourander et al. [21] found an association of being a victim of bullying at 8 years of age and use of specialized services for psychiatric disorders by 29 years of age (hazard ratio, HR = 1.9). Elevated healthcare costs for victims of bullying might, therefore, also be found for younger children, unless it is unclear at which age suffering children would finally seek help and therefore produce costs by using health services. Analyzing data from more than 16,000 children and adolescents aged 8–18, Analitis et al. [39] revealed that one of the factors most strongly associated with being bullied were younger age (age group eight to eleven). Considering this, one might expect even higher healthcare costs in this age group.

## Limitations

A limitation of the study is the participation rate of 7.38%. A selection bias to the effect that victims of bullying were more willing to participate in the study than non-bullied pupils is possible. Such a selection bias would not only influence the estimate of the prevalence of bullying, but might also influence the estimation of the cost differences. Because it may be those who are bullied and feel a higher burden (suffering) are more likely to take part. However, the typical dominance of verbal and social bullying as well as the characteristic gender effect [50] supports the generalizability of the present results. Furthermore, in our sample pupils of A-level schools are clearly over-represented (see “[Sample description](#)” above), which also means that those who are better-off socio-economically were more likely to take part. There is evidence that those more disadvantaged are more likely to be victims of bullying [51], i.e. were less included. This would counteract the previously described selection bias.

Furthermore, the cross-sectional design of the study limits our ability to draw causal conclusions. It is possible that health problems are a cause rather than an outcome of bullying. Alternately, it is also possible that both are caused by a third underlying variable (e.g., personality, psychological problems or family pathology). Pre-existing conditions for bullying might account for part of the cost, which cannot be ruled out due to the cross-sectional study design. Unfortunately, the conducted Forms of Bullying-Scale do not include information about the duration of the experienced bullying. We, therefore, cannot consider this important fact, which might have an impact on healthcare costs as well.

## Implications

The present findings clearly show that frequent bullying, beyond its well-documented association with elevated risk for the development of psychopathology, is also associated with elevated healthcare costs. Even though bullying experiences in childhood have comparable or even worse negative long-term effects than childhood maltreatment [13], and bullying is a far more common phenomenon that affects all social classes [51], this topic has attracted far less attention. COI studies in this field might change this by showing that bullying has comparable or even higher healthcare costs to society than common childhood disorders like ADHD and depression.

In many areas of healthcare, cost effectiveness has been a factor influencing decisions on resource allocation, pricing and reimbursement. In contrast, it is hardly considered in the educational sector so far [25]. The high-appearing costs of primary prevention programs often result in a lack of appropriate interventions against bullying. The high costs caused by bullying as well as the potential gain of effective bullying prevention to victims, families and society are often not sufficiently recognized. The already cited meta-analysis [24] showed a general effectiveness of school-based prevention, whereby the five included evaluations of the Olweus Bullying Prevention Program had particularly large effects with Odds Ratios between 1.43 and 2.89; thus, its principles were explicitly recommended. The effectiveness of a program was determined by its intensity and duration and successful programs comprised the following elements: firm disciplinary methods, parent training/meetings, videos and work with peers (peer mediation, peer mentoring, and/or encouraging bystander intervention to prevent bullying).

Nevertheless, the effectiveness of school-based prevention programs is only modest, partly because up to 40% of adolescents do not disclose bullying to teachers or parents for fear of reprisals or shame [52, 53]. Therefore, one might want to consider other possibilities for intervention, e.g., in primary care. Primary care is where children and adolescents often make first contact with health services. Given the associations between being bullied and developing mental and physical health problems, it can be expected that the affected children are more likely to encounter primary care professionals than do their non-bullied peers [54]. Greater awareness and responsiveness, as well as the use of screening questionnaires, have the potential to more effectively recognize and manage affected children in this context [55].

Our data suggest that effective prevention could not only prevent negative health outcomes to the individual but also provide an enormous economic benefit for families and society. The social need for action in considering the issue of school bullying is underpinned by the present work, not only

from a moral point of view, but also from the perspective of healthcare policy.

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## Compliance with ethical standards

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

**Research involving human participants** The study has been approved by ethics committee of the Medical Faculty of the University of Heidelberg and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

**Informed consent** At the beginning of the online questionnaire, parents were informed about protection of data privacy and the anonymity of their answers.

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