Prevalence and Predictors of Text-Based and Visually Explicit Cybersex Among Adolescents

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Abstract

This study investigates different types of cybersex behaviors among adolescents and examines whether the compensation and recreation hypothesis remain valid explanatory models in a context of more explicit types of cybersex. An online survey was completed by 594 adolescents (ages 15-18). Results show that engagement in both text-based and more visual types of cybersex appears to be remarkably common among adolescents. It was further tested whether text-based sexually arousing online conversations are more prevalent among socially anxious adolescents and whether more visual types of online sexual communication are more prevalent among adolescents with low levels of social anxiety, or whether these cybersex behaviors need be seen as a response to a need for sensation. Findings indicate that socially anxious adolescents are less inclined to engage in more visual cybersex with a dating partner and that sensation-seeking explains boys' involvement in text-based sexually arousing communication.

Keywords: young people, cybersex, online sexual activities, online communication, sensation-seeking, sexual attitude, sexual orientation, social anxiety

Prevalence and Predictors of Text-Based and Visually Explicit Cybersex Among Adolescents

Studies in diverse samples have explored engagement in online sexual activities (OSA), such as visiting sexual explicit websites, looking for dates or sexual partners, or seeking sexuality-related information (e.g., Boies, 2002; Peter and Valkenburg, 2008). A specific type of OSA is cybersex (Cooper and Griffin-Shelley, 2002), described in this study as an online activity that involves sexual gratification achieved by engaging in sexual chat sessions. Studies on cybersex have shown that, on average, between 30 and 40 percent of adults engage in this type of OSA (Cooper et al., 2002; Daneback et al., 2005).

Most of the studies that investigated OSA and cybersex have studied (emerging) adults. However, Boies (2002) found that 44% of the university students who engaged in OSA started when they were 16 or younger. Research on OSA among adolescents found that adolescents actively explore the Internet looking for sexual material and frequently communicate about topics of a sexual nature (e.g., Braun-Courville and Rojas, 2009; Peter and Valkenburg, 2008; Subrahmanyam et al., 2006). Research on online chatting showed that young people use online chat rooms to discuss sexual topics or to look for dating partners (Subrahmanyam et al., 2006). In a study of chat room conversations, Subrahmanyam and colleagues (2006) found that almost three out of ten adolescents had conversations about sexual topics and that adolescents make requests for online sexual contacts through both sexually implicit and explicit messages.

While OSA can be seen as sexual exploration, important and healthy in the context of adolescent development (Koyama et al., 2009), OSA may also be categorized as risky behaviors, potentially entailing negative consequences and experiences (Baumgartner et al., 2010). Such negative consequences are, among others, the distribution of embarrassing and

offending pictures and video clips by others (Slonje and Smith, 2008), or expressions of regret and embarrassment. Moreover, some behaviors involve more risks than others.

Baumgartner and colleagues (2010), for instance, argue that adolescents' online communication with strangers may be more risky, because this type of communication may involve unwanted sexual solicitations.

In view of these and similar findings, it is important to expand our understanding of cybersex in adolescence. The aim of this study is to address two noticeable gaps in the current literature. First, we will investigate cybersex from a broad perspective by introducing a range of different forms of cybersex, thus addressing the fact that cybersex has often been defined in a fairly restricted manner. Second, we will examine whether the common explanatory models for involvement in OSA, i.e., the recreation and the compensation hypotheses, can be expanded to cybersex and still hold if we define cybersex in such a broad, differentiated manner. The compensation hypothesis predicts that people engage in sexual activities on the Internet to compensate for a non-satisfying sexual situation in their offline lives. The recreation hypothesis relies on sensation-seeking and states that people who are sexually involved on the Internet are characterized by a strong need for sensation and recreation (Peter and Valkenburg, 2007).

Types of cybersex behavior: The communication environment and the type of communication partner

Previous studies in adolescents have looked at cybersex as a rather narrowly defined online behavior. Most research has, for instance, been conducted in the context of older, more text-based environments, such as chat rooms (e.g., Subrahmanyam et al., 2006; Ybarra and Mitchell, 2008). Recent advances in online technologies have, however, created more opportunities for cybersex. Webcams, for instance, have been shown to be widely used by

young people (e.g., Peter et al., 2007). Considering those new communication devices can be important for a deep understanding of cybersex, as they allow real-time, audiovisual sexual conversations. The visual explicitness of this communication (leading, for instance, to nudity or masturbation in front of the webcam) is likely to be very different from the nature and tone of more text-based online conversations.

Furthermore, the existing literature on cybersex has largely overlooked the type of communication partners involved in sexual activities on the Internet (e.g., Subrahmanyam et al., 2006). Although it can be assumed that cybersex with a dating partner, with an offline friend or acquaintance, or with a stranger has different meanings, involves different risks, and therefore has different explanatory mechanisms, little or no attention has been paid to the distinctions between the different potential communication partners. It is therefore the first goal of this study to take account of the type of communication partner in cybersex as well as to introduce a variety of different cybersex behaviors (some executed via webcam) in this study area.

