Cyberbullying and adolescent mental health: systematic review

Cyberbullying e saúde mental dos adolescentes: revisão sistemática

Acoso cibernético y la salud mental de los adolescentes: revisión sistemática

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Abstract

Cyberbullying is a new form of violence that is expressed through electronic media and has given rise to concern for parents, educators and researchers. In this paper, an association between cyberbullying and adolescent mental health will be assessed through a systematic review of two databases: PubMed and Virtual Health Library (BVS). The prevalence of cyberbullying ranged from 6.5% to 35.4%. Previous or current experiences of traditional bullying were associated with victims and perpetrators of cyberbullying. Daily use of three or more hours of Internet, web camera, text messages, posting personal information and harassing others online were associated with cyberbullying. Cybervictims and cyberbullies had more emotional and psychosomatic problems, social difficulties and did not feel safe and cared for in school. Cyberbullying was associated with moderate to severe depressive symptoms, substance use, ideation and suicide attempts. Health professionals should be aware of the violent nature of interactions occurring in the virtual environment and its harm to the mental health of adolescents.

Bullying; Adolescent; Mental Health

Resumo

Cyberbullying*, uma nova forma de violência expressa por meio da mídia eletrônica, tem preocupado pais, educadores e pesquisadores. A associação entre* cyberbullying *e a saúde mental dos adolescentes será revisada. Revisão sistemática em duas bases de dados: PubMed e a Biblioteca Virtual em Saúde (BVS). A prevalência do* cyberbullying *variou entre 6,5% a 35,4%.* Bullying *tradicional prévio ou atual estava associado às vítimas e agressores do* cyberbullying*. Uso diário de três ou mais horas de Internet, web câmera, mensagens de texto, postar informações pessoais e assediar outros* online *estavam associados ao* cyberbullying*. "Cybervítimas" e cyberbullies tinham mais problemas emocionais, psicossomáticos, dificuldades sociais, e não se sentiam seguros e cuidados na escola. O* cyberbullying *estava associado à sintomatologia depressiva moderada e grave, uso de substâncias, ideação e tentativas de suicídio. Profissionais de saúde devem conhecer as interações de natureza violenta que ocorrem no ambiente virtual e de seus agravos para a saúde mental dos adolescentes.*

Bullying*; Adolescente; Saúde Mental*

Introduction

Access to the Internet and use of text messaging has influenced social interaction among teenagers in recent decades. Most teenagers have a personal computer or mobile phone and communicate daily with several people at the same time, being exposed to the influences of instant contact and its repercussions, which in many cases can be harmful [1]. More recently, cyberbullying, a new form of violence expressed through electronic media, has concerned parents, educators and researchers due to its effects on adolescents' mental health [2].

The term cyberbullying is derived from traditional bullying behaviors, which are observed mainly among elementary-school students, such as verbal abuse, teasing, insults and threats, as well as physical aggression, such as hitting, kicking, punching and damaging the belongings of others. Such behaviors must occur repeatedly and systematically against an individual who fails or is unable to defend himself or herself, in order to be classified as bullying [3]. Correlates of traditional bullying can be useful to understand youth internet harassment, because this field is much more established. Just over 15% of children and adolescents are bullied "sometimes" or more frequently with negative health and social challenges consistently reported. Studies revealed that victims report significantly more concurrent health problems, emotional-adjustment problems, school-adjustment problems, and poorer relationships with classmates when compared with non-bullying involved youth [4,5]. According to Hawker & Boulton [6], being the target of bullying was most strongly related to depression, compared with all other outcomes, in a meta-analysis performed with studies from 23 countries.

Cyberbullying, on the other hand, involves the use of electronic media with the intention of causing harm, humiliation, suffering, fear and despair for the individual who is the target of aggression. These actions can be carried out via email, chat rooms, online voting booths, cell phones and instant messaging [7]. Studies suggest that 20-40% of teenagers will have at least one cyberbullying experience during their adolescence, and that the number of cybervictims is increasing [8]. Nocentini et al. [9], using a list of behaviors, classified cyberbullying according to the nature of attacks in: (1) written-verbal, which include phone calls, text messages and emails; (2) visual, which involves sending embarrassing images and/or pictures; (3) representation, which refers to more sophisticated attacks, consists of using or stealing someone else's identity to reveal personal information, using his/her account and; (4) exclusion, which consists of deliberately excluding someone who is a member of the online group.

