Prevalence and risk of violence against children with disabilities: a systematic review and meta-analysis of observational studies

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Summary

Background Globally, at least 93 million children have moderate or severe disability. Children with disabilities are thought to have a substantially greater risk of being victims of violence than are their non-disabled peers. Establishment of reliable estimates of the scale of the problem is an essential first step in the development of effective prevention programmes. We therefore undertook a systematic review and meta-analysis to synthesise evidence for the prevalence and risk of violence against children with disabilities.

Methods For this systematic review and meta-analysis, we searched 12 electronic databases to identify cross-sectional, case-control, or cohort studies reported between Jan 1, 1990, and Aug 17, 2010, with estimates of prevalence of violence against children (aged ≤18 years) with disabilities or their risk of being victims of violence compared with children without disabilities.

Findings 17 studies were selected from 10 663 references. Reports of 16 studies provided data suitable for meta-analysis of prevalence and 11 for risk. Pooled prevalence estimates were 26·7% (95% CI 13·8–42·1) for combined violence measures, 20·4% (13·4–28·5) for physical violence, and 13·7% (9·2–18·9) for sexual violence. Odds ratios for pooled risk estimates were 3·68 (2·56–5·29) for combined violence measures, 3·56 (2·80–4·52) for physical violence, and 2·88 (2·24–3·69) for sexual violence. Huge heterogeneity was identified across most estimates ($I^2 > 75\%$). Variations were not consistently explained with meta-regression analysis of the characteristics of the studies.

Interpretation The results of this systematic review confirm that children with disabilities are more likely to be victims of violence than are their peers who are not disabled. However, the continued scarcity of robust evidence, due to a lack of well designed research studies, poor standards of measurement of disability and violence, and insufficient assessment of whether violence precedes the development of disability, leaves gaps in knowledge that need to be addressed.

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Introduction

Violence against children is a huge and serious problem worldwide.[1] An estimated 53 000 children aged 0–17 years were murdered in 2002 and about 150 million girls and 73 million boys were thought to have been sexually abused.[1] However, little is known about the magnitude of violence against children with disabilities. Worldwide, an estimated 5% of children (about 93 million) aged 0–14 years have moderate or severe disability, with estimates ranging from 2·9% in high-income countries to 4·4–6·4% in low-income and middle-income countries.[2] The results of a review[3] of the extent of violence in adults with disabilities showed that they are at increased risk of being victims of violence compared with those without disabilities; adults with mental illness are particularly vulnerable. Children with disabilities are also thought to be at greater risk of violence than are those without. The reasons for this difference include societal stigma and discrimination, negative traditional beliefs and ignorance within communities,[4] lack of social support for carers,[5] type of impairment (eg, communication difficulties), and heightened vulnerability as a result of the need for increased care, including medical attention.[6]

Reliable estimates of the extent of the problem are essential for the development of effective population-level public health programmes to prevent children with disabilities from becoming victims of violence, and improve their health and quality of life. The conclusion drawn from the findings of a previous systematic review of population-based studies was that the association between childhood disability and abuse was weak.[7] However, this study was not based on a quantitative synthesis of the evidence and the results of individual studies continue to draw attention to the increased risk of becoming a victim of violence for a child with a disability.[8] We undertook a systematic review and meta-analysis to identify the characteristics and coverage of research into the prevalence and risk of violence perpetrated against children (aged ≤18 years) with disabilities; assess the quality of this research; and undertake a quantitative synthesis of the evidence, with a view to identifying knowledge gaps and research priorities.

Panel 1: Criteria for assessment of quality

Core criteria for all studies

1 Are the study design and sampling method appropriate for the research question? Random sample or whole population (1 point).
2 Is the sampling frame appropriate? Unbiased sampling frame (ie, census data; 1 point).
3 Is the sample size adequate? Sample size greater than 100 individuals (1 point).
4 Are objective, suitable, and standard criteria used for measurement of violence outcomes? Official records or self-report with appropriate questions (1 point).
5 Are objective, suitable, and standard criteria used for measurement of disability? Clinically diagnosed or screened (1 point).
6 Are reasons for non-response reported? Refusers described (1 point).

Prevalence studies only (maximum score=8)

1 Are the estimates of prevalence given with confidence intervals (CIs)? CIs reported (1 point).
2 Are the study subjects and the setting described in detail? Study subjects described (1 point).

Risk studies only (maximum score=10)

1 Were confounding variables controlled for in the analyses? Confounders controlled (1 point).
2 Are the estimates of risk (odds ratio) given with CIs? CIs reported (1 point).
3 Was an appropriate control group used? Suitable control drawn from non-disabled population (1 point).
4 Are the study subjects and controls described in detail? Study subjects and controls described (1 point).

