

Systematic Review: Bullying Involvement of Children With and Without Chronic Physical Illness and/or Physical/Sensory Disability—a Meta-Analytic Comparison With Healthy/Nondisabled Peers

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Abstract

Objective To compare levels of victimization and perpetration associated with bullying among children and adolescents with and without chronic physical illnesses and/or physical or sensory disabilities. **Methods** In total, 107 studies were identified using a systematic search in electronic databases and cross-referencing. A random-effects meta-analysis was computed. **Results** Children and adolescents with chronic physical illness or disability were more likely to be victims of bullying in general (odds ratio [OR] = 1.65), particularly physical bullying (OR = 1.47), relational bullying (OR = 1.47), verbal bullying (OR = 1.67), cyberbullying (OR = 1.39), and illness-specific teasing (OR = 5.29). They were also more likely to be bullies in general (OR = 1.28), as well physical (OR = 1.38) and relational bullies (OR = 1.13). The effect sizes varied across different illnesses and disabilities and, in part, by visibility of the disease, school type, and year of assessment. **Conclusions** Although most between-group differences tend to be small, some form of intervention is needed to reduce bullying among children and adolescents with chronic physical illnesses and/or physical or sensory disabilities, and illness-specific weight- and appearance-related teasing in particular.

Key words: bullying; chronic illness; disability; peer victimization; teasing.

Bullying or peer victimization can be defined as an aggressive behavior repeated over time with the intention to harm the victim. It is characterized by an imbalance of power between the bully and the victim, with the bullied person being the weaker of the two (e.g., Juvonen & Graham, 2014). Different forms of bullying have been distinguished (e.g., Faith, Reed, Heppner, Hamill, Tarkenton, & Donewar, 2015; Scheithauer, Hayer, Petermann, & Jugert, 2006): Physical bullying is characterized by observable behaviors including hitting, pushing, and insulting. Relational forms of bullying or aggression refer to

more subtle, indirect forms of behavior such as spreading untrue rumors and socially excluding the victim. Verbal bullying involves teasing, taunting, spreading rumors, and threatening. Finally, cyberbullying refers to victimization by means of electronic media. About 15–18% of 11- to 15-year-old students report being bullied, although the rates vary depending on the measures and cutoff scores which are used (Due et al., 2005). Peer victimization has been found to increase the risk for mental health problems, such as anxiety or depression (Reijntjes, Kamphuis, Prinzie, & Telch, 2010), and also leads to poor academic outcomes

(Schwartz, Gorman, Nakamoto, & Toblin, 2005). In children with chronic illnesses, peer victimization has also been linked to poorer treatment adherence (Janicke, Gray, Kahhan, Junger, Marciel, Storch, & Jolley, 2009; Storch, Heidgerken, Geffken, Lewin, Ohleyer, Fredde, & Silverstein, 2006).

It has been suggested that children and adolescents with chronic health conditions have an increased risk of being bullied (Faith et al., 2015). First, a child who is physically different is an easy target for victimization (Dawkins, 1996). Symptoms of the disease or treatment regimens may cause peers to perceive them as being different. For example, children with facial disfigurement may not meet the beauty standards of their peer group. In addition, children with chronic illnesses may be perceived as physically weaker, and are therefore vulnerable to peer victimization (Nadeau & Tessier, 2006; Twyman et al., 2010). Next, young people with chronic illnesses are at increased risk for showing reduced social functioning (social and communication skills) and academic performance, which could provoke negative reactions from their peers (Pinquart & Teubert, 2012). In addition, psychological vulnerabilities, such as reduced self-esteem (Pinquart, 2013a) or a negative body image, of these children may increase the risk of being bullied (Fox & Farrow, 2009; Pinquart, 2013b). Finally, some authors have suggested that negative attitudes expressed by peers toward an illness, or even peer prejudices about children with disabilities, may increase the risk of being bullied (e.g., Storch et al., 2004a).

No attempts have been made to integrate the results of available studies on bullying involvement of children with chronic physical illness or physical/sensory disability into a meta-analysis, with the exception of obesity. Based on 16 articles, van Geel, Vedder, and Taniol (2014) observed that the odds of being bullied increased for obese young people by 51%. Unfortunately, this meta-analysis did not compare different forms of bullying. For example, obese children may be more likely to become victims of weight-related teasing than of physical bullying because they may be perceived as physically able to defend themselves when being physically attacked.

As victims of bullying are also often perpetrators (e.g., Ilola, Lempinen, Huttunen, Ristkari, & Sourander, 2016), it would also be relevant to know whether young people with chronic physical illnesses and/or physical or sensory disabilities are more likely to bully other students. However, the argument that children with physical illnesses or disabilities may, at least in part, be weaker than their peers (Nadeau & Tessier, 2006; Twyman et al., 2010) would suggest that the opposite would be true, at least with regard to physical bullying.

