Sexting and the definition issue: A literature review

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ABSTRACT

Sexting among youths has become a necessary topic of interest in research because of the negative consequences that this activity could create, especially when content is shared with others. Indeed, this loss of control could lead to humiliation, (cyber)bullying or harassment. The development of new technologies, the press coverage and the increase of prevalence rates could also explain the growth of interest in sexting. However, its definition is still a grey area. This review examines the different definitions of sexting used in the literature and its correlates. Several elements of the definition of sexting were assessed: actions (sending, receiving, forwarding); media types (text, images, videos); sexual characteristics; and transmission modes. Nine databases were searched for studies on sexting among youths up to 18 years of age. Eighteen studies published between 2012 and 2015 were included. Prevalence rates of sexting ranged between 0.9% and 60% partly depending on the definition. Most studies assessed sending but when sending and receiving were measured, prevalence rates were higher for receiving. Some articles found associations with age, gender, race, sexual behavior, romantic relationships, risky behaviors, online activity, psychological difficulties and social pressure. Finding a consensus regarding the definition is essential to assess accurately the activity and adapt prevention. Adolescents' interpretations of the activity are important as sexting could be used as a sexual behavior between two consenting persons. Prevention strategies should focus on sexting that goes wrong when it is forwarded to a third party and when it occurs in a context of pressure or harassment.

Keywords:

Sexting; Youths; Adolescents; Review, Definition; Characteristics

Contributors' Statement:

Yara Barrense-Dias conceptualized the review, developed the search strategy, determined manuscript eligibility, extracted and interpreted the data and drafted the manuscript.

Christina Akre conceptualized the review, developed the search strategy, determined manuscript eligibility, extracted data and critically revised the manuscript.

Joan-Carles Suris and Andre Berchtold contributed to the search strategy and determination of the manuscript eligibility and critically revised the manuscript.

All authors approved the final manuscript as submitted.

Summary statement:

To understand sexting and adapt prevention, there is a need to find a consensus on its definition in terms of actions (sending, receiving, forwarding), media types (text, images, videos) and content. This study provides a detailed review of these different dimensions to pave the way for a clearer definition of sexting.

INTRODUCTION

The Internet and new technologies have become socializing tools, particularly appreciated by adolescents with the development of their communication skills [1-3]. This connected environment has changed the social context in which their relationships with others are created and perpetuated [4]. During adolescence, the construction of a personal identity also implies sexuality exploration [5]. Indeed, little by little, adolescents discover sexuality and today, new technologies with their unlimited connection and instantaneousness communication and impression of security, are fully part of this process and influence interactive experiences [2, 3, 6]. Technology progress and development of communication and sharing means, including growth of the Smartphone market and conception of new applications, frequently lead to the creation, the evolution or the facilitation of certain behaviors [7, 8] such as *sexting*, the contraction of *sex* and *texting.*

Regarding young people, considering sexting as a problem per se or as a risky behavior appears to be a controversial issue [4, 9]. On the one hand, in a sexualization context, sexting could be considered as a harmless way to express desire and a consensual practice between two persons [10]. On the other hand, some negative consequences could result from this activity, such as humiliation, (cyber)bullying or harassment, especially when the content is shared with others without consent and it goes viral [3, 10, 11]. Legal aspects are also debated, particularly when minors are involved, to determine if it could be considered as child pornography [9]. Finally, a previous literature review on sexting emphasized the demonizing of it as results showed that most of the reviewed studies sought to associate sexting with other risk behaviors [4].

The aim of this review was to examine the existing literature on sexting among adolescents up to 18 years old. The upper age limit was determined according to the rationale that possible

consequences of sexting would be different for minors in terms of crisis management and legal issues. Moreover, minors are particularly vulnerable because they might be less conscious regarding the limits of what they share of their private sphere online. We structured our research according to two questions: 1) what are the similarities and differences in the measures of sexting and questions used in the literature to determine how this activity is currently defined; and 2) what are the characteristics and correlates of sexting to explore the main contexts of sexting reported up to now. Compared to previous reviews on sexting [4, 12, 13], this review provides additional information on three aspects. First, even if the definition aspect has been touched upon, we conducted a detailed analysis differentiating and examining each element of the definition of sexting: actions (sending, receiving and forwarding); media types (text, images, and videos); sexual content; and transmission modes. Second, we were interested in the characteristics of sexting. In addition to an update with articles of 2015, we included a large overview of the different correlates of sexting such as gender issues, Internet outcomes, relational context and mental health. Third, as additional information and to offer a complete synthesis, we also collected the prevalence rates of the activity.