Cyberbullying may achieve a greater audience than traditional bullying, since it occurs in the virtual space, where free expression is allowed without social control. Additionally, it is difficult to remove information from a website. Dehue et al. [10] suggest three conditions that must be met for a behavior be considered "cyberbullying": the attack must be intentional, occur repeatedly and cause psychological distress. The main damage caused by cyberbullying is to harm the victim's reputation, with repercussions that may be even greater than those observed in traditional bullying. Victimization related to cyberbullying has been associated with social and behavioral problems [8]. In this article we aimed to review and evaluate the associations between cyberbullying and adolescent mental health problems.

Methods

This review included studies on the prevalence of cyberbullying and its association with mental health problems among adolescents in the general population. Several cyberbullying definitions have been presented in the literature, describing some aggressive, hostile, or harmful act that is perpetrated by a bully through an unspecified type of electronic device. In this review, we used the following definition of cyberbullying, with the aim of unifying the concepts that appear in the literature: "an intentional act of aggression towards another person online". Mental health problems refer to a recognizable set of emotional problems, symptoms or behaviors associated with considerable distress and substantial interference with personal functions.

Information sources

We searched for studies published in English, Portuguese and Spanish (languages) in two electronic databases: PubMed and Virtual Health Library (*Biblioteca Virtual em Saúde* – BVS). The BVS includes data from the Latin American and Caribbean Centre on Health Sciences Information (LILACS), Spanish Bibliographic Index of Health Sciences (SBIHS), MEDLINE, The Cochrane Library and SciELO. The Pan American Health Organization/World Health Organization (PAHO-WHO), together with BIREME (the Latin American and Caribbean Center on Health Sciences Information) provides open access to full-text health related publications from Latin America and the Caribbean. The PRISMA state-

ment was used to build and elaborate this systematic review and the *Effective Public Health Practice Project Quality Assessment Tool* (EPHPP) was applied to assess the methodological quality of the articles included [11,12].

Search strategy

The search strategy was performed on two occasions: in May and June 2013. We searched for the term "cyberbullying" in all fields, with no time limits. The search was conducted using the following keyword combinations: (cyberbullying OR bullying) AND adolescent AND (mental health OR health). Search details were: cyberbullying OR (bullying [Mesh terms] OR bullying [All fields] OR cyberbullying [All fields]) AND (adolescent [MESH terms] OR adolescent [all fields]) AND (Mental Health [MESH terms] OR (mental [All fields] AND Health [All fields]) OR (mental health [All fields]. Article references were screened for additional information.

Study selection

Articles were evaluated and selected according to the following eligibility criteria: (1) population-based representative samples of 6th to 12th grade students or youth from the ages of 10 to 17; (2) cross-sectional prevalence studies on cyberbullying and; (3) the use of standardized instruments to assess cyberbullying and mental health problems. We excluded studies on specific adolescent populations, such as, adolescents at risk of psychosis, those with intellectual disabilities, developmental issues or obesity, homosexuals or adolescents who were in jail.

Titles and abstracts were assessed independently by two evaluators. Whenever there was disagreement between the evaluators, another reviewer was called to give his opinion.

Data collection

Data collected: total number of patients, age, sex, study design, sample characteristics, cyberbullying assessment instruments, prevalence and risks factors of cyberbullying, measures and mental health problems related to cyberbullying.

Results

We found 377 articles in the systematic search and two articles in the manual search. A total of 43 articles were selected. Literature reviews, theoretical essays and qualitative studies were excluded, resulting in 13 articles. Three articles were excluded for the following reasons: (1) the sample was repeated; (2) the study did not inform the prevalence of cyberbullying; and (3) the response rate was below 60%. Figure 1 describes the selection process of the studies included in this review.

Samples were taken from the population of adolescents who were attending the 6th to 12th grades, or aged between 10 and 17 years. Prevalence of cyberbullying varied between 6.8% to 35.4% [13,14,16,17,18,19,20,21,22]. In one study, whose participants were recruited from a popular website, the prevalence was higher: 72% [15]. The number of questions used to investigate cyberbullying varied across studies. However, the content of questions was similar and were related to having received or sent messages with the intention of humiliating or causing embarrassment, with threats or disclosure of personal information, photos or photo montage through electronic media, such as internet or mobile phone [14,15,16,17,18,19,20,21,21,22]. We used the follow abbreviation to describe those involved in cyberbullying: cybervictims: Cy-v; cyberbullies (perpetrators of cyberbullying): Cy-b, and those who reported experiences both as a cybervictim and as a cyberbully: Cy-v/Cy-b (Table 1).

