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Citation for the original published paper (version of record):

Beckman, L., Hellström, L., von Kobyletzki, L. (2020)

Cyber bullying among children with neurodevelopmental disorders: A systematic review

Scandinavian Journal of Psychology, 61(1): 54-67

<https://doi.org/10.1111/sjop.12525>

Access to the published version may require subscription.

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<http://urn.kb.se/resolve?urn=urn:nbn:se:mau:diva-897>

Cyber bullying among children with intellectual or neuropsychiatric disorders: A systematic review

Journal:	<i>Scandinavian Journal of Psychology</i>
Manuscript ID	Draft
Manuscript Type:	Review Paper
Keywords:	cyber bullying, children, adolescents, disability, systematic review

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**Cyber bullying among children with intellectual or neuropsychiatric disorders: A
systematic review**

Abstract

Background: Children with intellectual and neuropsychiatric disorders (IND) may have difficulties with communication and social interaction. Previous research has shown that these children are at an increased risk of being involved with bullying compared to peers without IND. It is still unclear to what extent children with IND are involved in cyber bullying, i.e., bullying with electronic devices.

Aim: This systematic review aimed at studying the prevalence of cyber bullying among children and adolescents with intellectual or neuropsychiatric disorders in need of special education.

Methods: The databases Web of Science, Scopus, ERIC, psychINFO, PubMed and Cochrane were searched including hand search of reference lists until February 24, 2018. Abstract and article review, data abstraction, and study quality assessment were performed by two independent reviewers.

Results. Two-hundred-thirty-three abstract were scanned. In the eight included studies the prevalence rates of cyber victimisation among students with IND ranged from 0%-41%, for cyber perpetration between 0%-16.7%, and for bully-victims 6.7%. All studies was cross-sectional and the sample size ranged between 22 and 149 participants with IND and age between 10-21 years. The diagnosis related to impairment were within the span of intellectual and neuropsychiatric disorders.

Conclusion: Students with disabilities due to IND may be involved in cyber bullying, and the extent might be significantly higher compared to typically developing students, but this needs to be confirmed in future studies. Future studies should if possible include control groups with

typically developed children and adolescents as well as validated and standardized measurements of cyber bullying.

Introduction

The devastating long-term consequences of bullying on children's current and future health are well known, including impact on mental and physical health, as well as on social and financial outcomes later in life (Takizawa, Maughan, & Arseneault, 2014). A recent review (Wolke & Lereya, 2015) on long term effects of bullying show a linkage between victimisation and depression later in life, poor academic achievement and school absenteeism as well as suicidal behavior. Still, as many as about one third of children report occasional victimisation or perpetration whereas one in ten report chronical victimisation or perprtration (Molcho et al., 2009). Bullying is defined as aggressive behavior including intentions to be hurtful or harmful; repetitive and systematic actions and some sort of power imbalance between those involved (Olweus, 1993). Traditional forms of bullying include physical, verbal, and social (sometimes called relational or exclusionary) actions. For adolescents, bullying can take place not only inside or outside the school but also on the internet or via other electronic devices and the overlap between so called cyber bullying and traditional bullying can be large (Olweus, 2012). Traditional bullying has been studied to a larger extent compared to cyber bullying implying a need of more research on cyber bullying. Cyber bullying definitions can vary (Englander, Donnerstein, Kowalski, Lin, & Parti, 2017; Kiriakidis & Kavoura, 2010; Tokunaga, 2010) although most are based on Olweus' (Olweus, 1993, 1996a) criteria (e.g., Smith et al., 2008). The criterion of repetition is one of the aspects that in the traditional definition of bullying distinguishes bullying from solely aggressive behavior (Olweus, 1993). However, the pervasiveness in cyber bullying repetition by a single peretrator may be less important (of hurtful behavior from a single perpetrator) (Dooley,

Pyżalski, & Cross, 2009), as dissemination and following effects often can occur (Kiriakidis & Kavoura, 2010; Slonje & Smith, 2008). It has been argued that these aspects make cyber bullying a more severe phenomenon than traditional bullying (Dooley et al., 2009; Wang, Iannotti, Luk, & Nansel, 2010) but studies on that issue shows inconsistent results (Beckman, Hagquist, & Hellström, 2012; Gradinger, Strohmeier, & Spiel, 2009).

Bullying among students with disabilities

Students with disabilities have been found to be at an even higher risk of bullying involvement, compared to students without disabilities (Mañano, Aimé, Salvas, Morin, & Normand, 2016; Piquart, 2017; Rose, Monda-Amaya, & Espelage, 2011; Schroeder, Cappadocia, Bebeko, Pepler, & Weiss, 2014). An intellectual or neuropsychiatric disability often equates a diagnosis such as attention-deficit disorder (ADHD), autism spectrum disorder (ASD) or intellectual disability (ID). A literature review (Rose et al., 2011) noted that in several studies, over 50% of students with disabilities, both physical and mental, reported bullying victimisation. Another systematic review (Schroeder et al., 2014) showed that children and youth with ASD are experiencing increased rates of perceived physical, verbal, and relational forms of bullying relative to the general population. However, bullying research investigating prevalence and predictors among students with disabilities has yielded inconsistent results in the few studies conducted. Woods and Wolke (2004) found comparable victimisation rates among students with disabilities requiring special educational needs and students without disabilities. In contrast Little (2002) found that up to 94% of mothers to children with Asperger's syndrome and nonverbal learning disorders reported their child as a victim of peer victimisation. These variations may be attributed to ambiguity in the definition, the settings in which the bullying occurs, populations of students examined, and/or demographics or differences in data collection procedures (Piquart, 2017; Rose et al., 2011).

School setting

Research on the impact of school setting on victimisation is not unanimous. It is debated whether the increased inclusion of students with ASD in mainstream classrooms place them at a greater risk for involvement in bullying (Schroeder et al., 2014). According to traditional bullying in inclusive settings, findings indicate that students and teachers consistently rank their classmates with disabilities as frequent victims of bullying (Nabuzoka, 2003). “Students who have a disability or who have unusual attributes are especially vulnerable targets of teasing and bullying” (Walker, Colvin, & Ramsey, 1996, p.190). Even though children with disabilities may be more vulnerable targets of victimisation in inclusive settings, research has shown that students with disabilities in segregated settings were 2 to 3.5 times more likely to be victimized compared to other subgroups of students (e.g., Martlew & Hodson, 1991; Morrison, Furlong, & Smith, 1994), or showed no difference compared to students in inclusive settings (Reiter & Lapidot-Lefler, 2007). Researchers favouring inclusive settings for students with disabilities suggest enhanced social skill acquisition, improved overall social and academic development (Brown et al., 1989), increased acceptance, reduction of negative stereotypes (Martlew & Hodson, 1991), and increased participation (Sabornie, 1994). On the other hand, if students are not fully integrated into peer groups, inclusive settings may maintain or exacerbate victimisation (Martlew & Hodson, 1991).

