

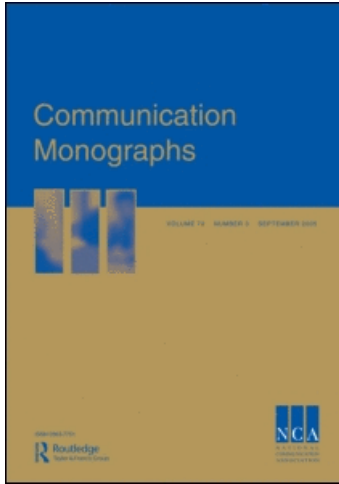
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Adolescents' Use of Sexually Explicit Internet Material and Sexual Uncertainty: The Role of Involvement and Gender

Jochen Peter & Patti M. Valkenburg

Research has shown that adolescents' use of sexually explicit Internet material (SEIM) is positively associated with an important characteristic of the developing sexual self, sexual uncertainty. However, the causal relation between SEIM use and sexual uncertainty is unclear. Moreover, we do not know which processes underlie this relation and whether gender moderates these processes. Based on a three-wave panel survey among 956 Dutch adolescents, structural equation modeling revealed that more frequent SEIM use increased adolescents' sexual uncertainty. This influence was mediated by adolescents' involvement in SEIM. The impact of SEIM use on involvement was stronger for female than for male adolescents. Future research on the effects of SEIM may benefit from greater attention to experiential states during SEIM use.

Keywords: Pornography; Teenagers; Youth; Media; Internet

In the past years, evidence has accumulated that adolescents' use of the Internet for sexual exploration is related to an important component of adolescents' identity development—the evolving sexual self (for a review, see e.g., Subrahmanyam & Greenfield, 2008). The sexual self refers to an individual's sense of him/herself as a sexual person. Because the use of sexually explicit Internet material (SEIM) has become a normative experience among adolescents (e.g., Brown & L'Engle, 2009; Peter & Valkenburg, 2006; Wolak, Mitchell, & Finkelhor, 2007), scholars have started to study whether the use of such material is related to specific characteristics of the sexual self. In this context, there has been first evidence that the use of SEIM is

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associated with greater sexual uncertainty (Peter & Valkenburg, 2008b). Sexual uncertainty can be considered an important characteristic of the developing sexual self (e.g., Schenkel & Marcia, 1972; Waterman & Nevid, 1977). It refers to the extent to which adolescents are unclear about their sexual beliefs and values. This uncertainty may show in poorly integrated, unclearly defined, and temporally unstable sexual beliefs and values (Peter & Valkenburg, 2008b).

Research on the link between adolescents' use of SEIM and sexual uncertainty has responded to long-standing requests for a stronger focus on how sexual media content contributes to adolescents' identity development (e.g., Brown, 2000; Ward, 2003). However, at least three shortcomings currently impair a better understanding of the relation between SEIM use and sexual uncertainty. First, due to the reliance on cross-sectional designs (e.g., Peter & Valkenburg, 2008b), existing research is still inconclusive about the causal relation between SEIM use and sexual uncertainty. Therefore, it is the first goal of this study to investigate, in a longitudinal design, the causal nature of the relation between the frequency of SEIM use and sexual uncertainty.

A second shortcoming refers to our lacking knowledge about how and why the frequency of SEIM use may affect the development of adolescents' sexual selves. Similar to other new research fields, research on the relation between adolescents' use of SEIM and the developing sexual self has rarely dealt with the processes that underlie this relation. However, first evidence has been presented that sexual arousal and positive affects toward SEIM mediate the effects of SEIM use on adolescents' sexual cognitions (Peter & Valkenburg, 2008a, 2009a). These findings suggest that investigating experiential states during the use of SEIM may help us better understand the effects of this material. Thus, the second goal of this study is to investigate whether an experiential state, such as the involvement in SEIM, may mediate the effect of the frequency of SEIM use on adolescents' sexual uncertainty.

A final shortcoming involves that we do not know whether female or male adolescents are more susceptible to the effects of SEIM use on sexual uncertainty. Some studies have started to investigate gender differences in the impact that SEIM use exerts on sexual cognitions and behavior (Brown & L'Engle, 2009; Peter & Valkenburg, 2008a, 2009b). But our knowledge of how this crucial variable affects the processes that underlie the effects of SEIM is still very limited. Therefore, the third goal of this study is to investigate whether the influence of SEIM use on sexual uncertainty and its underlying mechanisms depend on adolescents' gender.

By SEIM we mean professionally produced or user-generated (audio)visual material on or from the Internet which depicts sexual activities and (aroused) genitals in unconcealed ways, usually with a close-up on oral, anal, and vaginal penetration. *Playboy*-type nudity is not included in this definition. We do not imply that adolescents who use SEIM are morally or otherwise wrong. The use of SEIM among adolescents needs to be seen in the context of adolescents' sexual development, most notably the peak of sexual curiosity in adolescence (Savin-Williams & Diamond, 2004). At the same time, adolescents have integrated the

Internet into their daily lives more than any other age group, which also gives them unprecedented access to sexually explicit material.