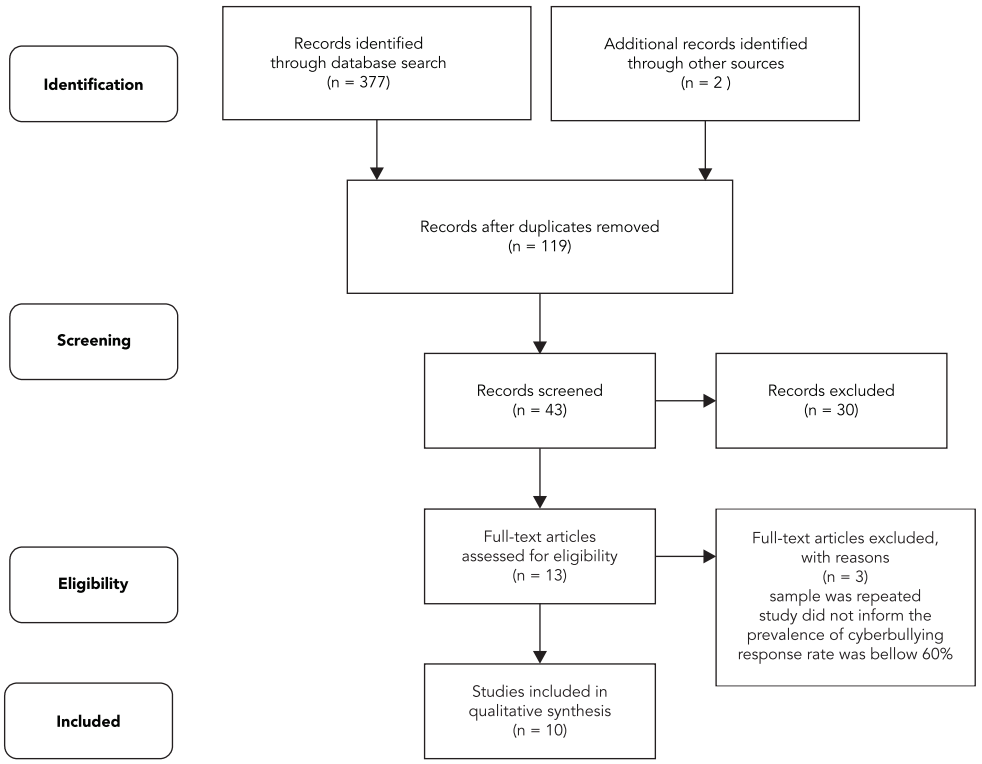
Risk factors associated with cyberbullying varied across studies. Nevertheless, in most studies, history of previous or current experiences of traditional bullying was related to cyberbullying [13,14,15,16,17,18,19]. The following factors were associated with cyberbullying: three hours or more of daily internet use [13,16,17], use of instant messaging [15,16,17], relationship problems [13,16,17], hyperactivity-inattention problems [17], behavior problems [17], school-related problems [14,17,18], and risky behavior on the internet, such as posting personal information, using a web camera and harassment of others online [13,14,15,16] (Table 2).

Between-group comparisons (Cy-v vs. Cy-b vs. Cy-v/Cy-b) showed that a higher proportion of cybervictims came from monoparental families, had psychosomatic problems (headache, abdominal pain and sleep problems), presented higher levels of perceived difficulties, emotional problems, peer and social difficulties, as well as not feeling safe at school and not feeling properly looked after by teachers [17]. The following factors were related to being a cyberbully: headache; high levels of perceived difficulties, not feeling safe in school and not feeling properly looked after by teachers; behavior problems; hyperactivity; smoking, frequent drunkenness; and reduced pro-social behavior (Table 2). Finally, all risk factors above were related to being cyberbullies and cybervictims at the same time [17].

In a multicenter study that assessed emotional impact of different forms of traditional

Figure 1

Identification of independent studies for inclusion in systematic review.



bullying and cyberbullying, 68.5% of adolescents experienced some negative emotions such as anger, upset, worry, stress, fear and "depressive feelings", while 24.5% of adolescents did not care about the incidents [22].

Cyberbullying has been associated with depressive symptomatology in several studies [13,14,18,19]. In three studies [13,14,18], the likelihood of reporting harassment carried out through the internet was significantly higher among adolescents who presented a more severe depressive symptomatology, as compared to those who presented a mild or absent depressive symptomatology (OR = 3.38 [13], OR = 4.38 [18]) (Table 2).