In sum, the first research question of the present meta-analysis asks whether young people with chronic physical illnesses and/or physical or sensory disabilities are at an increased risk for being bullied in general, and for being the victims of physical, relational, verbal, cyberbullying, and particularly appearance- and weight-related bullying. The second research question asks whether young people with chronic physical illnesses and/or physical or sensory disabilities are more likely to bully other children rather than healthy and nondisabled children, and whether this is true for the different forms of bullying.

Moderator Effects of Kind of Illness and Other Study Characteristics

Results of individual studies are inconsistent when it comes to whether children with chronic illnesses and/or physical or sensory disabilities have an increased risk of being bullied or of bullying other children. For example, Hamiwka, Yu, Hamiwka, Sherman, Anderson, and Wirrell (2009) observed that children with epilepsy were more likely to be bullied than their healthy peers, whereas children with chronic kidney disease were not. Similarly, some studies found elevated levels of perpetration among children with chronic physical illnesses and/or physical or sensory disabilities (e.g., Hamiwka et al., 2009), while the opposite was found in other studies (Percy-Smith, Caye-Thomasen, Gudman, Jensen, & Thomsen, 2008). Possible reasons for the heterogeneity of the results of the individual studies were analyzed in the next step of the meta-analysis (Lipsey & Wilson, 2001). We limited the search for moderator variables to studies on victimization and perpetration in general rather than to the different forms of bullying because larger numbers of studies were available on general measures, thus increasing the chances for identifying moderating effects (Lipsey & Wilson, 2001). The following moderator variables were considered:

Type of illness. Few studies have compared levels of bullying within different kinds of physical illnesses or disabilities. Nordhagen, Nielsen, Stigum, and Köhler (2005) found higher levels of bullying among children with epilepsy and obesity than in those with visual impairments and asthma. As already reported, Hamiwka et al. (2009) identified higher levels of bullying among children with epilepsy than among those with chronic kidney disease. The present meta-analysis explores whether these results can be generalized to other studies.

Visibility. Because being physically different has been identified as a risk factor for being bullied (Dawkins, 1996; Storch et al., 2004a), children with visible diseases and disabilities were expected to be

more likely to be bullied than their peers with invisible chronic conditions.

School type. If students with chronic illnesses and disabilities are mainly bullied by their healthy peers, then attending special schools for students with chronic illnesses or disabilities should reduce their risk for being bullied. Nonetheless, school-type differences may be smaller than expected because students from special schools may be bullied by class mates with disabilities or by healthy/nondisabled students from outside their school. In a study not specific to chronic physical illness, school-type differences in levels of bullying were inconsistent (Rose, Stormont, Wang, Simpson, Preast, & Green, 2015). Thus, school-type differences were analyzed in an exploratory analysis.

Information source for bullying. Children with more internalizing behavior problems or poor self-esteem might be more likely to perceive mild teasing as victimization, which could contribute to elevated reports of peer victimization of children with chronic physical illness. Thus, it was tested whether stronger elevations of peer victimization would be found if child self-reports were used, rather than reports by parents, peers, or teachers.

Sampling. As clinical samples may be more likely to include children with severe chronic illnesses than community-based (school-based) samples, it was tested whether between-group differences in bullying are higher in clinical samples than in community-based samples.

Age. Appearance-related teasing increases during adolescence (Helfert & Warschburger, 2013). Thus, it was tested whether the risk of being bullied or bullying increases with age among children with chronic illnesses.

Gender. Boys report bullying other children or being bullied in general more often than girls (Scheithauer, 2003). In addition, they also report being both perpetrators and victims of physical aggression in particular more frequently than girls (e.g., Scheithauer et al., 2006). The present meta-analysis tests whether a chronic physical illness increases or decreases these gender differences.

Year of publication. In many countries, the prevalence of bullying tends to be lower in more recent cohorts, possibly because of increased prevention and intervention efforts (Molcho, Craig, Due, Pickett, Harel-Fisch, & Overpeck, 2009). The present meta-analysis tests whether the differences between bullying involvement of children with and without chronic physical illnesses and/or disabilities also declines in recent studies.

Study quality. We assessed three variables as indicators of study quality: whether children with and without chronic illness and/or disability did not differ in third variables (e.g., age, gender), whether a validated

bullying measure was used, and whether the study has been published. While the first two variables may cause nonsystematic errors and were considered for exploratory analysis, publication status may lead to a systematic error: Nonsignificant effects may be less likely to be published than significant effects (e.g., Lipsey & Wilson, 2001). The focus was, therefore, whether larger between-group differences would be found in published as compared with unpublished studies.

Moderating effects of study design (cross-sectional vs. longitudinal studies) could not be tested, as only two longitudinal studies were available.

