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Explaining the Relationship Between Sexually Explicit Internet Material and Casual Sex: A Two-Step Mediation Model

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Abstract Despite increasing interest in the implications of adolescents' use of sexually explicit Internet material (SEIM), we still know little about the relationship between SEIM use and adolescents' casual sexual activities. Based on a three-wave online panel survey study among Dutch adolescents ($N = 1079$; 53.1% boys; 93.5% with an exclusively heterosexual orientation; $M_{\text{age}} = 15.11$; $SD = 1.39$), we found that watching SEIM predicted engagement in casual sex over time. In turn, casual sexual activities partially predicted adolescents' use of SEIM. A two-step mediation model was tested to explain the relationship between watching SEIM and casual sex. It was partially confirmed. First, watching SEIM predicted adolescents' perceptions of SEIM as a relevant information source from Wave 2 to Wave 3, but not from Wave 1 to Wave 2. Next, such perceived utility of SEIM was positively related to stronger instrumental attitudes toward sex and thus their views about sex as a core instrument for sexual gratification. Lastly, adolescents' instrumental attitudes toward sex predicted adolescents' engagement in casual sex activities consistently across waves. Partial support emerged for a reciprocal relationship between watching SEIM and perceived utility. We did not find a reverse relationship between casual sex activities and instrumental attitudes toward sex. No significant gender differences emerged.

Keywords Pornography · Youth · Media effects · Casual sex · Perceived realism · Sexual behavior

Introduction

Several studies in various Western countries have demonstrated that exposure to sexually explicit Internet material (SEIM) has become a part of contemporary youth culture as many adolescents use SEIM (e.g., Beyens, Vandenbosch & Eggermont, 2015; Peter & Valkenburg, 2011; Ševčíková & Daneback, 2014; for a review, see Peter & Valkenburg, 2016). At the same time, research from the U.S. among students in the 7th–12th grade has demonstrated that one in three adolescents has had casual sex at least once, with this number increasing when adolescents grow older (Fortunato, Young, Boyd, & Fons, 2010). In this context, scholars have suggested that SEIM use and casual sex may be related (Heldman & Wade, 2010). Cross-sectional research has supported this suggestion (e.g., Lo, Neilan, Sun, & Chiang, 1999; Lo & Wei, 2005; Mattebo, Tydén, Häggström-Nordin, Nilsson, & Larsson, 2014; for a review, see Peter & Valkenburg, 2016). Moreover, one longitudinal study among adults demonstrated that the use of pornography predicts casual sex over time (Wright, 2012). However, due to the lack of longitudinal studies among adolescents, our understanding of how SEIM use and casual sex relate to each other over time is still limited. Because of the centrality of sexual developmental tasks in adolescence (e.g., Collins, 2003), such knowledge may be especially helpful for parents and educators who intend to educate adolescents toward a healthy sexuality. Therefore, a first aim of the current study was to study, over time, potential relationships between adolescents' use of SEIM and engagement in casual sex.

Scholars have also emphasized that, in order to advance theory development and to improve the effectiveness of sexual

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health interventions, we need to pay more attention to the processes that may underlie the effects of SEIM on adolescent sexuality (e.g., Peter & Valkenburg, 2010, 2016; To, Ngai, & Iu Kan, 2012; Wright, 2011). Despite some first attempts to explain the influence of watching SEIM on adolescents' sexuality (e.g., Peter & Valkenburg, 2008, 2009a, 2010; To et al., 2012), we still lack knowledge about why SEIM use may change adolescents' sexual behavior (Peter & Valkenburg, 2016) and may motivate them, in particular, to engage in casual sex. Prior studies have suggested that perceived utility of SEIM and instrumental attitudes toward sex may explain the influence of SEIM selection on casual sex among adolescents (Peter & Valkenburg, 2010; Ward, Epstein, Caruthers, & Merriwether, 2011). The perceived utility of SEIM is a response state and can be described as "the extent to which adolescents perceive SEIM as a relevant source of information about sex and as applicable to the real world" (Peter & Valkenburg, 2010, p. 377). Instrumental attitudes toward sex refer to an instrumental interpretation of sex that values individuals' physical sexual satisfaction rather than building committed, affectionate relationships (Hendrick & Hendrick, 1987). Instrumental attitudes toward sex are thus favorable toward casual sex as this sexual activity fits with the focus on sexual pleasure and neglect of commitment (Peter & Valkenburg, 2010). No study to date has investigated the potential combined explanatory roles of perceived utility of SEIM and instrumental attitudes toward sex empirically. It is the second aim of this study to test whether the perceived utility of SEIM and instrumental attitudes toward sex may explain a relation between SEIM use and casual sex.

Lastly, sexual socialization research has shown that boys and girls tend to be socialized toward different sexual identities (e.g., Tolman, Striepe, & Harmon, 2003). As a result, it seems conceivable that boys and girls respond differentially to SEIM. The third aim of this study is therefore to explore the potential moderating role of gender in the processes that underlie the relation between SEIM use and casual sex.

Watching SEIM and Casual Sexual Activities

Sexually explicit Internet material (SEIM) can be defined as "professionally produced or user-generated (audio)visual material on or from the Internet that typically intends to arouse the viewer and depicts sexual activities and (aroused) genitals in unconcealed ways, usually with close-ups on oral, anal, and vaginal penetration" (Peter & Valkenburg, 2010, p. 377). Casual sex refers to sexual activities that occur between non-romantic and non-committed partners (Fortunato et al., 2010; Heldman & Wade, 2010).

One theoretical framework to explain the influence of SEIM use on engagement in casual sex is Bandura's (2001) social cognitive theory. Social cognitive theory posits that observing media models who engage in behavior may stimulate

media users' tendency to perform this behavior. Moreover, the performance of the observed behavior is most likely when it is rewarded, or at least not punished. Evidence has accumulated that sexually explicit material frequently portrays sexual activities between two casual, uncommitted partners (e.g., Brosius, Weaver, & Staab, 1993; Klaassen & Peter, 2015). Actors and actresses in sexually explicit material typically appear to be sexually rewarded for these casual sexual activities. Such rewards are shown in the form of close-ups of sexual orgasms derived from the satisfying sexual interactions (e.g., Gorman, Monk-Turner & Fisch, 2010) or by emphasizing pleasure as the main motivation to engage in sexual interactions (Brosius et al., 1993). Watching SEIM may thus suggest that having casual sex is one way to engage in a sexually satisfying activity.

To date, there is some evidence of associations between SEIM use and adolescents' experience with casual sex (for a review, see Peter & Valkenburg, 2016). However, except for two studies (Vandenbosch & Eggermont, 2013; Wright, 2012), all other studies on the topic focused on a unidirectional influence of SEIM use on sexual behavior. This conceptualization of media influence is at odds with more advanced recent theorizing about media effects. For example, in his reinforcing spirals model (RSM), Slater (2007, 2015) has outlined that the relationship between exposure to media messages and behavioral outcomes is likely bidirectional. Following the literature on selective exposure (e.g., Zillman & Bryant, 1985), the RSM suggests that media users (e.g., SEIM users) will be more motivated to engage in behaviors that are consistent with the media content they have consumed (e.g., casual sex). In turn, individuals who perform particular behaviors (e.g., casual sex) will be encouraged to seek out media content that is consistent with their own behavior (e.g., watching SEIM). This reasoning has been substantiated by several studies on sexual media use and various sexual outcomes (e.g., Bleakley, Hennessy, Fishbein, & Jordan, 2008; Peter & Valkenburg, 2009b, but also see, e.g., Vandenbosch & Eggermont, 2013; Wright, 2012). Based on RSM theory (Slater, 2007, 2015) and several supporting empirical studies (Bleakley et al., 2008; Peter & Valkenburg, 2009b), we hypothesized:

Hypothesis 1 Watching SEIM and engaging in casual sex will be positively related to each other in a reciprocal fashion.