Panel 2: Key characteristics of participants and outcome measures of interest

Type of disability and definition*

- Any disability (five studies,[16–20] 12 608 participants): combined categories of specific disability types, typically physical disabilities or long-term health problems (eg, diabetes, asthma that restricts daily activities)
- Mental illness (four studies,[18,20–22] 5360 participants): depression, anxiety, post-traumatic stress disorder, emotional disorder, behavioural disorder, oppositional defiant disorder, or conduct disorder
- Intellectual impairments (five studies,[18,20,21,23,24] 4192 participants): learning disabilities, autism, Asperger's syndrome, or attention deficit hyperactivity disorder
- Mental or intellectual disabilities (four studies,[5,25–27] 503 participants): combined categories of intellectual or mental disabilities, or developmental disabilities not otherwise specified
- Physical impairments (four studies,[20,21,28,29] 521 participants): cerebral palsy, muscular dystrophy, mobility impairments, pronounced coordination problems, spina bifida, poliomyelitis, or Erb's palsy
- Sensory impairments (two studies,[21,30] 1765 participants): hearing impairment, visual impairment, and speech or language problem
- Multiple impairments (one study,[31] 500 participants): at least two or more specified impairments (intellectual, physical, or sensory) at birth or shortly thereafter

Type of violence and definition*

- Physical violence (11 studies,[5,18,22–27,29–31] 5306 participants): hitting, kicking, beating, threat of physical harm, corporal punishment resulting in marks or abrasions, loss of parental control during discipline, binding of hands as a restraint; and fractures, bruises, cuts caused by the actions of others
- Sexual violence (15 studies,[5,16–20,22–28,30,31] 14 675 participants): unwanted sexual touch, forcing to touch someone sexually, forced sexual intercourse, attempted rape, flashing or sexual exposure, verbal sexual harassment, sexual intercourse before 12 years of age
- Emotional abuse (six studies,[18,24–27,30] 4384 participants): humiliation, social rejection, or psychological abuse
- Neglect (six studies,[5,18,24,26,27,31] 4669 participants): lack of supervision, medical neglect, inadequate housing, hygiene neglect, no response on attempt to interact with parents
- Any violence (eight studies,[5,18,21,23,24,27,30,31] 8740 participants): combinations of the above categories of violence and abuse

*Studies included a range of types of disability and violence by use of various definitions and were therefore grouped according to the main categories listed. More than one type of disability or violence was investigated in some studies.

Methods

Search strategy and selection criteria

We searched Medline, PsycINFO, CINAHL, International Bibliography of the Social Sciences, ASSIA, ERIC, Sociological Abstracts, Cochrane Library, Embase, National Criminal Justice Reference System Abstracts Database, Social Care Online, and Social Sciences Citation Index to identify studies reported between Jan 1, 1990, and Aug 17, 2010. A search strategy was developed for each database using a combination of free text and controlled vocabulary terms (appendix p 1). We used search terms from two categories relating to disability (eg, "physical*", "intellectual*", "learning", "disabilit*", "disabl*", and "handicap*") and violence (eg, "violence", "aggression", "neglect*", and "maltreat*"). The strategy was also designed to identify studies in which violence against adults with a disability was investigated.[3] No language restrictions were placed on the searches or search results. Additional strategies included hand searches of journals that were not indexed in the electronic sources, internet searches for grey literature, and screening of reference lists of retrieved studies. A total of 10 663 titles and abstracts and 846 full-text articles were independently screened by two reviewers from a team of six (LJ, SW, KH, LE, EMcC, and GB). From these, 74 potentially relevant studies were screened by two lead reviewers (LJ and SW; weighted κ=0·81). Discrepancies were resolved through

discussion with the other lead reviewers (KH and MAB). The inclusion criteria for studies were that they were cross-sectional, case control, or cohort in design; the investigators measured violence perpetrated against children (aged ≤18 years); specific disability types (eg, vision loss), specific disorders (eg, psychiatric disorders), activity limitations, or support needs (eg, use of specialised equipment) were reported; definitions and methods of measurement for violent outcomes were reported; and prevalence rates or odds ratios or raw data to enable their calculation were reported. The exclusion criteria for the studies were that they were based on selected populations affected by violence (eg, victims of violence;[9,10] children with disabilities referred for problems related to sexual abuse[11]); the investigators focused mainly on adults (aged >18 years); had a response rate of less than 50%; and response rates were not reported. We also excluded two studies of children who were deaf with a primary diagnosis of a substance use disorder[12,13] because of the strong association between these disorders and violence.[14] We did not include a criterion for selection of studies in which violence was reported within a defined timeframe because this was not the case in most studies.

Quality assessment and data extraction

Studies were quality assessed independently by two reviewers (LJ and SW) based on standard criteria (panel 1).[15] Agreement between reviewers was high (prevalence studies, weighted $\kappa=0.90$; risk studies, 0.93) and discrepancies were resolved through discussion with the other lead reviewers (KH and MAB). For each study, data were extracted by one reviewer and checked for accuracy by another for study setting; participants (number, mean age, sex, and disability type); outcome measurement (violence type and measurement instrument, timeframe, and perpetrator); and, for studies in which risk was measured, details about the comparison group and confounding factors were taken into account.

Participants' characteristics and outcome measures

Panel 2 summarises the key characteristics of the participants and outcome measures of interest. Children with a range of disabilities, based on various definitions, were included in the studies. They were grouped according to the following disabilities: intellectual impairments; disability associated with mental illness; physical impairments; and sensory impairments. Our key outcomes of interest were physical violence; sexual violence; emotional (or psychological) abuse; neglect; and any violence (all categories of violence, abuse, and neglect combined).