Sex differences and setting

Cyber bullying research shows inconsistent results regarding sex differences. Some report girls being over-represented in cyber victimisation (Beckman, Hagquist, & Hellström, 2013; Calvete, Orue, Estévez, Villardón, & Padilla, 2010; Cappadocia, Weiss, & Pepler, 2012),

while other studies found no sex differences (Balakrishnan, 2015; Smith et al., 2008). While one study (Norwich & Kelly, 2004) found that primary school girls with learning disabilities in inclusive settings reported significantly more in-school bullying than those in segregated settings (83% compared with 42%), there were no such differences between inclusive and segregated settings among boys. The opposite was found for secondary school boys, i.e. boys in inclusive settings reported less in-school bullying than segregated boys (17% compared with 70%), while there were no such differences for the girls.

Data source

A majority of research on the prevalence of victimisation in typically developing young people uses self-reports (Owens, Skrzypiec, & Wadham, 2011), whereas parent reports (Cappadocia et al., 2012; Little, 2002) or parent and teacher reports (Rowley et al., 2012) more often are used in studies of bullying involvement among students with ASD. It has been suggested that this may be based on the belief that the inability to understand complex social situations makes young people with ASD incapable of answering questions about bullying (Loveland, Pearson, Tunali-Kotoski, Ortegón, & Gibbs, 2001). On the other hand, parent and teacher reports have been shown not to cohere with their children's involvement in bullying, and bullying can be underassessed. For example, one study (Bradshaw, Sawyer, & O'Brennan, 2007) found 41% of students reporting frequent victimisation while staff (71.4%) estimated that fewer than 15% of students were frequent victims.

When studying bullying among students with disabilities, research on cyber bullying are still lacking. More research in this area is needed as students with ASD often are experienced users of the internet (Kuo, Orsmond, Coster, & Cohn, 2014), and might be at high risk of cyber bullying involvement (Didden et al., 2009). One previous systematic review (Alhaboby,

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3 Barnes, Evans, & Short, 2017) studied cyber victimisation among people living with chronic
4 conditions or disabilities and the documented health impact. They found 10 studies which fell
5 within their inclusion criteria and concluded that people with physical impairments,
6 intellectual disabilities and specific chronic diseases were at higher risk of victimisation
7 following devastating health complications. Alhaboby et al. (2017) did not, however include
8 for example cyber perpetration, or school setting, and the scope was broader including
9 physical as well as mental disability which also could be self-assessed. Therefore, the aim of
10 this study is to systematically review the literature on the prevalence of involvement in cyber
11 bullying among school-aged youth with impairment due to intellectual or neuropsychiatric
12 disorders as perpetrators, victims or both (“bully-victims”).

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25 Further, we aim to examine whether the observed prevalence for bullying vary across (a) data
26 source (self-report, parent, teacher or peer report) (b) medical diagnosis of study population
27 (e.g., ADHD, ASD); (c) sociodemographic factors (e.g., sex, age, parental occupation or
28 income); (d) school setting (inclusive or segregated) and (e) definition of cyber bullying.

36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 **Methods**

Article selection procedure

42 The authors conducted a systematic search for studies reporting the prevalence of cyber
43 bullying (i.e. both perpetrating and victimisation) among school-age youth with intellectual or
44 neuropsychiatric disorders and special educational needs. The study followed a pre-defined
45 protocol (see appendix). The stop date of searches was February 24, 2018. The systematic
46 process included the following steps performed by two reviewers: (a) electronic search in
47 databases (i.e. Scopus, Web of Science, ERIC, PsycINFO, Cochrane, and PubMed), (b) title
48 and abstract review, and (c) hand searches in Google scholar and article reference lists. A

systematic search of data bases within education, psychology, social work, public health and medicine was conducted to identify articles reporting the prevalence of cyber bullying among school-age youth with intellectual or neuropsychiatric disorders with educational needs. See appendix for search terms.

Definitions and inclusion and exclusion criteria

Definitions of children with impairment due to intellectual or neuropsychiatric disorders. Intellectual, learning or neuropsychiatric disorders included ADHD, autism spectrum disorder (including Aspergers’ syndrome), and Tourettes’ syndrome, that is conditions were the child needs special education, or help with learning impairment. To be included in this review, the diagnosis of the studied children should have been assessed by a physician.

From now on we summarize the above conditions using the term “intellectual or neuropsychiatric disorders” (IND).

Definition of cyber bullying. In this review, cyber bullying (victimisation and perpetration) is defined as any form of aggressive behaviour online (e.g., harassment, abuse) that implies a physical harmful or hurtful verbal intent from one or many perpetrators towards a victim, using electronic devices. We chose to use the word cyber bullying (by definition, repetitive behavior) in this review although some articles might investigate online aggression without repetition as a criteria. As a consequence, we included the operationalization of repetition of the behavior (time frame) and what terms the authors have used (victimisation, abuse, etc.) in table 1.

Inclusion criteria. Studies were included in this review if they met the following inclusion criteria. First, the studies had to be empirical studies with data on the outcome (cyber bullying

and/or cyber victimisation) and exposure, i.e., IND. Second, quantitative data and the prevalence of cyber bullying needed to be reported. Third, the informants must be no older than 21 years old in order to include children from an inclusive school setting or a segregated school setting (studies on respondents who were only adults was excluded, however studies with data only with parental report was included). Fifth, the informants' medical diagnoses must be stated and assessed by a physician.

The first and second authors independently read the titles and abstracts of all articles and retained articles with the potential to meet the inclusion criteria. Hand search of reference lists of potential articles and reviews on cyber bullying and IND were conducted to identify articles not identified in the electronic search.