Influence of SEIM Use on Sexual Uncertainty

Recent research has suggested that adolescents may become uncertain as they get in contact with sexual beliefs and values that typically present alternatives to, or conflict with, what they have learned about sex and sexuality from parents, teachers, and peers (Peter & Valkenburg, 2008b). Research on adolescents' sexual socialization suggests that at least three values are important to adolescents. First, several studies have documented that the majority of adolescents adhere to the sexual standard of permissiveness with affection (Reiss, 1960), that is, they consider an affectionate, committed relationship an important prerequisite to having sex (e.g., Sprecher & Hatfield, 1996). Second, both sexologists and sociologists have pointed out that, at the latest since the 1980s, "ethics of relationships" (Weeks, 1995, p. X) or "ethics of negotiation" (Schmidt, 2005, p. 10) increasingly dominate people's decisions about what is sexually acceptable. These ethics, in turn, require mutuality and consensus in sexual relations. Third and finally, at least in many Western countries, sex education since the 1960s has followed what Luker (2006) has called an "equality model of sexuality" (p. 244). Such a model emphasizes the reciprocity of sexual activities and responsiveness to the partner's wishes.

In contrast, content analyses of sexually explicit material have consistently pointed out that sex with affection, reciprocal and mutual sexual relations, and gender equality do not occur frequently. Rather, sexually explicit material is often characterized by unaffectionate sex, male dominance, and the objectification of women (Brosius, Weaver, & Staab, 1993; Cowan & Campbell, 1994; Cowan, Lee, Levy, & Snyder, 1988; Ertel, 1990; Jensen & Dines, 1998; Palys, 1986). Unaffectionate sex refers to sexual activities that lack warmth, care, or love. Typically, the sexual partners are most concerned with the fulfillment of their own sexual pleasures, and the sexual partner is exchangeable. Brosius et al. (1993) have found that unaffectionate sex occurred in about 94% of the video films investigated. Ertel (1990) has reported that unaffectionate sex characterized 82% of the pornographic scenes studied.

Male dominance as a characteristic of sexually explicit material can be defined as one-sided sexual activity in which the man controls the situation and commands the woman. The woman has to satisfy the desires of the man who, in turn, does not acknowledge her gratification. Palys (1986) has found that males dominated females in 58% of all scenes in pornographic movies. A similar percentage (54%) was reported by Cowan et al. (1988) for scenes in X-rated videotapes. Similarly, Ertel (1990) has found that about three quarters of sexually explicit movies featured male dominance.

Objectification of women, finally, refers to the reduction of women to their sexual appeal in terms of their outer appearance and a focus on their body parts, most notably their genitals. It also entails that women are depicted as sexual playthings waiting to satisfy male sexual desires. Content analyses have shown that, in sexually

explicit material, the objectification of women, for example through full-screen genitalia shots, outnumbers the objectification of men by 2:1 (Cowan et al., 1988; Ertel, 1990). Scholars often point to objectification of women in scenes in which the man ejaculates on the body, the face, or in the mouth of a woman (e.g., Jensen & Dines, 1998). Brosius et al. (1993) found that this occurred in 98% of the pornographic movies studied. In sum, adolescents who use SEIM are likely to be confronted with a social and sexual reality that is at odds with central values of their sexual socialization. As sociologists have argued, when people are confronted with alternatives to traditional beliefs and values, the simultaneous requirement to make sense of these alternatives is often accompanied by uncertainty (e.g., Bauman, 1997; Luker, 2006). Therefore, we hypothesize:

H1: As adolescents use SEIM more frequently, their sexual uncertainty will increase.

Underlying Mechanisms: Involvement

We focus on adolescents' involvement in SEIM as a potential explanation of why the frequency of SEIM use affects sexual uncertainty. Involvement refers to an intense experiential state during the reception of media content and comprises both affective and cognitive processes (e.g., Perse, 1990; Vorderer, 1993; Wirth, 2006). When people are highly involved in a particular content, they seem to be absorbed by the content and tend to forget the world around them. As outlined by other authors (e.g., Liebes & Katz, 1986; Vorderer, 1993), this mode of reception is opposed to a distanced and analytical mode of reception.

Scholars have called for more attention to adolescents' involvement in sexual media content to explain the processes that underlie its effects on adolescents (e.g., Peter & Valkenburg, 2008a; Ward, 2003). To date, however, the involvement concept has not been employed in research on the effects of sexually explicit content on adolescents. This is striking because there are at least two reasons why the involvement concept can be applied to study, in particular, the processes that underlie the effects of SEIM use on sexual uncertainty. First, the development of the sexual self is an important developmental goal in adolescence (e.g., Steinberg, 2008) and the resulting sexual curiosity predestines adolescents not only to use SEIM, but also to become involved in it. Whereas the narrative and scenery in sexually explicit material may be fictional, the sexual action is usually real in the sense that it is not simulated. This may be particularly attractive to adolescents because many adolescents lack sexual experience and have most probably never observed people having sex. Research indeed suggests that young people go through strong experiential states when confronted with sexual media content (e.g., Boies, 2002; Goodson, McCormick, & Evans, 2000). Therefore, it may generally make sense to include involvement into our thinking about the effects of SEIM.

Second, theoretical approaches, such as the sexual behavior sequence (Byrne, 1977), posit that experiential states evoked by sexual content mediate the impact of

stimuli in sexual media content on particular outcome variables. In line with principles of classical conditioning, the sexual behavior sequence approach specifically states, that both unconditioned sexual stimuli (e.g., coitus in sexually explicit material) and conditioned sexual stimuli (e.g., particular aspects of the reality portrayed in sexually explicit material) elicit experiential states in people. These experiential states, in turn, affect how people respond to sexual media content. As outlined above, involvement can be defined as an experiential state (e.g., Liebes & Katz, 1986; Vorderer, 1993; Wirth, 2006). Consequently, it may mediate the effects that the frequency of SEIM use exerts on adolescents.