Methods

Studies were selected through electronic databases (MEDLINE, PSYDEX, PSYCINFO, Google Scholar) by using specific search terms ([teasing, bullying, or peer victimization] and [chronic illness of disability]) and search for additional studies that were cited in the identified papers. Criteria for the inclusion of studies in the present meta-analysis were as follows:

1. The studies were published or presented before August 2016.
2. They compared the levels of bullying experienced by children with chronic physical illnesses and/or physical or sensory disabilities with their healthy peers.
3. They provided sufficient information for computing effect sizes.
4. The mean age of participants was <20 years.

In regard to the question whether an illness is defined as chronic, we followed the suggestion by Thompson and Gustafson (1996), stating that a chronic illness can be defined as a condition that is associated with functional impairment and lasts for a considerable period, has a sequela that persists for a substantial period, persists for >3 months in a year, and/or necessitates a period of continuous hospitalization for >1 month. As obesity is associated with functional impairments, orthopedic and other physical complications, and reduced life expectancy, and shows a considerable persistence over time, we included studies on obesity (Price & Proietto, 2015; Sokol, 2000). Documentation of physician diagnosis was not a requirement because some broad-based survey studies do not have access to medical documentation. Identified, unpublished studies were also included.

We identified 410 studies. After exclusion of 303 papers that did not meet the inclusion criteria or that were not available (Figure 1), the meta-analysis included 107 studies that provided results from 180 samples. Seven unpublished studies were included. Selected study characteristics are provided in [Supplementary Appendix I](#).

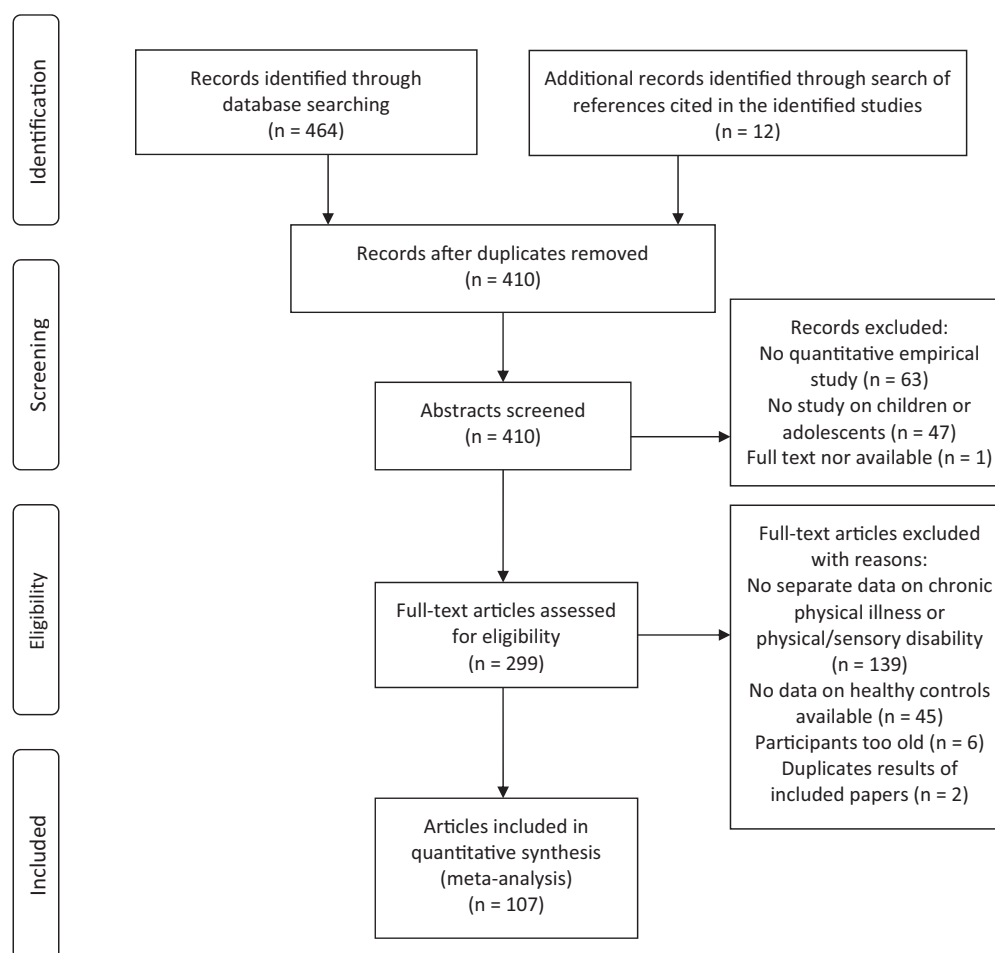


Figure 1 PRISMA 2009 flow diagram.

All studies were coded by the author. To proof the interrater reliability for these codes, the author and a graduate student trained in pediatric psychology and research methods coded 20% of the selected studies independently. All variables were checked for interrater reliability. Differences were resolved by discussion.