METHODS

Search strategy

On the 4th of November 2015, Medline (PubMed/OVID), Embase, PsycINFO, Web of Science, BDSP (database in Public Health), SAPHIR, Library Network of Western Switzerland and ScienceDirect databases were scanned. Participants' age was limited to 18 years and younger. For this limit, we used the following terms in the search: adolescent, adolescence, child, teen, teenager, youth, young adult, young people. Whenever possible, we used database-specific indexing terms: adolescent, young adult (MeSH-terms); juvenile, adolescent, child (Embase);

child, pre-adolescent, adolescent, young adult, student (including pupil and apprentice) (BDSP). Even if we limited the age to 18 years and younger, we decided to include terms like young adult and young people in the search strategy to make sure that age range and definitions were properly used as they could vary. For example, the World Health Organization gave overlapping definitions with adolescents defined as people between 10 to 19 years, youth between 15 to 24 years and young people between 10 to 24 years [14]. To not miss an article, we therefore preferred to check all the articles that were identified with this search strategy and excluded them after having confirmed the age range used. For the concept of sexting, we used specific terms such as sexting, sex-texting, sexual messaging, sexto and only one database (Embase) had the term sexting as an indexing term. We also combined terms related to social media and the Internet (cyberbullying, bullying, the Internet, social media, cell phones, cellular phone, text messaging, online social networks) with sexual terms (sex, sexual, psychosexual behavior). These terms were searched in all possible fields, regardless of their place in the paper (title, abstract, keywords, main text, etc.). No limits were given for geographic areas, year of publication and method used. For language, we restrained the search to English. All types of papers were included in the search strategy (book chapters, peer-reviewed journal articles, abstracts, etc.). Overall 428 records were identified and 205 duplicate results were excluded.

Inclusion criteria

The 223 remaining records were assessed for eligibility on the basis of the abstract and in case of doubt, the full-text was read. The first inclusion criterion was that sexting had to be the main focus of the article. If it was used as a secondary outcome, we considered the paper as out of subject.

Regarding the age limit of 18, some articles were not clear about the age. One of them mentioned 18 years for the upper age limit but the category 18 or older was presented in the tables [11]. Another article only used the high-school term without any age indication [15] and three others only gave means or medians with standard deviation as the only information on age [9, 16, 17]. We contacted the authors of these articles and three of them confirmed that the upper age limit was over 18 [11, 15, 17] while one confirmed that participants were under the age of 18 [9]. Another author did not confirm but presumed that it might comprise a few older than 18-year-old adolescents because some pupils tend to repeat one or two years during their school careers because they underperform at school (grade retention) [16]. Thus, we decided to exclude this article. A longitudinal article was based on the second and third waves of a study and indicated an age range of 14-18 for the second wave [18, 19]. Even if the article used data from participants aged more than 18 years in the third wave, we decided to include it because we considered that data were initially based on the first wave with an age range of 13-17.

Next, we decided to exclude papers that did not present the results of a study per se (editorials, commentaries, letters to the Editor, position statements, erratum, reports, books for general public or case reports). We did not include abstracts or conference proceedings either because some information were lacking. Reviews were also excluded but we went through their reference lists to check if we missed any article. Our final sample consisted of 18 articles.

Figure 1

RESULTS

Overview

The articles included in this review were in English and were published between 2012 and 2015. The majority presented results from the USA (n=10) followed by two articles on data from the

United Kingdom, two others on multiple European countries, one from Belgium, one from the Slovak Republic, one from the Czech Republic and one from Peru. Respondents' age ranging between 10 and 18 years old. Most used methods were quantitative (n=15), only one article used longitudinal data [18], two used a qualitative approach [20, 21] and one used mixed methods [22]. We decided to combine the results of the two qualitative articles because they were based on the same study and on the same sample [23]. For the article with mixed methods, we decided to include the rates in our results even if they were based on a non-representative sample of 51 participants. Prevalence rates of sexting, without any distinction, ranged between 0.9% and 60%.

Table 1

Definitions

We analyzed questions and measurements used to assess sexting. We were interested in several dimensions of the definition: content, actions, transmission mode and sexual characteristics. We considered these different elements as being helpful to catch all the subtleties of the activity.

Media types

Only text messages, without any other specification, were included in one article to measure sexting [24] and in eight papers, only images were used [9, 18-21, 25-27]. Six studies involved both types of content (text and images) [28-32], however only one examined these contents with two different questions to assess text and images on one side and text-only on the other [32]. Four studies also used video as a possible media type but it was never isolated. Indeed, three of them combined videos and images [22, 33, 34] and one had a larger definition with text messages, photos and videos but no distinction was made in the way the question was asked in terms of media type [35]. All studies but one used images in the definition, either in an isolated way or in combination with text messages and/or videos. When a distinction was made, images and images

combined with videos had generally lower prevalence rates of sending than text messages and text messages combined with images. Moreover, the article in which text messages were differentiated from the combination of text messages and images demonstrated a large difference between the two groups [32]. Indeed, the prevalence rate for text messages reached 17% whereas for text messages and images together, it only reached 5%. These differences showed that text messages were more frequent. None of these studies mentioned audio messages.

Actions

We found two categories of sexting: active sexting with the actions of creating, showing, posting, sending or forwarding to a third party and passive sexting with the actions of asking, being asked or receiving [18]. One article made no distinction between active and passive sexting, combining them in one general term [24]. Other studies focused only on one action: either receiving [31] or sending [9, 19, 25, 26, 28, 32, 35]. Seven articles used passive and active actions but distinguished them by asking several separate questions [18, 22, 27, 29, 30, 33, 34]. For these studies, prevalence ranged from 7.1% to 60% for passive sexting and 2.5% to 27.6% for active sexting. These rates indicated that passive sexting was more common or more reported. Qualitative studies also explored sending and receiving but the distinction between the two actions was not apparent and depended on the questions and respondents [20, 21]. However, this difference was not relevant for these studies because their objective was to explore the practice, including the definition, according to the participants' opinions.