If involvement in SEIM mediates the effect of the frequency of SEIM use on sexual uncertainty, two effects are important: first, the effect of SEIM use on involvement and, second, the effect of involvement on sexual uncertainty. Generally, research on concepts that are strongly related to involvement, such as transportation, suggests that involvement may increase with experience with a particular content (e.g., Gerrig, 1998). More specifically, some evidence has emerged that people who watch sexual media content more frequently are more strongly involved in it (Zurbriggen & Morgan, 2006). Finally, there is internally valid evidence that the frequency of adolescents' SEIM use results in more intense experiential states, such as greater subjective sexual arousal and more positive affective responses to the material (Peter & Valkenburg, 2008a, 2009a). Therefore, we hypothesize:

H2a: As adolescents use SEIM more frequently, they will be more strongly involved in the material.

As far as the effect of involvement in SEIM on sexual uncertainty is concerned, researchers generally agree that the information people receive when they are involved in media content is not compartmentalized into independent knowledge structures, but partly incorporated into existing knowledge, beliefs, and attitudes (e.g., Perse, 1990; Wirth, 2006). What adolescents learn while they are involved in SEIM may thus not remain confined to the experience of being involved in SEIM. Rather, it is integrated with adolescents' existing sexual knowledge and linked, for example, with sexual beliefs and attitudes. More specifically, the involvement concept can explain why information that is incongruent with existing beliefs may render people uncertain about these beliefs (Appel & Richter, 2007). At least two reasons seem important. First, once involved in media content, all mental capacities are engaged in the experience of the content (e.g., Perse, 1990; Slater & Rouner, 2002). As a result, people's ability to avoid or discard belief-incongruent information is reduced. Second, involvement—as "living within" a particular media content (Vorderer, 1993)—may reduce people's ability to think critically about the media content. As several scholars have argued, critical thinking about media content, which enables people to reject belief-incongruent information, is incompatible with involvement as an intense experiential state (e.g., Slater & Rouner, 2002). As a consequence, when people are highly involved in media content, belief-incongruent information will not only penetrate existing beliefs, but it will also be evaluated less critically. Eventually, involvement with SEIM thus intensifies adolescents' contact with sexual information

that is most probably incongruent with the sexual beliefs that they have acquired in their sexual socialization. We hypothesize:

H2b: As adolescents become more involved in SEIM, their sexual uncertainty will increase.

Gender Differences

One explanation of gender differences in sexuality derives from the social-construction-of-sexuality perspective. This perspective states that social and cultural processes, notably sexual socialization, shape how male and female adolescents approach sexuality (e.g., Gagnon & Simon, 1973). Specifically, this perspective emphasizes that male and female adolescents undergo a different sexual socialization. Tolman (2002), for example, has pointed out that female adolescents are discouraged from being sexual as this may threaten their reputation as “good girls.” For male adolescents, in contrast, sexual experience is considered more appropriate and may even be valued (e.g., McCormick, Brannigan, & Laplante, 1984). Similarly, girls are expected to control their sexual desire and seek commitment in romantic relationships. For boys, conversely, acting on sexual impulses and avoiding committed relationships is seen as “normal” and acceptable (e.g., Allen et al., 2007; McCormick et al., 1984).

Unaffectionate sex, male dominance, and female objectification—the characteristics of sexually explicit material outlined above—seem to correspond more strongly with the sexual socialization of male adolescents than that of female adolescents. For example, when male adolescents see uncommitted, purely sexual relations in SEIM, it may conflict less with what they have learned about sex than with what female adolescents have learned about sex. As a result, we expect that the impact of the frequency of SEIM use on sexual uncertainty as hypothesized in H1 is moderated by gender. Specifically, we hypothesize:

H3a: The impact of the frequency of SEIM use on sexual uncertainty will be stronger for female adolescents than for male adolescents.

Research has consistently shown that men react to sexually explicit material with more positive emotions than women (for a meta-analysis, see Allen et al., 2007). In addition, there is evidence that young men find sexually explicit material more arousing, more informative, more entertaining, and less disgusting than young women do (Boies, 2002; Goodson et al., 2000). In contrast to these subjective evaluations of sexually explicit material, however, gender differences in physiological sexual arousal to such material are smaller, with females only being somewhat less aroused than males (for a meta-analysis, see Allen et al., 2007). Thus, whereas both males and females become physiologically aroused, females interpret the experience less positively than males do. One explanation of these gender differences is that the physiological enjoyment of material that contradicts values learned in sexual socialization elicits conflicting feelings in females. These conflicting feelings, in turn, are experienced as unpleasant, which eventually translates into less positive

evaluations of sexually explicit material among females than among males (Allen et al., 2007).

Because involvement and (sexual) arousal are related (e.g., Wirth, 2006), the results of research on sexual arousal may also be applied to specify gender differences in the mediation process predicted in hypotheses 2a and 2b. Males typically report somewhat higher subjective arousal to sexually explicit material (Boies, 2002; Goodson et al., 2000). We, therefore, expect that the impact of the frequency of SEIM use on involvement will be stronger for male than for female adolescents. However, based on the explanation for the gender differences in the interpretation of physiological arousal, we expect a different pattern for the impact of involvement on sexual uncertainty. In line with this explanation, we assume that female adolescents feel a stronger discrepancy between their sexual socialization and their involvement in SEIM than male adolescents do. Consequently, if female adolescents get more strongly involved in SEIM as a result of a more frequent use of it, they may be more likely than male adolescents to experience conflicting feelings about this involvement. These conflicting feelings may eventually increase the likelihood that female adolescents become uncertain about their sexual beliefs and values. In sum, we hypothesize that the mediation process specified in hypotheses 2a and 2b will be moderated by gender.