The following variables were coded: the number of patients (interrater agreement: intraclass correlation coefficient [ICC] = 0.99) and control group members (ICC = 0.97), mean age (ICC = 1.0), percentage of girls (ICC = 1.0), year of publication (ICC = 1.0), type of illness (interrater agreement 93%), the sampling procedure (1 = community- or school-based sample, 2 = clinical sample; interrater agreement 95%), school type (1 = regular school, 2 = special school, 3 = information not available, mixed schools; interrater agreement 95%), equivalence of patient and control group with regard to third variables (1 = yes, 2 = not tested/no; ICC = 0.90), publication status (1 = published, 2 = unpublished; ICC = 1.0), the quality of the measure of bullying (ICC = 0.86), the rater of bullying (1 = child, 2 = parents, 3 = peers, 4 = teachers; interrater agreement 95%), the odds ratios (ORs) for sum measures of bullying, and different

forms of bullying (physical, relational, verbal, cyber, illness-specific teasing; ICC = 0.92). The information on most of these variables was directly provided in the publication. The extent to which the illness or disability was visible was coded as high if it affected the appearance of the child and was clearly visible to others (e.g., cerebral palsy, cleft lip, obesity, short stature; 1 = yes, 2 = no). Regarding the equivalence of patient and control group in third variables (e.g., age, gender), the papers were checked whether they provided this information. If not, the coders tested the equivalence as long as descriptive information was provided for the patient group and control group. With regard to the quality of the bullying measure, we checked whether the paper or related studies provided support for the validity of the measure, such as meaningful correlations with other bullying scales (1 = yes, 0 = no).

If between-group differences were reported for several subgroups within the same publication (e.g., for different illnesses or for boys vs. girls), they were entered separately in the analysis.

Eight studies provided results for more than one disease. Their effect sizes are therefore statistically dependent because of the use of the same control

condition. In principle, three strategies could be applied for carrying out analyses of dependent effect size data (Hedges, Tipton, & Johnson, 2010). First, the correlations among the effect size estimates could be explicitly modeled using multivariate methods. This strategy could not be used in the present meta-analysis because knowledge of the covariance structure of the effect size estimation errors was lacking. Hedges et al. (2010) suggested a statistical procedure if the covariance structure of the dependent estimates is not known. However, this approach could not be used because >20 studies with more than one effect size per study would be needed for a reliable estimation. Second, a mean effect size of these studies could be computed across diseases. However, as we were interested in a comparison of chronic diseases, this would lead to a loss of relevant information. A third strategy is to ignore the dependence of some effect sizes. According to Hedges et al. (2010), this strategy is not too misleading if few studies report more than one effect size. This is the case in the present meta-analysis.

Statistical Integration of the Findings

A random-effects meta-analysis was computed in four steps, as outlined by Lipsey and Wilson (2001). In random effects models, it is assumed that the identified studies are a random sample of a theoretical universe of all possible studies on a given research question, and that these studies vary in the size of their effects. Random-effects models are preferred when effect sizes vary significantly between studies and not all possible reasons for heterogeneity can be identified (Lipsey & Wilson, 2001).

First, ORs were extracted or calculated for the individual studies. The odds are the ratio of the probability that the event of being bullied or bullying others, respectively, occurs in a defined group to the probability that it does not. The OR is then computed as a quotient of the odds of children with and without illness/disability. An OR that is >1 indicates an elevated level of bullying in children with chronic physical illnesses and/or physical or sensory disabilities. Logged ORs were computed because they were normally distributed.

Next, logged ORs were weighted by the inverse of the squared standard error of the mean and combined to compute an overall weighted mean effect size. The weighting procedure takes into account differences in sample sizes. The significance of the mean was tested by dividing the weighted mean effect size by the estimated standard error of the mean. Then, confidence intervals (CIs) that included 95% of the effects were computed for each effect size. The weighted effect sizes and the 95% CIs were later converted back to ORs by taking the antilogarithms. Fail-safe N_s were computed based on Rosenberg (2005).

Then, the homogeneity of the effect sizes was tested by use of the homogeneity statistic Q . Finally, an analog to the analysis of variance was applied to test whether the effect sizes differed by categorical moderator variables, such as visibility of the illness or disability. A significant Q score indicates that the size of the effects differs significantly between studies. If more than two conditions are compared, differences between individual conditions were interpreted as significant when the 95% CIs did not overlap (Lipsey & Wilson, 2001, p. 114). Effects of continuous moderator variables were tested with weighted regression analyses.

Results

In total, 62,855 children and adolescents with chronic physical illnesses and/or sensory or physical disabilities were included. The largest subgroups were obesity ($N = 29,570$), asthma ($N = 14,390$), chronic skin diseases ($N = 3,118$), and visual impairments ($N = 1,312$). The respondents had a mean age of 13.8 years ($SD = 2.6$); 49% were girls and 45% were members of ethnic minorities.