Adolescents evaluated in the *Youth Internet Safety Survey* who had depressive symptoms and a history of cyberbullying presented higher scores of emotional distress, as compared to those who did not present depressive symptoms and were not victims of cyberbullying [13]. Five years later, the *Second Youth Internet Safety Survey* found an increase of 50% in the prevalence of cyberbullying: 9% [16]. Emotional distress was present in 38% of the adolescents. The following types of cyberbullying were significantly related to a three-fold increased risk of emotional distress: episodes in which the aggressor was an adult; publication of a picture of the child or adolescent; and episodes accompanied by aggressive contacts off-line, like receiving a telephone call or when the aggressor went to the victim's house [16,17]. Preadolescents were significantly more likely to report distress due to the experience of cyberbullying, as compared to adolescents. After adjusting for confounders, the probability of stress and suffering among preadolescents had a four-fold increase (OR = 3.1; $p < 0.04$) [16].

Besides depressive symptomatology from moderate to severe intensity [13,14,18,19], use of substances [20], suicidal thoughts and suicide attempts were also associated with cyberbullying [18,20,21] (Table 2). Cyberbullying was a predictor of suicide attempts, especially among those who suffer cybervictimization: 1.9 times compared to 1.5 times among the cyberbullying perpetrators [21].

Table 1

Characteristics of studies.

Reference	Country	Study design	Sample characteristics	Participants	Participation rate	Cyberbullying measurements	Quality of studies
Ybarra [13]	USA	Cross-sectional populational-based. Randomly selected phone numbers. Telephone survey	Regular Internet urban users (i.e., at least six times in the previous six months). One young person and one caregiver	N = 1,501. Age: 10-17 years. 47% girls and 53% boys.	82%	(1) Whether the respondent felt worried or threatened because of someone else bothering or harassing him or her while online (yes/no) and (2) whether the respondent felt threatened or embarrassed because someone had posted or sent a message about the young person for other people to see (yes/no)	Strong
Ybarra et al. [16]	USA	Cross-sectional populational-based. Randomly selected phone numbers. Telephone survey	Regular Internet urban users (i.e., at least six times in the previous six months). One youth and one caregiver	N = 1,500. Age: 10-17 years. 51% girls and 49% boys	45%	(1) In the past year did you ever feel worried or threatened because someone was bothering or harassing you on-line? (2) In the past year did anyone ever use the Internet to threaten or embarrass you by *posting* or *sending* messages about you for other people to see?	Strong
Juvonen & Gross [15]	USA	Cross-sectional. Anonymous web-based survey	Participants from 55 states recruited through a popular teen web site	N = 1,454. Age: 12-17 years. 75% girls and 25% boys	NI	9 questions about aggressive behavior on the Internet	Weak
Hinduja & Patchin [21]	USA	Cross-sectional, randomized. Self-reported questionnaire	36 middle schools from the largest school district of USA. Representative sample	N = 1,963. 6th-8th grades. 48% girls and 52% boys	96%	14 questions: 9 questions about cybervictimization and 5 question about cyberbullying offending	Moderate
Sourander et al. [17]	Finland	Cross-sectional populational-based. Self-reported questionnaire	Two cities in north and south of Finland. All children attending the seventh and ninth grade, except for children attending classes for the physically or mentally disabled	N = 2,215. 7th-9th grades. 50% girls and 50% boys	90.9%	Two general questions about cyberbullying, defined as: "cyberbullying is when someone repeatedly makes fun of another person online or repeatedly picks on another person through e-mail or text messages or when someone posts something online about another person that they don't like": (1) During the past 6 months, how often have you been cyberbullied? (2) During the past 6 months, how often have you cyberbullied others	Strong

(continues)

Table 1 (continued)