- H3b: The impact of the frequency of SEIM use on involvement will be stronger among male adolescents than among female adolescents.
- H3c: The impact of involvement on sexual uncertainty will be stronger among female adolescents than among male adolescents.

Method

Sample and Procedure

Our study is based on a three-wave panel survey, which enables us to test the hypothesized mediation pattern adequately. The first wave was fielded in May and June 2006 among 2,341 Dutch adolescents aged 13 to 20, the second wave was fielded 6 months later, in November and December 2006, and the last wave was fielded in May and June 2007. Sampling and fieldwork were done by Qrius, a Dutch research institute specializing in research among adolescents. Respondents were recruited, by means of a quota sample, from an existing online panel managed by Qrius. The sample for our study was quoted for participants' gender and age because, in surveys on sensitive issues, respondents' gender and age seem to affect their willingness to participate and respond (e.g., Wiederman, 1993). The resulting sample did not deviate from national distributions of age and gender among Dutch adolescents.

Prior to the first wave, institutional approval, parental consent for minors' participation, and adolescents' informed consent were obtained. Respondents were asked to fill in an online questionnaire. We opted for an online questionnaire because online surveys or, more generally, computer-mediated surveys have proven to be the best mode of interviewing when sensitive issues are studied (e.g., Mustanski, 2001).

Across all three waves, the cooperation rate was 54%, which was calculated on the basis of the eligible cases and completed questionnaires in the third wave. For more detailed information on fieldwork, attrition rates, confidentiality, privacy, and length of the questionnaire, see Peter and Valkenburg (2009b).

Younger adolescents were less likely to participate in all three waves than older adolescents ($M_{\text{part.}} = 16.78$, $SD = 2.26$, $M_{\text{non-part.}} = 16.18$, $SD = 2.28$), $F(1, 1935) = 33.17$, $p < .001$, $\chi^2 = .017$. Boys (49 percent) participated less often than girls (60 percent) in all three waves, $\chi^2(1, N = 1937) = 13.85$, $p < .001$, $\phi = .11$. These gender and age differences in participation merge with other sex-related research and point to a more general problem in this type of research (e.g., Wiederman, 1993). Participants differed from nonparticipants in that they reported less intense involvement in SEIM. This difference may be related to the age and gender differences between participants and nonparticipants. When we controlled for gender and age, the differences between participants and nonparticipants in terms of involvement in SEIM disappeared. Thus, nonparticipation caused little unexplainable systematic differences in the data.

A valid measurement of the mediating variable in this study, involvement in SEIM, presupposes that adolescents have ever had contact with SEIM. As a result, we did not ask this question to respondents who indicated that they had never been in touch with such material. Because the statistical technique we used (see below) requires complete data from all respondents in all three waves, this necessary filter along with missing cases in some items left 956 respondents for analysis.

Measures

Use of SEIM. For the most part, we followed an operationalization used by Peter and Valkenburg (2006), which has been shown to be valid and reliable. Respondents were asked to indicate how often, in the six months prior to the interview, they had intentionally looked at (a) pictures with clearly exposed genitals; (b) videos with clearly exposed genitals; (c) pictures in which people are having sex; (d) videos in which people are having sex. We emphasized in this operationalization the intentionality of SEIM use to distinguish this type of use from random contact with SEIM, for example through pop-up windows or spam emails. Adolescents were informed that the question was about sexually explicit, pornographic content on or from the Internet (and not *Playboy*-type nudity). They were also told that looking at such content did not imply being online, but could also refer to sexually explicit material downloaded from the Internet. Further, adolescents were explained that genitals referred to the penis and the vagina and that "having sex" implied clearly visible vaginal, anal, or oral penetration. The response categories were 1 (*never*), 2 (*less than once a month*), 3 (*1–3 times a month*), 4 (*once a week*), 5 (*several times a week*), 6 (*every day*), and 7 (*several times a day*). In all three waves, the items formed a uni-dimensional scale (explained variance at least 87% in the three waves). Cronbach's alpha was at least .95 across the three waves. Means and standard deviations are listed in Table 1.

Table 1 Zero-order correlation of variables in the models and scale-relevant information

<i>N</i> = 956	SEIM use (W1)	SEIM use (W2)	SEIM use (W3)	Involvement (W1)	Involvement (W2)	Involvement (W3)	Sexual uncertainty (W1)	Sexual uncertainty (W2)	Sexual uncertainty (W3)
SEIM use (W2)	.68								
SEIM use (W3)	.65	.71							
Involvement (W1)	.58	.46	.44						
Involvement (W2)	.48	.60	.50	.60					
Involvement (W3)	.44	.48	.58	.53	.65				
Sexual uncertainty (W1)	.10	.11	.05	.21	.21	.14			
Sexual uncertainty (W2)	.10	.17	.12	.14	.25	.22	.35		
Sexual uncertainty (W3)	.10	.10	.21	.17	.21	.36	.35	.41	1.00
<i>M</i>	2.11	2.13	2.15	1.89	1.88	1.91	2.37	2.37	2.34
<i>SD</i>	1.40	1.49	1.47	0.91	0.94	0.94	0.84	0.86	0.85

Note. Correlation coefficients greater than or equal to .10 are significant at $p < .01$ (two-tailed).