The Role of Perceived Utility of SEIM and Instrumental Attitudes Toward Sex

Recent approaches to media effects, such as the Differential Susceptibility to Media Effects Model (= DSMM, Valkenburg & Peter, 2013a, b) and the script acquisition, activation,

application model (Wright, 2011, 2014), have called for more attention to the processes that take place between selective exposure to a particular media content and the outcomes of such exposure. Specifically, the DSMM posits that some types of media effects (e.g., effects on state-type variables) may precede and explain other types of media effects (e.g., effects on attitudes or behavior). The DSMM assumes that state-type variables are the result of prior interactions with media exposure and refer to cognitive, emotional, and excitative responses while consuming media messages. Attitudes and behavior are typically influenced afterward and are thus partly shaped by one's responses to media content (Valkenburg & Peter, 2013a, b). The assumption of the DSMM about the importance of state-type variables builds upon previous theories, such as transportation theory (Green & Brock, 2002) and the extended elaboration likelihood model (Slater & Rouner, 2002). For instance, in transportation theory, it is expected that when being exposed to media content, users actively interact with media content and show affective and cognitive responses (Green, Brock, & Kaufman, 2004). Numerous studies have shown that media users engage in cognitive, emotional, and excitative responses when being exposed to (sexual) media messages (e.g., Allen et al., 2007; Green, 2006; Green & Brock, 2000).

The DSMM predicts that prior media exposure may affect media users' responses to future media content, which may subsequently influence users' attitudes and behavior. The DSMM does not specify the causal order between attitudes and behavior. However, social cognitive theory, on which the DSMM builds, posits that the formation of attitudes likely precedes the performance of a particular behavior (Bandura, 2001). Before initiating behavior, individuals are expected to engage in cognitive processes that evaluate the favorability of the behavior they consider to enact. A combined theoretical framework of the DSMM (Valkenburg & Peter, 2013a, b) and social cognitive theory (Bandura, 2001) thus suggests that a two-step mediation model of (1) state-type variables and (2) attitudinal variables may explain the relationship between media use (i.e., selection of SEIM) and behavioral outcomes (i.e., engaging in casual sexual activities).

For the relationship between selection of SEIM and casual sexual activities, the literature points to the cognitive state of perceived utility of SEIM as a state-type variable (Peter & Valkenburg, 2006, 2010) and to instrumental attitudes toward sex as an attitudinal variable (Ward et al., 2011). As to the perceived utility of media content, the evaluation of the utility of the media content during media exposure becomes more favorable when using the medium more often (Valkenburg & Peter, 2013a, b). It is important to note that perceived utility is not conceptualized here as a trait or preexisting schema that would be independent of SEIM use. Even though adolescents may develop ideas about the utility of SEIM independent of using SEIM (e.g., from parents or peers), prior research has indicated that watching SEIM increases adolescents' evaluations

of its perceived utility. More precisely, studies have shown that the more adolescents use SEIM, the more they perceive to derive useful personal information when watching SEIM, when assessed both cross-sectionally and longitudinally (Peter & Valkenburg, 2006, 2010). In addition, transportation theory (Green, 2006) and the extended elaboration likelihood model (Slater & Rouner, 2002) have suggested that people's engagement with media content can increase the perceived realism of such content (Green, 2006). It can thus be expected that more frequent exposure to highly arousing content such as SEIM may increase the perceived utility of SEIM.

Various theories, such as the DSMM (Valkenburg & Peter, 2013a, b) and social cognitive theory (Bandura, 2001), suggest that media users may be more likely to be influenced by these media messages because they consider media content relevant for their lives (i.e., perceived utility of media messages). The more media users believe they can learn from or receive relevant information of a media source, the more willing they are to accept the messages promoted in the media source. Accordingly, the perceived utility of SEIM has been demonstrated to mediate the extent to which watching SEIM triggered a change in adolescents' sexual attitudes (Peter & Valkenburg, 2006, 2010; Vandenbosch, van Oosten, & Peter, 2018). Similar findings have been reported in research on the mediating role of perceived realism in the relationship between the use of general entertainment media and instrumental attitudes toward sex (Chock, 2011). In conclusion, theoretical models, such as the DSMM (Valkenburg & Peter, 2013a, b) and transportation theory (Green, 2006), as well as empirical research (e.g., Chock, 2011) suggest that perceived utility may mediate the relationship between sexual media use and sexual attitudes.

As to instrumental attitudes toward sex, the literature has suggested that an instrumental perspective toward sex is often portrayed in SEIM (Klaassen & Peter, 2015; Van Doorn, 2010). Such a perspective is not only visualized by focusing on casual sex adventures (e.g., Brosius et al., 1993), but also in the portrayal of characters that have sex with others without considering relational or romantic aspects (Brosius et al., 1993; Klaassen & Peter, 2015). Several empirical studies have demonstrated positive relations between using SEIM and attitudes related to an instrumental interpretation of sexual activities (e.g., Omori, Zhang, Allen, Ota, & Imamura, 2011; Ter Bogt, Rutger, Engels, Bogers, & Kloosterman, 2010). More specifically, studies have shown that such attitudes toward sexuality mediated the relationship between general entertainment and pornographic media use and outcomes related to one's own sex life (e.g., Štulhofer, Buško, & Schmidt, 2012; Ward et al., 2011). For instance, Ward et al. demonstrated that a favorable attitude toward casual sex mediated the relationship between the use of men's magazines and movies and the number of casual sexual partners.

Taken together, the aforementioned theoretical considerations and empirical results from earlier research suggest

a two-step mediation model for the relationship between SEIM use and engagement in casual sex activities: We thus hypothesized:

Hypothesis 2a In a first step, the state-type variable of perceived utility of SEIM mediates the relationship between SEIM use and instrumental attitudes.

Hypothesis 2b In a second step, instrumental attitudes toward sex further mediate the relationship between perceived utility of SEIM and engagement in casual sexual activities.

Reciprocal Relationships Within the Two-Step Mediation Model

The DSMM proposes that the relationship between media exposure and state variables can be transactional (Valkenburg & Peter, 2013a, b). Thus, the experience of a particular state may also predict over time whether users will again consume the media content that evoked the state in the first place. In line with the DSMM, the literature has suggested that the perceived utility of SEIM stimulates watching SEIM. Qualitative research has shown that media users enjoy media content more when they perceive it as realistic (Steele & Brown, 1995). Similarly, a longitudinal study among Dutch adolescents has demonstrated that the perceived utility of SEIM predicted watching SEIM over time (Peter & Valkenburg, 2010). Therefore, we hypothesized:

Hypothesis 3 Perceived utility of SEIM and watching SEIM will be reciprocally related to each other over time.

Bem's (1967) self-perception theory focuses on individuals' self-perceptions or reflections about one's own behavior. This theory posits that many behaviors are associated with a set of beliefs about individuals who perform particular behaviors. Once someone has engaged in a behavior, he or she is likely to conform to the role that has been ascribed to performers of a particular behavior. The predictions of this theory have been supported in several studies (e.g., Frison, Vandebosch, Trekels, & Eggermont, 2015; Yee & Bailenson, 2007). Regarding casual sex, the literature has suggested that the sexual norms of individuals who engage in casual sex are more liberal and more favorable toward sex that occurs in an uncommitted context (Heldman & Wade, 2010; Stinson, 2010). On the basis of self-perception theory (Bem, 1967), we may thus expect that adolescents who have previously engaged in casual sex will develop positive attitudes toward casual sex and may gradually adopt more instrumental attitudes toward sexual activities that favor

physical pleasure over affection and intimacy (Peter & Valkenburg, 2010). In addition to the influence of instrumental attitudes on sex, which we predicted based on social cognitive theory (Bandura, 2001), we thus expect that casual sex will also predict adolescents' sexual attitudes. Consequently, we hypothesized:

Hypothesis 4 Instrumental attitudes toward sex and engaging in casual sex will be reciprocally related to each other over time.