Reference	Country	Study design	Sample characteristics	Participants	Participation rate	Cyberbullying measurements	Quality of studies
Wang et al. [19]	USA	Cross-sectional populational-based. Self reported questionnaire	A U.S. nationally-representative sample of adolescents	N = 7,313. 6th-10th grades. 42.3% girls and 56.7% boys	NI	Two questions about: (1) having suffered bullying through computer: messages or photos; (2) having suffered bullying through cellular	Strong
Ortega et al. [22]	Italy, Spain, England	Cross-sectional, multicentric. Self-reported questionnaire	Urban students. Representative sample	N = 5,862. Age: 12-16 years. 8th-, 10th and 12th grades. 48.8% girls and 52.2% boys	NI	12 questions to cellular phone; 12 questions to internet; DAPHNE questionnaire (Genta et al. [33])	Moderate
Schneider et al. [18]	USA	Census: (86%) of Boston metropolitan area. Self-reported questionnaire	22 high school urban students, middle and upper-middle class families	N = 20,406. 9th to 12th grades. 50.4% girls and 49.6% boys	88.1%	One question: "How many times someone used the internet, cellular or other means of electronic communication to intimidate, provoke or threaten you?"	Strong
Litwiller & Brausch [20]	USA	Cross-sectional, randomized. Self-reported questionnaire	27 high schools public students, from seven-county region. Representative sample. Rural Midwest region	N = 4,693. 9th-12th grades. 47% girls and 53% boys	65%	Three questions about cyberbullying: (1) someone spread rumors about you online in chats, website, by emails or text messages?; (2) someone posted compromising or inappropriate photos of you online?; (3) someone sent you aggressive messages or messages with threats by e-mail or text	Strong
Chang et al. [14]	Taiwan	Cross-sectional, randomized. Self-reported questionnaire	26 urban high schools, two cities. Representative sample	N = 2,992. 10th grade. 48% girls and 52% boys	80%	12 questions: six cybervictimization (how often has someone: posted rude comments; embarrassing photos; spread rumours; threatening comments; talked about sex online) and six cyberbullying (how often have you ever: posted rude comments; sent embarrassing photos; spread rumours; made threatening comments; talked about sex online)	Strong

NI: not informed.

Table 2

Cyberbullying prevalence and mental health problems.

Authors	Prevalence of cyberbullying	Risk factors related to cyberbullying	Measures of mental health problems	Mental health problems related to cyberbullying
Ybarra [13]	6.5%	**Male gender**: Depressive sintomatology (OR = 3.38; CI: 1.78-6.45); Daily use of the internet for three or more hours (OR = 4.34; CI: 2.12-8.89); Harasser of others online (OR = 4.19; CI: 2.06-8.50); Interpersonal victimization (OR = 3.07; CI: 0.57-6.00). **Female gender**: Daily use of the internet for three or more hours (OR = 3.67; CI: 1.53-8.8); Daily use of internet for two hours a day (OR = 2.34; CI: 1.16-4.73); Using the Internet most frequently for instant messaging (OR = 2.92; CI: 1.19-7.79) or e-mail (OR = 2.75; CI: 1.20-6.26); Harasser of others online (OR = 2.82; CI: 1.43-5.50)	Depressive symptoms of DSM-IV [34]	Symptoms of major depression (OR = 3.38; CI: 1.78-6.45)
Ybarra et al. [16]	9%	Harassing others online (OR = 3.6; CI: 2.3-5.7); Using internet for instant messaging, blogging, and chat room (OR = 3.4; CI: 0.9-6.3); Borderline/clinically significant social problems (OR = 2.4; CI: 1.2-4.4); Interpersonal victimization (OR = 1.5; CI: 1.0-2.2)	*Youth Self-Report of Child Behavior Checklist* (Achenbach [35])	Emotional distress: 38% of the harassed youth reported distress associated; Characteristics associated with emotional distress among targets of harassment incident: preadolescence (OR = 0.5.5; CI: 1.5-19.3), adult harasser (OR = 4.1; CI: 1.4-11.6); Being asked to send a picture of oneself (OR = 3.2; CI: 1.2-8.4); Aggressive offline contact (OR = 3.9; CI: 1.5-10.1)
Juvonen & Gross [15]	72%	School bullying (OR = 6.87; CI: 4.90-9.62); Daily use of the internet for three hours or more (OR = 1.45; CI: 1.04-2.02); Instant messaging (OR = 2.84; CI: 1.08-7.49); Webcam (OR = 1.50; CI: 1.04-2.14)	Social anxiety scale with 5 items (La Greca & Lopez [36])	Social anxiety (β = 0.31; $p < 0.01$)
Hinduja & Patchin [21]	Cy-v: 5.7-18.3%. Cy-b: 9-23.1%	Not found	Four items about suicide attempt and suicide adapted from American School Health Associations [37]	Suicidal ideation: Cybervictim (OR = 1.94; $p < 0.001$); Cyberbully (OR = 1.49; $p < 0.05$)

(continues)

Table 2 (continued)

