

The Use of Sexually Explicit Internet Material and Its Antecedents: A Longitudinal Comparison of Adolescents and Adults

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Abstract An implicit assumption in research on adolescents' use of sexually explicit internet material (SEIM) is that they may feel more attracted to such material than adults, given the "forbidden" character of SEIM for minors. However, systematic comparisons between adolescents' and adults' SEIM use and of its antecedents are missing. We conducted a two-wave panel survey among a nationally representative sample of 1,445 Dutch adolescents and a nationally representative sample of 833 Dutch adults. Adolescents' and adults' SEIM use was similar. When significant differences in the SEIM use occurred, they indicated that adults used SEIM more often than adolescents. Male adults were the most frequent users of SEIM. No difference in the antecedent structure of SEIM use emerged between adolescents and adults. In both groups, males, sensation seekers, as well as people with a not exclusively heterosexual orientation used SEIM more often. Among adolescents and adults, lower life satisfaction increased SEIM use. Our findings suggest that the frequency of SEIM use and its antecedents are largely the same among adolescents and adults.

Keywords Pornography · Adolescents · Youth · Media exposure

Introduction

The past years have seen a considerable increase in research on adolescents' use of sexually explicit internet material (SEIM) (e.g., Brown & L'Engle, 2009; Flood, 2007; Lo & Wei, 2005;

Mesch, 2009; Peter & Valkenburg, 2006; Wolak, Mitchell, & Finkelhor, 2007). Typically, the rationale for studies on adolescents' use of SEIM is guided by the notion of adolescent sexual exceptionalism. On the one hand, adolescents' access to SEIM is more strongly legally regulated than adults' access. Because sexually explicit material is considered inappropriate for minors, it is unlawful in most countries to make it accessible to minors (Thornburgh & Lin, 2002). On the other hand, sexual curiosity peaks in adolescence, partly due to hormonal changes, and this may result in adolescents' intense interest in sex and sexuality (Savin-Williams & Diamond, 2004). As a consequence of this tension—this is the implicit assumption—SEIM presents a "forbidden fruit" for adolescents (Bushman & Cantor, 2003): Because adolescents are not supposed to access SEIM, they may feel more attracted to the material than adults and, consequently, use it more often.

Although there are reasons to assume that adolescents differ from adults in their SEIM use, studies that systematically compare the two groups are missing. Further, it is unknown whether adolescents and adults differ in the antecedents of SEIM use. For example, personality characteristics, such as sensation seeking and depression, have been found to be associated with more frequent SEIM use among adolescents (e.g., Brown & L'Engle, 2009; Peter & Valkenburg, 2006; Wolak et al., 2007). However, it is unclear whether this pattern extends to adults. Therefore, the goal of this study was to compare the prevalence and the antecedents of SEIM use simultaneously between adolescents and adults. Such a benchmark study may help us to put teenagers' SEIM use in perspective. Moreover, such a study may provide us with an initial impression of the role that SEIM plays across the life-span. We define SEIM as professionally produced or user-generated pictures or videos (clips) on or from the internet that are intended to arouse the viewer. These videos and pictures depict sexual activities, such as masturbation as well as oral,

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anal, and vaginal penetration, in an unconcealed way, often with a close-up on genitals. *Playboy*-type nudity is not part of this definition.

Prevalence of SEIM Use

Research on the prevalence of SEIM use among adolescents differs in terms of the time of investigation, sample, sampling procedure, mode of interviewing, and the conceptual and operational definition of sexually explicit material (Fleming, Greentree, Cocotti-Muller, Elias, & Morrison, 2006; Flood, 2007; Lo & Wei, 2005; Mesch, 2009; Peter & Valkenburg, 2006; Skoog, Stattin, & Kerr, 2009; Wolak et al., 2007). As a result, the findings of the various studies diverge considerably. The main reason for these inconsistent findings may lie in selection biases induced by convenience samples (e.g., Bogaert, 1996). The only nationally representative study on adolescents' SEIM use to date, done among 1,500 U.S. teenagers in 2005, found that 1% of 10- to 11-year-old boys had consumed SEIM deliberately in the year before the interview (Wolak et al., 2007). The proportion increased to 11% among 12- to 13-year-old boys, to 26% among 14- to 15-year-old boys, and to 38% among 16- to 17-year-old boys. Among 10- to 17-year-old girls, only 2–8% used SEIM deliberately.

Research on adults' SEIM use is similarly plagued by incommensurability problems resulting from different samples, sampling techniques, and times of investigation (Boies, 2002; Buzzell, 2005; Goodson, McCormick, & Evans, 2000, 2001; Janghorbani, Lam, & Youth Sexuality Study Task Force, 2003; Lam & Chan, 2007; Traeen, Nilsen, & Stigum, 2006). As a consequence, estimates of adults' SEIM use vary. A more consistent picture, however, emerges when only the nationally representative studies of adults' SEIM use are considered. The three nationally representative studies to date found that less than 10% of adult women had used SEIM (4%, Buzzell, 2005; 7%, Janghorbani et al., 2003; 8%, Traeen et al., 2006, own computations based on Table 1, p. 248). For adult men, these figures varied between 22% in a study by Janghorbani et al. and 48% in a study by Traeen et al. (2006, our computations based on Table 1, p. 248).