Explanatory models for involvement in cybersex

The second goal of this study is to investigate whether models that explain involvement in online casual dating, namely, the recreation and the compensation hypotheses, could be expanded to the study of involvement in cybersex.

The compensation and recreation hypotheses

In order to explain people's online search for casual dates, Peter and Valkenburg (2007) generated two hypotheses. The compensation hypothesis refers to the question of whether online interaction can serve as a valuable and valid alternative for people who experience difficulties in face-to-face interactions. With respect to the search for casual dates on the Internet, the compensation hypothesis predicts that people engage in online casual dating in

order to counterbalance their dating anxiety and low self-esteem. The recreation hypothesis, on the other hand, states that people who look for casual dates on the Internet are high sensation-seekers. In their study, Peter and Valkenburg (2007) found support for the recreation hypothesis, showing that online casual dates were more often looked for by high sensation-seekers than by low sensation-seekers. The compensation hypothesis remained, however, largely unsupported. Other studies that tested this set of hypotheses, yielded rather mixed results. Some studies found that people with high levels of social anxiety more frequently engage in online communication (e.g., Bonetti et al., 2010; Gross, 2004; McKenna and Bargh, 2000); other have rejected the compensation hypothesis and instead found that it may mostly be extravert individuals who tend to be involved in online communication (Peter et al., 2005).

If we define cybersex from a broad, differentiated perspective, focusing attention on the textual, non-visual, visual and more explicit forms of cybersex as well as on the type of communication partner (ranging from one's dating partner to a complete stranger), the question arises as to whether the two often cited hypotheses should be investigated differently in the context of cybersex,. There are several reasons to expect that both the compensation and recreation hypotheses might not necessarily remain valid in a context of different, more explicit types of cybersex.

Cybersex as compensation: The compensation hypothesis

Some of the studies that addressed the compensation hypothesis (e.g., Bonetti et al., 2010; Gross, 2004) have pointed towards the concept of social anxiety as being essential to understanding compensation. Social anxiety has a detrimental influence on adolescents' social functioning, including the formation of intimate, sexual relationships (La Greca and Lopez, 1998). It can be hypothesized, then, that socially anxious adolescents will rely on the

Internet to overcome their social anxiety and to satisfy their need for intimacy and sexuality. Because the reduced visual and auditory cues of the Internet are believed to be appealing for socially anxious adolescents (McKenna and Bargh, 2000), research has confirmed that certain adolescents do use the Internet to overcome their social anxiety (Bonetti et al., 2010), leading to the notion of compensation. In the context of sexually oriented online conversations, this notion implies that socially anxious adolescents are more likely to engage in OSA than adolescents with a low level of social anxiety. However, it is unclear whether the Internet can still be seen as a sheltered environment for socially anxious adolescents when the controllability and the anonymity that is typical of the Internet (Peter and Valkenburg, 2007) disappears and when the reduced visual and auditory cues are displaced by the overt, visually oriented character of communication via webcam. We can assume that in this context, online communication might be less sought after by socially anxious adolescents. This change implies that the original compensation hypothesis should be broken up, with different expectations for the communication types that are anonymous and secure on the one hand, and for open, visual forms of communication with less anonymity and controllability on the other hand. This assumption leads to the following hypothesis:

H1a: Adolescents with a high level of social anxiety engage more often in text-based sexually arousing online conversations than adolescents with a low level of social anxiety.

H1b: Adolescents with a high level of social anxiety engage less often in more visual types of sexually arousing online conversations, such as sending sexy pictures of themselves, undressing in front of the webcam or masturbating in front of the webcam than adolescents with a low level of social anxiety.

A further goal of this study is to investigate whether this hypothesis holds all the more for gay, lesbian and bisexual youth. Because it has been shown that computer-mediated communication appears to have different meanings and functions for gay men, lesbians and bisexual individuals (e.g., Cooper et al., 2000; Daneback et al., 2005), this study will include sexual identity in the model and will examine individuals across the sexual identity spectrum. Cooper et al. (2000) have noted that *online disinhibition* can be especially relevant to those who feel suppressed because of their sexual orientation. Meeting new people, in particular other gay or bisexual individuals, tends to be complicated. In this view, the Internet can offer opportunities to connect with a vast group of potential friends and partners without social pressure (Hendrick and Hendrick, 2000). The question is, however, whether this applies to all forms of online communication. The same social pressure that drives gays and bisexuals towards the Internet might also push them away from the Internet when it no longer offers a protective and anonymous environment. Gay, lesbian and bisexual adolescents might more often engage in the types of cybersex that incorporate a sense of security and anonymity, but less often in the types of cybersex that do not imply this safety and anonymity. Therefore, this study will specifically explore whether support for the first hypothesis differs according to an adolescent's sexual orientation.