Some studies considered that forwarding someone's message to others than those initially involved by the sharing was directly included in the term sexting [22, 27]. From this point of view, sexting was clearly considered as a deviant behavior and a problem in itself with three possible actions: sending, receiving and forwarding to others. For other studies, it was less

obvious. Either sharing with a third party was only a possible risk and was defined separately from the activity of sexting or this action was indirectly comprised in the terms sending and/or receiving. However, for sending, nine studies added a detail in their questions: "a photo or a video of **yourself**" [9, 18, 19, 25, 26, 28-30, 32]. This specification demonstrated that sharing a photo of someone else with others was not considered as part of the definition of sexting, which implied that sexting could be defined as a risky behavior but not as a problem per se. Indeed, sexting does not necessarily lead to negative consequences, as it is only a risk.

Transmission mode

All studies defined sexting as an online, electronic or virtual activity using the Internet and/or mobile devices (e.g. mobile phone, Smartphone, computer, etc.). However, some studies distinguished between posting the content on the Internet (e.g. profile of the social network) and sending it directly to someone [33-35]. An online posting targets a wider public and in this perspective, the definition of sexting could not restrain to a simple exchange between two persons only. Finally, one study used another transmission mode defined as showing directly (face to face) a photo of oneself but the prevalence rate was very low with only 1% of participants [26].

Sexual characteristics

The sexual characteristics of sexting were also defined differently among studies and terms were multiple. Most articles (n=9) used a definition with sex-terms such as sext, sexting, sexy, sexually explicit, sexually related, sexually suggestive or sexual contents [24, 25, 29-35]. Seven studies used the terms nude or naked and nearly or partially nude or naked [9, 20, 21, 23, 26-28] and three others only used the term naked or nude [18, 19, 22]. Two papers described more precisely the sexual characteristics of a message. In one paper, specific body parts were added to

a question (*genitals, buttocks, and breasts*) and the age of the person on the pictures or videos was limited to 18 [27] . In the second paper, the authors detailed the content (*talk about having sex or images of people naked or having sex*) [31]. Interestingly, in the first paper, two different questions were asked: one without any detail and one with specific body parts. Prevalence rate reached 2.5% but decreased to only 1% when body parts were specified [27], possibly implying that sexting with suggestive content is more prevalent.

Correlates of sexting

Socio-demographic variables

Three main socio-demographic variables were found in this review: age, gender and race.

Overall, when significant associations with age were found, older participants (depending on the age range used by the authors) were more likely to report sexting behaviors [26, 27, 29, 30, 35]. No statistical tests were done for two other papers but the authors also indicated that sexting was performed more often by older adolescents [33, 34]. Interestingly, one paper demonstrated that, while sexting was more prevalent among older adolescents, the risk of being upset or harmed (*embarrassed*, *uncomfortable*, *perturbed*, *felt that you should not have seen this*, etc.) by this practice was associated with being younger [31]. Another study reported that age influenced the context in which sexting took part [22]. Indeed, older participants mostly considered sexting in a romantic or a sexual relationship whereas younger ones talked about fun and platonic context.

For gender differences, no consensus appeared. Some studies reported more girls being involved in sexting [26, 31] and others found boys being more likely to sext [24, 25, 30, 35]. But gender differences also depended on the definition of sexting. For example, one study found no difference for having received messages but for having sent them with more males having done so [29]. A gender difference was also reported for the transmission mode. Indeed, boys were

more likely to post photos of themselves on the Internet and girls to send them directly to a particular person [33, 34]. Regarding message content, in one paper, authors defined three sexting groups: no sexting, text only and photo (including text and photos) and a gender difference was found in the photo group with more girls reporting having sent photos [32]. Finally, another study found that boys were more likely to receive sexual messages whereas girls were more at risk to be harmed or embarrassed by receiving such messages [31].

Even if no consensus was found for gender differences, the qualitative study emphasized a gendered hierarchy for criticism with girls who sext being treated more negatively than boys [20, 21]. As a possible consequence of this difference in terms of judgment, girls also perceived more negative social reactions from peers towards sexting and were more unfavorable to this activity than boys [28]. However, a study demonstrated that negative judgments towards girls could also be found when they refused to sext by considering them as being "goody girls, prude or stuck-up"[22]. In addition to this disparity in terms of judgment, a gender difference was also identified for some factors associated with sexting. Indeed, in a study, girls who reported having been a victim of cyberbullying were significantly more likely to practice sexting, whereas cyberbullying for boys was not associated with it. For boys only, sexting was associated with excessive texting and having participated in a physical fight during the last 12 months [24].

Finally, some studies associated the practice of sexting with being part of an ethnic minority (e.g. Black Africans, Hispanics or Latinos) [26, 29, 30, 32].