Sexual uncertainty. We used a six-item scale developed by Peter and Valkenburg (2008b). Example items are “As far as sex is concerned, my beliefs often change” and “As far as sex is concerned, I am not sure about what I like and what I dislike.” Response categories ranged from 1 (*disagree entirely*) to 5 (*agree entirely*). The order of the items was randomized. In all waves, the items loaded on one factor (explained variance at least 71%), with a Cronbach’s alpha of at least .92. For means and standard deviations, see Table 1.

Involvement in SEIM. We operationalized this concept with the following four items which all started with “When I look at sex on the Internet . . .”: (1) “. . . I forget the time;” (2) “. . . I don’t notice what’s happening around me;” (3) “. . . I am completely concentrated;” and (4) “. . . I wonder afterwards where the time has gone.” Respondents were notified that sex on the Internet referred to sexually explicit, pornographic material on or from the Internet. The order of the items was randomized. The response categories ranged from 1 (*fully disagree*) to 5 (*fully agree*). In all three waves, the four items formed a uni-dimensional scale (explained variance at least 80%). Cronbach’s alpha was at least .91. Means and standard deviations can be found in Table 1.

Gender. Male adolescents were coded 0; female adolescents were coded 1.

Data Analysis

We tested our model with structural equation modeling, using AMOS 7.0. Two item parcels (i.e., the averaged item scores of two or more items) served as manifest indicators for the latent constructs of use of SEIM, involvement, and sexual uncertainty. For more information on item parceling, see Peter and Valkenburg (2009b).

Similar to other sex-related research, our variables and the pertinent residuals were not normally distributed. Bootstrapping is one possibility to address the statistical problems with significance testing that may result from the violation of these assumptions. Therefore, we tested the statistical significance of all analyses reported below not only with traditional parametric tests, but also with the bootstrap method. We estimated a 95% bias-corrected confidence interval for all values of interest (1,000 bootstrap samples, $N = 956$ each). If this interval includes zero, a given estimate is not significant. We accepted an estimate only as significant if both tests based on normal theory and the tests based on bootstrapping indicated a statistically significant difference from zero.

Results

H1 stated that a more frequent use of SEIM would increase adolescents’ sexual uncertainty. The zero-order correlations in Table 1 provide some first evidence of this influence. To investigate H1 rigorously, we tested a model in which previous levels of the dependent variable (i.e., autoregressive effects) along with simultaneous influences of the independent variable are controlled for (see Figure 1). Although not

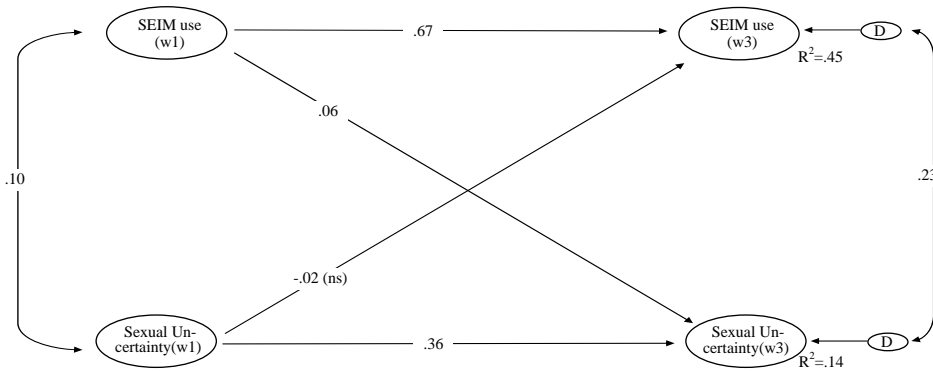


Figure 1 Effect of use of sexually explicit Internet material (SEIM) on sexual uncertainty. Coefficients are standardized estimates, significant at least at $p < .05$ (two-tailed), unless indicated otherwise. W1 = Wave 1; W3 = Wave 3. The ovals represent latent constructs. In this and all other models, we allowed error variances of the same item parcel to covary over time. For clarity reasons, observed variables, error variances, and measurement models are not shown.

of key interest in this study, we also included an overtime influence of sexual uncertainty (W1) on SEIM use (W3) to test for the possibility of such an influence.

The fit of the model in Figure 1 was good, $\chi^2(12, N=956) = 51.80, p < .001$, CFI = .995, RMSEA = .059 (95% confidence interval [CI]: .043/.076). As expected, more frequent use of SEIM (W1) increased sexual uncertainty (W3), $\beta = .06, B = .039, SE = .018, p < .05$ (95% bias-corrected bootstrapped confidence interval [bc BT CI]: .002/.078). In contrast, adolescents' sexual uncertainty (W1) had no impact on how often they used SEIM (W3), $\beta = -.02, B = -.030, SE = .047, ns$ (95% bc BT CI: -.129/.066). H1 was supported.

Jointly, H2a and H2b predicted an indirect effect of the frequency of SEIM use on sexual uncertainty via involvement. We used the model visualized in Figure 2 to test the hypothesized indirect effects with our longitudinal data. This model takes into account not only the previous levels of the mediating and the dependent variable, but also potentially confounding simultaneous influences of the variables in the model. The fit of the model presented in Figure 2 was good, $\chi^2(98, N=956) = 340.27, p < .001$, CFI = .987, RMSEA = .051 (95% bc BT CI: .045/.057). As hypothesized in H2a, more frequent use of SEIM (W1) resulted in stronger involvement in the material (W2), $\beta = .20, B = .131, SE = .022, p < .001$, (95% bc BT CI: .080/.183). In line with H2b, stronger involvement in SEIM (W2) increased sexual uncertainty (W3), $\beta = .09, B = .085, SE = .028, p < .01$, (95% bc BT CI: .020/.158).