Cybersex as recreation: The recreation hypothesis

As an alternative to the compensation hypothesis, the recreation hypothesis specifies that adolescents who engage in online communication do so because of the attractiveness of the activity and the sensations that come with it (Peter and Valkenburg, 2007). The recreation hypothesis is thus related to the concept of sensation-seeking, 'the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience' (Peter and Valkenburg, 2007). Sensation-seeking has been

shown to affect sexual behavior. Seto et al. (1995) indicated that sensation-seeking was related to earlier first intercourse and a greater variety of sexual activities. Considering cybersex to be a type of (sexual) risk behavior, which is what the recreation hypothesis implies, it can be assumed that the high sensation-seekers engage in cybersex more often, compared to their low sensation-seeking counterparts. Indeed, research by Peter and Valkenburg (2007) showed that high sensation-seekers more than low sensation-seekers initiate dates on the Internet. In this study, it will be specifically tested whether engagement in sexually oriented chat sessions is more prevalent in high sensation-seeking adolescents. Therefore, the following is hypothesized:

H2: High sensation-seeking adolescents engage more often in sexually arousing online conversations than low sensation-seeking adolescents.

However, in this study, we do not treat cybersex as an undifferentiated phenomenon. We focus on different types of behaviors and on the types of communication partners who are involved. Some of these behaviors are more explicit and incorporate more risks, such as masturbation in front of the webcam while a stranger is watching. The question then arises as to whether mere sensation-seeking is adequate to distinguish between those adolescents who engage in the most risky behaviors and those who do not. To explore this suggestion, we added the concept of impulsivity to our model. Impulsivity, a personality trait that is typically related to sensation-seeking (e.g., Donohew et al., 2000; Zuckerman, 1979), can intensify the hypothesized influence of sensation-seeking. More specifically, it has been shown that the interaction of sensation-seeking and impulsivity has a stronger effect than the effect of each concept separately. A high level of impulsivity together with high sensation-seeking produces a lower risk estimation (Roberti, 2004), resulting in a greater tendency towards risky behavior (Roberti, 2004). Hence, impulsivity can be regarded as an amplifying variable for the effect

of sensation-seeking. Therefore, with respect to the more risky types of cybersex, the following hypothesis is proposed:

H3: High sensation-seeking adolescents with high impulsivity are more likely to engage in the riskier types of sexually arousing online conversations than high sensation-seeking adolescents with low impulsivity.

Previous studies have shown that adolescents with positive attitudes toward the Internet use the Internet more often than students with negative Internet attitudes (Duggan et al., 2001) and studies on OSA have shown that adolescents who engage in these activities are more likely to endorse sexually permissive attitudes (Braun-Courville and Rojas, 2009). Prior research also has pointed out that boys (Peter and Valkenburg, 2006) and older adolescents (Peter and Valkenburg, 2008) are more likely to involve in OSA. And research on the use of sexually explicit internet material showed that the level of education of the users predicted the use of this material (Træen et al., 2006). Because adolescents' sexual attitudes, Internet attitudes, gender, educational level and age may provide alternative explanations for adolescents' involvement in cybersex behaviors, these variables will be controlled for when testing the hypotheses.

Method

An online survey was administered in two study panels of secondary school students in Belgium. With consent of the principals of the high schools, one panel was recruited by means of an invitation letter distributed in schools. The second panel was recruited through the social network site Netlog.com. Recruitment of participants via social network sites has been shown to be a suitable strategy in previous research examining personality correlates of internet use (e.g., Hughes et al., 2012).

Adolescents were invited to complete the survey online because it guaranteed more anonymity for the study of sensitive issues (Joinson, 1998). Completion of the survey took approximately 25 minutes. All ethical requirements were followed according to the local procedures; all participants were fully informed about the study and agreed to participate. The questionnaire was completed by 594 adolescents aged 15 to 18 years. The average age was 16.92 years; 60.1% of the students were girls.

Measures

Online communication. For each day of the week, adolescents indicated on a timeline the periods of time on which they usually engaged in online communication. The frequency of online communication in hours per week was obtained by summing all of the marked time periods.

Sexually arousing online communication. A preparatory focus group study was conducted to explore different types of cybersex behaviors. Based on those interviews, engagement in four types of sexually arousing online communication activities was measured: (1) online chatting for the purpose of sexually arousing the communication partner, (2) sending sexy pictures by e-mail or in chat sessions, (3) getting undressed in front of the webcam during online chat sessions and (4) masturbation in front of the webcam during online chat sessions. To account for the type of communication partner, the occurrence of each of these types of cybersex behaviors was measured separately for communication with respondents' *dating partner*, *offline friends* (i.e., friends who respondents know in real life), *online friends* (i.e., friends who respondents have never met in real life, but exclusively online) and *online strangers* (i.e., people who respondents have never met in real life and who respondents have only recently met online). For each communication partner separately, respondents were asked which of the cybersex types they

had experienced (1 = *yes*, 2 = *no*), and if they did, how often they engaged in the specific activity (1 = *once* to 5 = *more than 20 times*).

Social anxiety. Social anxiety was measured using the 18-item Social Anxiety Scale for Adolescents (SAS-A; La Greca and Lopez, 1998), which contains three subscales: fear of negative evaluation, social avoidance and distress. Several studies using the SAS-A have provided high validity and reliability scores in both community and clinical samples, across various cultural populations (e.g., Miers et al., 2008; Ranta et al., 2012), and in previous studies on Internet use and sexual Internet behavior (e.g., Valkenburg and Peter, 2008). The response options for each item ranged from *I totally agree* to *I totally do not agree* (Cronbach's alpha = .890).