Figure 1 summarizes the relationships that are predicted in Hypotheses 1 to 4.

Gender Differences

The DSMM (Valkenburg & Peter, 2013a, b) predicts that dispositional susceptibility variables affect how exposure to media content influences individuals. A potentially important dispositional susceptibility variable for the relationship between watching SEIM and casual sex may be gender. First, SEIM has been found to attribute an active, dominant role in sexual interactions more often to men than to women (e.g., Brosius et al., 1993; Klaassen & Peter, 2015). Second, boys and girls tend to be socialized toward different sexual attitudes and behaviors (Petersen & Hyde, 2011; Tolman et al., 2003). By and large, girls are more often supported to value engagement in a committed romantic relationship, while boys' engagement in sexual adventures is often seen as something normative and rewarding (Tolman et al., 2003). Consistent with these different gender roles, males report more sexual partners than females do (Petersen & Hyde, 2011) and tend to experience casual sex differently (Allison & Risman, 2013; Manning, Giordano, & Longmore, 2006). Thus, the literature suggests that male characters are more likely to have an active sexual role in SEIM and male adolescents receive more social rewards for engaging in casual sex. This may imply that male adolescents perceive the portrayal of casual sex activities in SEIM as more relevant for their personal lives (i.e., perceived utility of media messages) as opposed to female adolescents. Subsequently, they may be more likely to adopt instrumental attitudes toward sex and engage in casual sex.

Research on the consequences of pornography use regarding instrumental attitudes and sexual experience, however, has produced inconsistent results, with several studies not finding any differential effects of online pornography use between boys and girls (e.g., Peter & Valkenburg, 2009a, 2010; Vandebosch & Eggermont, 2013) and other research demonstrating such differential effects (e.g., Brown & L'Engle, 2009). For instance, one study supported a greater influence of pornographic material on boys by showing that exposure to sexually explicit content predicted an increased acceptance of permissive sexual norms

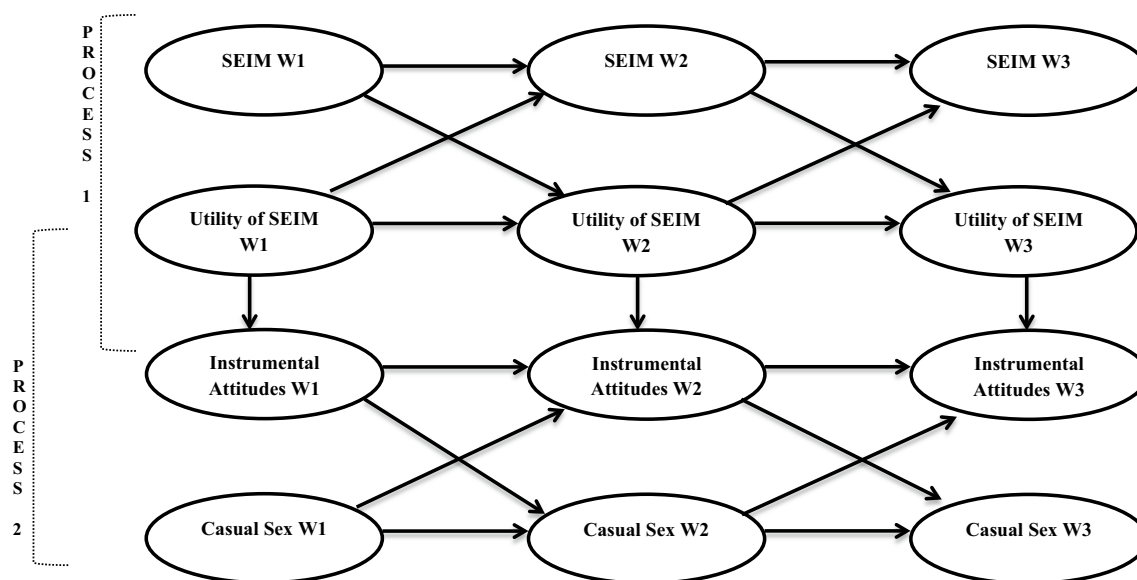


Fig. 1 Hypothesized model on the two-step process of perceived utility of SEIM and instrumental attitudes toward sexuality in the relationship between watching SEIM and involvement in casual sex. *Note:* SEIM sexually explicit Internet material, W1 Wave 1, W2 Wave 2, W3 Wave 3

among boys but not among girls (Brown & L'Engle, 2009). Such gender difference, however, did not occur in a study by Peter and Valkenburg (2010) on the relation between watching SEIM and instrumental attitudes toward sex.

The reason for these inconsistent findings is unclear. More attention to gender-specific underlying processes may potentially help to understand the inconsistencies in previous research. The gender difference may particularly unfold in the relationship between SEIM exposure and adolescents' perceived utility of SEIM, but may be less relevant in the direct relationships between SEIM exposure and sexual outcomes. Given the aforementioned inconsistent research findings on gender differences in the effects of SEIM, we abstained from formulating a hypothesis and posed a research question instead:

Research Question 1: Are there differences for male and female adolescents in the relationships between watching SEIM and casual sex and the underlying mechanisms?

Method

Participants and Procedure

This study relies on data from a three-wave online panel study¹ with an interval of 6 months, carried out between May

¹ The data of this three-wave panel study have also been used in six other papers of the authors to study the antecedents of SEIM use and relationships of SEIM use with other sexual outcomes. These papers can be acquired by sending an e-mail to the corresponding author.

2013 and May 2014 among 13- to 17-year-old Dutch adolescents by Veldkamp, a Dutch research agency. At baseline, 2137 adolescents participated (response rate = 78%); this sample was randomly selected from an existing panel of adolescents that is representative of the Dutch population regarding age, family composition, residential area, educational degree, and gender. Active parental consent was requested before the adolescents were asked to participate. Adolescent participants received an e-mail with an invitation to participate in the study. In line with the general educational schooling level in the Netherlands (CBS, 2014), most of the parents of the adolescents who were included in our study (77%) had followed a university or intermediate or higher vocational education. Six months later (Wave 2), 1765 adolescents (response rate from Wave 1 to Wave 2 = 82.59%) of those who had participated at baseline participated again. Finally, 1 year later (Wave 3), 1467 adolescents of those who had participated at baseline participated again (response rate from Wave 2 to Wave 3 = 83.12%; response rate from Wave 1 to Wave 3 = 68.65%). At baseline, the mean age of the 1467 adolescents that had participated in all waves was 14.94 ($SD = 1.40$), 50% were male and 93.5% identified themselves as heterosexual. Using Pillai's trace, a MANOVA analysis revealed that there were no significant differences between adolescents participating only at baseline and adolescents participating at all waves regarding age, gender, heterosexual orientation, watching SEIM, perceived utility of SEIM, instrumental attitudes toward sexual activities, and experience with casual sexual activities, $V = .01$, $F(7, 1890) = 1.74$, $p = .10$, $\eta p^2 = .01$.

Of the 1467 adolescents that had participated in all waves, the analytical sample included all respondents who were able to answer questions regarding the perceived utility of SEIM. Because some adolescents may find it difficult to answer questions about SEIM, adolescents were offered the answer category “I don’t know.” Adolescents who had indicated one or several times “I don’t know” on the items about the perceived utility in one or multiple waves were excluded from the dataset, resulting in a final sample of 1079 respondents (53.1% boys and 93.5% heterosexual orientation).^{2,3}

² An additional MANOVA analysis ($N = 1,467$), using Pillai’s trace, was performed to document the differences between the respondents who answered “I don’t know” on at least one of the questions regarding the perceived utility of SEIM at Wave 1 and also participated in Waves 2 and 3 ($N = 388$) and those respondents who answered all the questions at Wave 1 and also participated in Waves 2 and 3 ($N = 1079$, the analytical sample of the study). The analysis included age, gender, heterosexual orientation, watching SEIM, instrumental attitudes toward sexual activities, and experience with casual sexual activities, $V = .12$, $F(6, 1460) = 32.72$, $p < .001$, $\eta^2 = .12$. Significant differences were found for all variables except heterosexual orientation, $p = .99$. Descriptive statistics showed that respondents with missing data on one of the perceived utility questions were younger, more likely to be girls, and scored lower on watching SEIM, instrumental attitudes toward sex and casual sex activities, all $p < .001$. These findings are in line with prior literature reporting on the characteristics of adolescents who consume SEIM (e.g., Peter & Valkenburg, 2006).