The indirect effect of SEIM use on sexual uncertainty via involvement, as jointly predicted by H2a and H2b, was also significant, $B = .011, SE = .004, p < .01$, (95% bc BT CI: .003/.022). This indirect effect also remained significant when we included an additional direct effect of SEIM use (W1) on sexual uncertainty (W3) in the model. Including this (nonsignificant) direct effect did not significantly improve the model's fit, $\Delta\chi^2(1, N=956) = 1.18, ns$. Thus, H2a and H2b were supported. When

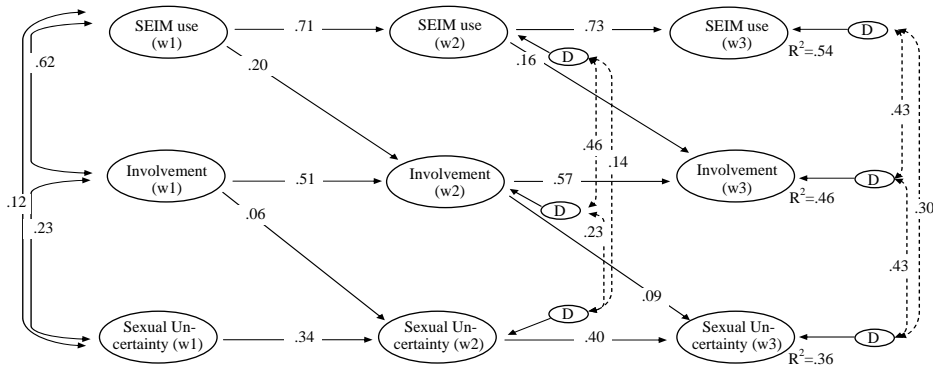


Figure 2 Involvement as a mediator of the impact of use of sexually explicit Internet material (SEIM) on sexual uncertainty. Coefficients are standardized estimates, significant at least at $p < .05$ (two-tailed). Dashed curves are covariances between disturbance terms (D). W1 = Wave 1; W2 = Wave 2; W3 = Wave 3. For clarity reasons, observed variables, error variances, and measurement models are not shown.

adolescents used SEIM more often, they were more strongly involved in the material. In turn, stronger involvement elicited greater sexual uncertainty.

Gender Differences

Hypotheses 3a, 3b, and 3c predicted that adolescents' gender would moderate both the direct effect of SEIM use on sexual uncertainty and the indirect effect of SEIM use on sexual uncertainty via involvement. We conducted a multiple-group analysis to test whether the paths of interests differed between male and female adolescents. In the multiple-group analyses, we followed a strategy outlined by Jaccard and Wan (1996). First, we estimated a model in which we did not pose any cross-group constraints, that is, we allowed the particular direct and indirect effects to vary between male and female adolescents. In a subsequent model, we constrained, one at a time, each direct effect and each path constituting an indirect effect to be equal across the two groups. Finally, we tested whether the fit of the constrained model differed from the fit of the unconstrained model. A significant change in the model fit indicates that the constrained path differed between male and female adolescents.

Was the direct effect of SEIM use on sexual uncertainty stronger for female adolescents than for male adolescents as predicted in H3a? The model without cross-group constraints (i.e., the model for both groups considered simultaneously) showed a good fit, $\chi^2(46, N = 956) = 53.82$, $p < .001$, CFI = .996, RMSEA = .033 (90% CI: .021 to .046). Constraining the path from SEIM on sexual uncertainty did not change the model fit significantly, $\Delta\chi^2(1, N = 956) = 0.49$, *ns*. Thus, gender did not moderate the influence of SEIM use on sexual uncertainty. Both among female and male adolescents, more frequent use of SEIM increased sexual uncertainty in equal terms. H3a was not supported.

H3b stated the impact of the frequency of SEIM use on involvement would be stronger among male than among female adolescents. The fit of the model without cross-group constraints was good, $\chi^2(196, N = 956) = 457.84, p < .001, CFI = .984, RMSEA = .037$ (90% CI: .033 to .042). When we constrained the path from SEIM (W1) to involvement (W2), the model fit changed significantly, $\Delta\chi^2(1, N = 956) = 14.36, p < .001$. The effect of SEIM use on involvement was stronger for female adolescents, $\beta = .26, B = .235, SE = .043, p < .001$, (95% bc BT CI: .114/.345) than for male adolescents, $\beta = .06, B = .037, SE = .029, ns$ (95% bc BT CI: -.021/.097). Thus, when female adolescents used SEIM more frequently, they were more strongly involved in the material than male adolescents. H3b was not supported.

Was the influence of involvement on sexual uncertainty stronger among female adolescents than among male adolescents as predicted in H3c? When we constrained the path from involvement (W2) to sexual uncertainty (W3), the model fit did not change significantly, $\Delta\chi^2(1, N = 956) = 0.20, ns$. The positive impact of involvement on sexual uncertainty did thus not differ among male adolescents and female adolescents. H3c was not supported. In sum, the analyses suggest that the indirect effect of SEIM use on sexual uncertainty via involvement was stronger for female adolescents than for male adolescents because female adolescents were more strongly involved in the material.