Authors	Prevalence of cyberbullying	Risk factors related to cyberbullying	Measures of mental health problems	Mental health problems related to cyberbullying
Sourander et al. [17]	17.6%. Cy-v: 4.8%. Cy-b: 7.4%. Cy-v/b: 5.4%	Cybervictimization: not living with both biological parents; perceived difficulties; emotional problems and peer problems; headache, abdominal pain, sleeping problems, not feeling safe at school and uncared about by teachers. Traditional victimization and school bullying. Cyberbullies: high level of perceived difficulties, hyperactivity, conduct problems, and lowprosocial behavior. Traditional bullying. Cybervictim and cyberbully were associated with all these risk factors above	*Strengths and Difficulties Questionnaire* – SDQ (Goodman [38])	Cyberbully: Hyperactivity problems (OR = 2.4; 95%CI: 1.4-3.9); Behavior problems (OR = 2.6; 95%CI: 1.5-4.5); Low prosocial behavior (OR = 2.3; 95%CI: 1.5-3.4); Emotional problems (OR = 2.1; 95%CI: 1.1-3.6); Peer problems (OR = 4.8; 95%CI: 2.9-7.7); Cybervictim: Behavior problem (OR = 2.6; 95%CI: 1.5-4.5); Hyperactivity problems (OR = 2.4; 95%CI: 1.4-3.9); Emotional problems (OR = 2.2; 95%CI: 1.2-3.9); Peer problems (OR = 4.8; 95%CI: 2.9-7.7)
Wang et al. [19]	10.1%	Male-gender. 6-8 grade	Depression: Six items: sadness; irritation, bad mood; hopelessness; changes in appetite; sleep; concentration problems in the past 30 days (Dahlberg et al. [39])	Depression, medically attended injuries, medicine use for sleeping problems and nervousness *
Ortega et al. [22]	England: 2.0% mobile phone, 2.6% Internet; Italy: 2.2% mobile phone; 1.9% Internet; Spain: 0.5% mobile phone 1.3% Internet	NI	DAPHNE questionnaire (Genta et al. [33])	Mobile phone cyberbullying: angry – 35.8%; not bothered – 25.4%;worried – 19.5%; upset – 18.3%; stressed – 13.3%; afraid – 13.3%; depressed – 10.7% Internet cyberbullying: not bothered – 35.7%; angry – 33.7%; upset – 19.5%; worried – 15.5%; afraid – 12.8%; depressed – 10.3%
Schneider et al. [18]	15.8%	Female gender; non-white/mixed race; non heterosexuality identified; lower school performance; lower school attachment	Centers for Disease Control and Prevention [40]; *Health and Risk Behaviors of Massachusetts Youth* [41]	Distress: Depressive symptoms (OR= 4.38; 99%CI: 3.76-5.10); Self-injury (OR = 4.79; 99%CI: 4.06-5.65); Suicidal ideation (OR = 3.35; 99%CI: 2.71-4.13); Suicide attempt (OR = 5.04; 99%CI: 3.88-6.55); Suicide attempt that required medical treatment (OR = 5.42; 99%CI: 3.56-8.26)

(continues)

Table 2 (continued)

Authors	Prevalence of cyberbullying	Risk factors related to cyberbullying	Measures of mental health problems	Mental health problems related to cyberbullying
Litwiller & Brausch [20]	23%	Not founded	Suicidal behavior: Center for Disease and Control [40]; Substance use: 17 items from *Monitoring the Future Survey* (Johnston [42]); Violent behavior: 4 items from Center for Disease and Control, 2008 [40]; Sexual behavior: 5 items from Center for Disease and Control [40]	Substance use (estimate = 0.33; 95%CI: 0.28-0.35); Violent behavior (estimate = 0.16; 95%CI: 0.14-0.19); Non safe sex behavior (estimate = 0.005; 95%CI: 0.00-0.15); Suicidal behavior R^2adj = 0.67
Chang et al. [14]	35.4%. Cy-v: 18.4%; Cy-b: 5.4%; Cy-v/Cy-b: 11.2%	Male (OR = 1.57; 95%CI: 1.15-2.16); Lower academic performance (OR = 1.69; 95%CI: 1.34-2.15). Internet risks behaviors: Posting personal information photos and using a webcam to chat with strangers: Cy-b (OR = 1.87; 95%CI: 1.28-2.73); Cy-v (OR = 1.58; 95%CI: 1.28-1.96); Cy-v/Cy-b (OR = 4.28; 95%CI: 3.00-6.10)	*Rosenberg Self-esteem Scale* (Rosenberg [43]); Depression CES-D (Radloff [44])	Low self-esteem scores and high depression scores *: Cy-v: low self-esteem scores and high depression scores; Cy-b: high depression scores; Cy-b/Cy-v: low self-esteem and high depression scores

Cy-v: cybervictims; Cy-b: cyberbullies; Cy-b/Cy-v: cybervictims/cyberbullies; NI: not informed; R^2: coefficient of multiple correlation.