Taken together, existing studies suggest that, in contrast to the forbidden-fruit effect assumed in research, adolescents' use SEIM less often than adults do. However, this conclusion is based on scattered studies whose comparability is severely limited. Therefore, we simply asked in this study to what extent SEIM use differed between adolescents and adults, without specifying the direction of potential differences.

Antecedents of SEIM Use

Theories of media use, such as the uses-and-gratifications and the selective exposure approach, generally agree that people select media content that matches existing predispositions

(e.g., Ruggiero, 2000; Zillmann & Bryant, 1985). More specifically, previous research on the antecedents of SEIM use (e.g., Peter & Valkenburg, 2006; Traeen et al., 2006) has emphasized that the use of (sexual) media content is shaped by at least four groups of influences: (1) demographics (as proxies for sociocultural influences), (2) social context, (3) personality characteristics and (4) sexual orientation.

Demographics

Based on the media practice model (Steele, 1999; Steele & Brown, 1995) and earlier research among adults (Traeen et al., 2006), we focus on gender, age, and education as demographics. As for gender, research has consistently demonstrated that males use SEIM more frequently than females (e.g., Mesch, 2009; Traeen et al., 2006; Wolak et al., 2007). As mentioned above, this gender difference has occurred both among adolescents and adults and is often explained with the fact that the majority of sexually explicit material caters to masculine notions of sex (e.g., Wilson-Kovacs, 2009). Accordingly, we expected this gender difference to emerge in the current study both among adolescents and adults.

As for age, sexual interest and desire rise sharply between childhood and through adolescence (Savin-Williams & Diamond, 2004). Young adults show more sexual interest than older adults (Beutel, Stobel-Richter, & Braehler, 2008). These findings merge with results that older adolescents use SEIM more frequently than younger adolescents (Wolak et al., 2007), while the reverse is true for adults (Janghorbani et al., 2003; Traeen et al., 2006). Consequently, we expected a positive effect of age on exposure to SEIM among adolescents and a negative effect among adults.

As for education, SEIM use has been found to increase with higher educational levels among adults, probably reflecting educationally determined gaps in internet access and technological skills (Traeen et al., 2006). It seems unlikely, though, that education also affects adolescents' SEIM use because internet access and technological skills are more evenly distributed among teenagers than among adults (CBS, 2008). As a result, we expected that higher educational levels would lead to a more frequent SEIM use among adults, but not among adolescents.

Social Context

In line with two explanations of the impact of social context on SEIM use, we investigated relationship status (single vs. being in a relationship) and attachment to friends as social context variables. A first explanation of why people's social context may affect their SEIM use states that the social control exerted through relationships reduces the possibilities to use SEIM without surveillance (Buzzell, 2005; Stack, Wasserman, &

Kern, 2004). Consequently, people without a relationship are more likely to use SEIM than those in a relationship. Studies have confirmed this prediction among adults (Buzzell, 2005; Stack et al., 2004), but not among adolescents (Peter & Valkenburg, 2006). The lacking effect of relationships on adolescents' SEIM use may result from the fact that adolescents' relationships rarely involve co-habitation. As a result, the possibility to exert social control is reduced. Therefore, we expected that having a relationship would decrease the use of SEIM among adults, but not among adolescents.

A second, related explanation of why people's social context may affect their SEIM use focuses on social inclusion through attachment to friends (L'Engle, Brown, Romocki, & Kenneavy, 2007). According to this explanation, a lack of social inclusion may draw individuals more strongly to solitary internet activities, while it keeps them from social online interactions. There is some evidence that adolescents with weak peer attachment use SEIM more often than adolescents with strong peer attachment (L'Engle et al., 2007). Moreover, studies have shown that socially excluded adolescents use the internet less often for social purposes than socially included adolescents do (e.g., Peter, Valkenburg, & Schouten, 2005; Valkenburg & Peter, 2007). Research on this issue among adults is missing. However, friends generally play a more important role in adolescence than in adulthood (Brown, 2004). Consequently, we expected that attachment to friends would reduce SEIM use among adolescents, but not among adults.

Personality Characteristics

Following earlier research on the impact of personality characteristics on SEIM use, we dealt with two personality characteristics—sensation seeking and depression/life satisfaction. Pornography with its unconcealed depiction of often intense, varied sexual activities is typically seen to cater to sensation seekers' need for novel, complex, and intense sensations and experiences (Zuckerman, 1994). The relationship between depression or low life satisfaction and SEIM use is usually attributed to an escapist function of SEIM for people who are depressed or dissatisfied with their lives (Wolak, Mitchell, & Finkelhor, 2003).