Exclusion criteria. We excluded studies written in other languages than Swedish or English. We did not include studies investigating students with only physical diseases still needing special education, such as children with low vision, diabetes, cancer. Studies documenting frequency of victimisation or perpetration compared to other groups of students via effect size calculations and not providing a concrete prevalence were excluded as our purpose was to raise awareness of the prevalence of cyber victimisation and perpetration across studies. If the same data set was used in two different studies, only the one with most information was included. Studies only including informants with the general expression "disabilities" was excluded. Where disagreements regarding inclusion or exclusion existed, all authors discussed the disagreements until consensus was reached.

Analysis of included studies

A total of eight articles met the criteria for inclusion in this review (see figure 1, flow chart). Number of participants with disabilities in the included studies ranged from 22 to 149. All the included studies used a cross sectional design. Studies were summarized by role in cyber bullying (victim, perpetrator, “bully-victim”), prevalence, assessment methods for type of informant source, diagnosis, background characteristics (e.g., age, sex), type of educational setting as well as definition of cyber bullying.

Collective terms. In the summary of the included articles (Table 1) we have chosen to use some collective terms although alternative terms may have been used by the different authors. The reason is to make the comparison between the articles more easily understandable. For example for educational setting we have chosen the collective terms “inclusive school setting” and “segregated school setting” to illustrate whether the students in the studies have attended a regular school setting or a specialist school setting due to their disability. We have also chosen the collective terms “cyber victimisation” and “cyber perpetration” when reporting prevalence rates although different studies may have used different terms. Four studies have used control groups including students without reported IND, also called typically developed children. Hence, our collective term for these students are “typically developing students”.

Quality Assessment. The eligibility of studies was independently assessed by two reviewers (LB, LH) based on titles and abstracts. Primary selected studies were further examined independently by the two reviewers (LB, LH) using a standardized data extraction form designed to describe the characteristics of studies to be included as set out in the recommendations in the Cochrane Handbook section 5.1.0 (Higgins, 2009). Disagreement was resolved by all authors. A set of quality appraisal items was applied. These included biases in sample selection, validity of measures of mental impairment (IND) and cyber bullying, appropriateness of statistical analysis, and adjustment for confounders.

The study design for all of the included studies was cross-sectional. We used a modified version of the Newcastle–Ottawa Scale (Wells, 2000). The included studies received ratings from low to moderate quality. This was mainly due to either no control group and/or sample drawn from a non-generalizable population.

[Figure 1, flow chart in here]

Results

A total of 233 articles were identified through the electronic search. Twelve additional articles were identified through hand search which were read independently by two authors. Finally, 32 articles were identified and read in full to determine inclusion eligibility. Reasons for exclusion of the articles read in full-text included no data on IND ($n=10$), no empirical data (e.g., reviews, discussion papers) ($n=4$), wrong age group ($n=5$), physical disability and no mental disability ($n=1$), different diagnoses not separated and specified (e.g., only studying a “disability”) ($n=4$). Of the 32 articles, a total of eight articles met the criteria for inclusion in this review. See figure 1, flow chart.

In the eight included studies, the prevalence rates of cyber victimisation among students with IND ranged from 0% - 41% (Barringer-Brown, 2015; Kloosterman, Kelley, Craig, Parker, & Javier, 2013), for cyber perpetration between 0%-16.7% (Heiman, Olenik-Shemesh, & Eden, 2015; Kloosterman et al., 2013), and for bully-victims 6.7% (Campbell et al., 2017).

All included studies used questionnaires to collect data on bullying and the variables of interest, completed by self-report or parent-report. Only two studies (Heiman & Olenik-Shemesh, 2015; Heiman et al., 2015) used the same measurement tool for assessing cyber bullying (Cyberbullying Self-Report Questionnaire) by Smith et al. (2008). Prevalence rates of victimisation was self-assessed weekly or monthly, and two studies reported prevalence

rates for being victimised in the past year (Heiman & Olenik-Shemesh, 2015; Heiman et al., 2015). Cyber victimisation rates were reported in all the included studies, cyber perpetration rates were reported in all included studies except Barringer-Brown (2015) and only two studies reported prevalence rates for cyber bully-victimisation (Campbell et al., 2017; Heiman et al., 2015). Five studies included comparison groups in terms of typically developing students (Barringer-Brown, 2015; Campbell et al., 2017; Heiman & Olenik-Shemesh, 2015; Heiman et al., 2015; Kloosterman et al., 2013). According to diagnoses, three studies focused on students with ASD (Campbell et al., 2017; Cappadocia et al., 2012; Kloosterman et al., 2013), one study did not separate between ASD and ADHD (Kowalski & Fedina, 2011). Didden et al. (2009) included students with intellectual disabilities were most students had an ADHD or ASD diagnosis (67%). One study focused on ADHD (Heiman et al., 2015), one study on seriously emotional disabled (SED) and specifically learning disabled (SLD) (Barringer-Brown, 2015) and one study (Heiman & Olenik-Shemesh, 2015) on (a) students with learning disabilities in inclusive school settings and (b) students with learning disabilities with comorbid conduct disorder, ADHD, or other behavioral problems, in segregated school settings (normal IQ). This study stated that the students' diagnosis were determined by pre-existing educational or psychological tests through the school counsellor. We chose to include this because the diagnosis was not self-reported. The sample sizes was in general small, 22-149 students with IND. Table 1 provides descriptive data for each study.

[Table 1 in here]

Prevalence rates of cyber victimisation and perpetration among school students with intellectual or neuropsychiatric disorder

Prevalence rates by type of cyber bullying and informant reported with a weekly time-

frame. The lowest prevalence rate of self-report weekly involvement in victimisation ranged from 0% out of 30 participants (Barringer-Brown, 2015) among students with SED and SLD, to the highest 12 % based on a total of 114 pupils (Didden et al., 2009) among students with intellectual disabilities, mostly with diagnoses such as ASD and ADHD. Didden et al (2009) also reported the highest (ignoring calls 8%) and the lowest (harassing 1%) perpetrator rates reported by a weekly basis.