Bullying was most often assessed with the revised Olweus Bully/Victim Questionnaire (Olweus, 1996; 8 studies), the Social Experience Questionnaire (Crick and Grotpeter, 1996; 6 studies), the bullying items from the Health Behavior in School-Aged Children studies (Olweus, 1992, 6 studies), peer nominations (6 studies), and other related instruments (73 studies). In total, 76 studies provided data on sum measures of victimization, 23 on physical victimization, 19 on relational victimization, 16 on verbal victimization, 7 on victimization by cyberbullying, and 15 on illness-specific teasing. In addition, 24 studies used sum measures of perpetration, 9 studies assessed physical perpetration, 8 assessed relational perpetration, 3 studies assessed being a cyberbully, and 2 verbal perpetrations. No study examined being a perpetrator of illness-specific weight- or appearance-related teasing.

Comparison of Bullying in Children With and Without Chronic Illness

Most studies reported only total scores of victimization and/or perpetration that do not take account individual forms of bullying (e.g., physical, verbal, relational), for example, by using a global question or by summing-up different kinds of bullying experiences. Weighted percentages of reports of total victimization indicate that 34.6% of children with a chronic physical illness or disability were victimized by peers, as were 25.8% of children without a chronic illness or disability (Table 1). Note that some studies provided only summary statistics such as ORs, without information on the percentages of bullied children.

Table 1. Odds Ratio of Bullying Victimization and Perpetration of Children With and Without Chronic Illness

Kind of bullying	<i>k</i>	% _{Pat}	% _{CG}	OR	95% CI		<i>Z</i>	<i>Q</i>	Fail-safe <i>N</i>
Victim									
Total score	131	34.6	25.8	1.65	1.51	1.80	11.41***	128.05	7517
Physical bullying	39	27.2	20.7	1.47	1.31	1.65	6.60***	39.75	293
Relational bullying	32	36.5	23.5	1.47	1.29	1.64	5.91***	34.43	243
Verbal bullying	27	47.9	26.8	1.67	1.36	2.04	4.94***	30.29	51
Cyberbullying	8	17.1	12.7	1.38	1.29	1.48	9.12***	14.77*	12
Illness-specific teasing	19	60.6	21.9	5.29	3.60	7.76	8.51***	23.11	12
Perpetrator									
Total score	39	27.7	22.0	1.28	1.17	1.39	5.40***	47.84	108
Physical bullying	18	16.8	11.5	1.38	1.25	1.51	6.62***	101.40***	7
Relational bullying	17	16.9	14.5	1.13	1.03	1.23	2.60**	13.05	1
Verbal bullying	3	14.5	10.3	1.31	.96	1.79	1.70	.78	
Cyberbullying	3	3.9	1.1	1.39	.73	2.67	.99	4.58	
Illness-specific teasing	0								

Note: OR > 0 indicate larger odds in children with chronic illness/disability than in their healthy peers. *k* = number of effect sizes included; %_{Pat}/ %_{CG} = weighted percentage of patients/control group members reporting victimization/perpetration; OR = effect size (weighted mean odds ratio); *Z* = test for significance of *r*. 95% CI = lower and upper limits of 95% confidence interval; *Q* = test for homogeneity of effect sizes.

**p* < .05,

***p* < .01,

****p* < .001.

Compared with their healthy and nondisabled peers, young people with chronic illnesses and/or physical or sensory disabilities were more likely to be bullied in general (OR = 1.65) as well as to be a victim of physical bullying (OR = 1.47), relational bullying (OR = 1.47), verbal bullying (OR = 1.67), cyberbullying (OR = 1.38), and illness-specific weight- or appearance-related teasing (OR = 5.29). With the exception of cyberbullying, the effect sizes were homogenous. The fail-safe *N* indicates that between 7,517 (total bullying) and 12 (cyberbullying, disease-specific bullying) additional studies reporting null results would be needed to reduce the cumulated effect size to the point of nonsignificance.

The nonoverlap of the 95% CIs indicates significantly stronger between-group differences for illness-specific teasing than for all other indicators of being bullied (Table 1). Thus, children with chronic conditions most often reported to be bullied because their illness changed their appearance (e.g., in the case of craniofacial conditions) or weight (in the case of obesity).

Young people with chronic physical illnesses and/or physical or sensory disabilities were also more likely to bully other children in general (OR = 1.28), and to be a perpetrator of physical (OR = 1.38) and relational bullying (OR = 1.13) in particular. According to the fail-safe *N*, 108 additional studies with null results would be needed to reduce the cumulated effect size of total perpetration to nonsignificance. However, only seven (physical bullying) and one (relational bullying) additional studies with null results would be needed to reduce these effect sizes on a nonsignificant level. No between-group differences were observed for

being a perpetrator of teasing and cyberbullying. With the exception of physical bullying, the effect sizes were, again, homogeneous (Table 1).