Several studies on adolescents' exposure to SEIM have found that sensation seekers use such material more frequently than non-sensation seekers (Brown & L'Engle, 2009; Peter & Valkenburg, 2006; Weisskirch & Murphy, 2004). In adult samples, this influence has not been found (Bogaert, 2001). Depressed adolescents and adolescents who are dissatisfied with their lives use SEIM more often than do non-depressed adolescents and adolescents who are satisfied with their lives (Peter & Valkenburg, 2006; Wolak et al., 2007; Ybarra & Mitchell, 2005). For adults, this relationship has been described in a case study (Stein, Black, Shapira, &

Spitzer, 2001). In sum, we expected that sensation seeking would increase SEIM use among adolescents, but not among adults. We further expected that dissatisfaction with one's life would result in higher SEIM use, both among adolescents and adults.

Sexual Orientation

Because, both among adolescents and adults, same-sex attraction is still associated with considerable repercussions and distress, gays and lesbians consider the internet often a safe space (Hillier & Harrison, 2007). As a consequence, gays and lesbians of all age groups use the internet for a variety of purposes, such as identity construction, the formation of friendships and intimate relationships, and the establishment of sexual contacts (Hillier & Harrison, 2007; Peter & Valkenburg, 2007). In addition, several studies have shown that SEIM use is higher among gay and lesbian adults than among heterosexual adults (Duggan & McCreary, 2004; Traeen et al., 2006). We expected to find this pattern also in the present study not only among gay and lesbian adults, but also among gay and lesbian youth.

Method

Sample and Procedure

We conducted a two-wave panel study among Dutch adolescents and adults in May 2008 and November 2008. In the first wave, 2,092 adolescents (aged 12–17 years) and 1,266 adults (18 years of age and older) were contacted. The response rate was 84% ($N = 1,765$) among the adolescents and 81% among the adults ($N = 1,026$), computed according to the guidelines of the American Association for Public Opinion Research (2006). Both adolescents and adults were randomly sampled from an existing online panel administered by the Dutch research bureau Veldkamp, which comprised 10,990 members in the adolescent panel and 100,267 members in the adult panel at the time of the first wave. Members of the online panel were initially sampled randomly in all parts of the Netherlands. In the Netherlands, more than 90% of adults and 98% of adolescents have home internet access (CBS, 2008). As a consequence, potential biases resulting from internet access did not present a problem for the representativeness of the sample.

In the second wave, 1,445 adolescents and 833 adults participated in the survey again. Thus, the attrition rate among adolescents was 18% and 19% among adults. Additional analyses showed that the variables relevant to this study did not differ between those who participated in both waves and those who participated only in the first wave. Panel attrition, then, did not reduce the generalizability of our results.

Participants were asked to complete an online questionnaire. When sensitive questions are involved, online questionnaires have been shown to produce more accurate answers and less non-response (Mustanski, 2001). Before the survey started, institutional approval, parental consent for minors, and informed consent of all participants were obtained. On the introduction screen, participants were notified that the survey was about internet use and sexuality; that the answers were treated confidentially; and that the principal investigators had no chance to identify who had given the answers. Veldkamp provided us with a unique number code for each respondent and did not link the answers to identifying information of the participants. Participants were also asked to complete the questionnaire in privacy. Participants were aware of the fact that they could terminate the survey at any point of time if they wished. The participants required 15–20 min to complete the questionnaire and afterwards received a voucher worth five Euros.

Measures

Use of SEIM

We largely followed an operationalization used by Peter and Valkenburg (2006). We asked participants how often, in the 6 months prior to the interview, they had intentionally looked at (1) pictures with clearly exposed genitals; (2) videos with clearly exposed genitals; (3) pictures in which people were having sex; (4) videos in which people were having sex. This operationalization emphasized the intentionality of exposure to SEIM to distinguish this type of exposure from unwanted contact with SEIM. In the introduction of the question, it was stated clearly that the question was about sexually explicit, pornographic content on or from the internet. Participants were also informed that looking at such content did not require being online, but could also imply watching sexually explicit material downloaded from the internet. Further, it was explained that genitals referred to the penis and the vagina and that “having sex” implied unconcealed 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*). Both in the adolescent and the adult sample and both in Wave 1 and Wave 2, the items formed unidimensional scales, with a minimum explained variance of 88%. All Cronbach’s alphas were at least .95 ($M_{\text{adol.}(t1)} = 1.43$, $SD = .93$; $M_{\text{adol.}(t1)} = 1.52$, $SD = 1.03$; $M_{\text{adol.}(t2)} = 1.45$, $SD = .96$; $M_{\text{adol.}(t2)} = 1.46$, $SD = .99$).

Gender

Males were coded 0 (adolescents: 51%; adults: 49), females were coded 1 (adolescents: 49%; adults: 51%).

Age

Participants’ age was computed for May 2008, the starting point of the first wave. The mean age was 14.49 years ($SD = 1.68$) in the adolescent sample and 47.89 years ($SD = 16.67$) in the adult sample.