Data analysis

Prevalence rates were calculated from raw proportions and 95% CIs with the Wilson method.[32] For studies in which raw data were not reported, the investigators were contacted to request data. Variances of the raw proportions were stabilised[33] and pooled based on

a random-effects model (DerSimonian and Laird method[34]). When raw data were provided, a crude odds ratio (OR) and 95% CI were calculated for comparison of children with disabilities with a group without disabilities. Pooled ORs with 95% CIs for the
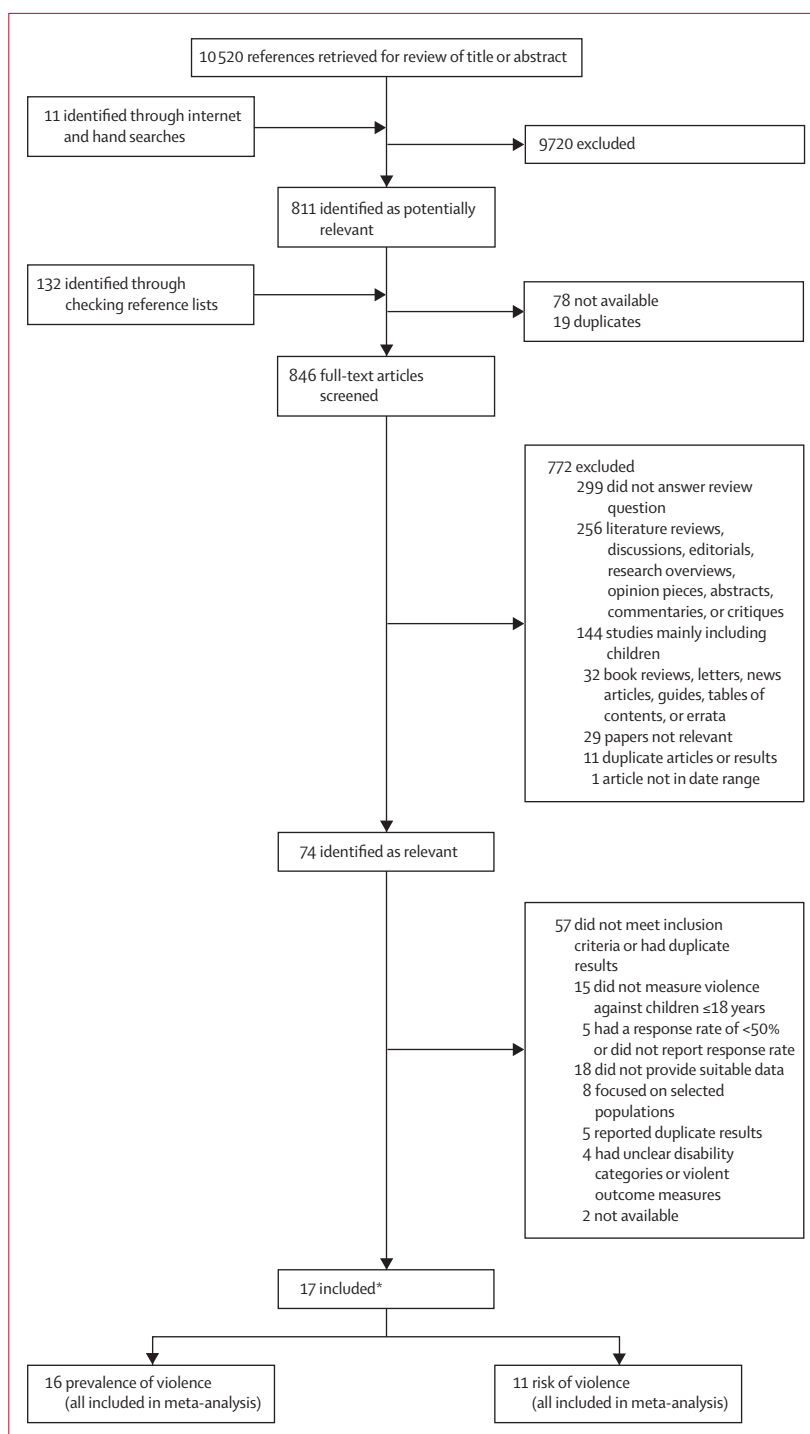
Figure 1: Flowchart of study selection
*Ten studies with data for risk and prevalence of violence, six with prevalence only, and one with risk only.