Prevalence rates by type of cyber bullying and informant reported with a monthly time-

frame. The lowest prevalence of monthly victimisation as well as perpetration using self-reports was shown in Kloosterman et al. (2013) where students with ASD reported 0% cyber victimisation via mobile phones based on a sample of 24 participants. This could be compared to their typically developing controls where 8.3% (based on 24 participants) reported victimisation via mobile phone. The highest prevalence rates of monthly self-reported cyber victimisation via the internet ranged between 14-29% based on 114 participants, depending on type of victimisation (Didden et al., 2009). Similarly, results from Kowalski and Fedina (2011) showed 21.4% cyber victimisation (2-3 times/month) among students with ASD and/or ADHD, based on 24 participants in total. The lowest cyber perpetrator prevalence were seen in (Kloosterman et al., 2013) with 0% of the students with ASD (based on a sample of 24 participants) or LD (based on 22 participants) reporting monthly cyber perpetration. The highest cyber perpetrator prevalence were presented by Didden (2009) ranging from 6-24% depending on type of cyber bullying.

The only prevalence reported by parents according to “once or twice“ during the last 4 weeks was by (Cappadocia et al., 2012) with a cyber victimisation prevalence rate of 4%.

“Once or twice” prevalence rates by type of cyber bullying and informant. Heiman, Olenik-Shemesch & Eden (2015) reported a prevalence of 18.7% yearly victimisation among students with ADHD (based on a total sample of 140 pupils). The highest prevalence of cyber victimisation was shown in Barringer-Brown (2015) where 41% of the IND students reported cyber victimisation once (time frame not clear) (compared to 73% among the typically developing).

Regarding cyber perpetration, the lowest prevalence was presented by Heiman, Olenik-Shemesch & Eden (2015) who’s study showed that 16.7% of students with ADHD reported cyber perpetration in the last year (based on a total of 140 participants). Campbell et al. (2017) reported prevalence for cyber bully-victims, but the time frame was unclear (“infrequent” during the current year). The same prevalence were reported for bully-victimisation among students with ASD (6.7%) and typically developing (6.7%), both groups based on 104 pupils respectively.

Prevalence rates and significant differences by type of cyber bullying and informant reported without a time-frame. Kowalski and Fedina (2011) reported student’s involvement in cyber bullying based on parental reports, but the response alternatives were not the same as their student’s, 73% (out of 33 parents) said that their child had never been cyber victimised, 3% said that their child had cyber perpetrated others and 85% stated that their child had never cyber perpetrated another. Twelve percent reported that they did not know whether their child had been involved in cyber bullying.

Kloosterman et al. (2013) found no significant differences between parent reports and child reports of cyber victimisation (as well as across all types of bullying behaviors) for both the

adolescents in the ASD group and the learning difficulties (LD)/ADHD group. Regarding differences between parent and child reports of cyber perpetration, no significant differences were found for neither the ASD group nor LD/ADHD (across all types of bullying behaviors).

Cyber bullying by background factors

Results regarding sex differences were not conclusive (Didden et al., 2009; Heiman & Olenik-Shemesh, 2015). Although more boys than girls reported cyber victimisation and perpetration via mobile phone and on the internet, Didden et al., (2009) found that this association did not hold a statistical difference (no adjustment reported). In contrast, Heiman and Olenik-Shemesh (2015) found significant differences with girls outnumbering boys: 14.7% of boys versus 25.5% of girls with LD in segregated school settings reported victimisation on the internet ($p < 0.001$) and 9.7% of boys versus 22.6% of girls in segregated school settings reported bullying perpetration. Sex differences were similar for students in inclusive school settings where 11.8% of boys and 15.5% of girls reported victimisation and 4.2% of boys and 16.9% of girls reported bullying perpetration on the internet. However, the sex differences for the students in inclusive school settings were not statistically significant. Cappadocia et al. (2012) reported no prevalence rates separated on sex but found a significantly higher proportion of girls than boys experiencing cyber victimisation ($p < 0.001$).

Age was not associated with cyber bullying via mobile phone in the only paper studying this (Didden et al., 2009).

ADHD predicted all types of involvements in cyber bullying compared to typically developing pupils ($p < 0.05$) in Heiman et al. (2015). Didden et al. (2009) found that students with ADHD more likely perpetrated others via mobile phone than students without IND and students with ASD ($p < 0.001$). Kloosterman et al. (2013) and Campbell et al. (2017) did not

find any significant differences between the students with ASD and the typically developing students regarding cyber victimisation or perpetration (via computer, e-mail messages, pictures, or using mobile phone). Students with LD were more likely to be cyber victimised ($p < 0.05$), cyber perpetrators ($p < 0.05$), and were more often bully-victims ($p < 0.05$) than typically developing students (Heiman & Olenik-Shemesh, 2015). There were no studies that stratified prevalence rates based on socioeconomic factors or age. Sex was a factor often reported as factor predicting involvement in cyber bullying.

Differences in cyber bullying behaviour by school setting

Only one study examined cyber victimisation among students with IND and special educational needs by comparing inclusive educational settings and segregated school setting (Heiman et al., 2015). Their results indicate that it is more common for students with learning disabilities in segregated educational settings to be involved in bullying compared to students with learning disabilities in inclusive educational settings. Regarding the other studies, those conducted in a segregated setting reported prevalence for cyber victimisation at least once in the last month in the range of 7%-29% and cyber perpetration 6%-24%. For the studies conducted in inclusive settings, the prevalence for cyber victimisation at least once a month were in the range 4.5%-21.4% and for cyber perpetration 0-8%.

Prevalence and definition

Four studies reported definitions for cyber bullying in their studies (Campbell et al., 2017; Cappadocia et al., 2012; Kloosterman et al., 2013; Kowalski & Fedina, 2011). Whereas Cappadocia et al. (2012), Kloosterman et al. (2013) and Kowalski & Fedina (2011) used the definition by (Olweus, 1996b), Campbell's et al. (2017) used a definition that were quite

similar to the one by Olweus. The comparison of parental reports in Cappadocia et al. (2012) and Kowalski and Fedina (2011) show that 3% and 10%, respectively report that their children have (ever) been cyber victimised. While the results of self-reported victimisation in the articles of Kloosterman et al. (2013), Kowalski and Fedina (2011), and Campbell et al. (2017) showed rates between 9.5% to 14.9%, cyber perpetration rates was stable at 8-8.5% once or twice within the past two months.

Discussion

This is the first study which has systematically reviewed the prevalence of cyber victimisation, - and perpetration in students with impairment due to intellectual or neuropsychiatric disorders (IND) in a school setting. We found eight studies that fell within our inclusion criteria. Not surprisingly, given the mix of measurements, definitions, time frames, informants and diagnosis, we found varying prevalence of cyber victimisation and perpetration among students with IND.