Education

We measured education on a 7-point scale that represents the various educational levels of the Dutch education system. The scale ranged from 1 (*elementary school*) to 7 (*university degree*). Participants were asked to indicate the highest completed educational degree ($M_{\text{adol.}(t1)} = 3.30$, $SD = 1.42$; $M_{\text{adol.}(t1)} = 4.27$, $SD = 1.67$).

Relationship Status

Singles were coded 0, people in a committed relationship (adolescents, adults) or registered partnership/marriage (adults) were coded 1. Sixteen percent of the adolescents and 75% of the adults were in a relationship.

Attachment to Friends

We operationalized this concept with four items from the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987). We chose the four items with the highest factor loadings in a previous Dutch study based on the inventory (Van Ammers et al., 1998). The selected items were “When my friends know that something is bothering me, they ask me about it,” “I tell my friends about my problems and troubles,” “My friends help me to understand myself better,” and “When I am angry about something, my friends try to be understanding.” Response categories ranged from 1 (*fully agree*) to 5 (*fully disagree*) and were reverse coded. In both the adolescent and the adult sample, the items loaded on one factor (explained variance 72% in the adolescent sample, Cronbach’s $\alpha_{\text{adol.}(t1)} = .87$, $M_{\text{adol.}(t1)} = 3.47$, $SD = .81$; explained variance 75% in the adult sample, Cronbach’s $\alpha_{\text{adol.}(t1)} = .89$, $M_{\text{adol.}(t1)} = 3.24$, $SD = .83$).

Sensation Seeking

We used the Brief Sensation Seeking Scale (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002). In earlier research (Peter & Valkenburg, 2008), the experience-seeking items and the bungee-jumping item did not load on one factor with the remaining five items of the scale. Therefore, we measured the concept only with those five items (e.g., “I would love to have new and exciting experiences, even if they are illegal”). Response categories ranged from 1 (*applies completely*) to 5 (*does not apply at all*) and were reverse coded. The five items

formed a unidimensional scale, both in the adolescent and the adult sample (explained variance 66% in the adolescent sample, Cronbach's $\alpha_{\text{adol.}(t1)} = .87$, $M_{\text{adol.}(t1)} = 2.89$, $SD = .87$; explained variance 63% in the adult sample, Cronbach's $\alpha_{\text{adul.}(t1)} = .86$, $M_{\text{adul.}(t1)} = 2.54$, $SD = .78$).

Life Satisfaction

This concept was operationalized with the 5-item Satisfaction-with-Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Response categories ranged from 1 (*applies completely*) to 5 (*does not apply at all*) and were reverse coded. Factor analyses revealed the unidimensionality of the scale for both samples (explained variance 66% in the adolescent sample, Cronbach's $\alpha_{\text{adol.}(t1)} = .87$, $M_{\text{adol.}(t1)} = 3.47$, $SD = .74$; explained variance 72% in the adult sample, Cronbach's $\alpha_{\text{adul.}(t1)} = .90$, $M_{\text{adul.}(t1)} = 3.48$, $SD = .79$).

Sexual Orientation

We geared our operationalization of participants' sexual orientation toward the H-scale developed by Kinsey, Pomeroy, and Martin (1948). We asked participants whether they felt sexually attracted 1 (*only to males*); 2 (*mainly to males, but also to females*); 3 (*equally to males and females*), 4 (*mainly to females, but also to males*), and 5 (*only to females*). As outlined above, the key distinction in this study was between people attracted (also) to the same sex and people exclusively attracted to the opposite sex. Therefore, we recoded the scale, separately for males and females, into a dichotomous variable with the categories 0 (*not exclusively heterosexual*) and 1 (*exclusively heterosexual*). Ninety-five percent of the adolescent sample and 91% of the adult sample were exclusively heterosexual.

Data Analysis

A rigorous test of the antecedents' hypothesized influences on SEIM use and their potential differences between adolescents and adults has to meet two criteria. First, there needs to be a statistical test of the difference between a particular antecedent's influence in the adolescent and in the adult sample. To statistically test such differences, we modeled interaction effects between each antecedent and participants' adolescent or adult status in our predictor model. Because Hayes (2005) has shown that centering variables in interaction effects in multiple regressions is often ineffective, we did not center the variables. The modeling of interaction effects implied that we had to pool the adolescent and adult sample. However, the adolescent and the adult sample differed in size. Therefore, we tested whether our results with unweighted data would meaningfully differ from data in which adolescents were

weighted down and adults were weighted up while the overall sample size was preserved. No meaningful differences occurred between the weighted and the unweighted data. As a result, all analyses were based on the unweighted data.