Sexual orientation. The respondents were asked to mark their sexual orientation among three categories: (1) *heterosexual*, (2) *gay/lesbian*, or (3) *bisexual*. Because of statistical considerations, however, without the intention to stigmatize on behalf of sexual orientation, we identified two categories: heterosexual adolescents and gay/lesbian or bisexual adolescents.

Sensation seeking. Following other studies in adolescent samples (e.g., Peter and Valkenburg, 2008), the Brief Sensation Seeking Scale (BSSS; Hoyle et al., 2002) was used, which is an 8-item, self-report measure with response categories from 1 (totally disagree) to 5 (totally agree) (alpha = .755).

Impulsivity. Respondent's impulsivity was measured using the Non-Planning Impulsiveness Subscale (11 items) of the Barratt Impulsiveness Scale, as it was translated by Lijffijt and Barratt (2005). Cronbach's alpha was rather low at .589.

Control variables. Sexual attitudes were assessed by the permissiveness (10 items, e.g., *Casual sex is acceptable*) and instrumentality subscale (5 items, e.g., *The main purpose of sex*

is to enjoy oneself) of the Brief Sexual Attitudes Scale (BSAS) proposed by Hendrick et al. (2006). The response categories ranged from 1 (I totally do not agree) to 5 (I totally agree) ($\alpha = .841$). With respect to the Internet attitudes, the social confidence subscale (7 items, e.g., *Going online has made it easier for me to make friends*) and the socially liberating subscale (8 items, e.g., *I am more myself online than in real life*) of Morahan-Martin and Schumacher's (2000) Internet Behavior and Attitude Scale, with response options from 1 (I totally do not agree) to 4 (I totally agree), were used ($\alpha = .857$).

Demographic characteristics. The respondents' gender (1 = *male*, 2 = *female*), age and level of education were measured.

Results

Online Communication

Online communication appeared to be prevalent among 15- to 18-year olds: 96.3% report communicating on the Internet. The respondents spent an average of two hours and 15 minutes per day on online communication. Almost seven out of ten adolescents always communicate with offline friends (67.9%) and nearly half of the adolescents report communicating with people they only know through the Internet (46.7%). Approximately four out of ten adolescents indicated that they are rarely or never accompanied by other persons when engaging in online communication (38.8%); 62.5% of the adolescents report having a webcam at their disposal.

Sexually arousing online communication

Table 1 shows, first, that online communication for the purpose of sexually arousing the communication partner appeared to be popular among fifteen- to eighteen-year-olds, especially when the other is their dating partner; almost six out of ten boys (55%) and four out of ten girls (40.6%) report having tried to sexually arouse their girl- or boyfriend in online

interactions. As for the other communication partners, 37.2% stated that they have tried to sexually arouse an offline friend, 22.4% an online friend and 12.6% an online stranger.

Second, one adolescent in five (20%) reported sending sexy pictures of him/herself to a dating partner, 9.1% reported sending sexy pictures to an offline friend and 7% to an online friend. While sending sexy pictures to an online stranger was less common among girls (1.5%), 7.9% of the adolescent boys reported sharing this type of picture with an online stranger at least once.

[Table 1 about here]

Third, a total of 7.6% of the respondents stated that they had been (at least partially) undressed while their webcam was on and their dating partner was watching. About one in ten boys (13.3%) and 3.8% of the girls indicated that they had been nude in front of their dating partner through the webcam. Webcam nudity was rather uncommon with offline friends (5.9% of the boys and 3.2% of the girls), but more common when online friends were watching, especially among boys (12.4% of the boys and 0.5% of the girls), and in front of online strangers (11.8% of the boys and 1.8% of the girls).

Finally, one tenth of the boys (10%) and 2.9% of the girls reported that they masturbated in front of a webcam when their dating partner was watching. In communication with offline friends, this behavior hardly ever occurs, but a little more than 5% (and more than one adolescent boy in ten) reported that they masturbated in front of the webcam when someone was watching who they only knew in the online world.

Hypothesis testing

A factor analysis on the set of 16 questions measuring involvement in sexually arousing online communication produced five factors (Eigenvalues > 1): one text-based cybersex factor and four visual cybersex factors. The first factor relates to online textual

communication for the purpose of sexually arousing the communication partner, irrespective of who the contact is. The other factors relate to the more visual behaviors and are grouped according to the type of communication partner involved. These include online sexually arousing visual communication with an adolescent's dating partner (3 items, factor loadings > 0.70 ; $\alpha = .81$), an offline friend (3 items, factor loadings > 0.60 ; $\alpha = .67$), an online friend (3 items, factor loadings > 0.45 ; $\alpha = .75$) and an online stranger (3 items, factor loadings > 0.80 ; $\alpha = .83$). Following (Peter and Valkenburg's (2006, 2008) procedure, for each factor, a summary score was created by summing the item scores and dividing the sum by the total number of items, such that higher scores reflect higher involvement.