Influence of Moderator Variables

Type of Illness

The ORs of the total scores of bullying and perpetration varied according to type of illness or disability (Table 2). Young people with chronic headaches (OR = 1.80), craniofacial conditions (such as cleft lip or palate, OR = 5.50), epilepsy (OR = 1.82), hearing impairments (OR = 1.58), obesity (OR = 1.78), skin diseases (OR = 1.39), visual impairments (OR = 1.80), or other/multiple diseases (OR = 1.52) were more likely to be bullied than their peers without these illnesses and disabilities. No such difference was observed for children with asthma or spina bifida. The nonoverlap of the 95% CIs indicates that children with craniofacial conditions showed a higher OR of being bullied than the other illness groups. In addition, young people with obesity were more likely to be bullied than children with spina bifida or cerebral palsy.

Furthermore, children with epilepsy (OR = 3.34), obesity (OR = 1.34), spina bifida/cerebral palsy (OR = 2.39), and those with other/multiple diseases (OR = 1.27) were more likely to bully other children than young people without these illnesses or disabilities. No such patterns were observed in young people with hearing or visual impairments. The nonoverlap of the 95% CIs indicates a stronger elevation of the OR in children with epilepsy, obesity, and cerebral palsy/spina bifida than in their peers with visual impairments (Table 2).

Table II. Influences of Categorical Moderator Variables on the Odds Ratio of Bullying and Perpetration (Total Scores)

Moderators	Victimization					Perpetration				
	<i>k</i>	OR	95% CI	<i>Z</i>	<i>Q</i>	<i>k</i>	OR	95% CI	<i>Z</i>	<i>Q</i>
Illness/disability					29.82**					19.10**
Asthma	7	1.20	0.91	1.59	1.29	1.41	0			
Chronic headache/migraine	5	1.80	1.22	2.65	2.96**	4.49	0			
Craniofacial conditions	3	5.50	3.01	10.03	5.55***	1.55				
Epilepsy	6	1.82	1.27	2.61	3.25**	9.00	2	3.34	1.48	7.51
Hearing impairment	4	1.58	1.04	2.42	2.12*	0.68	1	1.16	0.75	1.78
Obesity	44	1.78	1.55	2.03	8.38***	39.85	21	1.34	1.20	1.51
Skin diseases	8	1.39	1.01	1.90	2.04*	3.07	0			
Spina bifida/cerebral palsy	4	1.02	0.68	1.55	0.11	10.89*	1	2.39	1.20	4.75
Visual impairment	15	1.80	1.44	2.27	5.05***	6.86*	5	0.86	0.67	1.11
Other diseases	35	1.52	1.30	1.79	5.11***	25.59	9	1.27	1.05	1.53
Visibility					5.73*					
High	85	1.81	1.62	2.02	10.52***	85.52	32	1.27	1.11	1.46
Moderate/low	46	1.44	1.25	1.66	5.11***	35.16	7	1.43	1.01	2.03
School					0.20					
Regular school	109	1.65	1.50	1.82	10.06***	91.29	32	1.36	1.20	1.54
Special school	6	1.79	1.23	2.61	2.84**	3.75	3	0.99	0.69	1.42
Mixed schools	12	1.61	1.28	2.01	3.94***	26.63*				
Information source for bullying					7.07					
Child	101	1.58	1.44	1.74	9.34***	83.51	31	1.33	1.16	1.51
Parents	20	1.69	1.38	2.07	5.11***	30.26*	3	0.78	0.50	1.24
Peers	2	3.36	1.74	6.48	3.62***	3.36	1	1.65	0.75	3.65
Teachers	7	2.33	1.51	3.60	3.84***	3.62	4	1.47	0.90	2.40
Sampling					0.02					
Random (community or school based)	102	1.65	1.49	1.82	9.85***	81.27	29	1.23	1.08	1.40
Clinical sample	30	1.67	1.38	2.03	5.27***	40.89* ^a	10	1.65	1.24	2.20
Equivalence of the samples					1.84					
Yes	31	1.47	1.21	1.78	3.91***	26.60	13	1.18	0.96	1.45
No/not tested	100	1.72	1.55	1.90	10.49***	91.61	26	1.35	1.17	1.55
Quality of bullying measure					1.40					
Low	97	1.60	1.44	1.77	8.85***	77.04	28	1.25	1.08	1.45
High	33	1.84	1.55	2.18	6.92***	42.83	11	1.41	1.10	1.82
Publication status					0.77					
Unpublished	4	2.18	1.17	4.07	2.45***	0.90	2	0.85	0.32	2.24
Published	127	1.65	1.51	1.80	11.04***	120.33	37	1.30	1.15	1.47

Note: OR > 0 indicates larger odds in children with chronic illness/disability than in their healthy peers. *k* = number of effect sizes included; OR = effect size (weighted mean odds ratio); *Z* = test for significance of OR. 95% CI = lower and upper limits of 95% confidence interval; *Q* = test for homogeneity of effect sizes.

**p* < .05,

***p* < .01,

****p* < .001.

Visibility

Young people with visible conditions are more likely to be bullied than their peers with diseases that are less visible. However, visibility of the disease did not affect the odds of being a bully.