A second criterion that a rigorous analysis of the antecedents' hypothesized influences on SEIM use has to meet is internal validity. The majority of studies on SEIM use are based on correlational designs. These designs do not permit to disentangle the causal direction between SEIM and variables, such as life satisfaction and peer attachment. To improve internal validity, previous levels of SEIM exposure need to be controlled for and the antecedents need to temporally precede the use of SEIM. Therefore, we not only included exposure to SEIM in Wave 1, but also all antecedent variables—as measured in Wave 1—in our predictor model.

Similar to other sex-related research, our variables were not normally distributed as Shapiro-Francis tests revealed. This violation of an important assumption of parametric statistics may result in severe biases, particularly in significance testing. Therefore, the significance tests reported below for the regression analyses were not only based on traditional parametric tests, but also on bootstrapping. Bootstrapping does not make any assumptions about the distribution of variables or test statistics (Efron & Tibshirani, 1993) and is increasingly recommended as an alternative for the testing of non-normally distributed data. We estimated a 90% confidence interval (CI; 1,000 samples, $N = 2,278$ each). A given estimate was significant if this CI did not include zero. We accepted an estimate as significant only if the significant tests based both on normal test theory and on bootstrapping indicated a significant difference from zero.

Results

The first question raised in this study was whether adolescents and adults differed in their SEIM use. The chi-square tests in the last column of Table 1 show that adolescents and adults did not differ in their use of pictures with genitals, $\chi^2(3) = 3.53$, nor in their use of videos with clearly visible genitals, $\chi^2(3) = 6.23$. To illustrate, 7% of all adolescents and 9% of all adults reported that, in the 6 months before the survey, they had looked at pictures with clearly visible genitals on the internet at least once per week. The figures for those who had, in that period, never looked at such material were also nearly identical: seventy-five percent of the adolescent reported that they had never done so, as compared to 74% of the adults.

Small, but significant differences emerged between adolescents' and adults' use of pictures with explicit sexual activities, $\chi^2(3) = 8.19$, $p < .05$, and of videos with explicit sexual activities, $\chi^2(3) = 8.99$, $p < .05$. For example, 8% of all

Table 1 Use of sexually explicit internet material among adolescents and adults

	Adolescents			Adults			Males Adol.–Adults $\chi^2(3, 1444)$	Females Adol.–Adults $\chi^2(3, 1134)$	All Adol.–Adults $\chi^2(3, 2278)$
	Males (%)	Females (%)	All (%)	Males (%)	Females (%)	All (%)			
Pictures with genitals									
Never	65	86	75	57	89	74			
<1×/month	17	10	13	19	7	13	7.79,	3.40	3.53
1–3×/month	7	3	5	8	2	5	$p = .05$	ns	ns
1×/week and more	11	2	7	16	2	9			
Videos with genitals									
Never	70	91	80	63	89	76			
<1×/month	15	6	10	15	7	11	9.01	.78	6.23
1–3×/month	5	2	4	8	2	5	$p < .05$	ns	ns
1×/week and more	10	1	6	15	1	8			
Pictures with sex									
Never	69	87	78	60	89	75			
<1×/month	15	9	12	15	7	11	15.46	1.81	8.19
1–3×/month	6	3	4	10	3	6	$p < .001$	ns	$p < .05$
1×/week and more	10	1	6	14	1	8			
Videos with sex									
Never	71	90	80	63	88	76			
<1×/month	13	7	10	12	8	10	10.76	5.77	8.99
1–3×/month	6	2	4	8	3	6	$p < .001$	ns	$p < .05$
1×/week and more	10	2	6	16	1	8			

Note: Percentages may not add up to 100% because of rounding

adults used videos with explicit sex once a week or more, as opposed to 6% of all adolescents. Eighty percent of adolescents reported that they had never been in touch with online videos with explicit sex, whereas 76% of adults reported never having been in touch with such material. In sum, the use of SEIM was rather similar among adolescents and adults. When significant differences occurred, they were small and indicated that adults used SEIM more frequently than adolescents.

As the chi-square analyses in the third column from the right indicate, male adults consistently used SEIM more frequently than male adolescents. For example, 16% of the male adults used internet videos with explicit sex once a week or more, as opposed to 10% of the male adolescents. In contrast, whereas 71% of the male adolescents had never been in touch with internet videos with explicit sex, the corresponding number among male adults was only 63%.

As the chi-square analyses in the second column from the right show, female adolescents and female adults did not differ in their SEIM use. Moreover, females' SEIM use was generally low. Both among female adolescents and female adults, only 9–15% got deliberately in touch with SEIM. In sum, when significant differences emerged between adolescents' and adults' SEIM use, they occurred between

adolescent and adult males, with male adults using SEIM more frequently. Both female adolescents and female adults rarely used SEIM and hardly differed in the use of the material.

Antecedents of SEIM Use

Demographics

We predicted that, compared to females, males would use SEIM more often, with no significant differences emerging between adolescents and adults. Further, we predicted that older adolescents would consume SEIM more frequently than younger adolescents, and that younger adults would do so more often than older adults. Finally, we hypothesized that better educated adults would use SEIM more frequently than less well educated adults, with no such influence occurring among adolescents.