Hierarchical multiple regression analyses were performed to test for both the compensation and the recreation hypothesis, with the text-based cybersex factor and the four visual cybersex factors entered as the dependent variables. After the measures of social anxiety, sensation-seeking and impulsivity were included in the models to test which variables best predicted sexually arousing online communication, the interaction terms were created and added to the regression models. The control variables were gender, level of education, age, sexual orientation, sexual attitudes and Internet attitudes.

The compensation hypothesis. To test whether adolescents with a high level of social anxiety would more often engage in text-based sexually arousing online conversations, a hierarchical regression analysis was run with online sexual communication for the purpose of sexually arousing the communication partner as dependent variable ($F = 14.002$, $p < .001$, adjusted $R^2 = .219$). Table 2 shows that online communication intended to sexually arouse the other occurs more often in adolescents who tend to endorse a positive attitude toward sexuality ($\beta = .289$, $p < .001$). Social anxiety ($\beta = -.381$, $p = .080$), as well as the interaction

of gender and social anxiety ($\beta = .447$, $p = .089$), only showed a nearly significant impact, indicating that there is a negative effect for social anxiety, mainly in boys. Thus, hypothesis 1a, stating that text-based sexually arousing online conversations would be more prevalent among adolescents with a high level of social anxiety, was not confirmed in our study.

[Table 2 about here]

Five models were run to test whether the adolescents with a high level of social anxiety would engage less often in the more visual types of cybersex behaviors. In the regression model predicting visually explicit sexual communication with a dating partner ($F = 5.239$, $p < .001$, adjusted $R^2 = .084$), gender and the adolescents' degree of social anxiety were significant predictors, as were the interaction effect of gender and social anxiety. These findings imply that the visual types of online sexual contact with a dating partner are more popular among boys and, as expected, among adolescents who show lower levels of social anxiety. Furthermore, the impact of social anxiety turned out to be stronger among boys.

[Table 3 about here]

The analysis aimed at explaining the prevalence of visual types of online sexual communication with an offline friend ($F = 5.678$, $p < .001$, adjusted $R^2 = .092$) revealed that only sexual attitude and level of education were significant predictors. The same conclusion emerged from the models that were run for communication with an online friend ($F = 10.697$, $p < .001$, adjusted $R^2 = .173$) and with an online stranger ($F = 8.782$, $p < .001$, adjusted $R^2 = .144$). The analysis run for visual types of sexual communication with an online stranger revealed a significant interaction effect for social anxiety and sexual orientation, indicating that there is an effect for social anxiety, but only in those who self-identified themselves as gay/lesbian or bisexual.

In general, these analyses indicate that the cybersex behaviors are more prevalent in adolescents who have a positive attitude toward sexuality. The compensation hypothesis regarding text-based sexually arousing online communication (H1a) was not supported in our study. However, for the more visual types of cybersex behaviors executed with a dating partner, it was found that adolescents with lower levels of social anxiety engaged more often in these behaviors, thus partly confirming hypothesis 1b.

The recreation hypothesis. The results for the hierarchical regressions that tested whether the recreation hypothesis was supported are shown in Tables 4 and 5. With respect to the recreation hypothesis, a similar pattern as for the compensation hypothesis was found.

The analyses run for text-based online sexual communication aimed at sexually arousing the other ($F = 12.931$, $p < .001$; adjusted $R^2 = .245$) showed that this behavior can significantly be predicted not only by sexual orientation and sexual attitude but also by Internet attitude. Gay and bisexual adolescents, as well as adolescents who have a positive attitude toward sexuality or toward the Internet, are engaged more often in online communication to sexually arouse the other. The interaction effect between gender and sensation-seeking was also significant, indicating that there is an effect for sensation-seeking but only for male adolescents. In this sense, hypothesis 2 was partly confirmed because the recreation hypothesis was supported for boys, indicating that high sensation-seeking boys engage more often in online sexual conversations for the purpose of sexually arousing their communication partner.

[Table 4 about here]

[Table 5 about here]

Table 5 shows that visually explicit sexual communication with a dating partner ($F = 3.892$, $p < .001$; adjusted $R^2 = .073$) only was predicted by sexual orientation, which notes

that sending sexy pictures, undressing and masturbating in front of the webcam with a girl- or boyfriend occurs more frequently with gay and bisexual adolescents.

Sensation-seeking was not a significant predictor when visually explicit sexual communication with either an offline friend ($F = 5.103$, $p < .001$, adjusted $R^2 = .100$) or an online friend ($F = 9.243$, $p < .001$, adjusted $R^2 = .183$) served as the dependent variables. In both models, only sexual orientation and sexual attitude were significant predictors, indicating that the more visual types of online sexual communication with an offline or an online friend are more prevalent among gay and bisexual adolescents and among adolescents with a positive attitude towards sexuality. Similarly, with respect to online sexual communication with an online stranger ($F = 5.381$, $p < .001$; adjusted $R^2 = .107$), sexual orientation and sexual attitudes were significant predictors.

Overall, online sexual contacts were more common in gay, lesbian and bisexual adolescents and in adolescents who endorse a positive attitude towards sexuality and towards the Internet. Generally speaking, sensation-seeking did not predict the occurrence of cybersex activities. The recreation hypothesis in this study (H2) was only supported for online communication by male adolescents aimed at sexually arousing the communication partner. Therefore, in this study, the recreation hypothesis was only partly confirmed. Hypothesis 3, stating that high sensation-seeking adolescents with high impulsivity would be more likely to engage in the riskier cybersex behaviors, was not confirmed.