³ The structural equation models reported in Figs. 2 and 3 were also tested with a sample that included the participants with missing data ($N = 2,137$). Automatic imputation was conducted to replace missing values in SPSS (version 23). A pooled dataset of the mean estimates of the missing data was calculated from the five imputed datasets (i.e., multiple imputation, Acocck, 2007).

The results for the model that tested the reciprocal relationships between watching SEIM and casual sex were similar to the results reported in the manuscript for the sample that excluded participants with missing values ($N = 1079$, Fig. 2). The model, $\chi^2(202) = 2524.88$, $p < .001$, CFI = .95, RMSEA = .07 (90% CI: .071/.076), $\chi^2/df = 12.50$, showed that all paths were similar to the model reported in Fig. 2.

The results for the model that tested the two-step mediation model showed a good fit, $\chi^2(833) = 4313.35$, $p < .001$, CFI = .95, RMSEA = .04 (90% CI: .043/.046), $\chi^2/df = 5.18$. The results for the paths were similar to the results reported in Fig. 3, except for three paths. Exposure to SEIM at Wave 1 positively predicted perceived utility of SEIM at Wave 2, $\beta = .07$, $B = .07$, $SE = 0.26$, $p < .01$ (bc 95% bt CI: .021/.130). This relationship was not significant in the model shown in Fig. 3. The path from instrumental attitudes toward sex at Wave 1 marginally significantly predicted casual sex at Wave 2 according to the bootstrapped confidence intervals, $\beta = .05$, $B = .01$, $SE = 0.00$, $p < .05$ (bc 95% bt CI: $-.001$ /.013). This path was significant in the model in Fig. 3. In addition, the paths from engagement into casual sex at Wave 1/Wave 2 to instrumental attitudes toward sex at Wave 2/Wave 3 were significant, respectively, $\beta = .09$, $B = .67$, $SE = 0.17$, $p < .001$ (bc 95% bt CI: .268/1.105), $\beta = .07$, $B = .46$, $SE = 0.15$, $p < .005$ (bc 95% bt CI: .136/.815). These paths were not significant in the model in Fig. 3. This shows that systematic drop-out due to unfamiliarity with SEIM (see footnote 2) may influence the results. Because imputation methods have been debated (Allison, 2003), we chose to report the results without imputation in the results section.

Measures

Sociodemographic Traits

Participants indicated whether they were a boy (= 1) or a girl (= 2), their age, and heterosexual orientation. Peter and Valkenburg’s (2011) adapted measure of the H-scale developed by Kinsey, Pomeroy, and Martin (1948) was used to measure heterosexual orientation. Adolescents indicated whether they were sexually attracted to (= 1) only to boys, (= 2) mainly to boys, but also to girls, (= 3) equally to boys and girls, (= 4) mainly to girls, but also to boys, or (= 5) only to girls. The variable was recoded into a dichotomous variable “exclusively heterosexual orientation” with the categories 0 (= *exclusively heterosexual*) and 1 (= *not exclusively heterosexual*).

Watching Sexually Explicit Internet Material

A 7-point scale (*never* = 1 through *several times a day* = 7) was used to address the extent to which adolescents had intentionally exposed themselves to sexually explicit, pornographic Internet content during the last 6 months, and more specifically, to (a) pictures with clearly exposed genitals, (b) videos with clearly exposed genitals, (c) pictures in which people are having sex, (d) or videos in which people are having sex (Peter & Valkenburg, 2008, p. 585). Principal component analysis indicated that all items loaded on one factor (Wave 1 eigenvalue = 3.55; explained variance = 88.67%; $\alpha = .96$). All items were averaged into a new variable; higher scores indicate higher levels of watching SEIM.

Perceived Utility of Sexually Explicit Internet Material

Adolescents rated on a 7-point Likert scale ranging from 1 (= *not at all applicable to me*) to 7 (= *very applicable to me*) three items from a scale used by Peter and Valkenburg (2010). Examples of items were “By watching sex on the Internet, you can learn things you wouldn’t learn otherwise,” and “Sex on the Internet gives you valuable information about sex.” The response category “I don’t know” (= coded as a missing value, $n = 388$) was added for respondents who believed they were not able to answer these questions or had indicated they had never watched pornographic content on the Internet. Principal component analysis indicated that all items loaded on one factor (Wave 1 eigenvalue = 2.48; explained variance = 82.79%; $\alpha = .90$). All items were averaged into a new variable; higher scores indicate higher levels of perceived utility of SEIM.

Instrumental Attitudes Toward Sexual Activities

We used the scale by Hendrick and Hendrick (1987) in a shortened four-item version (Peter & Valkenburg, 2010).

Peter and Valkenburg showed preliminary evidence of the test–retest reliability of this adapted (translated) scale among adolescents. Four items were rated on a 7-point Likert scale ranging from 1 (= *not at all applicable to me*) to 7 (= *very applicable to me*). The items were “Sex is primarily physical,” “Sex is just a game,” “The main goal of sex is that you yourself have a good time,” and “Sex is a physical need, like eating.” Principal component analysis indicated that all items loaded on one factor (Wave 1 eigenvalue = 3.00; explained variance = 60.2%; $\alpha = .83$). All items were averaged into a new variable; higher scores indicate higher levels of instrumental attitudes toward sex.

Experience with Casual Sexual Activities

In line with prior research on the link between sexual media content and adolescent sexual behavior (Collins et al., 2004), participants indicated with “yes” (= 1) or “no” (= 0) their experience with three sexual behaviors with someone that they were not in love with and with whom they did not have a relationship: (a) touching each other’s genitals, (b) giving or receiving oral sex, and (c) vaginal intercourse (penis inside the vagina). Adolescents who identified themselves as gay or lesbian or were undecided about their heterosexual orientation answered a question about “having sex” instead of “vaginal intercourse.” The structure of the measurement instrument for sexual experience can be considered hierarchical (Miller & Moore, 1990). In this case, Guttman’s Lambda 2 is preferred above Cronbach’s alpha to calculate the reliability of the scale (Guttman, 1945; Tang & Cui, 2012). Guttman’s Lambda 2 ($\lambda_2 > .84$) indicated a good reliability. All items were averaged into a new variable where higher scores indicated higher levels of experience with casual sexual activities.

Analytical Strategy

Descriptive statistics and zero-order correlations were calculated. Measurement invariance was tested by creating a structural equation model for each latent construct in which prior values of the construct were regressed on the values of the construct in the next wave (e.g., SEIM use Wave 1 predicted SEIM use Wave 2, which, in turn, predicted SEIM use Wave 3). Covariances between error terms of the same manifest items of latent constructs between waves were also included. These models were constructed to conduct measurement invariance tests over time and between gender. Such tests determine whether the measurement of a latent constructs remains stable over time and between boys and girls, respectively. Following Cheung and Rensvold (2002), measurement equivalence would occur if the difference in

the CFI values between an unconstrained model (i.e., factor loadings vary freely) and a constrained model (i.e., factor loadings are constrained to be equal) is lower than .01.