Post-hoc Analyses

Although not the theoretical focus of this paper, at least two aspects deserve attention as plausible modifications or extensions of our results. First, there may be developmental differences in the effects found. Second, the influence of the frequency of SEIM use on involvement may have to be specified in nonlinear terms. Developmental research (Steinberg, 2008) suggests that the sexual selves of late adolescents (ages 19–20) are more developed than the sexual selves of middle adolescents (ages 16–18) and early adolescents (ages 13–15). As a result, the effect of SEIM use on sexual uncertainty may be weaker among late adolescents than among middle and early adolescents. We tested this possibility using multiple-group analysis and following the same procedure as outlined above for the test of gender differences. We did not find any significant differences between the three groups as far as the direct effect of SEIM use on sexual uncertainty was concerned, $\Delta\chi^2(2, N = 956) = 3.18, ns$. In addition, neither the impact of SEIM use on involvement, $\Delta\chi^2(1, N = 956) = 0.20, ns$, nor the impact of involvement on sexual uncertainty, $\Delta\chi^2(2, N = 956) = 0.28, ns$, differed between the three groups. In conclusion, the strength of the effects found did not depend on adolescents' age.

Research has shown that the repeated use of sexually explicit material may lead to habituation to the material. As a result, the initially strong affective reactions to the material decrease over time (e.g., Linz, Donnerstein, & Penrod, 1984). Although existing research has typically centered on desensitization to violent sexually explicit content, which is not the focus of this study, it seems possible that the influence of more general SEIM on involvement decreases after some time. Mathematically, this

would resemble an inverted U-shape, that is, a negative quadratic effect. Because, in this study, the impact of SEIM use on involvement is part of the mediation pattern, hypothesizing a nonlinear influence implies that the linear mediation pattern needs to be reinterpreted as a nonlinear mediation. The modeling of nonlinear effects in structural equation models with latent variables is currently impossible with non-normally distributed data, such as ours (Lee, Song, & Tang, 2007). Moreover, to our knowledge no research has shown how to model moderated nonlinear mediation effects in structural equation models with latent variables. This, however, would be necessary to adequately investigate the moderated mediation effect we found for gender.

To address this issue nevertheless, we decided to include a quadratic term of SEIM use in addition to the linear term in a structural equation model with manifest variables. Because the above analyses have shown that the effect of SEIM use on involvement only occurred among female adolescents, we tested whether, among females, the inclusion of a quadratic term would improve the fit of the model significantly among female adolescents. This was not the case, $\Delta\chi^2(1, N = 956) = 2.10$, *ns*. Nor was the quadratic effect of SEIM use on involvement significant, $B = -.046$, $SE = .031$, *ns* (95% bc BT CI: $-.127/.032$). Therefore, we concluded that, when the effect of SEIM use on involvement occurred, there was no evidence of desensitization.

Discussion

This study extends previous research that has dealt with the influence of adolescents' use of SEIM on the development of their sexual selves. The study not only shed some first light on the causal direction between SEIM use and sexual uncertainty by showing that more frequent SEIM use resulted in greater sexual uncertainty. The study also demonstrated that involvement, that is, an experiential state during SEIM use, mediated this influence. Finally, it became clear that gender moderated this indirect effect of SEIM use on sexual uncertainty via involvement. With increasing use of SEIM, female adolescents became more strongly involved in SEIM than male adolescents.

SEIM Use and Adolescents' Developing Sexual Selves

Throughout the past years, researchers have emphasized that an adequate and up-to-date approach to the effects of sexual media content on adolescents needs to move away from a mere focus on adolescents' sexual behavior as this focus reflects an adult discourse of adolescent sexuality. Scholars have called for more attention to the development of adolescents' sexual selves instead (e.g., Ward, 2003) and have pointed to the potentially influential role of SEIM in that process (Peter & Valkenburg, 2008b; Thornburgh & Lin, 2002). This study responds to these requests. Our findings suggest that when adolescents use SEIM more frequently, their sense of themselves as sexual beings (i.e., their sexual selves) slightly changes. They become uncertain about

their sexual beliefs; find it difficult to form opinions about sexual matters; and feel insecure about their sexual preferences. However, this result needs to be seen within the context of two broader meta-analytic findings. First, there is meta-analytic evidence that the frequency of using sexually explicit material does not differ between criminal sexual offenders and noncriminals (Allen, D'Alessio, & Emmers-Sommer, 1999). Therefore, it is crucial that adolescents' use of SEIM is not put in a pathological context, regardless of its frequency. Rather, it should be seen as a part of the exploration of oneself as a sexual person, which in turn may affect the development of the sexual self.

Second, if it is true that adolescents may struggle with putting the sexual reality portrayed in SEIM in perspective (Thornburgh & Lin, 2002), they need some guidance about the specific pornographic representation of sex that they encounter in SEIM. Meta-analytic evidence suggests that potentially adverse cognitive consequences of sexually explicit material can be mitigated by educational efforts, for example by making individuals aware of the unrealistic character of sexually explicit material (Allen, D'Alessio, Emmers, & Gebhardt, 1996). Therefore, educating adolescents about SEIM seems a more adequate step of helping them overcome sexual uncertainty than protecting or prohibiting them from SEIM.