Model 1 in Table 2 shows the main effects of the various antecedents in the pooled sample. Model 2 shows the results for when the interaction effects with developmental status (adolescent vs. adult) were included in the model. As expected, males used SEIM more often than females did, $B = -.26$,

$SE = .04$, $p < .001$ (Model 1). The 90% bias-corrected accelerated (bca) bootstrapped CI confirmed this result as it did not include zero. The main effect of gender was the same among adolescents and adults as the non-significant interaction effect between gender and developmental status in Model 2 indicates, $B = -.00$, $SE = .07$. The 90% bca bootstrapped CI supported this non-significant result as it included zero.

As Model 1 in Table 2 further shows, age and education had no main effect on SEIM use. In contrast to our expectations, there was also no evidence that education influenced SEIM use only among adults, $B = -.03$, $SE = .02$, 90% bca bootstrapped CI: $-.075/.007$ (Model 2). To test a potential differential age effect in the adolescent and the adult group, we ran the same model as in Model 1 separately for the adolescent and the adult sample (results not shown). This is the only possibility to test a potential difference between adolescents and adults in age effects on SEIM use because developmental status (i.e., membership in the adolescent or adult group) is defined by age. Contrary to our expectations, neither in the adolescent sample, $B = .01$, $SE = .01$, *ns*, 90% bca bootstrapped CI: $-.013/.034$, nor in the adult sample, $B = .00$, $SE = .00$, 90% bca bootstrapped CI: $-.001/.003$, the analyses elicited a significant influence of age on SEIM use. In sum, as far as demographics were concerned, only gender affected SEIM use.

Social Context

We hypothesized that having a relationship would reduce the use of SEIM among adults, but not among adolescents. Further, we expected that stronger attachment to friends would decrease the use of SEIM among adolescents, but not among adults.

Model 1 in Table 2 shows no main effects of relationship status or of attachment to friends. In contrast to our expectations, the impact of relationship status was also not moderated by being an adolescent or an adult (Model 2), $B = -.11$, $SE = .09$, *ns*, 90% bca bootstrapped CI: $-.248/.021$. Our expectations were also not supported regarding a differential effect of attachment to friends (Model 2), $B = -.02$, $SE = .04$, *ns*, 90% bca bootstrapped CI: $-.111/.062$. Neither among adolescents nor among adults, attachment to friends affected SEIM use. In conclusion, social context variables did not influence adolescents' or adults' SEIM use.

Personality Characteristics

We predicted that sensation seeking would increase the consumption of SEIM among adolescents, but not among adults. Further, we expected that dissatisfaction with one's

Table 2 Antecedents' of the use of sexually explicit internet material

DV = Use SEIM (t2)	Model 1			Model 2		
	<i>B</i>	<i>SE</i>	90% bca bootstrapped CI	<i>B</i>	<i>SE</i>	90% bca bootstrapped CI
Use SEIM (t1)	.544	.018***	.478/.603	.542	.018***	.481/.594
Female (t1)	-.259	.035***	-.327/-.204	-.264	.044***	-.350/-.188
Age (t1)	.000	.001	-.002/.001			
Education (t1)	.014	.010	-.002/.031	.027	.014*	.007/.055
In relationship (t1)	-.014	.039	-.076/.049	.054	.056	-.042/.147
Attachment (t1)	.011	.021	-.027/.056	.016	.027	-.039/.079
Sensation seeking (t1)	.048	.020**	.012/.090	.043	.024*	-.005/.094
Life satisfaction (t1)	-.041	.022*	-.080/-.005	-.044	.028	-.098/.012
Heterosexual orientation (t1)	-.216	.067***	-.388/-.093	-.150	.095	-.346/.005
Dev. status (Adult = 1) (t1)				.265	.264	-.212/.809
Female × Dev. status				-.001	.070	-.121/.124
Education × Dev. status				-.025	.022	-.065/.007
Relationship × Dev. status				-.112	.087	-.248/.021
Attachment × Dev. status				-.020	.044	-.111/.062
Sensation seeking × Dev. status				.002	.043	-.073/.092
Life satisfaction × Dev. status				.008	.045	-.074/.080
Heterosex. orient. × Dev. status				-.137	.134	-.437/.138
ΔR^2				.001		
Adj. R^2	.386			.387		

SEIM sexually explicit internet material

* $p < .05$; ** $p < .01$, *** $p < .001$ (one-tailed)

live would lead to more frequent SEIM use both among adolescents and adults.

As Model 1 in Table 2 indicates, sensation seekers were more likely to use SEIM than non-sensation seekers. In contrast to our expectations, this was true for both adolescents and adults, $B = .00$, $SE = .04$, 90% bca bootstrapped CI: $-.073/.092$. Model 1 in Table 2 also shows that lower life satisfaction predicted greater SEIM use. As expected, this influence occurred to an equal extent both among adolescents and adults, $B = .01$, $SE = .05$, 90% bca bootstrapped CI: $-.074/.080$. In conclusion, greater sensation seeking and lower life satisfaction increased SEIM use. These effects were the same among adolescents and adults.