	Study design	All studies						Prevalence only		Risk only				Quality score	
		Sample	Bias	Sample size	Violence measure	Disability measure	Refusers described	Prevalence with CI	Subjects described	Confounders controlled	Odds ratio with CI	Suitable control	Subjects described	Prevalence*	Risk†
Prevalence and risk															
Alriksson-Schmidt et al (2010)[16]	CS	1	1	1	1	0	0	0	0	1	1	1	0	4	7
Blum et al (2001)[20]	CS	1	1	1	1	0	0	0	1	0	0	1	1	5	6
Cuevas et al (2009)[27]	CS	1	0	1	1	1	0	0	1	1	1	1	1	5	8
Dawkins (1996)[29]	CS	1	0	1	1	1	0	0	0	0	0	1	0	4	5
Everett Jones et al (2008)[19]	CS	1	1	1	1	0	0	1	1	1	1	1	0	6	7
Miller (1993)[22]	CS	1	1	1	1	1	0	0	1	0	0	1	1	6	7
Reiter et al (2007)[26]	CS	0	1	1	1	1	0	0	1	0	0	1	1	5	6
Sullivan et al (2000)[18]	CS	1	1	1	1	1	1	0	0	0	0	1	0	6	7
Surís et al (1996)[17]	CS	1	1	1	1	0	0	0	1	0	0	1	1	5	6
Verdugo et al (1995)[24]	CS	0	1	1	1	0	0	0	0	0	0	1	1	3	5
Prevalence only															
Ammerman et al (1994)[5]	CS	0	1	1	1	1	0	0	1	..	..	..	..	5	..
Benedict et al (1990)[31]	Cohort	1	1	1	1	1	1	0	1	..	..	..	..	7	..
Ebeling et al (2002)[25]	CS	0	0	0	0	1	1	0	1	..	..	..	..	3	..
Jemtå et al (2008)[28]	CS	1	1	1	1	1	0	0	1	..	..	..	..	6	..
Mandell et al (2005)[23]	CS	1	1	1	0	1	0	0	1	..	..	..	..	5	..
Sullivan et al (2000)[30]	CS	1	1	1	1	1	1	0	1	..	..	..	..	7	..
Risk only															
Spencer et al (2005)[21]	Cohort	1	1	1	1	1	1	..	..	1	1	1	0	..	9

CI=confidence interval. CS=cross-sectional study. 1=study met the criteria. 0=study did not meet the criteria. For scoring criteria see panel 1. *Maximum score=8. †Maximum score=10.

Table 1: Quality assessment of studies in which prevalence or risk of violence reported

risk of violence were also calculated by use of a random-effects model.[34] Insufficient data were reported to allow for the calculation of adjusted ORs by age or other factors. Analyses were done with the functions for proportion and summary meta-analysis in StatsDirect (version 2.7.8). For pooled data, the I^2 statistic was used to estimate heterogeneity and risk of bias, specifically publication bias, with the Egger[35] and Begg-Mazumdar[36] tests. Small-study effects were assessed in sensitivity analyses.[37] Forest plots were generated showing either prevalence proportions or ORs with corresponding 95% CIs for each study and the overall random-effects pooled estimate. Potential sources of heterogeneity were further investigated by use of visual inspection of the data, forest plots, and bias assessment plots, and through meta-regression analysis. Univariate analyses were done by use of Stata (version 10.0) to test individual association of selected covariates with the pooled estimates: type of disability (mental or intellectual *vs* other type); geographical region (USA *vs* rest of the world); sample origin (clinical *vs* community); reporting (official records *vs* self-report); sample size (as a continuous variable); and quality assessment score. Because only a few covariates were individually significant, a multivariate meta-regression model was not developed.

Role of the funding source

The funding source helped to develop the protocol for the analysis, provided advice about the undertaking of the analysis, and contributed to the writing of the analysis. All authors had full access to the study data and the corresponding author had final responsibility for the decision to submit the report for publication.

Results

17 studies were selected for inclusion (figure 1; appendix p 2): 15 cross-sectional and two cohort. Prevalence of violence in children with disabilities only was reported in six studies,[5,23,25,28,30,31] prevalence in both children with and without disabilities in ten,[16–20,22,24,26,27,29] and risk of violence in individuals who were disabled compared with those who were not in one.[21] The type of perpetrator was not stated in 12 studies;[16–21,23,25,26,28,30,31] violence perpetrated by parents, other carers, or adults was reported in four;[5,22,24,27] and violence perpetrated by peers was reported in three.[22,27,29] Sample sizes were from 41 to 5503 children, with a combined total of 18 374 children with disabilities (appendix p 2). The age of included participants was generally 2–18 years; four studies included participants older than 18 years (aged 19 years[21,24] and 21 years[18,26]) and four included children from birth.[18,21,24,31] Data were reported for mixed-sex

samples in 16 studies and one included female populations only.[16] In the mixed-sex studies, 4457 (45%) of 9895 children were boys (weighted average). There was little geographical spread; 11 studies were undertaken in the WHO region of the Americas (all USA) and six in the WHO European region (two in the UK, and one each in Sweden, Finland, Spain, and Israel; appendix p 2).

Maximum quality scores were not achieved in any study (table 1). In four studies,[5,24–26] randomly selected or whole population samples were not used, three studies[25,27,29] were assessed as including some form of bias in their selection process, and one[25] had a small sample size. Two[23,25] and five[16,17,19,20,24] studies did not meet the criteria for violence and disability outcome measures, respectively. In 12 studies,[5,16,17,19,20,22–24,26,27–29] descriptive information about the people refusing to participate was not provided (table 1). In the studies in which prevalence estimates were reported, confidence intervals (CIs) were provided in only one,[19] and the sample of children with disabilities were not adequately described in four (table 1).[16,18,24,29] In four studies,[16,19,21,27] in which the risk of violence was reported, confounders were controlled for within the analyses. Odds ratios and CIs were reported in four studies,[16,19,21,27] and descriptive information about the control group in six.[17,20,22,24,26,27] All 11 studies of the risk of violence had a suitable control group.