Sexual behaviors and relationships

Eleven studies tried to explain possible associations with sexting in a sexual and/or romantic context. Six studies were interested in sexual behaviors in association with sexting [18, 26, 29-32]. Four of them distinguished two kinds of sexual behaviors: non-risky (e.g. intercourse) and risky

sexual behaviors (e.g. unprotected intercourse) [18, 26, 29, 30]. The authors of the two other papers only reported about sexual risk behaviors without any distinction. In one of these papers, the fact of having had sexual intercourse was considered as a risky offline activity, whether it was protected or not [31]. In the second paper, several sexual behaviors were measured ranging from, for example, having a romantic partner to touching genitals over clothes or engaging in vaginal sex, and all of them were considered as risky behaviors [32]. These six studies reported an association between sexting and the fact of being or having the intention of being sexually active. When assessed, sexting was also associated with the lesbian, gay, bisexual, transgender and queer movement [26, 29, 30]. When risky sexual behaviors were specified and distinguished from other sexual behaviors, studies assessed unprotected intercourse, concurrent partners, number of sexual partners in the last year, substance use before sex and sexually transmitted infections [18, 26, 29, 30]. Two of these studies reported an association between sexting and some specific risky sexual behaviors [26, 30]. On the contrary, the two others did not find an association between risky sexual behaviors and sexting, and sexting was only associated with the fact of being sexually active [18, 29]. For example, the longitudinal study found that sending pictures predicted having sex within the next year but did not find an association with risky sexual behaviors [18].

A study assessed the perception of youths of their parents' feelings and disappointment if they knew that their child was sexually active (*How badly would your parents feel if you had sexual relations?*). This measure was negatively associated with sexting: the less the feeling was perceived as bad the more the participant reported sexting activity [24].

Finally, four studies considered sexting as part of a romantic relationship [22, 28, 33, 34]. The fact of being in or looking for a steady relationship with the notion of a mutual trust was reported in two of these studies [33, 34].

Risky behaviors

Some studies analyzed the possible associations between sexting and different risky behaviors, other than sexual. First, associations between sexting and substance use were found for alcohol, marijuana and illicit drugs [19, 26, 31]. Regarding violence, a study reported an association between sexting and impulsivity for both genders [19], and another one found an association with the number of physical fights in the past 12 months, but only among boys [24]. Other risky behaviors were also associated with sexting such as truancy, trouble with teachers or with the police [31]. In this field of risky behaviors, personality traits such as high sensation or experience seeking were also assessed and were associated with sexting [31, 35].

The Internet and online activities

Sexting is part of online practices and some studies analyzed the possible associations between sexting and the Internet use variables. One study assessed online activities (the Internet games, video clips, instant messaging, social networking, etc.) and risky online activities (*to pretend to be a different person, to look for new friends, to add people to my friends list that I have never met in person*, etc.) [31]. These two kinds of online activities were associated with sexting but the association was stronger for risky online activities. Another study found that Internet addiction, measured with an Internet-related problem scale, was associated with sexting [9].Two studies found an association between sexting and excessive text messaging [24, 29]. These associations were explained by the fact that adolescents who hypertexted were more comfortable with digital communication, thus sexting could be easier for them [24]. Individual Internet use and technological infrastructure available in the country were assessed in a study but only the individual use was associated with sexting [35].

Social pressure – social support

The perceived social pressure and/or the fact of knowing someone who sexted was assessed in four studies. Indeed, adolescents who perceived the acceptance of sexting in their environment were more likely to report doing so [9, 28, 30, 32]. In a direct assessment of social pressure, one study explored the main reasons to practice sexting and one of them was being under the influence of a group [34]. The qualitative study also concluded that sexting could be done under pressure, especially towards girls [20, 21]. Finally, a study assessed the perception of social support from family, friends or significant others and it was negatively associated with sexting but for younger youths only [26].

Emotional and mental health issues

Two studies found an association between sexting and psychological or emotional difficulties [31, 32]. For depression, three studies found different results. Indeed, one study reported a strong association between depressive symptoms and sexting [25], but another one found less evident results as sexting was no longer associated with depression when the model was adjusted for age, gender, race, sexual behaviors and parent education [19]. Furthermore, another study found a relation between sexting and depressive state but only among younger girls [26]. One of these studies also assessed anxiety but no relation was found with sexting, even in the unadjusted model [19].

DISCUSSION

Even if prevalence rates were not part of the main focus of this review, we considered it important to offer a complete synthesis and it enabled us to observe that to date, prevalence rate comparisons between studies are very difficult to make because definitions and conceptualizations of sexting differ widely. The large range of prevalence rates (7.6%-60% for passive sexting and 0.9%-27.6% for active sexting) could be explained by cultural or

methodological differences but it could also come from the lack of a clear and universal definition. The difference in prevalence rates could also be explained by issues regarding research methods in general. First, the age ranges were different among the samples [12]. Because of the different age ranges used by the authors, we were not able to establish a precise standard on age but a trend stood out as, when associations between age and sexting were found, the activity was always more reported among older participants. Thus, it was quite evident that in a sample including younger participants, sexting would be less prevalent. Second, data were also collected differently with online surveys, pen-and-pencil questionnaires or face-to-face interviews and these differences could influence the answers, especially when the topic is sensitive. In this line and thirdly, as sexuality could be a sensitive topic especially among adolescents, the social desirability issue in responses could also influence the results [23]. One study assessed an indirect measure of sexting by asking participants if they knew someone who sexted and the indirect rate reached 54% whereas the direct one was 15% [30]. Another study reported that 60% of participants had been asked for a photo whereas only 31% reported having asked someone to send them a photo [18]. In this review, we also found that passive sexting had higher prevalence rates than active sexting. These different findings could reflect the reality of sexting but they could also be interpreted in terms of social desirability with participants who may be ashamed to have sent, asked or forwarded to a third party. Fourth, reference periods to assess sexting were also different. Indeed, articles referred to life prevalence [9, 18, 19, 22, 26, 27, 29, 30, 33, 34], last 12 months [31, 35], last 6 months [32], last 2 months [28], last month [25] or an average per day [24].