Toward an Experiential Perspective on the Effects of SEIM on Adolescents

This study is one of the first that has successfully employed the involvement concept to investigate the processes that underlie the effects of SEIM use on adolescents. The results of this study merge with other investigations that have demonstrated that other experiential states, such as arousal and the liking of SEIM, mediate the effects of SEIM use (Peter & Valkenburg, 2008a, 2009a). Jointly, these findings point to a potentially new, experiential perspective on the effects of SEIM use. Such an experiential perspective on the effects of SEIM use has at least three implications. First, a focus on experiential processes during the use of SEIM means turning away from exclusively cognitive approaches to the processing of SEIM. While an information processing perspective on the effects of SEIM use should not be abandoned, it seems important that we also focus on how adolescents experience such material to understand better how and why this content affects them. Second, an experiential perspective implies that we conceptualize the processing of SEIM as heuristic rather than as systematic. This conceptualization allows future research to derive hypotheses from theories and models that have been developed to explain the heuristic processing of entertaining content, for example Slater and Rouner's (2002) Extended Elaboration Likelihood Model. Third and finally, because experiential states are closely linked to affects and emotions (e.g., Tan, 2008), an experiential perspective calls for greater attention to what adolescents feel during the use of SEIM. A stronger focus on affects and emotions during SEIM use may help us integrate often reported reactions to sexually explicit material, such as pleasure and disgust, into our thinking about the effects of SEIM.

Given the dearth of studies on adolescents' processing of SEIM, our study can only shed some first light into the black box of the processes that underlie the effects of SEIM use on adolescents. Thus, it is unrealistic to assume that our simple one-step mediation pattern is sufficient to capture the complexity of the processes that unfold when adolescents watch SEIM. The influence of involvement on sexual uncertainty, in particular, seems to be mediated by multiple other processes. For example, models of the processing of entertaining content (e.g., Slater & Rouner, 2002) suggest that the increased perceived realism of SEIM along with the uncritical assessment of its content may further mediate the effect of involvement on sexual uncertainty. Disentangling these and related issues may considerably improve our understanding of why SEIM influences adolescents.

Gender Differences

In contrast to our expectations, female adolescents reported more involvement in SEIM as a result of using SEIM than male adolescents did. Three explanations are conceivable. The first explanation of our unexpected finding may be that, overall, SEIM has a greater novelty for female adolescents than for male adolescents. Male adolescents generally start using SEIM earlier in their lives than female adolescents (Wolak et al., 2007). Because the novelty of a stimulus can increase involvement (Wirth, 2006), female adolescents may thus become more involved in SEIM as a result of a more frequent use of it than male adolescents. A second explanation may come from the very character of involvement as an intense experiential mode of reception. Whereas this state may be correlated with sexual arousal (Wirth, 2006), it is not necessarily the same. We based our prediction on previous research on arousal reactions to sexually explicit material (e.g., Boies, 2002) and extended it to involvement. Future research should pay more attention to the differences between these experiential states. A final explanation refers to our operationalization of the use of SEIM. We asked adolescents about their use of SEIM in general, without specifying particular categories of SEIM. It may be that, compared to female adolescents, male adolescents were less selective in their use of SEIM and, consequently, less involved. If future researchers manage to convincingly address the ethical issues involved in asking adolescents about specific categories of SEIM, this may be a crucial step for a better understanding of gender differences in involvement in SEIM.

Unexpectedly, SEIM use did not elicit stronger effects on sexual uncertainty among females than it did among males. There was also no gender difference in the impact of involvement on sexual uncertainty. These findings suggest that the reality portrayed in SEIM did not conflict more strongly with what female adolescents have learned about sex in their sexual socialization than with what male adolescents have learned about sex. One explanation of these unexpected findings is that specific features of sexual socialization in the Netherlands affected our results. Generally, the Netherlands is well known for its liberal policy both toward adolescent sexuality and sexually explicit material. More specifically, there is tentative evidence that, both for

male and female adolescents, sexual socialization in the Netherlands emphasizes the importance of responsibility, mutuality, and honesty in sexual relations. Moreover, both for adolescent boys and girls, sex is rarely dramatized, but considered a normal part of growing up (Schalet, 2000). The fact that male and female adolescents are sexually socialized in a more egalitarian way than it is the case in other countries may thus explain why some of our predictions were not supported. At the same time, it becomes clear that our (non)-findings need replication in countries where the sexual socialization of adolescents follows more traditional lines.

Limitations

Our findings need to be seen against the backdrop of at least three limitations. First, although our three-wave panel design allowed us to address the causal direction of the effects of SEIM more rigorously than it is possible with cross-sectional designs, it does not have the same internal validity as experimental designs. Second, the effect sizes we found are small. In comparison to other longitudinal research among adolescents, our effects were considerably smaller than the effects of sexually explicit material on sexual attitudes and beliefs (Brown & L'Engle, 2009; Peter & Valkenburg, 2008a, 2009a) and somewhat smaller than effects on more affective outcome variables, such as sexual satisfaction (Peter & Valkenburg, 2009b). Generally, the well-known tendency of underreporting sensitive behavior may lead to an underestimation of effects. That said, once a reasonable number of studies are available, we need meta-analyses to address the question of how strong the impact of SEIM on adolescents really is. A final shortcoming of our study is that we cannot preclude a self-selection bias in our sample because our respondents participated in the survey voluntarily. People who participate in sex-related research are typically more sexually interested and experienced, more sexually permissive, and stronger sensation seekers (e.g., Wiederman, 1999). Whereas our initial sample did not include strikingly high numbers of sensation seekers and sexually experienced youth, our results should still be seen under the caveat of a self-selection bias.

In conclusion, this study merges with a growing body of longitudinal research that suggests that the use of SEIM affects adolescents' sexuality (Brown & L'Engle, 2009; Peter & Valkenburg, 2008a, 2009a,b). It is crucial that these findings will not be misrepresented to depict the Internet as a dangerous place for minors or to justify outdated approaches to adolescent sexuality. Rather, without falling prey to moral panics, scholars, parents, and practitioners need to realize that SEIM has become a part of adolescents' sexual socialization. Only with this awareness can potentially adverse effects efficiently be prevented or counteracted.

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