Prevalence rates of violence against children with disabilities were reported in 16 studies that included a total of 14 721 individuals (figure 2; table 2). Combined measures of violence with a pooled prevalence of 27% were reported in seven studies (figure 2; table 2).[5,18,23,24,27,30,31] Estimates ranged from 5% to 68% and there was a high level of heterogeneity between the pooled estimates (table 2). Removal of the lowest estimate, from a study[23] that included a combined measure of physical and sexual abuse only, did not affect the overall pooled estimate or level of heterogeneity (data not shown). Estimates for physical violence, corresponding to 745 incidents against 5306 children with disabilities were reported in 11 studies.[5,18,22–27,29–31] Estimates ranged from 4% to 68% with a pooled prevalence of 20% (figure 2; table 2), but there was evidence to suggest high heterogeneity (table 2). Estimates for sexual violence were provided in 15 studies[5,16–20,22–28,30,31] with a pooled prevalence of 14%, including a total of 1455 incidents in 14 675 children (figure 2; table 2). There was a substantial amount of heterogeneity between the estimates (table 2) and bias assessment indicated the possibility of small-study effects (Egger test p=0·0053; appendix p 10).[36] We therefore calculated a fixed-effect estimate, which resulted in a lower pooled prevalence estimate for sexual violence (8·9%, 95% CI 8·4–9·3). Estimates of emotional abuse with a pooled prevalence of 18% were reported in six studies (table 2).[18,24–30] Estimates for neglect were also reported in six studies,[5,18,24,26,27,31] giving a pooled prevalence of 10% (table 2). The I^2 statistic indicated substantial heterogeneity between estimates for both measures (table 2).
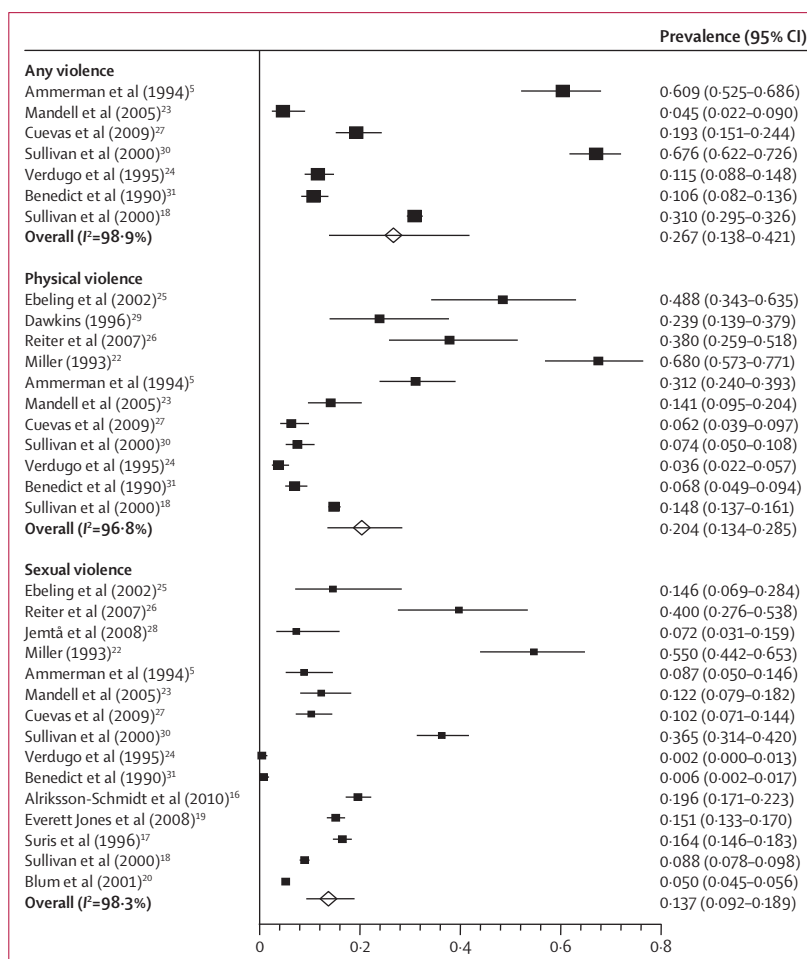

Figure 2: **Prevalence of violence in children with disabilities according to type of violence**

The prevalence of violence in children with mental or intellectual disabilities was assessed (table 2).[5,20,22–27] The pooled prevalence was 21% for the combined measure of violence, 27% for physical violence and 15% for sexual violence (table 2). However, estimates were associated with substantial heterogeneity (table 2). Pooled estimates were 27% for emotional abuse and 8% for neglect (table 2). For children with physical impairments,[16,20,28] the estimates of prevalence of sexual violence could be pooled (11%), but there was substantial heterogeneity between the values (table 2).