Regarding the main related characteristics highlighted in this review, as mentioned above, older adolescents were more likely to sext. This difference could be partly explained by the pubertal

and biological changes faced by older adolescents leading to the development of sexual interest [35, 36]. In addition to biological factors, psychological development (e.g. personality traits) and social environment (e.g. peer influence) could also explain the growth of sexual interest during adolescence [37]. Logically, as older adolescents are more likely to be sexually active [30], they are also more likely to sext as an association between sexting and being sexually active was found by certain studies.

For gender differences, no consensus was found but a trend was noticed in terms of judgment and criticism towards girls who are considered more pejoratively if they practiced sexting but also if they did not want to. The association between sexting behaviors and being part of an ethnic minority that was sometimes found, could be explained by the pressure context that these marginalized population could possibly experience [38]. Sexting was often associated with being sexually active, but not necessarily with specific risky sexual behaviors when they were assessed separately, such as unprotected intercourse, and it mostly occurred in the context of a relationship. Thus, sexting could be considered as part of sexual behaviors taking place during the sexual and romantic experimentation process. In this context, this activity could be interpreted as a way to approach a person, a prelude to an intercourse, an alternative to a face-to-face contact or an add-on to an active sexuality [22, 33, 34].

In the same line, as sexting may be understood as a sexual behavior in a larger context of sexualization, it may also be defined as a risky behavior and be included in a larger cluster of risky behaviors [19]. However, we found a trend of not defining sexting as a problem per se as sexting does not necessarily lead to negative consequences. Finally, non-heterosexuality, when it was assessed, was associated with sexting. An explanation could be that the activity of sexting is

used in this case as an alternative to a face-to-face contact and a way to create a form of intimacy for this population as reactions from their surroundings could be difficult to deal with [26].

Adolescence is also a period of growing independence and individuation during which peers become strong references [28]. In this context, sexting was also associated with direct and indirect peer pressure. Adolescents' behaviors could depend on the perception of their peers' reaction as conformity to the group is often a condition to be accepted [30]. The direct peer pressure could appear before sexting, to push someone to do it or after the fact to mock or harass the involved person. Online communication, especially with social networks, have changed the context in which peer pressure can occur because it could more easily extend into the home environment and be present on a daily basis with the Internet [39] .

Regarding the associations with these different conducts, we could suggest that sexting may be analyzed in terms of development and time-limited risk taking [18, 19, 26, 40]. However, longitudinal data are needed to understand the place of sexting in relation to sexual behaviors, risky behaviors, health related problems and pressure. Indeed, for example, depression could follow sexting because the person realized the risk that was taken or because a third party was involved [19, 26]. On the contrary, these symptoms could also precede the activity because of pressure to do it or because depression may push someone to choose sexting as a way to feel desired and considered [11, 19]. The only longitudinal study found in this review demonstrated that sending pictures predicted having sex within the next year, suggesting that sexting could be used as a prelude to an active and face-to-face sexuality [18].

We are aware that sexting is an evolving concept and changes as fast as social media. The definition could also vary from one person to another according to personal or cultural differences. However, if research aims to assess sexting, a consensus on the way to measure it

has to be found. Indeed, one of the issues about sexting and research on the subject is the lack of a clear, validated and universal definition of the activity [12]. Therefore, we suggest the following recommendations. First, professionals must determine if the term sexting itself could be used when two persons agree to share messages, when the private characteristic is not respected because of a transmission to other parties without consent, and/or when it becomes a way to harass someone. In other words, should this term refer to a sexual behavior between two consenting persons and change to another term such as harassment if it deviates? Should it be used to indicate the activity that goes wrong and defined as a problem per se? Should it include the two situations? Second, more qualitative studies are needed to understand adolescents' definition of sexting and the context in which it occurs [41]. Most studies found that adolescents considered sexting as a possible activity during a relationship and could be defined as a normal way to flirt. Prevention strategies should also consider this idea and focus on sexting that goes wrong when it is forwarded to a third party and when it occurs in a context of pressure or harassment. Third, a clear distinction between the different types of media is needed because they have different potential impacts. Indeed, possessing and forwarding a text message may have a different impact than a photo or a video [32]. Moreover, sexting could be a progressive activity and begin with text messages to continue with photos and videos. Fourth, as sexting seems to occur in different contexts according to age, prevention should also vary according to the later. Differentiating the dimensions of sexting in terms of activity, content and age, and finding a consensus regarding the definition are two essential steps to assess and understand the practice, adapt prevention to the reality of the activity, and reach the intented targets.