To test our hypotheses, two structural equation models were estimated.⁴ Previous research suggests an impact of age (Fortunato et al., 2010; Ybarra & Mitchell, 2005), heterosexual orientation (Peter & Valkenburg, 2011; Traeen, Stigum, & Sorensen, 2002), and gender (Peter & Valkenburg, 2006; Petersen & Hyde, 2011; Tolman et al., 2003) on engagement in casual sex and SEIM use. As a consequence, all models controlled for the baseline values of age, heterosexual orientation, and gender (except for the model testing gender differences) by modeling covariances with exogenous constructs and predictive paths to endogenous constructs. Variables that are known as outcomes of SEIM use are generally not considered as control variables as the literature warns against undesirable effects of such “bad controls” in predictive models (Angrist & Pischke, 2008, 2015). Moreover, the model controlled for prior values of a particular endogenous construct. For instance, watching SEIM at baseline predicted watching SEIM at Wave 2. The inclusion of such autoregressive control variables is considered a highly conservative test of a sexual media effect relationship (Little, Card, Preacher, & McConnell, 2009; Wright & Bae, 2013). The fit was evaluated based on Byrne (2001): CFI ($\geq .90$) and RMSEA ($\leq .08$).

Exposure to SEIM, perceived utility of SEIM, instrumental attitudes toward sex, and casual sex activities were modeled as latent variables, with the items measuring the latent constructs as manifest variables. The control variables age, heterosexual orientation, and gender were entered as manifest variables. Covariances between error terms of the same manifest items of latent constructs between waves as well as between exogenous constructs of the same wave and error terms of endogenous constructs of the same wave (except

⁴ Because our three-wave design did not allow to model the relationship between perceived utility of SEIM and instrumental attitudes toward sex over time, a separate model was tested. In line with cognitive dissonance theory (Festinger, 1957) and RSM (Slater, 2007, 2014), a new model with the cross-lagged relationships between perceived utility of SEIM and instrumental attitudes toward sex was tested. Age, gender, and heterosexual orientation were added as control variables. The fit was good, $\chi^2(202) = 412.70$, $p < .001$, CFI = .99, RMSEA = .03 (90% CI: .027/.035), $\chi^2/df = 2.04$, and *all* expected longitudinal paths between perceived utility of SEIM and instrumental attitudes toward sex were significant according to normal test theory and bootstrapped CFI’s, $p < .05$. One exception was that perceived utility of SEIM at Wave 1 significantly predicted instrumental attitudes at Wave 2 according to results of normal test theory, $\beta = .09$, $B = .07$, $SE = 0.32$, $p < .05$, but marginally significant according to bootstrapping analysis, bc 95% bt CI: $-.004/.137$. The model thus supported that perceived utility of SEIM is a predictor of instrumental attitudes toward sex, but also that instrumental attitudes toward sex predict the perceived utility of SEIM over time.

Table 1 Means, standard deviations, and zero-order correlations of the key variables ($N = 1079$)

	M	SD	Zero-order correlations												
			2	3	4	5	6	7	8	9	10	11	12	13	14
1. Watching SEIM W1	1.84	1.28	.66**	.65**	.35**	.26**	.27**	.32**	.25**	.28**	.24**	.20**	.25**	.07*	.04
2. Watching SEIM W2	1.88	1.31	1	.70**	.28**	.34**	.30**	.27**	.29**	.26**	.11**	.17**	.19**	.04	-.01
3. Watching SEIM W3	2.04	1.36		1	.29**	.31**	.39**	.32**	.28**	.36**	.18**	.17**	.27**	.02	.03
4. Perceived utility SEIM W1	2.93	1.48			1	.52**	.46**	.39**	.30**	.27**	.11**	.14**	.16**	-.02	.06*
5. Perceived utility SEIM W2	2.84	1.51				1	.52**	.29**	.40**	.35**	.05	.11**	.11**	-.04	.04
6. Perceived utility SEIM W3	2.81	1.47					1	.32**	.34**	.41**	.08*	.12**	.21**	-.01	.02
7. Instrumental attitudes W1	2.92	1.31						1	.56**	.54**	.19**	.17**	.21**	-.06	.00
8. Instrumental attitudes W2	2.85	1.34							1	.62**	.15**	.27**	.25**	-.07*	-.03
9. Instrumental attitudes W3	2.86	1.31								1	.17**	.20**	.27**	-.07*	-.01
10. Casual sex W1	.07	0.23									1	.52**	.50**	.19**	.05
11. Casual sex W2	.09	0.25										1	.61**	.18**	.00
12. Casual sex W3	.11	0.26											1	.19**	.03
13. Age W1	15.11	1.39												1	.01
14. Heterosexual orientation W1	.06	0.25													1

SEIM sexually explicit Internet material, W1 Wave 1, W2 Wave 2, W3 Wave 3

** $p < .01$; * $p < .05$ (two-tailed)

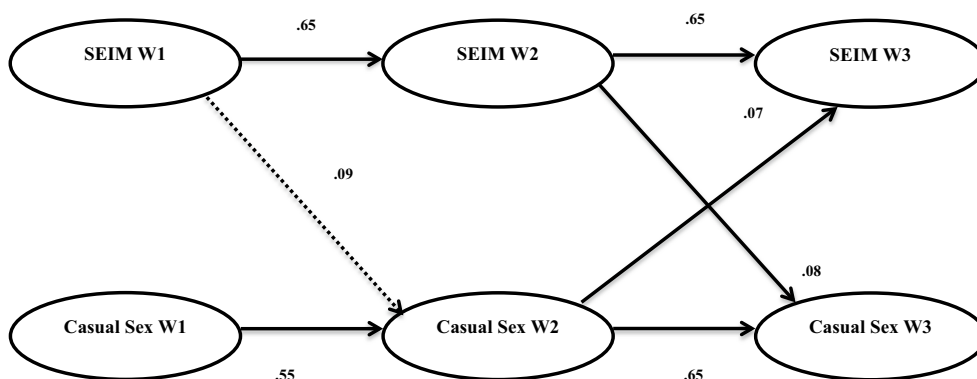


Fig. 2 Model showing standardized coefficients for relationships between watching SEIM and involvement in casual sex ($N = 1079$). Note: All full paths were significant at $p < .05$ (two-tailed) based on results of normal test theory and bootstrapped 95% confidence inter-

vals. Dotted paths were marginally significant according to bootstrapped 95% confidence intervals. For clarity, error terms, covariance, and measurements are not shown. SEIM sexually explicit Internet material, W1 Wave 1, W2 Wave 2, W3 Wave 3

between the mediators of perceived utility and instrumental attitudes) were also modeled.

Hypothesis 1 was tested in the first model. This model included the reciprocal relationships between watching SEIM and involvement in casual sexual activities. A second model tested Hypotheses 2 through 4 as illustrated in Fig. 1. This model included the relationships between watching SEIM, perceived utility of SEIM, instrumental attitudes, and casual sexual activities. The temporal order in the model in Fig. 1 is the only model possible to test simultaneously the mediating roles of perceived utility of SEIM and instrumental attitudes,

the reciprocal relationships between the use of SEIM and the perceived utility of SEIM, and the reciprocal relationships between instrumental attitudes and casual sexual activities.