School Type

While ORs of being bullied did not vary between regular and special schools, the odd of being a bully was only elevated in children with chronic illnesses or disabilities from regular schools. However, studies in special schools mainly focused on students with sensory impairments.

Source of Information

The source of information regarding victimization and perpetration did not affect the size of between-group differences. Bullying involvement also did not vary between school-based samples and clinical samples.

Age and Gender

Similarly, the results did not vary according to participants' age or gender (Table 3).

Year of Publication

We identified a moderating effect of year of the studies' publication, with between-group differences in

Table III. Influences of Continuous Moderator Variables on the Odds Ratio of Bullying and Perpetration (Total Scores)

Independent variable	Victimization				Perpetration			
	<i>k</i>	<i>B</i>	β	<i>t</i>	<i>k</i>	<i>B</i>	β	<i>t</i>
Age	108	.005	.03	.31	32	.003	.02	-.11
% female children	126	-.000	-.02	-.22	39	.002	.13	.93
Year of publication/presentation	120	.017	.18	-2.02*	38	.005	.05	-.34

Note: *k* = number of studies; *B*/ β non-/standardized regression coefficient, *t* = test for significance. **p* < .05.

victimization being smaller in more recent studies (Table 3).

Study Quality

The three indicators of study quality (sociodemographic equivalence of the samples, quality of bullying measure, and publication status) were not significant moderators (Table 2).

Additional Analyses

Because studies with healthy children show gender differences in physical bullying (e.g., Scheithauer et al., 2006), possible moderating effects of gender on the ORs of being a victim and perpetrator of physically bullying were also examined. Again, no significant moderating effects were observed ($\beta = .16$, $t = 0.96$, $p < .34$ and $\beta = .17$, $t = 0.75$, $p < .47$).

As about 47% of the included children with chronic diseases had obesity and there is some controversy whether obesity is a chronic illness (Price & Proietto, 2015), we also tested whether the results would change if the studies on obesity are excluded. Although the ORs slightly decreased, we still found that young people with chronic illnesses and/or physical or sensory disabilities were more likely to be bullied in general as well as to be a victim of all assessed forms of bullying. They were also still more likely to bully others in general and to show relational bullying in particular. However, the odds of being a perpetrator of physical bullying was no longer elevated (see Supplementary Table S1). In contrast, obese young people showed higher levels of physical perpetration than their healthy peers ($k = 14$, OR = 1.58, $Z = 5.32$, $p < .001$). The moderator effect of visibility was only marginally significant in the reduced sample, probably because of lower statistical power. A new moderator effect was detected: Between-group differences in total victimization were larger if peer reports rather than self-reports were used. However, this effect has to be interpreted with caution, as only one study used peer reports (see Supplementary Table S2). Results on continuous moderator variables did not change after exclusion of studies on obesity (see Supplementary Table S3).

Discussion

The present meta-analysis is the first to compare levels of different forms of bullying involvement in young people with and without a chronic physical illness and/or a physical or sensory disability. Children and adolescents with these illnesses and disabilities were more likely to be victims of bullying in general, particularly physical bullying, relational bullying, verbal bullying, cyberbullying, and illness-specific teasing. They were also more likely to be a bully, particularly that of a relational or physical nature. However, the latter effect was limited to children with obesity. The effect sizes varied across different illnesses and disabilities and, in part, by visibility of the disease, school type, and year of publication.

Although the ORs of young people with chronic illnesses and/or physical or sensory disabilities were elevated for all assessed aspects of bullying, the present meta-analysis indicates that most between-group differences tend to be small, as average victimization rates were only elevated by about 7%. The only exception was illness-specific weight- or appearance-related teasing where almost a 30% difference was found. However, the latter studies mainly referred to craniofacial conditions and obesity, which are easily visible to others. This study's results indicate that in the case of visible diseases, bullying most often focuses on appearance-related characteristics of the illness.

Children with a chronic illness or disability were more likely to bully other children than their healthy peers, but these differences tended to be smaller than differences in victimization. Elevated levels of perpetration may, in part, be a reaction to being bullied. Unfortunately, no longitudinal studies that analyzed the temporal order of victimization and perpetration were found. Because rates of perpetration were lower than the victimization rates, one could gather that some children with chronic illnesses or disabilities may be less likely to become a bully because of being weaker (Nadeau & Tessier, 2006; Twyman et al., 2010) or more socially withdrawn than their peers (Pinquart & Shen, 2011). Elevated levels of physical perpetration were observed in young people with obesity rather than other diseases probably because their high body weight may give them more physical power.