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Figure 1. Flow of studies through the review process

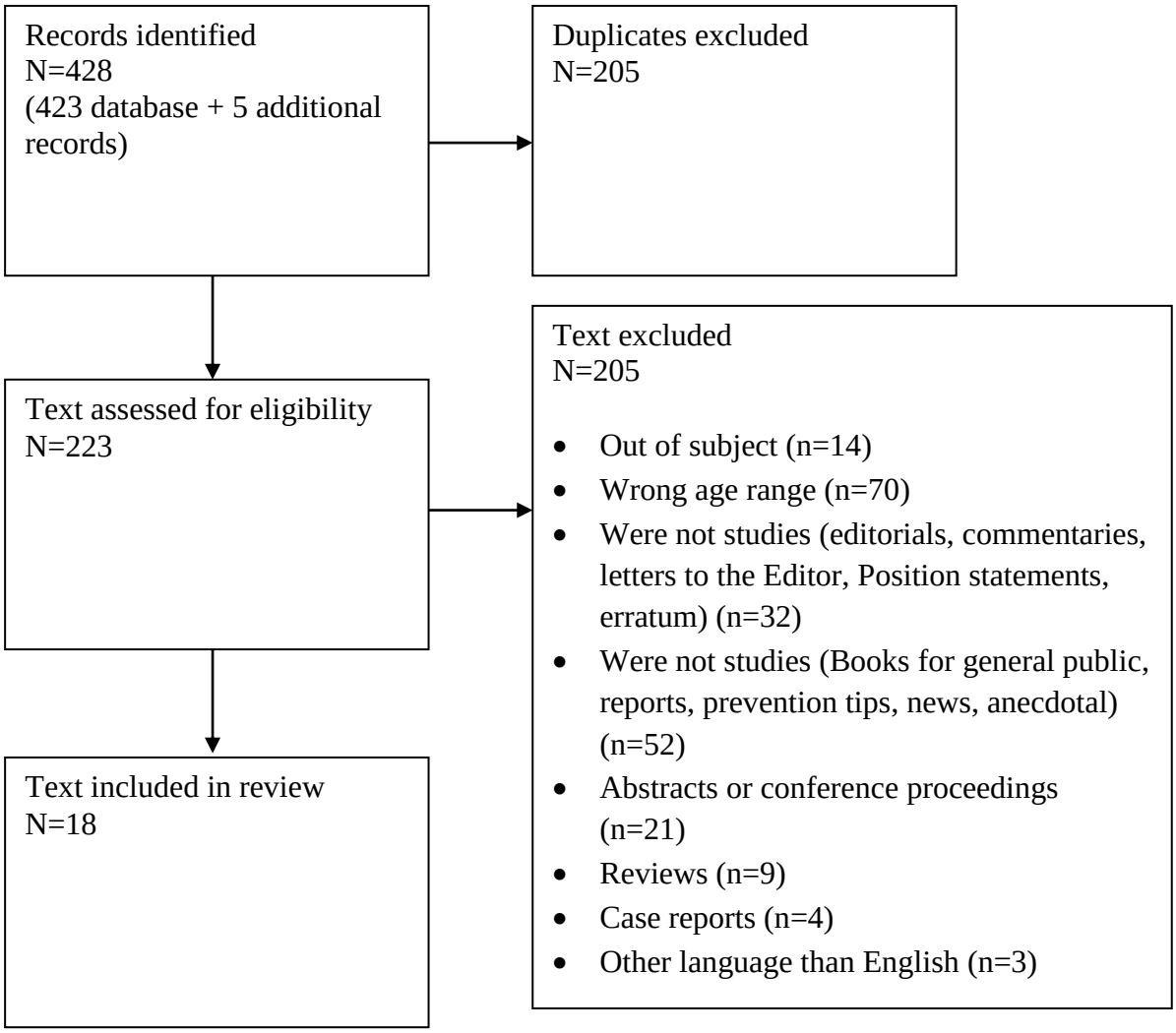

Table 1 Key elements of the reviewed articles (N=18)

Authors (Year), Country of study	Sample size and age range	Research design	Sexting measurements	Main findings
Baumgartner SE, Sumter SR, Peter J, Valkenburg PM, Livingstone S (2014), Europe	14'946 children and adolescents (49.7% boys) aged 11-16	▪ Cross-sectional ▪ Data from the EU KIDS Online project ▪ At home interviews ▪ Face-to-face but private completion (paper-and-pencil or online) for sensitive questions (sexting)	▪ In the past 12 months, have you sent or posted a sexual message (words, pictures or videos) of any kind on the Internet?	▪ Sexting prevalence ranged from 0.9% to 11.5% ▪ Individual level characteristics, age and sensation seeking are rather universal predictors of sexting ▪ Country characteristics had no direct effect on adolescent sexting but traditionalism significantly predicted gender differences in sexting ▪ In more traditional countries, gender differences were stronger with more boys engaging in sexting than girls
Houck CD, Barker D, Rizzo C, Hancock E, Norton A, Brown LK (2014), USA	420 at-risk (withdrawing, hyperactivity, nervousness, declining grades) adolescents aged 12-14	▪ Cross-sectional ▪ Computer-based survey	▪ In the last 6 months, have you texted / e-mailed someone a sexual picture of yourself? ▪ In the last 6 months, have you texted / e-mailed someone a sexual message to flirt with them?	▪ Sexting prevalence of 22%, 17% sexual messages only and 5% sexual messages and photos ▪ Pictures were endorsed significantly more often by females and Latinos ▪ Sexting of any kind was associated with higher rates of engaging in a variety of sexual behaviors and sending photos was associated with higher rates of sexual activity than sending text messages only ▪ Youth who reported sexting reported more difficulties with emotional competence
Kopecky K (2012), Czech Republic	9353 respondents (52.6% boys) aged 11-17	▪ Cross-sectional ▪ Online questionnaire	▪ Have you ever placed your own sexy photo or video where you were partially or completely naked on the Internet? ▪ Have you ever sent your own sexy photo or video where you were partially or completely naked, to anybody?	▪ Sexting prevalence of 8.25% for sexting in form of placing the material on Internet and 9.7% when the material was sent to other people ▪ Reasons for sexting: out of boredom, to make intimate contact, self-representation, social pressure, to arouse the recipients, not planned ▪ Sexting can be regarded as dangerous: harassment, sexual abuse, publication of photographs, to be charged for production or distribution of child