Descriptive statistics indicated that the skewness level of heterosexual orientation and experience with casual sexual activities was above 3.0 and the kurtosis level of these variables also exceeded 10.0. According to Kline (2010), the normality assumption was thus violated, which is common in sex-related research. In line with prior research on SEIM (e.g., Peter & Valkenburg, 2010), bootstrapping (95% bias-corrected bootstrapped confidence intervals [bc95%btCI];

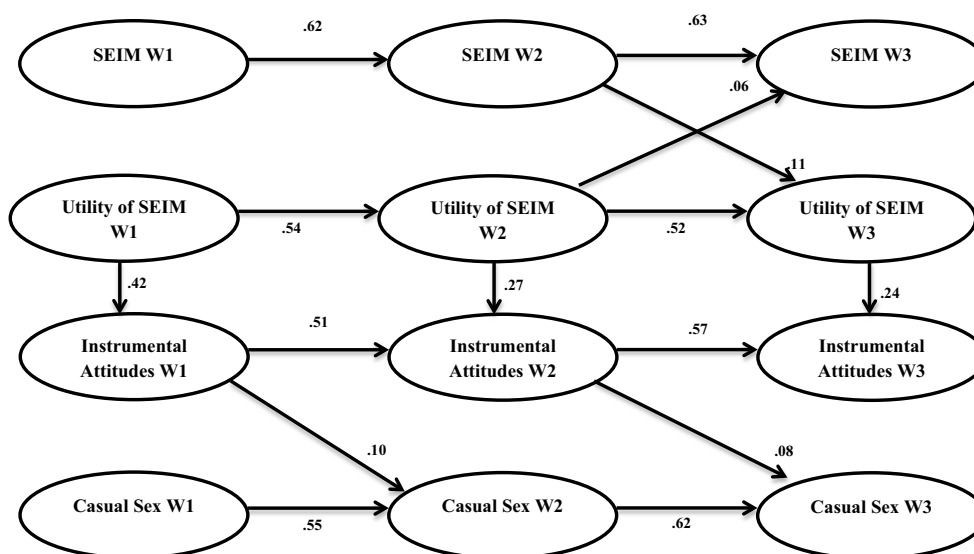


Fig. 3 Model showing standardized coefficients for relationships between watching SEIM, perceived utility of SEIM, instrumental attitudes, and involvement in casual sex ($N = 1079$). *Note:* All full paths were significant at $p < .05$ (two-tailed) based on results of normal test

theory and bootstrapped 95% confidence intervals. For clarity, error terms, covariance, and measurements are not shown. *SEIM* sexually explicit Internet material, *W1* Wave 1, *W2* Wave 2, *W3* Wave 3

1000 bootstrapped samples) was used to validate the parametric significance tests. Moreover, bootstrapped confidence intervals around indirect effects were calculated to test the significance of the indirect relationship between watching SEIM at Wave 1 and casual sexual activities at Wave 3.

To address Research Question 1, model constrain tests were conducted for models 1 and 2 to test whether the fit of an unconstrained model that allowed differences between boys and girls for the hypothesized pathways was superior to the fit of a model constraining hypothesized pathways to be similar between boys and girls (Rigdon, Schumacker, & Wothke, 1998) in AMOS 23.

Results

Table 1 presents the descriptive statistics of all relevant variables. Additionally, the percentile distribution was also calculated. At baseline, almost half of the sample had recently accessed SEIM (46.2%). This number slightly increased in Waves 2 (47.5%) and 3 (51.4%). One out of ten adolescents had engaged in casual sex activities at baseline (11.6%). This number showed an increasing trend over time (Wave 2 = 15.1%; Wave 3 = 17.7%). In addition, approximately one out of six adolescents held moderate-to-strong instrumental attitudes toward sex (Score > 4; Wave 1 = 18.1%, Wave 2 = 15.8%, Wave 3 = 17.3%). One in five adolescents

moderately to strongly believed they may learn something from watching SEIM. This number slightly decreased when the panel grew older (Score > 4; Wave 1 = 21.4%, Wave 2 = 20.7%, Wave 3 = 19.1%). The zero-order correlations further presented some initial evidence that watching SEIM, perceived utility of SEIM, instrumental attitudes toward sexual activities, and involvement in casual sexual activities were related to each other.

Measurement Invariance Tests

As for the measurement invariance tests over time (unconstrained vs constrained model), the results showed that ΔCFI was smaller than .01 for the measures of SEIM use (.935/.934), involvement in casual sexual activities (.987/.987), perceived utility of SEIM (.991/.991), and instrumental attitudes toward sexual activities (.987/.987).

As for the measurement invariance tests between gender groups (unconstrained vs constrained model), the results showed that ΔCFI was smaller than .01 for the measures of SEIM use (.916/.916), involvement in casual sexual activities (.988/.986), perceived utility of SEIM (.991/.981), and instrumental attitudes toward sexual activities (.977/.977).

Together, these results indicate that the factor loadings for each latent construct were equal over time and did not differ between boys and girls. Measurement equivalence was thus obtained over time and between gender groups.

Watching SEIM and Casual Sex

Hypothesis 1 predicted that watching SEIM and involvement in casual sexual activities would be reciprocally related. The fit of the model testing this relationship, as shown in Fig. 2, was overall acceptable, $\chi^2(202) = 1508.77$, $p < .001$, CFI = .94, RMSEA = .08 (90% CI: .074/.081), $\chi^2/df = 7.47$. Watching SEIM at Wave 1 predicted adolescents' engagement in casual sexual activities at Wave 2, $\beta = .09$, $B = .01$, SE = 0.00, $p < .01$ (bc 95% bt CI: .000/.025; marginally significant). Also, watching SEIM at Wave 2 was significantly related to frequency of engaging in casual sex at Wave 3, $\beta = .08$, $B = .01$, SE = 0.00, $p < .01$ (bc 95% bt CI: .001/.024). Although adolescents' casual sexual activities at Wave 1 did not significantly predict watching SEIM at Wave 2, $\beta = -.05$, $B = -.35$, SE = 0.19, $p = .07$ (bc 95% bt CI: $-.843/.198$), engaging in casual sex at Wave 2 significantly predicted watching SEIM at Wave 3, $\beta = .07$, $B = .54$, SE = 0.19, $p < .005$ (bc 95% bt CI: .019/1.061).

With regard to Research Question 1, the model constrain test revealed no support for gender differences as the fit of the constrained model, $\chi^2(378) = 1903.78$, $p < .001$, CFI = .93, RMSEA = .06 (90% CI: .06/.06), $\chi^2/df = 5.04$, was not superior to the fit of the unconstrained model, $\chi^2(374) = 1898.31$, $p < .001$, CFI = .93, RMSEA = .06 (90% CI: .06/.06), $\chi^2/df = 5.08$, CMIN (4) = 5.48, $p = .24$.

Testing a Two-Step Model of Underlying Mechanisms

Hypothesis 2 posited that watching SEIM would indirectly relate to engaging in casual sexual activities through a two-step mediation process of perceived utility of SEIM and instrumental attitudes toward sexual activities. In addition, Hypothesis 3 predicted that perceived utility and watching SEIM would be reciprocally related to each other. Hypothesis 4 stated that the relationships between instrumental attitudes and casual sex would be reciprocal. The model testing Hypotheses 2–4 (see Fig. 3) demonstrated a good fit of the data, $\chi^2(833) = 2506.59$, $p < .001$, CFI = .96, RMSEA = .04 (90% CI: .041/.045), $\chi^2/df = 3.01$. The results partially supported the two-step mediation model that was predicted in Hypothesis 2. Watching SEIM at Wave 1 did not predict adolescents' perceptions of the utility of SEIM at Wave 2, $\beta = .05$, $B = .05$, SE = 0.04, $p = .15$ (bc 95% bt CI: $-.024/.121$). However, watching SEIM at Wave 2 was significantly related to perceived utility of SEIM at Wave 3, $\beta = .11$, $B = .12$, SE = 0.03, $p < .001$ (bc 95% bt CI: .039/.183).

Furthermore, at all waves, the data supported the hypothesized relationships between perceived utility of SEIM and instrumental attitudes toward sexual activities.⁵ Perceived

utility at Wave 1, Wave 2, and Wave 3 cross-sectionally predicted, respectively, instrumental attitudes at Wave 1, $\beta = .42$, $B = .40$, SE = 0.03, $p < .001$ (bc 95% bt CI: .331/.471), Wave 2, $\beta = .27$, $B = .25$, SE = 0.03, $p < .001$ (bc 95% bt CI: .185/.314), and Wave 3, $\beta = .24$, $B = .23$, SE = 0.03, $p < .001$ (bc 95% bt CI: .169/.287).