Discussion

This study examined the prevalence of sexually arousing online communication activities in an adolescent sample and sought to explain this type of cybersex behavior by testing a set of hypotheses. Although studies so far have focused primarily on cybersex behaviors in (emerging) adults, this study showed that adolescents are also actively engaged in cybersex.

Not only have text-based, online interactions aimed at sexually arousing one's communication partner been shown to be surprisingly common among adolescents, but the other, more visually explicit types of cybersex behavior (such as nudity or masturbation in front of the webcam) were fairly prevalent as well. Boys, in particular, tend to engage in more visual and riskier forms of cybersex. It was, for instance, found that one in ten adolescent boys indicated that they have masturbated in front of the webcam with their dating partner (10%), with an online friend (11.8%) and even with an online stranger (11.2%).

Adolescents most often communicated in a sexual manner with those communication partners they call dating partners. For instance, 40.6% of the girls and 55% of the boys that have or had a relationship tried to arouse their dating partner during online communication. This suggests that teenagers perceive their boy- or girlfriend as reliable and trustworthy in regard to intimate and sexual interactions. The findings also revealed that while offline friends are rarely involved in online sexually arousing communication, online friends and online strangers are more frequently solicited in regard to being nude or masturbating in front of a webcam. This finding can be interpreted in two ways. The fact that online conversations with offline friends are rarely given a sexually arousing turn can be seen as a risk avoiding strategy; offline friends can easily and on every occasion recall the intimate cybersex behavior their friends once committed, which is, at least in the adolescents' perceptions, not true for online friends and online strangers, who do not take part in their real lives. The higher frequency of online sexual activities (OSA) with online friends and online strangers can also be seen as an indicator of the disinhibition effect. The online context, with its anonymity, controllability and reduced visual and auditory cues (Peter and Valkenburg, 2007), as well as the perceived discretion of communicating with someone who will not be encountered in real life, appears to lower the threshold for acceptable behavior online.

Explaining involvement in cybersex

To explain the prevalence of the different forms of cybersex behaviors among adolescents, including the textual as well as the visually more explicit forms of cybersex, and taking account of the type of communication partner, it was tested whether the compensation and recreation hypothesis would still hold in this context.

First, the compensation hypothesis was broken up to examine whether text-based sexually arousing online communication tends to be experienced predominantly by socially anxious adolescents and whether the more visual types of sexually arousing communication tends to be experienced predominantly by adolescents with lower levels of social anxiety. No support was found for a compensation effect regarding text-based online communication for the purpose of sexual arousal. Social anxiety was not related to the prevalence of text-based cybersex. For the more visual types of cybersex, social anxiety did contribute to the occurrence of sexually arousing communication with dating partners. This finding implies that socially anxious adolescents, and boys in particular, are less likely to engage in the more visual types of online sexual communication, however, this only applies to dating partners and not other online encounters. This finding provides support for our hypothesis that social anxiety would have a different outcome in the more visually explicit contexts of cybersex behaviors. However, this finding was only true regarding the communication with dating partners. This conclusion raises an additional explanation. Studies on adolescent romantic relationships have shown that social anxiety is related to dating anxiety (e.g., Glickman and La Greca, 2004). It is possible that adolescents who feel socially anxious also feel anxious in dating situations and therefore engage less often in cybersex with their dating partner. One explanation might thus be that the stresses that are characteristic of romantic relationships and the anxiety experienced during interactions with a dating partner, often called dating

anxiety (Grover and Nangle, 2003), inhibit adolescents from involvement in (visually explicit) cybersex with their dating partner.

Second, the recreation hypothesis, which suggests that involvement in sexually oriented interactions needs to be seen as the fulfillment of a need for recreation and sensation, was tested. This hypothesis was only partly supported. The interaction analyses indicated that sensation-seeking had an effect in boys as regards online communication for the purpose of sexually arousing the communication partner. Contrary to our expectations, impulsivity did not appear to amplify the effect of sensation-seeking.

Overall, this study elucidated the online sexual contacts that adolescents frequently and actively engage in. Our study adds to the existing literature on online sexual communication by revealing that adolescents do use newer, online tools (e.g., webcams) in addition to the older, text-based tools and that they engage in more explicit, visual cybersex activities among a range of communication partners. Furthermore, our study provides some new insights into how these newer forms of cybersex might be explained from the perspective of compensation and recreation research. Although the explanatory power of both social anxiety and sensation-seeking in this context was rather weak, this study is a first step towards understanding the mechanisms that can explain involvement in different types of cybersex. For the older, text-based sexually arousing communication, it appears that sensation-seeking is the explanatory mechanism for boys. For the more visual sexually arousing online communication, social anxiety appears to be important in that socially anxious adolescents are less inclined to send sexy pictures, undress or masturbate in front of the webcam while their dating partner is watching. However, the explanatory models of compensation and recreation alone were not sufficient to account for the high prevalence of the variety of cybersex behaviors. More research is needed to reveal the explanatory mechanisms

underlying the online sexual communication behaviors that adolescents engage in, in particular for the more visual types of cybersex, while accounting for the type of communication partner. Our study revealed that involvement in OSA appears to be the result of other, contextual or personality factors: sexual orientation, gender, and sexual attitude appear to affect both text-based and more visual online sexual communication. It was found that gay, lesbian and bisexual adolescents more often engage in cybersex behaviors than heterosexual adolescents. This finding confirms that *online disinhibition* is especially relevant to adolescents who feel restrained because of their sexual orientation (Cooper et al., 2000).