The highest risk of total victimization was observed in children with craniofacial conditions, epilepsy, chronic headache, visual impairment, and obesity. In contrast, children with spina bifida/cerebral palsy or asthma were not more often bullied than their healthy peers. The high prevalence of total victimization in children with craniofacial conditions may, first, be based on the fact that these conditions are highly visible. However, visibility of the disease is not a sufficient explanation for the high risk of victimization of children with craniofacial conditions, as spina bifida and cerebral palsy are also visible conditions that were not associated with elevated levels of victimization. A second and better explanation of the high levels of victimization of children with craniofacial conditions refers to not meeting the beauty standards of their peer because facial appearance exerts a strong impact on social interactions (Masnari et al., 2012).

Other factors probably explain the observed above-average risk of victimization in young people with epilepsy and chronic headache, such as elevated levels of behavior problems and reduced social functioning (e.g., lower social competence; Cook, Williams, Guerra, Kim, & Sadek, 2010; Pinquart & Shen, 2011; Pinquart & Teubert, 2012). Psychological vulnerabilities, such as low self-esteem and body dissatisfaction, have been identified as potential mediators of the association between weight status and peer victimization (Fox & Farrow, 2009). Thus, some risk factors may be associated with some chronic diseases (e.g., Fox & Farrow, 2009; Masnari et al., 2012), but not with others.

The high risk of perpetration of children with epilepsy can be easily explained. Neuroimaging studies have identified frontal lobe brain abnormalities in patients with epilepsy (Herrman et al., 2002), which are associated with executive function deficits that impair the inhibition of aggressive behavior toward others.

The present meta-analysis did not find lower total scores of peer victimization in special schools than in regular schools. Although children from special schools for students with disabilities or chronic illnesses cannot be bullied by healthy or nondisabled classmates, they are probably bullied by classmates with disabilities or chronic illnesses, or by children outside their schools. Students with chronic illnesses from regular schools showed higher levels of perpetration. This difference should be interpreted with caution, as school type and the type of illness/disability were confounded (most students from special schools had sensory disabilities, and students with these disabilities did not show higher levels of perpetration). Therefore, studies from special schools on students with other physical illnesses are needed before further conclusions can be drawn.

Interestingly, between-group differences in total victimization were smaller in more recent studies. This might be the result of the increasing dissemination of antibullying programs (Molcho et al., 2009; Nicholas et al., 2012).

Results did not vary according to how the bullying was reported. Thus, between-group differences in bullying involvement are unlikely to be based on, for example, children with chronic illnesses overreporting bullying events, or perceiving mild teasing as victimization.

No moderating effects were found in regard to sampling procedure, quality of the bullying measure, publication status, age, and gender. Thus, the results were robust in regard to these study characteristics.

Limitations and Conclusions

Some limitations of the present meta-analysis have to be mentioned. First, separate analyses of victimization could only be computed for nine illness groups. Perpetration could only be analyzed in five illness groups. More studies on bullying involvement are needed for other diseases, such as cancer and diabetes. Next, only a limited number of studies are available on the involvement of children with chronic physical illnesses and/or physical or sensory disabilities in cyberbullying and illness-specific teasing. Additionally, only concurrent associations between chronic illnesses and bullying involvement were analyzed. Although it was hypothesized that having a chronic illness or disability increases the risk of being bullied, victimization could also affect the risk for developing some chronic diseases, such as migraine or obesity (e.g., Gray, Kahhan, & Janicke, 2009). Finally, given this study's quantitative approach, young people's phenomenological experiences of bullying could not be examined.

As a first conclusion, children and adolescents with chronic physical illnesses or disabilities are more likely to be bullied than their healthy, nondisabled peers, but differences between these groups tend to be small. Most adolescents with chronic physical illnesses or disabilities do not report being victims of bullying in general, although illness-related teasing about appearance or weight is common among young people with craniofacial conditions and obesity. Between-group differences in general measures of peer victimization tend to be small because healthy children may be bullied for other reasons, such as sexual orientation, ethnicity, or academic problems.

Second, the results indicate that action is needed to prevent and reduce illness-specific forms of bullying. Although average effects of general school-based antibullying programs tend to be small to very small (Jiménez-Barbero, Ruiz-Hernández, Llor-Zaragoza,

Pérez-García, & Llor-Esteban, 2016), the establishment of a school policy on bullying, training of emotional control, and promotion of supportive peer relations lead to above-average reduction of bullying (Lee, Kim, & Kim, 2015). Coping with bullying is a part of some psychosocial interventions for children with chronic illnesses (e.g., Nicholas et al., 2012), but more information is needed about their effects on bullying-related events.

Finally, given the fact that bullying involvement varies between chronic illnesses, more research is needed to help us understand the differences and factors that may play a role. Thus, further studies are needed that assess bullying involvement of children with different chronic physical diseases as well as potential risk factors, such as visibility of the disease, physical strength/weakness, attractiveness, social competence, and psychological health. Identifying the factors that explain elevated levels of bullying in children with chronic physical illnesses and/or disabilities would also help with designing interventions aimed at preventing and reducing bullying in these groups.

Supplementary Data

Supplementary data can be found at: <http://www.jpepsy.oxfordjournals.org/>.

Conflicts of interest: None declared.

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