Estimates for the risk of violence were provided in 11 studies[16–22,24,26,27,29] that included 13 505 children with disabilities (figure 3; table 3). For the combined measure, the pooled OR was 3·7 with substantial heterogeneity (table 3). Physical violence was reported in six studies,[18,21,22,26,27,29] indicating an increased risk in children with disabilities compared with controls (OR 3·6; table 3). However, bias assessment showed asymmetry in the funnel plot (Egger test, p=0·01; Begg-Mazumdar test, p=0·04; appendix p 10). Exclusion of two outliers (Reiter and colleagues[26] and the vision and hearing impairment

	Any violence (95% CI)				Physical violence (95% CI)				Sexual violence (95% CI)				Emotional abuse (95% CI)				Neglect (95% CI)			
	Studies	Chil-dren	Preva-lence	Hetero-geneity	Studies	Chil-dren	Preva-lence	Hetero-geneity	Studies	Chil-dren	Preva-lence	Hetero-geneity	Studies	Chil-dren	Preva-lence	Hetero-geneity	Studies	Chil-dren	Preva-lence	Hetero-geneity
Disability																				
Any	7	5087	26·7% (13·8–42·1)	98·9% (98·7–99·1)	11	5306	20·4% (13·4–28·5)	96·8% (95·9–97·4)	15	14 675	13·7% (9·2–18·9)	98·3% (98·1–98·5)	6	4384	18·1% (11·5–25·8)	94·7% (91·6–96·3)	6	4669	9·5% (2·6–20·1)	98·4% (98·0–98·7)
Mental or intellectual	4	1013	21·2% (5·8–42·8)	98·1% (97·4–98·6)	7	1186	26·8% (11·4–45·8)	97·7% (97·0–98·2)	8	6522	14·5% (7·1–24·0)	97·2% (96·3–97·7)	4	810	26·7% (11·1–46·0)	96·2% (93·6–97·4)	4	907	7·8% (3·6–13·4)	84·5% (48·5–92·2)
Physical	0	0	..	..	1	46	..	..	3	1134	11·2% (3·6–22·1)	92·6% (79·9–96·0)	0	0	..	..	0	0	..	..
Other types	2*†	812	..	..	2*†	812	..*†	..*†	2*†	812	..	..	1†	312	..†	..†	1*	500	..*	..*
Study characteristics																				
Random or whole population sample	5	4504	24·2% (9·8–42·4)	99·0% (98·8–99·2)	7	4632	17·2% (10·0–26·0)	96·6% (95·4–97·4)	11	14 001	14·5% (9·5–20·3)	98·6% (98·3–98·7)	3	3848	10·6% (6·6–15·3)	87·6% (49·4–94·1)	3	4036	8·7% (0·2–28·0)	99·3% (99·1–99·4)
Community setting	5	4637	14·5% (5·8–26·3)	98·4% (97·9–98·7)	8	4815	18·5% (10·8–27·8)	97·1% (96·2–97·7)	12	14 184	12·4% (8·0–17·5)	98·4% (98·1–98·6)	4	4031	16·8% (10·1–24·8)	93·9% (88·2–96·2)	5	4531	10·1% (2·4–22·3)	98·7% (98·3–98·9)
Official records	3	4074	34·6% (12·5–61·0)	99·4% (99·2–99·5)	3	4074	9·6% (4·6–16·1)	95·1% (89·6–97·1)	3	4074	11·4% (1·1–30·3)	99·2% (98·9–99·4)	2	3574	..	..	2	3762	..	..

Data are number, unless otherwise indicated. We calculated pooled proportions with a random-effects model. We used the I^2 statistic (95% CI) to estimate heterogeneity between pooled studies: I^2=30–60%, moderate heterogeneity; 50–90%, substantial heterogeneity; 75–100%, considerable heterogeneity. ..=insufficient sample. *Multiple impairments. †Sensory impairment.

Table 2: Random-effects pooled prevalence estimates by type of violence

estimate from Spencer and colleagues[21]) resulted in a pooled OR of 4·05 (95% CI 3·39–4·82). Risk of sexual violence was also increased in children with disabilities (2·9; table 3), but these estimates were associated with substantial heterogeneity (table 3). The risks of emotional abuse (4·4) and neglect (4·6) were also increased; both measures were associated with high heterogeneity (table 3).

Pooled estimates of the risk of violence were calculated for five studies[21,22,24,26,27] that included children with mental or intellectual disabilities (table 3). For the combined measure, the pooled OR was 4·3 with high levels of heterogeneity between the estimates (table 3). Risk of physical violence, sexual violence, and emotional abuse was raised in children with mental or intellectual disabilities (3·1, 4·6, and 4·3, respectively; table 3).[21,22,26,27] Risk estimates of other types of disability could not be pooled because of insufficient numbers of studies.