With respect to gender, a remarkable difference comes into view. When findings from the frequency analyses are compared to findings from the regression analyses, the former clearly revealed that boys are more likely to engage in cybersex than girls, but the latter revealed that gender hardly ever was one of the significant predictors in the regression models. This seems to suggest that other concepts in the model may at least partially explain why the overall gender difference exists. Further analyses into these concepts point out that male respondents have a more positive attitude toward sexuality, $t(376, 612) = 7,072$ $p < .001$, and on average score higher on sensation seeking, $t(461, 260) = 2,010$ $p < .05$, while female adolescents show higher levels of social anxiety, $t(499, 478) = -2,416$ $p < .05$, which corresponds with gender differences found in previous studies on OSA and sensation seeking (Peter and Valkenburg, 2008), and social anxiety (Pierce, 2009). These findings imply that the overall gender difference in cybersex behaviors may in fact represent differences in sexual attitudes, sensation seeking, and social anxiety, and not differences in gender as such.

Perhaps not surprisingly, the most consistent predictor of involvement in both text-based and visually explicit cybersex was adolescents' sexual attitude. Especially sexual communication for the purpose of sexually arousing the communication partner, appeared to

be driven by adolescents' sexual attitude. A remarkable exception here, however, is that online sexual communication with a dating partner was not predicted by sexual attitudes but by social anxiety. It appears that sexual attitudes, that are especially gauged by sexual permissiveness, do not play a role in cybersex behaviors within relationships. With respect to cybersex outside a relationship, however, it appears that adolescents with more permissive attitudes more often engage in cybersex. This finding lends support to our idea that it is important to take account of the type of communication partner in cybersex. Future studies should, for instance, investigate whether dating anxiety could explain the lower engagement in cybersex with dating partners among socially anxious adolescents and whether other factors might explain cybersex with other communication partners.

Conclusion and limitations

Most previous data on OSA were collected in the USA, with the exception of Peter and Valkenburg's data (e.g., 2007; 2008) collected in the Netherlands. As our data were collected in a rather liberal country, namely Belgium, this study provides a new perspective on adolescent's OSA, and the findings should be interpreted in this cultural context. The cultural context implies that it might be invalid to make generalizations about the findings toward other, less sexually liberal cultural contexts. Therefore, findings should be cautiously interpreted. Nonetheless, our study revealed important findings that might be extrapolated to other countries as well. The fact that data were selected in two samples and the overrepresentation of girls may raise concerns with regard to the generalizability of the findings. Yet, the aim of this study was to conduct an in-depth exploration of OSA among adolescents in order to determine whether involvement in text-based and visually explicit types of cybersex is a relevant phenomenon in adolescence and what mechanisms might explain this phenomenon. Although the samples do not allow widespread generalization to

other populations, the samples are comparable to that used in research on the use of sexually explicit websites among adolescents and are representative in terms of educational level of the general student population in Belgium (Vandenbosch & Eggermont, 2013). Moreover, the findings of our study were analogous to those reported in previous studies (e.g., Peter and Valkenburg, 2007, 2008; Pierce, 2009) and provide a greater understanding of involvement in text-based and visually explicit types of cybersex among adolescent populations.

Our study revealed that adolescents actively engage in different types of cybersex among a variety of communication partners. Research should further investigate if and how engagement in these OSA contributes to adolescents' sexual self-esteem, sexual identity and sexual skills.

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Table 1. Prevalence of 4 types of Online sexual communication activities among 4 communication partners

	dating partner			friend			online friend			online stranger		
	boys	girls	total	boys	girls	total	boys	girls	total	boys	girls	total
Sexually arouse the other	55	40.6	46.4	44.1	32.7	37.2	30.1	17.2	22.4	18.3	8.7	12.6
Sending sexy pictures	20.4	19.8	20	10.0	8.5	9.1	10.9	4.4	7	7.9	1.5	4
Undress in front of the webcam	13.3	3.8	7.6	5.9	3.2	4.3	12.4	0.5	5.4	11.8	1.8	5.9
Masturbation in front of the webcam	10	2.9	5.7	3.3	1.4	2.2	11.8	2.3	6.2	11.2	1.4	5.4

Note: Frequencies for dating partner are shown for adolescents who have or who have had a dating partner in the past (N = 524).