Sexual Orientation

We expected that adolescents and adults with a not exclusively heterosexual orientation would use SEIM more often than adolescents and adults with an exclusively heterosexual orientation. Model 1 in Table 2 confirmed this expectation. As predicted, no significant interaction effect between sexual orientation and being an adolescent or an adult emerged, $B = -.14$, $SE = .13$, 90% bca bootstrapped CI: $-.437/.138$.

In sum, our results did not show any difference between adolescents and adults in the antecedent structure of SEIM use. Two alternative explanations exist for this unexpected finding. First, gender may not only affect SEIM use directly, but may also moderate the influence of particular antecedents. As a result, potential differences between adolescent and adults may be obscured when this moderating gender influence is not investigated. We tested this alternative explanation by estimating a model in which we added to Model 2 in Table 2 all necessary two-way interactions between gender and the antecedents and, as focal variables, all three-way interactions between a particular antecedent variable, developmental status, and gender (results not shown). None of these three-way interactions were significant. Consequently, differential antecedent structures of SEIM use did not occur when we took into account a potential moderating gender effect.

A second explanation of our unexpected similarities between adolescents and adults in their antecedent structure of SEIM use refers to the statistically disadvantageous measurement of developmental status as a dichotomy. Investigating age as a continuous variable instead may create more statistical variance and, consequently, more sensitivity to detecting a moderating effect of developmental status. To investigate this possibility, we estimated Model 2 in Table 2 by operationalizing developmental status no longer as a dichotomous variable, but as a continuous variable. This implied that we modeled the moderator variables as interactions between each antecedent variable and age (results not shown in Table).

The results were similar to the findings presented in Model 2 in Table 2, with one exception. A significant interaction effect between age and education emerged, $B = -.001$, $SE = .0005$, $p < .05$, 90% bca bootstrapped CI: $-.002/-.0003$. The regression coefficient of the focal independent variable, education, was $B = .04$, $SE = .01$, $p < .05$, 90% bca bootstrapped CI: $.014/.072$. This meant that the positive influence of education decreased as people mature. However, post hoc probing of the interaction effect showed that only among the 12- to 24-year olds (i.e., adolescents and emerging adults) did the better educated use SEIM more often than the less educated. Among people 25 years and older, the effect of education on the use of SEIM was not significant.

Discussion

Despite growing interest in adolescents' SEIM use, little research has been done that helps us to put it in perspective. This study was the first that systematically compared SEIM use and its antecedents between adolescents and adults, using a longitudinal design. Based on a nationally representative survey study among Dutch adolescents and adults, we found that the frequency of SEIM use and its antecedents were largely identical among adolescents and adults. The study has implications for the contextualization and evaluation of adolescents' use of SEIM. It also calls for a reorientation of research on the issue in terms of life-span development.

Prevalence of SEIM Use

At least implicitly, the rationale in much research on adolescents' SEIM use is based on the assumption that adolescents' sexual exceptionalism leads to a forbidden-fruit effect: Just because adolescents are not allowed to consume SEIM, such material may become more attractive to them than for adults, given adolescents' developmentally determined intense interest in sexual matters. In comparison to adults, adolescents may hence use SEIM more frequently. We did not find any evidence of a forbidden-fruit effect in terms of a more frequent use of SEIM among adolescents than among adults. The legal restrictions of adolescents' SEIM use along with heightened sexual curiosity in adolescence are undeniable facts. However, this tension did not translate in a more frequent SEIM use among adolescents than among adults. If anything, adults used SEIM more often than adolescents.

We dealt in this study only with the frequency of SEIM use, compared between adolescents and adults, as an indicator of a forbidden-fruit effect, but future researchers should also focus on the motives of SEIM use. Possibly, a closer look at the motives of SEIM use may reveal that, in comparison with adults, adolescents use SEIM more strongly in order to act against something that they are prohibited to do. Such

motives of rebellion or unconventionality may improve our understanding of whether and to what extent SEIM may present a forbidden fruit for adolescents.

The only difference between adolescents' and adults' SEIM use occurred between male adolescents and adults. Male adults used SEIM more frequently than male adolescents did. Two conclusions can be drawn from this finding. First, male adults are the main users of SEIM. Second, if differences in SEIM use occur between adolescents and adults, they are caused by the differential use between adolescent and adult males. Adolescent and adult females did not differ in their SEIM use: Only about 10% report using SEIM deliberately, an estimate that was in line with findings from previous nationally representative surveys (Traeen et al., 2006; Wolak et al., 2007).