Visual inspection of the Forest plot identified sample size as a source of potential heterogeneity. However, in univariate meta-regression analyses, sample size as a continuous covariate was not significantly associated with prevalence or risk of violence (data not shown). Significantly higher estimates of prevalence of any violence (β=1·08, SE[β]=0·22, p=0·004) were reported in studies done in hospital settings than in other settings and estimates of prevalence of sexual abuse were higher in studies of children with mental or intellectual

disabilities (0·36, 0·20, p=0·09) than with other impairments. None of the other covariates were significant (data not shown). For risk of violence, study characteristics that were individually significant were type of reporting (official records *vs* self-report; 0·60, 0·21, p=0·02) for physical violence and type of disability (mental or intellectual disability *vs* other types of disability; 0·76, 0·33, p=0·05) for sexual violence.

Discussion

Findings from this systematic review and meta-analysis show that violence is an important problem for children with disabilities, confirm the variable quality of studies, and show wide variation in the prevalence and risk of violence between studies. Our review is the first to provide pooled estimates of the prevalence and risk of violence perpetrated against children with disabilities. We have also investigated characteristics of studies that might affect these estimates. The pooled risk estimates indicate that for all types of violence, children with disabilities are at a significantly greater risk of violence than are their peers without disabilities.

Although our understanding of the scale and effect of violence against children has developed within the past decade, the magnitude of violence against children with disabilities remains less clear. The conclusion drawn from the results of a previous review was that evidence to

support an association was weak;[7] however, our pooled estimates support the findings from individual studies that children with a disability are at increased risk of becoming victims of violence.[8] Although based on a small subgroup of studies, and with much uncertainty around pooled estimates, children with mental or intellectual disabilities seem to have a higher prevalence and risk of violence than do children with other disability types. This observation was most apparent for the prevalence of physical violence and emotional abuse and for the risk of sexual violence. The scarcity of studies in which children with physical or sensory impairments were assessed prevented analyses of pooled data for other types of disability. As with reports of violence against adults with disabilities,[3] research from high-income countries dominates, with most of the studies included in our review undertaken in the USA and the remainder in the WHO European region. Estimates are therefore missing for most regions of the world, particularly low-income and middle-income countries. This is a fundamental gap that needs to be addressed because these countries generally have higher population rates of disability,[38] higher levels of violence,[39] and fewer support services than do high-income countries.[38]

Although children with disabilities are vulnerable to different types of violence, the focus in most studies was on child maltreatment—ie, physical and sexual violence, neglect, and emotional abuse.[8] Recognition that the extent of violence against children with disabilities might extend further than has been assessed in research studies is important for the interpretation of the results. Only one study[29] of school bullying in children with disabilities met our selection criteria. Other studies of school bullying were excluded (eg, because violent outcomes were not reported separately from less traumatic forms of victimisation[40] or a response rate was not reported[41]). Other forms of violence outside the scope of this review, such as witnessing domestic violence and experience of war or terrorism, are also important in understanding the full extent of violence against children with disabilities. As with studies of child maltreatment in the general population,[42] the prevalence of emotional abuse or neglect have only been assessed in a few studies of children with disabilities. Measurement of emotional abuse and neglect might be open to greater interpretation than are other forms of abuse and the definition and measurement of neglect poses specific challenges.[43,44] The results of our review show that the prevalence of emotional abuse is at least similar to that of physical violence, and that the risks of violence are highest for emotional abuse and neglect. Importantly, therefore, the assessment of these should not be overlooked in future studies.

There are several limitations to this systematic review. First, the potential for reverse causation (ie, the disability arises as a result of abuse) cannot be ruled out. Although many childhood disabilities will seem to have occurred from birth or developed soon after, the actual onset of
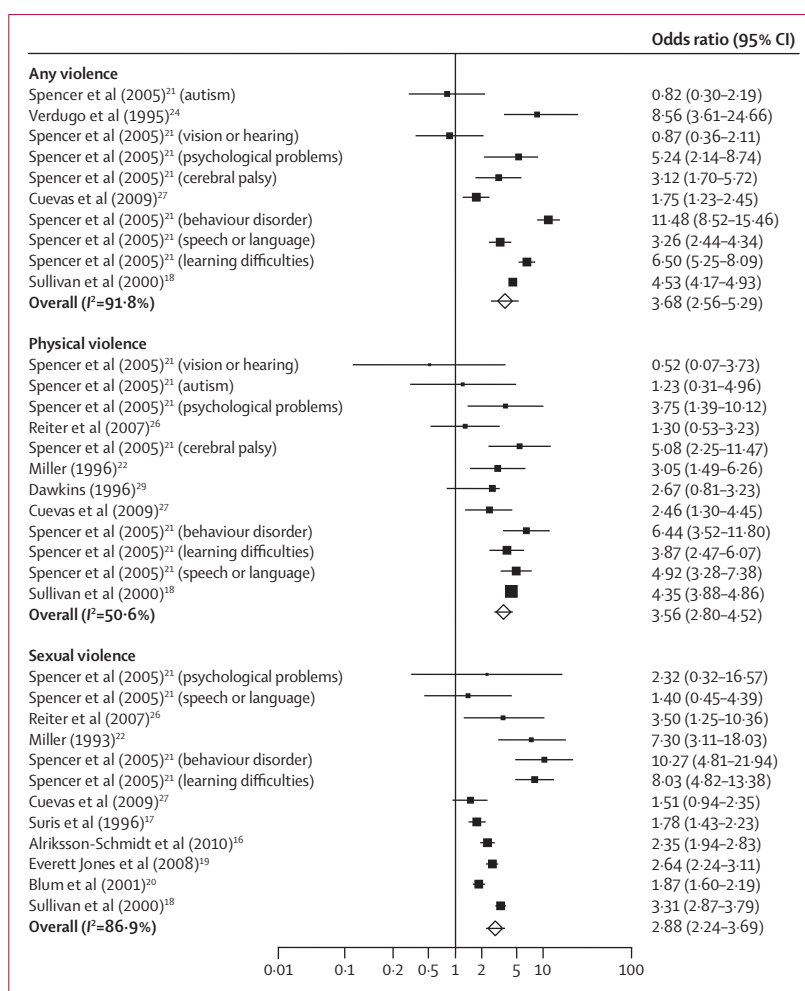