Table 2. Hierarchical Multiple Regression testing the impact of social anxiety on text-based online sexual communication for the purpose of sexually arousing the communication partner

	<i>adj. R²</i>	β
Model 1	.215***	
Gender		-.099*
Age		.051
Internet attitudes		.076
Sexual attitude		.308***
Level of education		.015
Sexual orientation		.217***
Model 2	.217***	
Gender		-.089
Age		.053
Internet attitudes		.108*
Sexual attitude		.295***
Level of education		.015
Sexual orientation		.223***
Social anxiety		-.076
Model 3	.219***	
Gender		-.422*
Age		.048
Internet attitudes		.101*
Sexual attitude		.289***
Level of education		.019
Sexual orientation		.149
Social anxiety		-.381
Gender x Social anxiety		.447
Sexual orientation x Social anxiety		.112

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 3. Hierarchical Multiple Regression testing the impact of social anxiety on visual online sexual communication with a dating partner, with an offline friend, with an online friend and with an online stranger

	Dating Partner		Offline Friend		Online Friend		Online Stranger	
	<i>adj. R²</i>	β	<i>adj. R²</i>	β	<i>adj. R²</i>	β	<i>adj. R²</i>	β
Model 1	.061***		.095***		.177***		.126***	
Gender		-.026		.040		-.051		-.058
Age		-.024		-.053		-.075		-.035
Internet attitudes		.025		.040		.072		.042
Sexual attitude		.119*		.198***		.120*		.102*
Level of education		.072		.112*		.066		.074
Sexual orientation		.195***		.194***		.346***		.297***
Model 2	.070***		.093***		.175***		.130***	
Gender		-.011		.038		-.054		-.070
Age		-.021		-.054		-.075		-.037
Internet attitudes		.074		.032		.062		.003
Sexual attitude		.101		.201***		.124*		.117*
Level of education		.071		.112*		.066		.075
Sexual orientation		.204***		.193***		.345***		.290***
Social anxiety		-.115*		.020		.022		.091
Model 3	.084***		.092***		.173***		.144***	
Gender		-.591**		-.131		-.031		.307
Age		-.030		-.057		-.075		-.033
Internet attitudes		.059		.024		.059		.000
Sexual attitude		.089		.196***		.121*		.116*
Level of education		.079		.114*		.066		.070
Sexual orientation		-.028		-.024		.146		-.165
Social anxiety		-.721**		-.264		-.104		.049
Gender x Social anxiety		.779**		.229		-.027		-.497
Sexual orientation x Social anxiety		.332		.294		.262		.586*

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 4. Hierarchical Multiple Regression testing the impact of sensation seeking and impulsivity on text-based online sexual communication for the purpose of sexually arousing the communication partner

	<i>adj. R²</i>	β
Model 1	.235***	
Gender		-.110*
Age		.037
Internet attitudes		.102*
Sexual attitude		.330***
Level of education		.011
Sexual orientation		.198***
Model 2	.241***	
Gender		-.105*
Age		.041
Internet attitudes		.099*
Sexual attitude		.302***
Level of education		.009
Sexual orientation		.198***
Sensation seeking		.104*
Impulsivity		-.023
Model 3	.245***	
Gender		.366
Age		.038
Internet attitudes		.102*
Sexual attitude		.307***
Level of education		-.116
Sexual orientation		.191***
Sensation seeking		.356
Impulsivity		-.047
Gender x Sensation seeking		-.543*
SES x Sensation seeking		.140
Impulsivity x Sensation seeking		.027

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 5. Hierarchical Multiple Regression testing the impact of sensation seeking and impulsivity on visual online sexual communication with a dating partner, with an offline friend, with an online friend and with an online stranger

	Dating Partner		Offline Friend		Online Friend		Online Stranger	
	<i>adj. R²</i>	β	<i>adj. R²</i>	β	<i>adj. R²</i>	β	<i>adj. R²</i>	β
Model 1	.070***		.103***		.188***		.113***	
Gender		-.031		.034		-.053		-.055
Age		-.035		-.061		-.085		-.027
Internet attitudes		.029		.041		.074		.041
Sexual attitude		.131*		.207***		.133**		.103*
Level of education		.073		.111*		.067		.065
Sexual orientation		.201***		.202***		.351***		.283***
Model 2	.073***		.101***		.187***		.111***	
Gender		-.035		.028		-.058		-.061
Age		-.026		-.056		-.080		-.025
Internet attitudes		.025		.040		.072		.041
Sexual attitude		.098		.194***		.116*		.104
Level of education		.064		.104*		.061		.062
Sexual orientation		.205***		.206***		.355***		.286***
Sensation seeking		.073*		.006		.021		-.033
Impulsivity		.050		.052		.049		.044
Model 3	.073***		.100***		.183***		.107***	
Gender		.330		.381		.185		-.179
Age		-.028		-.058		-.081		-.025
Internet attitudes		.028		.040		.074		.042
Sexual attitude		.097		.192***		.116*		.107*
Level of education		.019		.225		.002		-.105
Sexual orientation		.200***		.203***		.351***		.285***
Sensation seeking		.025		.026		.038		-.021
Impulsivity		-.167		-.156		-.050		.165
Gender x Sensation seeking		.420		-.408		-.280		.137
SES x Sensation seeking		.050		-.135		.065		.186

Impulsivity x Sensation seeking	.387	.375	.174	-.222
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* $p < .05$ ** $p < .01$ *** $p < .001$

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