* Odds ratio for mental health problems was not informed.

Adolescents who were victims of cyberbullying and traditional school bullying reported more depressive symptoms and higher scores on the suicidal ideation and suicidal behavior scale (OR = 1.5), as well as more suicide attempts that demanded medical treatment (OR = 2.1) [21]. Hinduja & Patching's [21] study showed that the likelihood of attempting suicide was up to twice as high among victims and aggressors, as compared to those not involved in cyberbullying (OR = 1.5; OR = 2.1, respectively). In this review, all types of traditional bullying and cyberbullying were associated with increased suicidal thoughts among victims and offenders [18,20,21] (Table 2).

Discussion

Cyberbullying occurs at a lower prevalence than other traditional or school bullying. However, cyberbullying affects a significant portion of adolescents (10 to 20%), being related to emotional stress and negative emotions such as anger, fear, stress depression [13,16,17,22]. Cyberbullies and cybervictims reported more experiences with school bullying, suggesting continuity and overlapping between traditional bullying and cyberbullying [17,18]. Considering the importance of virtual spaces for interaction and for the psychosocial development of adolescents, the results suggest that negative interactions in a virtual environment could mediate the broad range of disturbances associated with bullying and cyberbullying: academic and psychosocial problems, depression, low self-esteem, and externalized hostility, among others.

Studies included in this review identified several psychosocial risk factors and mental health problems associated with cyberbullying among victims, offenders, and those who are, at the same time, victims and offenders. Cyberbullying is associated with emotional stress [13,16,17], social anxiety [15], substance use [20], depressive symptoms [13,14,18,19], suicidal ideation and suicide attempts [18,20,21].

Emotional responses of adolescents exposed to cyberbullying vary in intensity and quality. In a multicenter study, that assessed the emotional impact of different forms of traditional bullying and cyberbullying, 68.5% of adolescents expe-

rienced some negative emotions such as anger, upset, worry, stress, fear and "depressive feelings", while 24.5% of adolescents did not care about the incidents [22]. The emotional impact is harmful to most victims, however adaptive resilience and a positive appraisal of a stressful situation or developmental strengths like self-esteem and self-efficacy could minimize the emotional damage to some victims. Further research should investigate which resilience factors could buffer the impact of negative experiences such as cyberbullying and bullying among adolescents [23].

Anger was the most common reported emotion among adolescents in the study cited previously [22]. Situations like "posted things about me that I do not want anyone to know" harm the victims' reputation, publicly humiliate them or damage their friendships and social status in a stage of life in which the social group has an important role in shaping identity [1]. Anger has been considered a reaction to violations of autonomy and serves to facilitate a vigorous response to address the danger when an action has a negative impact on the "self" [24]. Therefore, in this context, angry reactions, could be considered a "healthy response" to cyberbullying.

Cybervictims may suffer verbal and visual anonymous attacks (photomontage) and anonymity can increase the feeling of fear and insecurity among the victims. When the perpetrator was an adult or an unknown person or group of persons, the victims also reported fear for their personal safety [9,15]. Online aggressions can occur at any time, in the victim's own house, a safe environment. Most teens do not report the incident to adults, and the main reason reported by them has been that "they need to learn to deal with their own problems" (50%), and also because they fear their parents would restrict their access to the Internet (31%), leading to social isolation [14,25,26].

Adolescents who reported experiences of cyberbullying, particularly those who suffered frequent attacks (two or more times a month), had more severe depressive symptoms when compared with adolescents exposed to other forms of bullying [18]. The feelings of helplessness and powerlessness to defend themselves from incidents of cyberbullying can increase the sense of fear and emotional distress, contributing to the emergence of depressive symptoms. The association between bullying, cyberbullying and depressive symptoms found in several studies [13,14,18,19] suggests that these phenomena occur in a bidirectional way (i.e., they can be either the cause or the consequence of each other). Cognitive impairment and depressive mood can change the perception of victims and the lack of social cues in online communication, such as volume and tone**,** can result in negative interpretations of ordinary situations, which can be perceived as threatening.