Among pupils with IND the highest prevalence (occurring at least once during a year) of cyber victimisation was 41% (Barringer-Brown, 2015; Kloosterman et al., 2013), and cyber perpetration up to 18.7% (Heiman et al., 2015; Kloosterman et al., 2013), and bully-victim prevalence at 6.7% for total sample (Campbell et al., 2017). Astonishingly, only two studies reported prevalence for cyber bully-victimisation– although this behavior may be more common in students with disabilities (e.g., Kaukiainen et al., 2002).

The studies included have a varying sample size, diagnoses and data collection methods differ (definitions, questionnaire and informants), which probably affects the outcome of interest.

We know that that questions about bullying including the word bullying, as well as includes a definition of bullying usually reduce the prevalence compared to asking questions about

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3 general incidents or situations. This is suggested being due to stigma and shame related to
4 being victimised (Bosworth, Espelage, & Simon, 1999; Greif & Furlong, 2006; Kert,
5 Coddington, Tryon, & Shiyko, 2010).
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10 There were conflicting results regarding diagnose of mental disability, prevalence and type of
11 cyber bullying involvement, and it still needs to be solved whether students with IND are
12 more prone to be victims or perpetrators.
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17 Two studies used parental information in addition to student information (Kloosterman et al.,
18 2013; Kowalski & Fedina, 2011), and parental information might underassess the prevalence
19 of bullying. This was found even in studies on disease prevalence, parents underassessed
20 childrens symptoms. Thus, students should report their own involvement in cyber bullying
21 whenever possible.
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28 The prevalence differed across sex, and school setting, with higher proportions among girls
29 and segregated settings. In comparison to studies on traditional bullying where boys almost
30 always are more likely to be involved in bullying, at least in more direct forms of bullying
31 (Card, Stucky, Sawalani, & Little, 2008), results in cyber bullying research often report
32 tendencies that girls are more involved than boys (e.g., Beckman et al., 2013; Cappadocia et
33 al., 2012). This could be due to that girls are more exposed to cyber bullying locations, i.e.
34 they spend more time online on social forums where different types of victimisation and
35 harassment are common (Beckman et al., 2013). Generally, research studying bullying among
36 students with disabilities do seldomly report differences regarding sex. This is probably due to
37 a lower number of girls compared to boys getting diagnosed with disabilities such as ASD and
38 ADHD, where most research has been done. There could also be an underlaying belief that
39 boys and girls with certain diagnoses are involved in bullying in similar ways. Drawing on the
40 extensive research on sex differences in traditional bullying in general populations, we still
41 know very little about sex differences when it comes to bullying in general and cyber bullying
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in particular among students with disabilities. Some differences regarding sex occurred in the current literature review which could result from what type of cyber bullying has been studied.

Research on the impact of school setting on victimisation is not unanimous. It is debated whether the increased inclusion of students with ASD in mainstream classrooms place them at greater risk for involvement in bullying (Schroeder et al., 2014) or whether inclusive settings provide skills and opportunities leading to a lower risk for bullying involvement (Brown et al., 1989; Martlew & Hodson, 1991; Sabornie, 1994). The results from the studies included in this review indicate that students with disabilities in segregated school settings report slightly higher prevalence rates of bullying involvement compared to students with disabilities in inclusive school settings. The only study (Heiman & Olenik-Shemesh, 2015) which directly compared these two settings confirmed a lower prevalence of cyber bullying in inclusive schools. Inclusive settings can be beneficial to students with disabilities due to enhanced social skill acquisition, improved social and academic progress (Brown et al., 1989), enhanced approval and understanding of differences (Martlew & Hodson, 1991), and increased participation (Sabornie, 1994). Segregated setting may limit opportunities to develop a protective peer base (Martlew & Hodson, 1991; Morrison et al., 1994) and to learn, practice, and receive validation for appropriate social skills (Mishna, 2003). More studies comparing these two different forms of educational setting are needed to be able to draw conclusions whether this has an impact on cyber bullying involvement.

Interestingly, when comparing prevalence rates among studies using Olweus' definition we found that that prevalence rates was quite stable, in particular among cyber perpetrators. This implies the importance of harmonizing measures including using the same definition in order to compare results between different studies.

Limitations and directions for future studies

There are a few limitations with this review that must be highlighted: First, a limitation with the search strategy was that we found that many of the studies was not identified in the databases. The explanation for this was that many studies did not investigate cyber bullying per se, but bullying in general. This problem is also discussed in the review by Alhaboby et al. (2017) and highlights methodological difficulties when searching for articles that include cyber bullying. Children with disabilities are a very broad inclusion criteria, and although we narrowed our target group to include only intellectual or neuropsychiatric disorders, we experienced that the classification of children with disabilities differ a lot within different studies.

Although this systematic review provide us with a good overlook of current studies on cyber bullying and students with IND, the studies included were all very different from each other, both in terms of study sampling and quality. The sample size were in general small and not all used control groups. All included studies used different measurements and time frames, definitions and diagnosis, making it difficult to generalize the results. However all studies were conducted in Western countries which make it more reasonable to believe that we can generalize results to similar Western countries. The included studies were conducted in the USA, Holland, Australia, Israel and Canada, leaving many countries unrepresented. As the school setting (and possibly the view on disability) can differ across countries, studies on the effect of school setting on cyber bullying in pupils with IND should be conducted in other countries. Further, in the early cyber bullying research, questions were not very specific and did more or less only included questions about being victimised via the internet or mobile phone, thus future studies should specify the mode of bullying (e.g., social forums, texting, chatting, sexting). Finally, in several of the reviewed studies, methodology were poorly described and lacking in details.

Conclusion and implications

- According to our review, students with disabilities due to IND are involved in cyber bullying, and the extent might be slightly higher compared to typically developing students, however, this needs to be confirmed in future studies.
- When conducting prevalence studies, the validity of information regarding impairment and bullying is of high importance and can influence results. It is also important to distinguish, and compare, different educational settings.
- There is a need of harmonizing measurements and definitions for cyber bullying in studies including students with disabilities in order to compare results from different studies and settings.
- Whenever possible, students themselves should be the ones reporting bullying involvement. However, including several informants strengthens the validity.

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For Peer Review

Table 1. Summary of findings cyber bullying among students with intellectual or neuropsychiatric disorders.