				pornography, to be expelled from school, suicide
Kopecky K (2015), Slovak Republic	1466 respondents (45% boys) aged 11-17	▪ Cross-sectional ▪ Online questionnaire	▪ Have you ever placed your own sexy photo or video where you were partially or completely naked on the Internet? ▪ Have you ever sent your own sexy photo or video where you were partially or completely naked, to anybody?	▪ Sexting prevalence of 7.6% for sexting in form of placing the material on Internet and 9.3% when the material was sent to other people ▪ Reasons of the sexting: a part of a romantic relationship, a tool to kill time, a result from social pressure, a tool of self-presentation or a tool for revenge
Lippman JR, Campbell SW (2014), USA	51 adolescents (51% boys) aged 12-18	▪ Cross-sectional ▪ Written questionnaires administered during focus group	▪ Have you ever sent a picture or video with your cell phone that involves nudity, also sometimes called sexting? ▪ Have you ever received a picture or video on your phone that involves nudity, also sometimes called sexting? ▪ Have you ever forwarded *sexts* you received depicting other people?	▪ Sexting prevalence of 21% for sending, 48% for receiving and 2.3% for forwarding to a third party ▪ Often occurred within the context of a desired or established romantic or sexual relationship with peers ▪ A majority of adolescents believed that sexting was no big deal ▪ Girls but not boys were judged for their sexting practices ▪ Adolescents were increasingly likely to place sexting within a romantic and/or sexual context as they get older

Livingstone S, Görzig A (2014), Europe	18'709 internet-using children and adolescents (50% boys) aged 11-16	▪ Cross-sectional ▪ Data from the EU KIDS Online project ▪ At home interviews ▪ Face-to-face but private completion (paper-and-pencil or online) for sensitive questions (sexting)	▪ In the past 12 months, have you seen or received sexual messages of any kind on the Internet?	▪ Sexting prevalence of 15% ▪ 24% of those who had experienced sexting reported that this experience had upset them (uncomfortable, harmed or felt that they should not have seen it) ▪ The risk of receiving sexts was associated with older children, boys, higher sensation seeking, psychological difficulties, offline and online risky behaviors ▪ The risk of being harmed from receiving sexts was associated with younger children, girls, lower sensation seeking and psychological difficulties
Mitchell KJ, Finkelhor D, Jones LM, Wolak J (2012), USA	1560 youth Internet users aged 11-17	▪ Cross-sectional ▪ Telephone survey	▪ Have you ever taken nude or nearly nude pictures or videos of yourself? ▪ Has someone else ever taken nude or nearly nude picture or videos of you? ▪ Have you ever taken nude or nearly nude pictures or videos of other kids who were under the age of 18? ▪ Has anyone ever sent you nude or nearly nude pictures or videos of kids who were under the age of 18 that someone else took? ▪ Have you ever forwarded or posted any nude or nearly nude pictures or videos of other kids who were under the age of 18 that someone else took?	▪ Sexting prevalence of 2.5% in form of appearance in or creation of a picture and 7.1% in form of receiving a picture ▪ 54% of those who appeared in or created a picture and 84% of those who received reported sexually explicit picture (breast, genitals, bottom) ▪ 21% of those who appeared in or created a picture and 25% of those who received reported feeling very upset, embarrassed or afraid ▪ 28% of those who appeared in or created a picture and 28% of those who received reported incidents to an authority ▪ 10% of those who appeared in or created a picture and 3% of those who received reported a distribution incident
Rice E, Gibbs J, Winetrobe H, Rhoades H, Plant A, Montoya J, et al. (2012), USA	1839 high-school students (51.9% boys) aged 12-18	▪ Cross-sectional ▪ Supplemental questionnaire	▪ Have you ever sent a sexually explicit message or photo of yourself by cell phone? ▪ Do you know anyone who has sent a sexually explicit message or photo of themselves by cell phone?	▪ Sexting prevalence of 15% ▪ 54% reported knowing someone had sent a sext ▪ Older adolescents were more likely to sext ▪ Adolescents whose peers sexted were more likely to sext ▪ Non-heterosexual students were more likely to report sexting