Figure 3: Risk estimates of violence in children with disabilities according to type of violence

disabilities or, therefore, whether violence occurred before or after their development is not possible to ascertain from the included studies. This knowledge is particularly important for children with mental illness, when early exposure to violence might contribute to the development of later behavioural or emotional problems.[45,46] Second, we noted significant heterogeneity between all of our pooled estimates. The results of the meta-regression analyses did not provide a clear explanation, but wide variation in the characteristics of studies is likely to have contributed to the lack of clarity. An ongoing challenge in the discipline is variation in the operational definitions of disability, and the variety of methods used to validate disability,[7,8] shown by the wide range of disability types, categories, and methods used in the included studies. Similar inconsistencies were noted within definitions and methods of measurement of violence, particularly sexual violence. Definitions covered various forms of sexual violence, including unwanted sexual touch[17,26,27] and forced involvement in sexual acts,[16,17,19,20,27,28] and in one study intercourse before the age

	Any disability			Mental or intellectual disability		
	Studies	Odds ratio (95% CI)	Heterogeneity	Studies	Odds ratio (95% CI)	Heterogeneity
Any maltreatment	4	3·68 (2·56–5·29)	91·8% (87·7–94·1)	3	4·28 (2·12–8·62)	94·0% (90·2–95·9)
Physical violence	6	3·56 (2·80–4·52)	50·6% (0–73·0)	4	3·08 (2·08–4·57)	50·8% (0–77·2)
Sexual violence	9	2·88 (2·24–3·69)	86·9% (78·8–90·9)	4	4·62 (2·08–10·23)	84·7% (64·4–91·2)
Emotional abuse	4	4·36 (2·42–7·87)	94·4% (91·4–96·0)	3	4·31 (1·37–13·56)	96·2% (94·2–97·3)
Neglect	3	4·56 (3·23–6·43)	73·8% (27·7–86·0)	2	..	..

We used the I^2 statistic (95% CI) to estimate heterogeneity between pooled studies. ..=insufficient sample.

Table 3: Random-effects pooled odds ratios for risk of violence

of 12 years was used as a proxy measure.[20] Furthermore, although official reports of maltreatment were used in some studies,[18,30,31] in others the reliance was on child, parent, or professional reports. These discrepancies are likely to account for some of the heterogeneity between studies and suggest a need for greater consensus in terms of the definitions, types, and measures of disability and violence. Third, prevalence within a whole population sample was investigated in only one study included in our systematic review.[21] Although other population studies have been reported,[47–49] they did not meet our inclusion criteria. The lack of whole-population studies has been criticised because selected populations and settings might introduce bias, overestimating the level of violence in children with disabilities.[7,21] The results of our review confirm this, showing that significantly higher prevalence estimates of any violence were reported in studies in hospital settings. However, although our decision to include studies based on a range of sampling methods might have introduced bias, variations in estimates were not consistently accounted for by the characteristics of the studies assessed in the meta-regression analysis. This finding suggests that other unknown factors are also important in accounting for differences between estimates. As a further limitation, the pooled risk estimates might overestimate the association between violence and disability because of inadequate adjustment for confounding. In only four studies[16,19,21,27] was confounding adequately controlled for and, importantly, adjustment for birthweight, gestational age, and socioeconomic status reduced the association between violence and some types of disability in one study.[21]

By establishment of the prevalence and risk of violence against children with disabilities in this systematic review, we address the initial step in the public health approach to prevention of violence against children with disabilities. The results suggest that up to a quarter of children with disabilities will experience violence within their lifetimes and confirm that children with disabilities are three to four times more likely to be victims of violence than are their peers without disabilities. Thus, children with disabilities in all settings should be viewed as a high-risk group in whom it is important to identify violence. Interventions that have been shown to be effective for prevention of violence and mitigating its consequences in children without disabilities[50] should be assessed in children with disabilities as a matter of priority.

The results of our review show that although awareness of the risks of violence against children with disabilities has increased, robust evidence continues to be scarce because of a lack of well designed research studies, poor measurement of disability and violence, and insufficient assessment in studies of whether violence preceded the development of disabilities. These gaps need to be addressed through high-quality epidemiological research that focuses on all disability types, uses currently available standardised measures of disability and violence, focuses on low-income and middle-income countries, and includes accurate assessment of whether disabilities were present before exposure to violence, or were a direct result of violence.

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