In addition, instrumental attitudes were related to casual sexual activities over time. Instrumental attitudes toward sex at Wave 1 and Wave 2 predicted, respectively, adolescents' casual sexual activities at Wave 2, $\beta = .10$, $B = .01$, SE = 0.00, $p < .005$ (bc 95% bt CI: .003/.025) and Wave 3, $\beta = .08$, $B = .01$, SE = 0.01, $p < .01$ (bc 95% bt CI: .002/.022). However, according to the bootstrap estimates, the indirect relationship between watching SEIM at Wave 1 and casual sexual activities at Wave 3 was not significant (bc 90% bt CI: .000/.001).

The reciprocal pattern of the relationships between watching SEIM and perceived utility of SEIM (= Hypothesis 3) was partially confirmed. Perceived utility of SEIM at Wave 1 was not a significant predictor of watching SEIM at Wave 2, $\beta = .04$, $B = .04$, SE = 0.02, $p = .16$ (bc 95% bt CI: $-.018/.088$). However, perceived utility of SEIM at Wave 2 did predict adolescents' selective exposure to SEIM at Wave 3, $\beta = .06$, $B = .06$, SE = 0.02, $p < .01$ (bc 95% bt CI: .014/.118).

Regarding Hypothesis 4, no support emerged for an inverse relationship between casual sex and instrumental attitudes. Casual sex at Wave 1 did not predict adolescents' instrumental attitudes at Wave 2, $\beta = .06$, $B = .44$, SE = 0.22, $p = .05$ (bc 95% bt CI: $-.095/1.011$). Instrumental attitudes at Wave 3 were also not predicted by casual sex activities at Wave 2 according to results of normal test theory, $\beta = .03$, $B = .24$, SE = 0.21, $p = .26$, and bootstrapping analysis, bc 95% bt CI: $-.295/.726$.

Lastly, the model constrain test regarding Research Question 1 indicated the reported relationships were similar among boys and girls.⁶ The fit of the constrained model, $\chi^2(1617) = 3750.67$, $p < .001$, CFI = .94, RMSEA = .04 (90% CI: .03/.04), $\chi^2/df = 2.32$, was not superior to the fit of the unconstrained model, $\chi^2(1606) = 3741.71$, $p < .001$, CFI = .94, RMSEA = .04 (90% CI: .03/.04), $\chi^2/df = 2.33$, CMIN (11) = 8.96, $p = .626$.

⁶ Prior literature has suggested that the influence of sexual media content may differ according to age (Ward, 2003). Therefore, we conducted two additional model constrain tests to examine whether the models reported in Figs. 2 and 3 differed between adolescents aged 13 to 15 years ($n = 613$) and adolescents aged 16 to 17 years ($n = 466$). These models controlled for heterosexual orientation and gender. The results showed the relationships were not significantly different for the models shown in Fig. 2, CMIN (4) = 7.47, $p = .113$, and Fig. 3, CMIN (11) = 10.61, $p = .467$. Age did not moderate the results.

⁵ See footnote 4

Discussion

Prior cross-sectional research has pointed to a relationship between using SEIM and casual sex (Lo et al., 1999; Lo & Wei, 2005; Mattebo et al., 2014). Extending this literature, the current three-wave panel study demonstrated that frequent viewers of SEIM are more likely to engage in casual sex over time. However, only mixed support emerged for the reverse relationship between casual sex and the selection of SEIM.

In addition, the present study aimed at explaining how watching SEIM related to adolescents' casual sexual activities by integrating multiple explanatory processes and acknowledging their dynamic nature. In line with the DSMM (Valkenburg & Peter, 2013a, b) and social cognitive theory (Bandura, 2001), we found that a two-step mediation model, including the state-type variable of perceived utility of SEIM and the attitudinal variable of instrumental attitudes toward sexuality, may have some potential to explain the relationship between selective exposure to SEIM and engaging in causal sexual activities. More specifically, exposure to SEIM predicted perceived utility of SEIM (but only from Wave 2 to Wave 3), and perceived utility of SEIM predicted instrumental attitudes toward SEIM (although mostly from Wave 2 to Wave 3, see footnote 4), which in turn predicted adolescents' engagement in casual sex.

Several inconsistent findings still remain to be resolved, also regarding the studied reciprocal relationships. Mixed results were found for a reciprocal relationship between watching SEIM and perceived utility. No support was found for a reciprocal relationship between casual sex and instrumental attitudes toward sex. Finally, in contrast to gender socialization literature (Tolman et al., 2003), all the reported relationships appeared to be similar among adolescent boys and girls. Our findings have several implications for future research.

Use of SEIM and Casual Sex

Adolescence is a period in which young people explore, and experiment with, their sexuality (e.g., Tolman & McClelland, 2011). This sexual experimentation includes causal sexual experiences (Fortunato et al., 2010), as we also demonstrated in our study. In response to a recent article highlighting the dearth of research on the role of using SEIM in casual sexual behavior (Heldman & Wade, 2010), the current study showed that casual sex may be motivated by adolescents' use of SEIM. Moreover, our findings initially point to the possibility that the increased availability of sexual media content in general (Garcia & Reiber, 2008; Weinberg, Lottes, & Gordon, 1997) and of SEIM in particular in the past years (Heldman & Wade, 2010) may be related to a trend toward more casual sexual relations among young people.

Our findings further merge with literature emphasizing that the recurrent portrayal of casual sex as a preferred way to obtain sexual gratification relates to viewers' own sexual trajectory (Wright & Randall, 2012). However, the suggested role of SEIM in the increased incidence of casual sex adventures can only be understood when we also consider other non-media influences that are likely to play an important role as well (Shafer, Bobkowski, & Brown, 2013; Valkenburg & Peter, 2013a, b). For instance, the sociocultural change surrounding the link between intimacy and committed relationships (Heldman & Wade, 2010; Stinson, 2010) and the role of perceptions about peers' casual sex behavior (Shafer et al., 2013; Stinson, 2010) deserve further attention. Such cultural changes have especially been noted among early adults (Heldman & Wade, 2010), suggesting the relationships between SEIM use and casual sex may even be stronger among young adults and thus become stronger when adolescents grow older.

We conceptualized the relation between the selection of SEIM and casual sex using Slater's (2007, 2015) reinforcing spirals model. However, the propositions of the reinforcing spirals model were only partly supported as we did not find a consistent reciprocal relationship between SEIM use and engagement in casual sex. While the relationships that suggested a media effect (i.e., the influence of SEIM use on casual sex) were rather robust over time, relationships suggesting a media selection effect were not (i.e., the influence of casual sex on SEIM use). Although this pattern thus does not support a truly reinforcing spiral pattern, it is in line with results from earlier longitudinal research on the relation between SEIM use and adolescent sexuality. The (limited number of) available longitudinal studies on the use of SEIM (see Peter & Valkenburg, 2016) all suggest that SEIM use predicts adolescent sexual outcomes. Rather mixed findings have, however, been reported when studying the possibility of a reverse relationship (e.g., Peter & Valkenburg, 2008, 2009b; Vandenbosch & Eggermont, 2013).

To explain the mixed results among adolescents, research may consider explanations proposed in longitudinal research among adults that found no support for a reciprocal relationship between a more positive attitude toward extramarital sex and pornography consumption (Wright, Tokunaga, & Bae, 2014). This research suggested that in particular personality, physiological, and affective factors influence the consumption of pornography (Wright et al., 2014). According to this reasoning, SEIM use is rather driven by excitatory stimuli within an individual (e.g., the need for sensation) and is less dependent on one's sexual attitudes or behavior. Another possibility is that media selection effects may become stronger when adolescents grow older and become more independent. Such maturation effects have also been suggested in prior research on SEIM use among adolescents. A three-wave panel study reported that sexual satisfaction predicted adolescents'

use of SEIM between the second and the third wave, but not between the first and second wave (Peter & Valkenburg, 2009b). Future research is needed to further explore these explanations.