Authors and country where study was conducted	Participants (n, age, type of disability and/or school setting)	Type of study, data source, questionnaire and time frame	Prevalence and type of cyber bullying	Definition of cyberbullying
(Kowalski & Fedina, 2011) US	N= 42 (18 girls, 24 boys) Age 10-20 years, M= 13.69, SD = 2.61; median = 13) Children diagnosed with ASD and/or ADHD Location: Summer wilderness camp for children with ADHD and Asperger Syndrome	Type of study: Cross-sectional <i>Electronic Bullying Questionnaire</i> (Kowalski & Limber, 2007), developed after Olweus BVQ (Olweus, 1996, 2004) Time frame includes past	<i>Self-reported cyber victimisation within the past 2 month:</i> Once or twice: 9.5% 2-3 times /month or more: 21.4% <i>Self-reported cyber perpetration</i> Once or twice: 8% 2-3 times /month or more: 0% <i>Parental reported, cyber victimisation:</i> Never: 73%	“When we say ‘cyber bullied’ we mean bullied through email, instant messaging, in a chat room, on a website, or through a text message sent to a cell phone”. Based on Olweus

	School setting: not reported	couple of month: weekly & monthly	Don't know: 12% <i>Parental reported cyber perpetration</i> Never: 85% Don't know: 12% Ever perpetration: 3% The cyber bullying occurred most common through instant messaging: 66.7% Social networking sites: 60.0% Text messaging: 20%	(1996/2004).
(Barringer-Brown, 2015) US	N=30 with disability and 22 typically developing controls, age ranging from 12-19 years old	Type of study: Cross- sectional Questionnaire: Same questions as in Didden	<i>Self-reported cyber victimisation among SED/SLD children</i> Never: 35% Once: 41% 2-3 times in total: 17%	None reported

	Children with seriously emotional disability (SED) and specifically learning disability (SLD) with a majority of ASD and ADHD diagnoses	(2009) Time frame includes the last 3 months: weekly & monthly	2-3 times /month: 7% Once a week: 0% <i>Typically developing controls</i> Never: 18% Once: 73% 2-3 times: 9% 2-3 times /month: 0% Once a week: 0%	
(Didden et al., 2009) The Netherlands	N=114, 82 boys and 32 girls, ages 12-19 years old 82% of the children had an intellectual disability or	Type of study: Cross-sectional Questionnaire: No validated instrument	<i>Self-reported via the internet:</i> <i>Cyber victimisation at least once a week</i> ranging from 5-12% depending on the form of victimisation <i>About once a month:</i>	None reported

	borderline IQ (IQ<85), 1 % of the participants had an average or above average IQ (total IQ between 85–118) and went to the school because of a developmental disorder and behaviour and emotional problems. Most adolescents (67%) had a diagnosis, such as ADHD or ASD	Time frame includes the latest 3 months: weekly & monthly	14-29% depending on the form of victimisation <i>Self-reported cyber perpetration once or more/week: 1-8% depending on the form of perpetration</i> <i>Occurred about once a month:</i> 6-24% depending on the form of perpetration <i>Self-reported cyber victimisation at least once/ 3 month</i> ranging 2-18% depending on the form of victimisation <i>Self-report cyber perpetration once/3 month:</i> 0-23% depending on the form of	
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			<p>perpetration</p> <p><i>Self-reported cyber victimisation via the phone: ranging between 0%-7% among girls and 2%-11% among boys depending on the form of victimisation</i></p> <p><i>Self-reported cyber perpetration via the phone: ranging between 0%-6% among girls and 0%-17% among boys depending on the form of victimisation</i></p>	
<p>(Campbell et al., 2017)</p> <p>Australia</p>	<p>N= 104 (91 boys and 13 girls), age 11-16 years (M = 12.69, SD = 1.42) with ASD matched with 104 typically</p>	<p>Type of study: Cross-sectional</p> <p>Self-report questionnaire</p>	<p><i>Self-reported cyber victimisation (at least once /year)</i></p> <p>ASD: 14.9%</p> <p>Typically developing: 15%</p>	<p>“Cyberbullying is when one person or a group of people repeatedly try to</p>

	developing controls.	(Campbell & Morgan, in press; Hooijer & Campbell, under review)	<i>Self-reported cyber perpetration (at least once /year)</i>	hurt or embarrass another person, using their computer or mobile phone to use power over them. With cyberbullying the person bullying usually has some advantage over the person targeted and it is done on purpose to hurt them, not like an accident or when friends tease each
	School setting: inclusive school		ASD: 8.5%	
	The typically developing children were drawn from three different Australian states and attended both government and nongovernment schools, similar to the students with ASD	Time frame: Weekly & monthly during the year	Typically developing:12.5%	
			<i>Self-reported cyberbully-victimisation(at least once /year)</i>	
			ASD: 6.7%	
			Typically developing:6.7%	

				other.”
(Heiman, Olenik-Shemesh, & Eden, 2015) Israel	N=140 children with ADHD (26.4% female), and 342 controls (55% female), age 12-16 (M=14.8, SD =1.17) Inclusive educational setting	Type of study: Cross-sectional Self-report questionnaire: <i>Cyberbullying Self-Report Questionnaire</i> (Smith et al., 2008) Time frame: Yearly	<i>Self-reported cyber victimisation in the last year</i> ADHD: yes: 18.7% Typically developing controls: 12.6% <i>Self-reported cyber perpetration in the last year</i> ADHD: yes: 16.7% Typically developing controls: 11.0%	None reported
(Heiman & Olenik-Shemesh, 2015) Israel	N= 149 children with learning disabilities (LD), 116 children with comorbid LD and 242 typically developing controls. Ages 12-17 years (M = 14.4,	Type of study: Cross-sectional Self-report questionnaire: <i>Cyberbullying Self-</i>	<i>Self-reported cyber victimisation in the last year:</i> LD inclusive setting: Boys: 11.8% Girls: 15.5%	None reported

	SD = 1.18) for the entire sample	<i>Report Questionnaire</i> (Smith et al., 2008)	LD segregated setting: Boys: 14.7% Girls: 25.5%	
	Children with LD attending general education classes; students with comorbid LD attending special education classes (after comprehensive educational and psychological tests, they were advised to attend special education classes) and 242 typically developing children as comparison group	Time frame: Yearly	Typically developing controls Boys: 11.2% Girls: 15.3% <i>Self-reported cyber perpetration in the last year</i> LD inclusive setting: Boys 4.2% Girls 16.9% LD segregated setting: Boys 9.7% Girls: 22.6% Typically developing controls:	