				▪ Participants who had sexted were more likely to be sexually active and exhibited a trend toward unprotected sex
Rice E, Rhoades H, Winetrobe H, Sanchez M, Montoya J, Plant A, et al. (2014), USA	1285 middle school students (51.5% boys) aged 10-15	▪ Cross-sectional ▪ Supplemental questionnaire	▪ Have you ever received a sexually explicit message or photo of someone by cell phone? ▪ Have you ever sent a sexually explicit message or photo of yourself by cell phone?	▪ Sexting prevalence of 20.1% for receiving and 4.6% for sending ▪ Sending and receiving were significantly associated with one another ▪ Older students were more likely to report receiving a sext ▪ Sexting was associated with sexual activity ▪ Having received was correlated with being African American and sending ≥100 texts per day ▪ Having sent was correlated with being a male, sending ≥100 texts per day and being lesbian, gay, bisexual or queer
Ricketts ML, Maloney C, Marcum, CD, Higgins, GE. (2015), USA	1617 high schools students (49% males), under the age of 18 (mean 15.77)	▪ Cross-sectionnal ▪ Paper-and-pencil questionnaire	▪ Have you ever texted a nude/partially nude picture of yourself within the past year?	▪ Sexting prevalence of 13% for having sexted in the past year ▪ Internet-related problems increase the likehood of sexting ▪ Individuals association with deviant peers (have texted nude picture and/or used another person's debit/credit card without permission) increase the likehood of sexting
Ringrose J, Harvey L, Gill R, Livingstone S (2013), UK Ringrose J, Harvey L	35 young people aged 13-15	▪ Qualitative survey ▪ Focus groups, individual interviews and digital observation of Facebook pages		▪ Gender inequity issues ▪ Images connoting sexual attention seeking outside the cover of a relationship marked girls as slutty and lacking self-respect ▪ Boys can gain value and reputational reward from possessing images of esteemed girls' bodies ▪ Girls are under pressure to send photos to boys

(2015), UK				
Temple JR, Choi H (2014), USA	964 adolescents (44% boys) aged 14-18 at wave 2	▪ Longitudinal: data from waves 2 and 3 (spring 2011-spring 2012) ▪ Questionnaire	▪ Have you ever sent naked pictures of yourself to another through text or e-mail? ▪ Have you ever asked someone to send naked pictures of themselves to you? ▪ Have you ever been asked to send naked picture of yourself through text or e-mail?	▪ Sexting prevalence of 27.6% for sending, 31.4% for having asked and 60% for having been asked ▪ Sending a sext at wave 2 mediated relationship between asking or being asked for a sext and having sex over the next year ▪ Sending a sext at wave 2 was associated with having sex at wave 3 but not with risky sexual behaviors ▪ Sexual or risky sexual behaviour at wave 2 did not significantly predict sexting at wave 3 ▪ Sending, as opposed to asking or being asked, was the salient component in the link between sexting and sexual behaviour demonstrating a higher level of comfort with one's sexuality.
Temple JR, Le VD, van den Berg P, Ling Y, Paul JA, Temple BW (2014), USA	937 high-school adolescents (43% boys) aged 14-18	▪ Cross-sectional ▪ Questionnaire	▪ Have you ever sent naked pictures of yourself to another through text or e-mail?	▪ No prevalence ▪ Unadjusted model: sexting was associated with symptoms of depression, impulsivity and substance use (alcohol, marijuana or illicit substances) ▪ Adjusted model for prior sexual behaviour, age, gender, race and parent education: sexting was no longer related to depression and associations with impulsivity and substance use were attenuated ▪ Sexting is a modern day risky behaviour and a risk marker for other risky behaviors, but not necessarily as an indicator of poor psychological health

Van Ouytsel J, Van Gool E, Ponnet K, Walrave M (2014), Belgium	1028 adolescents (42% boys) aged 15-18 of 11 secondary schools in Belgium	▪ Cross-sectional ▪ Questionnaire	▪ In the last month, have you sent a sexually suggestive picture (naked or half naked) of yourself using the Internet or a mobile phone?	▪ Sexting prevalence of 11.1% ▪ Personality factors are significant predictors of teenagers' engagement in sexting: higher score for sensation seeking and experiential thinking ▪ Significant relationship between depression and sexting ▪ Economic stress or financial stress is a significant predictor of sexting
Walrave M, Heirman W, Hallam L (2014), USA	498 adolescents (46% boys) aged 15-18 from two Belgian secondary schools	▪ Cross-sectional ▪ Paper-pencil survey	▪ Have you sent *sexts* in the last two months?	▪ Sexting prevalence of 26% ▪ Attitude towards sexting (funny or not, clever or stupid, enjoyable or not) tended to be slightly negative ▪ Similarly, subjective norms (what significant others think) was rather unfavourable to sexting ▪ Conversely, perceived behavioural control (able to send, the tools needed, sexting is easy) was rather high for sexting ▪ Subjective norms is the most important predictor followed by attitude towards sexting, adolescents are influenced relatively more by the social pressure that they anticipate receiving
West JH, Lister CE, Hall PC, Crookston BT, Snow PR, Zvietcovich ME, et al. (2014), Peru	949 high school adolescents (34.35% boys) aged 12-18 from Cusco	▪ Cross-sectional ▪ Paper-pencil survey	▪ On average, how much time per day do you spend sending or receiving sexually related text messages?	▪ Sexting prevalence of 20.5% ▪ Significant correlates for girls' sexting included having been cyberbullied and parental factors while factors for boys were physical fighting, excessive texting and parental factors ▪ Boys reported higher rates of sexting than girls
Ybarra ML, Mitchell KJ (2014), USA	3715 youth US residents (43.4% boys) aged 13-18	▪ Cross-sectional ▪ Online survey	▪ How often have you sent or showed someone sexual pictures of yourself where you were nude or nearly nude?	▪ Sexting prevalence of 7% ▪ Females, older, Hispanic, lesbians, gays or bisexuals were more likely to engage in sexting ▪ All sexual behaviors were associated with sexting, as well as some risky sexual behaviors

				▪ Adolescents who reported sexting were also more likely to use substances and less likely to have a high self-esteem