The Explanatory Value of a Two-Step Mediation Model with Attention for Reciprocity

We found partial support for the explanatory value of a two-step mediation model for the relationship between watching SEIM and casual sexual activities. Watching SEIM predicted that adolescents perceived SEIM as more relevant and realistic over time, but only from Wave 2 to Wave 3, not from Wave 1 to Wave 2. In turn, the increased perceived utility of SEIM was related to a more instrumental view toward sexuality. These instrumental attitudes subsequently related to a higher likelihood of engaging in casual sex over time. Previous research has focused especially on state-type variables to explain the influence of sexual media use (e.g., Chock, 2011; Davis, Norris, George, Martell, & Heima, 2006; Peter & Valkenburg, 2008, 2010; Vandenbosch et al., 2018). Our findings suggest that the explanatory process may be more complex. Specifically, our literature review and findings on the two-step mediation model suggest that, if we want to improve our theoretical understanding of how SEIM use relates to adolescent sexuality, we need to consider two theoretical propositions: first, the proposition of the DSMM that state-type variables precede attitudinal variables (Valkenburg & Peter, 2013a, b) and, second, the proposition of social cognitive theory that attitudinal variables precede behavioral variables (Bandura, 2001). The DSMM does not specify a temporal order between attitudes and behavior (Valkenburg & Peter, 2013a, b), but the results of our study together with social cognitive theory (Bandura, 2001) support this order. Future research should try to replicate our findings to advance our grasp of which type of variables underlie the effects of SEIM and in which temporal order.

Our study focused on a cognitive state-type variable, the perceived utility of SEIM. We could only partly support that watching SEIM increased perceived utility of SEIM over time. Again this finding may be explained by a maturation effect (Peter & Valkenburg, 2009a). The more adolescents grow older, the more their prior SEIM usage may affect their perceived utility perceptions when using SEIM. More research is needed to further explore why these results are not consistent over time.

However, we also need to explore other state-type and attitudinal variables to explain how using SEIM relates to adolescent sexuality. One particular important state-type variable may be the excitative factor of sexual arousal. Sexual arousal is typically seen as a key factor to understand the effects of sexually explicit material (Byrne, 1976; Peter &

Valkenburg, 2008; Wright, 2011). Studies have demonstrated that sexual arousal explains associations between exposure to sexually explicit material and sexual attitudes, such as sexual preoccupation (Peter & Valkenburg, 2008), acceptance of rape myths (Davis et al., 2006) and endorsement of hostile sexist beliefs (Hald, Malamuth, & Lange, 2013). As these attitudes are important antecedents of sexual behavior (Lonsway & Fitzgerald, 1994), two-step mediation models that include sexual arousal may be a promising direction for future research. Such research should take account of reciprocal relationships as sexual arousal derived from SEIM use and more general adolescents' sexual interest are expected to drive SEIM use (Peter & Valkenburg, 2008, 2016).

Future research may also consider a three-step mediation model including affective and cognitive state variables as well as an attitudinal variable preceding a behavioral outcome. In one recent paper, we found that the emotional state-type variable enjoyment of SEIM preceded the cognitive state-type variable perceived utility (Vandenbosch et al., 2018). As such, future research may combine the insights of the latter article suggesting an order exists in state-type variables (Vandenbosch et al., 2018), with the findings of the current paper on the order between attitudinal and behavioral outcomes.

Lastly, no reciprocal relationship emerged between instrumental attitudes and casual sex. These findings are in contrast to the predictions from Bem's (1967) self-perception theory. As this study was one of the first to test these relationships, we are cautious in concluding such relationships may not exist and encourage future research to further explore these relationships. Possibly, the development of instrumental attitudes due to more engagement in casual sex requires more time than the applied six months' time interval in the current study, or a more powerful study design is needed to report such relationships.

Gender Similarities

In line with several other investigations (e.g., Peter & Valkenburg, 2009b, 2010; Vandenbosch & Eggermont, 2013), we did not find evidence for gender differences in the relationships studied. Our results thus suggest that the relationship between watching SEIM and adolescents' engagement in casual sex is similar among boys and girls. Potentially, gender differences may still occur, but could not be addressed by the measure that we and several prior studies on SEIM used, that is, a measure of biological sex (e.g., Peter & Valkenburg, 2009b; Vandenbosch & Eggermont, 2013). Gender schema theory posits that a more differentiated measure that truly captures gender is more suitable to address the extent to which boys and girls have internalized a feminine or masculine identity (Bem, 1981). Such measures can also address

variations in girls' and boys' hyperfeminine and hypermasculine identities that may determine whether and how gender differences occur in adolescents' interactions with SEIM. Indeed, recent research has reported that hypergender orientations play a role in how adolescents select (Vandenbosch, 2015), respond to (Vandenbosch, 2015; van Oosten, Peter, & Boot, 2015), and are affected by SEIM (van Oosten, 2016). Therefore, we encourage future research to explore whether gender differences can be found when taking into account hypermasculinity and hyperfemininity.

Limitations

Our study has several limitations. First, although the longitudinal design is a desideratum in current research on adolescents' use of SEIM (e.g., Peter & Valkenburg, 2016), our three-wave panel study design was still limited. A four-wave panel study should be preferred in future research testing the influence of SEIM use (Wave 1) on casual sex (Wave 4) through perceived utility of SEIM (Wave 2) and instrumental attitudes (Wave 3). Second, it needs to be pointed out that our longitudinal study with its correlational design does not allow to infer causality claims or achieve the internal validity of experimental designs. Future experimental research (among emerging adults, given the ethical concerns of such research among adolescents) may further explore the proposed causal order in the two-step mediation model. Third, besides the role of perceived utility of SEIM as a response state (as it was interpreted in the current theoretical model), research has also suggested that perceived utility can be conceptualized as a moderator and thus a predefined trait (see Valkenburg & Peter, 2013a, b for a clear description on the role of perceived realism as a moderator versus a mediator in media effects research). Future research is advised to consider how trait perceived utility may moderate the links between SEIM use, instrumental attitudes, and casual sex experiences. Such research may especially be conducted among experienced SEIM consumers who may have developed more stable perceptions about the perceived utility of SEIM as a result of watching SEIM. The development of such stable perceptions may also relate to our results that show a relationship between SEIM use and perceived utility from Wave 2 to Wave 3, but not from Wave 1 to Wave 2. Fourth, the implications of the study findings need to be interpreted taking into account the effect size of the reported relationships. The effect sizes of the influence of SEIM were rather low, but in line with prior research on SEIM (e.g., Peter & Valkenburg, 2010; Wright & Randall, 2012). Media research, however, has pointed out that the importance of these associations should be compared with other socialization factors, such as parenting, that show similar effect sizes (Valkenburg & Peter, 2013a, b). Fifth, we cannot exclude the possibility that important control

variables such as pubertal maturation and sex drive (Peter & Valkenburg, 2016), which were not included in our data set, may change the pattern of our findings. Also, our sample lacked power to test the moderating influence of sexual experience on the relationship between SEIM use and casual sex behavior. Future research may consider to further examine the potential moderating role of sexual experience in an adapted study design among adolescents. Sixth, our use of self-report measures for sensitive behavior, along with the pertinent social desirability biases, may have led to an underreporting of the use of SEIM and casual sex experience, especially among girls (Petersen & Hyde, 2011). In addition, our measure of casual sex did not address the frequency to which adolescents engaged in different casual sex behaviors. Future research is advised to measure the number of different casual sex activities adolescents have engaged in, in combination with the frequency of engaging in such behaviors. Lastly, the study was conducted in the Netherlands. The cultural context may limit the generalizability of the findings as literature describes the Netherlands as a country with a rather liberal sexual orientation (Schalet, 2000).

Conclusion

The current findings may help scholars to grasp how watching SEIM is related to adolescents' sexuality. Specifically, our findings suggested that state-type variables (i.e., perceived utility of SEIM) and attitudinal (i.e., instrumental attitudes toward sexuality) variables may help to explain the relationship between watching SEIM and casual sexual activities among adolescents. However, several inconsistent results highlight the need for future research to further explore the explanatory power of this two-step mediation model.

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