			Boys: 5.6% Girls 12.5% <i>Self-report cyber bully-victimisation in the last year</i> LD inclusive setting: Boys: 5.3% Girls: 0% LD segregated setting: Boys: 7.3% Girls: 10.7% Typically developing controls Boys: 5.7% Girls: 2.4%	
(Kloosterman, Kelley, Craig,	N= 24 boys with ASD (“high functioning” = no cognitive	Type of study: Cross-sectional	<i>Self-reported cyber victimisation at least once in the past couple of months</i>	(Olweus, 1996)

Parker, & Javier, 2013) Canada	disability nor ADHD) compared to two control groups, age 11-18 years (M = 14.76; SD = 1.90) Comparison groups: a group of boys with LD (n=22) and a group of typically developing boys (n=24). School setting: inclusive education school	Questionnaire (Olweus, 1996) Time frame included the last couple of month : monthly	Via computer or e-mail messages, or pictures ASD:12.5% LD: 4.5% Typically developing controls : 4.2% Via mobile phone ASD: 0% LD: 0% Typically developing controls: 8.3% <i>Self-reported cyber perpetration at least once in the past couple of months</i> Via computer or e-mail messages, or pictures ASD: 8.3% LD: 4.5% Typically developing controls: 0% Via mobile phone ASD: 0%
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			LD: 0%	
			Typically developing controls: 4.2%	
(Cappadocia, Weiss, & Pepler, 2012)	N= 192 parents to children aged 5-21 years (M = 11.71; SD 3.55) with ASD	Type of study: Cross-sectional	<i>Parental-reported cyber victimisation in last month</i>	(Olweus, 1996)
Canada	Children with ASD: Asperger syndrome (54%), high functioning autism (14%), Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) (13%), and autism (19%). Attended elementary, middle, or high school. 80% of these children were placed in inclusive	Parental questionnaire (Olweus, 1996)	Never: 90%	
		Time frame included in the last month: monthly	Once: 4%	
			2–3 times: 4%	
			Once/week: 1%	
			Twice or more/week: 1%	

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	school settings and 20% were placed in segregated school settings			
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PRISMA 2009 Flow Diagram

Figure 1: Flow chart diagram showing the process of study selection

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Appendix 1

Protocol for “Cyber bullying among children with intellectual or neuropsychiatric disorder: A systematic review”

Aim:

The aim of this study is to systematically review the literature on the prevalence of involvement in cyber bullying among school-aged youth with intellectual or neuropsychiatric disorders as perpetrators, victims or both (“bully-victims”). Further, we aim to examine whether the observed prevalence rates for bullying vary across (a) data source (self-report, parent, teacher or peer report) (b) medical diagnosis of study population (e.g., ADHD, ASD); (c) sociodemographic factors (e.g., sex, age, parental occupation or income); (d) school setting (inclusive or segregated) and (e) definition of cyber bullying.

Methods:

A systematic review will be undertaken to (a) evaluate the prevalence of school-aged youth with special needs involved in cyberbullying as perpetrators, victims or both (“bully-victims”).

(b) Examine whether the observed prevalence estimates vary between different background factors and assessment methods for the study group. Background factors could for example be age, sex and socio-economic status. Assessment methods could be type of measurement such as interview or questionnaire, parent- or teacher rating, as well as how cyberbullying is defined in the study. If possible, a meta-analysis will be undertaken.

Definitions:

Definitions of children with impairment due to intellectual or neuropsychiatric disorders

Intellectual or neuropsychiatric disorders are defined as conditions where the child needs special education, or help with learning impairment. To be included in this review, the diagnosis of the

Appendix 1

studied children should have been assessed by a physician. Children needed to have an impairment due to these conditions.

From now on we only use the term “students with intellectual or neuropsychiatric disorders (IND) to refer to the target study group.

Definition of cyber bullying

In this review, cyberbullying (victimisation and perpetration) is defined as any form of aggressive behaviour online (e.g., harassment, abuse) that implies a harmful physical, or hurtful verbal intent from one or many perpetrators towards a victim, using electronic devices. We chose to use the word cyber bullying (by definition, repetitive behavior) in this review although some articles might investigate online aggression without repetition as a criteria. As a consequence, we included the operationalization of repetition of the behavior (time frame) and what terms the authors have used (victimisation, abuse, etc.) in table 1.

Search Strategy

Systematic literature search in Scopus, PsycINFO, ERIC, PubMed, Cochrane and Web of Science; hand search in reference lists of included papers, conference reports will be performed. Searches will also be performed in Google and Google Scholar search engines.

Inclusion criteria are:

- Empirical studies with prevalence data on impairment due to intellectual or neuropsychiatric disorders and the outcome (cyber bullying).
- Participants with a diagnosis of intellectual or neuropsychiatric disorder assessed by a physician, and the specific diagnosis should be stated.
- Studies including children and adolescents up to 21 years as target group.

Exclusion criteria are:

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- Articles reporting in other languages than Swedish or English.
- Studies investigating children with impairment due to physical diseases such as children with diabetes, cancer, back pain.

Endpoints:

Primary:

- Prevalence of cyber bullying during childhood and adolescence.
- If prevalence vary with type of school setting, data source, background variables, or definitions of cyberbullying.

Primary outcome of interest are:

1. Cyberbullying perpetrators.
2. Cyberbullying victims.
3. Cyberbullying “bully-victims” (i.e. those children reporting both being bullied and victimised).

Primary exposure of interest are:

1. Impairment due to intellectual disabilities.
2. Impairment due to neuropsychiatric disorders: ADHD, autism spectrum disorder, dyslexia, oppositional defiant disorder.

Eligibility assessment

Two reviewers will independently assess the eligibility of studies based on the title and abstract. If either of the reviewers considers a study potentially eligible, the full article will be retrieved for further assessment. In the second screening phase, full text papers will be assessed independently by the two reviewers using a standardized data extraction form designed to describe the characteristics of studies to be included as set out in the recommendations in the Cochrane Handbook section 5.1.0. Disagreements will be resolved by all authors.