Cyberbulliyng may have even more harmful outcomes to adolescents' mental health, including substance abuse, increased suicidal ideation and suicide attempts [20,21]. The Hinduja & Patching [21] study showed that the likelihood of committing suicide attempts is up to twice as high among victims and aggressors, as compared to those not involved in cyberbullying. Having experienced cyberbullying alone does not induce suicide. Nevertheless, adolescents who have suffered cyberbullying may experience negative psychological states and abuse of alcohol and other drugs as a way to deal with negative feelings related to the aggression. This explanation is in agreement with the drug abuse etiology in adolescence. The use of psychoactive substances may also help adolescents to habituate to the physical pain and anxiety associated with auto-mutilation. Using substances can also encourage adolescents with suicidal ideation, increasing auto-mutilation behaviors, lessening the inhibition and aggravating negative pre-existing moods [27,28,29].

The adapted model showed in Figure 2 illustrates how drug use and violent behavior can mediate the relationship between cyberbullying, physical bulling and suicidal conduct in adolescents.

It is unlikely that experiences of cyberbullying alone lead to youth suicide. Rather, they may exacerbate an adolescent's instability and hopelessness at a time when they are already struggling with stressful life circumstances. Future research should identify the nature of this stress inducing experience. Studies regarding the differences found between adolescents facing cyberbullying, such as those who "do not care" and those "strongly impaired", may bring important contributions to strategies of prevention and intervention. Prevention strategies have to be implemented in order to avoid risk behaviors and aid adolescents to find effective ways of handling cyberbullying incidents and to avoid risk behaviors, such as exposing personal information, photos and webcam use with strangers, which can raise cyberbullying incidents and mental health damage [30,31,32].

Limitations

Cyberbullying is a new concept in the literature and the methodology applied to investigate it is still a subject of discussion. A variety of terms

are used including "online bullying", "electronic bullying", "internet harassment" and "cyberbullying". For this reason the search of articles was carried out using a comprehensive methodology. However, articles from two relevant databases such as PsycINFO and Social Science Citation Index were not considered for this review.

Most of the studies developed specific questions and evaluated the frequency of cyberbullying in different ways, depending on the researchers' objectives. Differences in definitions and, consequently, in the forms of measurement may impact on the estimates of prevalence of cyberbullying and of its impact on mental health.

Evaluating violent behaviors, which are not socially accepted may have influenced the adolescents answers and biased the cyberbulling prevalences and their association with mental health problems. Finally the causal direction of the association between cyberbullying and mental health problems cannot be determined by transversal studies included in this review.

Conclusions

Online communication has become a centerpiece in the life of adolescents, offering many opportunities for psychosocial development and construction of intimate relationships. However, in this context, violent interactions such as cyberbullying may occur.

Cyberbullying is associated with emotional stress, social anxiety, substance use, depressive symptoms, suicidal ideation and suicide attempts. Parents and educators ought to know the risks of on-line communication and need to promote dialogue about the topic, aiding adolescents to find effective ways to deal with such incidents. Health professionals must be aware of the occurrence of cyberbulling and its association with mental health problems.

Resumen

Se revisa la asociación entre el acoso cibernético y la salud mental de los adolescentes. Se realiza una revisión sistemática de dos bases de datos: PubMed y la Biblioteca Virtual en Salud (BVS). La prevalencia de ciberacoso varió de un 6,5% a un 35,4%. Los acosos cibernéticos tradicionales -pasados o actuales- se asociaron con las víctimas y los acosadores cibernéticos. El uso diario de tres o más horas de Internet, cámara web, mensajes de texto, la publicación de información personal y acosar a los demás se asociaron con el acoso cibernético. Ciber-víctimas y acosadores cibernéticos tenían más problemas emocionales, psicosomáticos, dificultades sociales y no se sentían seguros y cuidados en la escuela. El ciberacoso se asoció con síntomas de moderados a graves de depresión, abuso de sustancias, ideación suicida e intentos de suicidio. Los profesionales de salud deben conocer la naturaleza violenta de las interacciones que se producen en el entorno virtual y sus peligros para la salud mental de los adolescentes.

Acoso; Adolescente; Salud Mental

Contributors

S. M. B. Bottino conceived the initial idea for the article, carried out the search, analyzed the results and wrote the article. C. M. C. Bottino supported in the article write-up, revision and answers to partners. C. G. C. Regina collaborated with the initial selection of articles, applied the eligibility criteria, and supported the revision and analysis of results. A. V. L. Correia contributed towards the results analysis and revision of the final text of the article. W. S. Ribeiro collaborated with the methodology, revision and application of eligibility criteria, and carried out the revision and correction of the final version of the article.

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