Antecedents of the Use of SEIM

The absence of developmental differences in SEIM use also characterized our antecedent analysis. The antecedent structure of SEIM use was largely identical between adolescents and adults as far the variables in this study were concerned. The only difference occurred when we modeled people's developmental status with age as the moderating variable. Among adolescents and emerging adults, the better educated used SEIM more often than the less educated. This curious digital divide may partly result from the fact that better educated adolescents and emerging adults may use the internet more frequently. As a consequence, SEIM may be somewhat more easily accessible for better educated individuals than for less educated individuals. Overall, however, our findings suggest that what drives SEIM use is partly fixed at the beginning of adolescence. Obviously, this conclusion only applies to antecedents that can be meaningfully compared between adolescence and adulthood. Developments typical of adolescence, most notably pubertal maturation, may help us to understand the specifics of adolescents' SEIM use better.

Our study confirms once more the most robust finding in the field: Males use SEIM more often than females do (e.g., Brown & L'Engle, 2009; Janghorbani et al., 2003; Mesch, 2009; Peter & Valkenburg, 2006; Traeen et al., 2006; Wolak et al., 2007). Thus, the main difference in SEIM use is not developmentally determined, but gender-based. In their SEIM use, adolescent males are thus more similar to adult males than to their same-age female peers. Conversely, adolescent females are more similar to adult females than to their male peers in their SEIM use.

In addition, our study showed that two antecedents that have been identified as influences on adolescents' SEIM use—sensation seeking and life satisfaction (Peter & Valkenburg, 2006; Wolak et al., 2007)—also predicted adults' SEIM use: Sensation seekers used SEIM more often than non-sensation seekers did, regardless of whether they were teenagers or

adults. This finding is striking because sensation seeking generally decreases over the life span (Zuckerman, 1994). Apparently, though, sensation seeking keeps its distinctive impact on the use of SEIM also at later life stages. Further, we found that both adolescents and adults who were less satisfied with their lives used SEIM more frequently than adolescents and adults who were more satisfied with their lives.

In contrast to previous correlational research (Peter & Valkenburg, 2006; Wolak et al., 2007), our study with its longitudinal design was able to shed some light on the causal direction between life satisfaction and SEIM use. Life satisfaction predicted the use of SEIM, which suggests that the use of such material may have an escapist function for people who are dissatisfied with their lives. However, even with our longitudinal design we cannot preclude that this statistical relation may be spurious if other, currently omitted variables are included in the model. Apart from taking this possibility into account, future researchers should also focus on a potentially reciprocal relation between life satisfaction and SEIM use.

Our investigation demonstrated that an antecedent that has been shown to affect adults' SEIM use—people's sexual orientation—also influences adolescents' use of such material. Adolescents and adults who were not exclusively heterosexual used SEIM more often than exclusively heterosexual adolescents and adults. This result merges with other research that has shown that gays and lesbians consider the internet a protected, safe space to express their sexual orientation (Hillier & Harrison, 2007).

Contrary to our expectations, social context variables—relationship status and attachment to friends—did not affect SEIM use. Regardless of whether adolescents and adults were in a relationship, they consumed SEIM equally often. This finding confirms earlier results among adolescents (Peter & Valkenburg, 2006), but was at odds with research among adults (Buzzell, 2005; Stack et al., 2004). A simple explanation of the divergent finding among adults may be the change in internet use patterns. In 2000/2002 when the General Social Survey data, which both Buzzell and Stack et al. used, were collected, internet access was not as mobile and ubiquitous as it is today. As a result, the surveillance of a person's internet use was easier then than it is today. Thus, our findings suggest that the social-control explanation of people's SEIM use is no longer up-to-date. Relationships do not reduce people's SEIM use.

Our study did also not support the social-inclusion explanation of SEIM use. Both among adolescents and adults, a greater attachment to friends did not reduce SEIM use. In the context of other research that failed to find an influence of people's social context on their SEIM use (Peter & Valkenburg, 2006), this finding suggests that SEIM use may not result from social exclusion. While the consumption of SEIM may be a largely solitary activity, it does not seem to be

caused by a lack of social attachment or integration, neither among adolescents nor among adults. As outlined above, personality characteristics seem to play a more important role as antecedents of SEIM use.

In conclusion, our study has shown that SEIM use and its antecedent structure is similar among adolescents and adults. The typical adolescent user of SEIM does not differ much from the typical adult user of such material. This is an important background for discussions about SEIM use among adolescents. Some accounts of the issue tend to paint a picture of current adolescents and post-adolescents as “pornified” youth (Paul, 2005) or “Generation XXX” (Carroll et al., 2008), implying that adolescents may constitute the group in which SEIM use is the highest. Our study has demonstrated that such labels may be misleading, at least when we compare adolescents with adults and their SEIM use. However, our study does not permit us to say anything about potentially similar (non-) influences that SEIM use has on adolescents and adults. Based on recent longitudinal research (Brown & L’Engle, 2009; Peter & Valkenburg, 2009a, b, 2010), certain influences of SEIM use on adolescents’ sexual attitudes and gender role definitions may differ between adolescents and adults. To learn more about developmentally based differences in the influence of SEIM we need more research that compares adolescents and adults.

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