Appendix 1

Data extraction

A data extraction form was developed and two reviewers will independently extract the data from included studies using this form. Extracted data items will include characteristics of each study, study methodological quality items, and the outcomes of interest for each study.

Study quality assessment

Following the Cochrane Collaboration's recommendation to present potential biases for each study, a set of quality appraisal items will be applied. These include the Newcastle-Ottawa scale for assessing the quality of non-randomized studies. Studies were rated with stars (a maximum of 6 stars), with fewer stars indicating lower quality (included studies total score ranged from 1-4). The following areas was scrutinized and assessed: Selection of the exposed group, Comparability of exposed and unexposed, and Assessment of outcome. Low sampling quality included e.g., no unexposed, i.e., no control group, and if selection of the exposed group was drawn from a group not comparable to the exposed population (non-generalized general population).

Statistical analysis

- Articles that meet the inclusion criteria will be recorded in table format in order to perform a systematic and narrative synthesis on the available evidence. If studies include combinations of cyberbullying (such as bully-victims not separated) we will seek to distinguish the separate prevalence; if this is not possible we will report the combined data. If possible, we will undertake meta-analysis of study findings; including meta-regression to explore sources of heterogeneities (e.g., methodological quality, age of participants sex, other differences due to confounding factors).

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Ethics and dissemination

Results will be disseminated in a scientific peer reviewed journal.

Appendix 1

Search terms and number of hits in each database

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PUBMED

Search	Search terms	Number of hits
#1	(cyber-bullying) OR cyber-aggression) OR cyber-abuse) OR cyber-harassment) OR cybervictimization)	161
#2	(special educational needs OR learning disability OR dyslexia OR adhd OR autism OR asd OR Tourettes OR attention deficit hyperactivity disorder OR asperger OR neurodevelopment OR disability OR cognitive OR intellectual disability OR special needs OR inclusive school OR oppositional defiant disorder)	671016
#1	((((cyber-bullying OR cyber-aggression OR cyber-abuse OR cyber-harassment OR cybervictimization))) AND ((special educational needs OR learning OR dyslexia OR adhd OR autism OR asd OR Tourettes OR attention deficit hyperactivity disorder OR asperger OR neurodevelopment OR disability OR cognitive OR intellectual disability OR special needs OR inclusive school OR oppositional defiant disorder)))	25

PsychINFO

Search	Search terms	Number of hits
#1	"cyber bullying" OR "cyber victimization" OR "cyber harassment" OR "cyber abuse" OR "cyber deviance" OR "cyber aggression"	540

Appendix 1

#2	"attention deficit hyperactivity disorder" OR "adhd" OR "autism" OR "asperger" OR "Oppositional Defiant Disorder" OR "intellectual disorder" OR "intellectual disability" OR "disability" OR "inclusive school" OR "special needs" OR "special education" OR "neurodevelopment" OR "cognitive" OR "tourettes" OR "learning disability"	791,854
#1	("attention deficit hyperactivity disorder" OR "adhd" OR "autism" OR "asperger" OR "Oppositional Defiant Disorder" OR "intellectual disorder" OR "intellectual disability" OR "disability" OR "inclusive school" OR "special needs" OR "special education" OR "neurodevelopment" OR "cognitive") AND ("cyber bullying" OR "cyber victimization" OR "cyber harassment" OR "cyber abuse" OR "cyber deviance" OR "cyber aggression")	62

ERIC

Search	Search terms	Number of hits
#2	"special needs" OR "adhd" OR "disability" OR "autism" OR "intellectual disability" OR "attention deficit hyperactivity disorder" OR "oppositional defiant disorder" OR "inclusive school" OR "neurodevelopment" OR "cognitive" OR "dyslexia" OR asperger OR learning disability OR tourettes	196,176
#1	"cyber bullying" OR "cyber victimization" OR "cyber harassment" OR "cyber aggression" OR "cyber deviance"	138
#1 		12

Web of Science

Appendix 1

Search	Search terms	Number of hits
#1	"cyber bullying" OR "cyber victimization" OR "cyber harassment" OR "cyber aggression" OR "cyber deviance" OR "cyber abuse"	605
#2	"special needs" OR "adhd" OR "disability" OR "autism" OR "intellectual disability" OR "attention deficit hyperactivity disorder" OR "oppositional defiant disorder" OR "inclusive school" OR "neurodevelopmental" OR "cognitive" OR "dyslexia" OR asperger OR "learning disability"	998,274
#1& #2		41

Scopus

Search	Search terms	Number of hits
#1	((TITLE-ABS-KEY ("cyber bullying" OR "cyber victimization" OR "electronic bullying" OR "cyber harassment" OR "cyber aggression")))	939
#2	(TITLE-ABS-KEY ("special needs") OR TITLE-ABS-KEY ("adhd") OR TITLE-ABS-KEY ("disability") OR TITLE-ABS-KEY ("autism") OR TITLE-ABS-KEY ("asd") OR TITLE-ABS-KEY ("intellectual disability") OR TITLE-ABS-KEY ("attention deficit hyperactivity disorder") OR TITLE-ABS-KEY ("oppositional defiant disorder") OR TITLE-ABS-KEY ("inclusive school") OR TITLE-ABS-KEY ("neurodevelopment") OR TITLE-ABS-KEY ("cognitive") OR TITLE-ABS-KEY ("dyslexia"))	1,035,048

Appendix 1

#1& #2	((TITLE-ABS-KEY ("special needs" OR "adhd" OR "disability" OR "autism" OR "asd" OR "intellectual disability" OR "attention deficit hyperactivity disorder" OR "oppositional defiant disorder" OR "inclusive school" OR "neurodevelopment" OR "cognitive" OR "dyslexia" OR "tourettes" OR "learning"))) AND ((TITLE-ABS-KEY ("cyber bullying" OR "cyber victimization" OR "electronic bullying" OR "cyber harassment" OR "cyber aggression"))))	46
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Cohrane

Search	Search terms	Number of hits
#1	cyberbullying or cybervictimization or cyber abuse or cyber deviance or cyber harassment or cyber aggression: (title, abstract keyword)	28
#2	special educational needs or dyslexia or oppositional defiant disorder or inclusive school or disability or special needs or attention deficit hyperactivity disorder or adhd or autism or asperger or neurodevelopment or cognitive or intellectual disability or disability or learning disability or tourettes	69731
#1& #2		5