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Differential Developmental Profiles of Adolescents Using Sexually Explicit Internet Material

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This study used a person-centered approach to examine whether different developmental trajectories of boys' and girls' use of sexually explicit Internet material (SEIM) exist, which factors predict these trajectories, and whether sexual behavior develops differently for adolescents in these trajectories. A combination of latent class growth analysis on SEIM use and latent growth curve analysis on sexual behavior was used on four-wave longitudinal data of 787 eighth through tenth grade Dutch adolescents. Among boys, four SEIM use trajectories were identified, which were labeled Nonuse/Infrequent Use, Strongly Increasing Use, Occasional Use, and Decreasing Use. Among girls, a large Stable Nonuse/Infrequent Use and smaller Strongly Increasing Use and Stable Occasional Use trajectories were distinguished. Higher initial levels and/or stronger increases in SEIM use were predicted by demographic, social contextual, personal, and media use characteristics, including a stronger sexual interest, a higher degree of perceived realism regarding sexualized Internet content, and more permissive sexual attitudes. Moreover, initial levels of and, to some extent, developmental changes in sexual behavior varied for boys and girls in the different SEIM use trajectories. Whereas some adolescents showed concurrent low levels, or parallel strong increases in SEIM use and sexual behavior, a subgroup of boys decreased their SEIM use while increasing their sexual behavior.

A growing number of studies have linked adolescents' use of sexually explicit Internet material (SEIM) to their engagement in sexual behavior. In doing so, however, most studies have framed their questions in terms of media's effects on sexual outcomes, thereby ignoring the varying contexts in which media are selected and the possibility that adolescents differentially change their use over time. Consequently, it is unknown whether sexual behavior develops differently for adolescents showing different patterns in SEIM use. The aims of the present study, therefore, were (1) to identify different developmental trajectories of adolescents' SEIM use and the factors that predict these trajectories and (2) to describe the unique developmental changes in sexual behavior that adolescents in each of these SEIM use trajectories experience. By SEIM use, we mean the

active and purposeful searching for and viewing of sexually explicit Internet material, as opposed to accidental exposure to such material.

SEIM Use in Context

The abundance of sexually explicit material on the Internet, and the ease with which adolescents can access this material (Cooper, 1998), have sparked parents' and professionals' concerns about the potential negative consequences of exposure to SEIM. These concerns primarily reflect the fear that adolescents may have difficulty putting the often one-sided and unrealistic character of SEIM in perspective and, as a result, uncritically adopt the attitudes, expectations, and behaviors displayed in SEIM (Braun-Courville & Rojas, 2009). Empirical research addressing such media effects on adolescents' sexual outcomes suggests this fear is to some extent justified, by showing that SEIM use is related to earlier sexual initiation, more sexual experience and

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sexual partners, more permissive attitudes about sex, and more conventional gender-role beliefs (for a review, see Owens, Behun, Manning, & Reid, 2012).

While informative, studies using such a media-effects paradigm are limited in that they have not described how and why young people differ in their SEIM use during adolescence. According to the selective exposure perspective (Zillmann & Bryant, 1985), people tend to actively select media content that matches their dispositions and interests, while avoiding material that does not fit with their ideas and interests. Hence, there is strong reason to assume that adolescents selectively use SEIM (Peter & Valkenburg, 2009). However, the factors that determine this selection process, or the predictors of SEIM use, are still understudied. In addition, prior studies have either measured SEIM use at a single point in time (e.g., Lo & Wei, 2005) or have analyzed the relative stability of SEIM use across multiple time points (e.g., Peter & Valkenburg, 2009). Both designs are unable to demonstrate how individual adolescents' SEIM use develops over time. Adolescence is a period characterized by a strong increase in sexual curiosity (Savin-Williams & Diamond, 2004), and SEIM may be used in multiple ways (e.g., for information gathering, for sexual stimulation, or for seeking normative validation for actual behavior; Bleakley, Hennessy, Fishbein, & Jordan, 2008) to fulfill this curiosity. Hence, it is conceivable that the increasing interest in sexual matters that takes place during adolescence manifests itself, at least for some adolescents, in an increase in SEIM use. In sum, there is a lack of knowledge on both the development in SEIM use that individual adolescents show over time (i.e., intraindividual differences) and the variation between individuals in this development, as well as the factors that explain this variation (i.e., interindividual differences).

The media practice model (Brown, 2000; Steele & Brown, 1995) offers a framework for understanding both intraindividual and interindividual differences in SEIM use during adolescence. One of the main assumptions of this model is that media use is purposive and motivated: People are active audience members who select and use media based on who they are at a particular moment or who they wish to become. Hence, media use should be considered in context. How young people select, interpret, and apply media is dependent on their personal background, their dispositions and interests, and environmental factors (Bleakley et al., 2008). Prior research has linked adolescents' selection of (sexualized) media content to at least four groups of variables: (a) demographic characteristics, (b) social context characteristics, (c) personal characteristics, and (d) media use characteristics (Brown, 2000; Kim et al., 2006; Peter & Valkenburg, 2006).

With respect to demographic characteristics, boys and older adolescents have been found to use SEIM more often than girls (Lo & Wei, 2005; Peter & Valkenburg, 2006). Moreover, studies have shown that getting lower

grades in school is related to watching more sexually explicit material on television (Collins et al., 2004). It is unclear, however, whether educational level predicts differences in SEIM use during adolescence.

Social context characteristics, such as religion and parental upbringing, play an important role in adolescents' identity development, and as such they help determine what media content adolescents turn to (Steele & Brown, 1995). Collins and colleagues (2004) have demonstrated that religiosity and parental knowledge about adolescents' whereabouts both reduce the amount of watching sexually explicit content on television. It is unknown whether and how communication about sex with parents is related to adolescents' SEIM use. On the basis of assumptions of the media practice model, one could argue that adolescents who frequently communicate about sexual matters with their parents turn less to SEIM as a source for information. At the same time, however, it is conceivable that an open communication about sexuality reduces potential barriers to using SEIM, either for gathering different information or for sexual stimulation.

With respect to personal characteristics, it can be hypothesized that adolescents with more permissive sexual attitudes turn more frequently to SEIM, because the way sex is displayed in this medium more likely reflects their own ideas and expectations regarding sexuality (Hawk, Vanwesenbeeck, De Graaf, & Bakker, 2006). Similarly, adolescents with a strong sexual interest are more likely to use SEIM than adolescents who are less cognitively involved with sexuality (Peter & Valkenburg, 2006).

Prior studies have furthermore indicated that characteristics of media use, such as the opportunity to access and use media in privacy, are related to the frequency with which adolescents turn to sexualized media content (Kim et al., 2006). Moreover, media selection is influenced by adolescents' expectations toward media content and use (Brown, 2000). Adolescents who are eager to learn about sexuality will particularly use SEIM as a source for information when they expect SEIM to be realistic and instructive (Hawk et al., 2006).

Taken together, these findings demonstrate that multiple factors may influence the extent to which adolescents turn to SEIM at a given moment, and point to the need to consider SEIM not as a uniform and static influence on sexual outcomes but rather as a dynamic and context-dependent behavior in itself. Therefore, the first aim of this study was to identify different developmental trajectories of adolescents' SEIM use, as well as the factors that predict these SEIM use trajectories.

SEIM Use and Sexual Behavior

As stated, prior research has predominantly used a media-effects paradigm to study whether adolescents'

use of sexualized media content and their sexual behavior are related. Recently, scholars have called for more advanced approaches to studying the relation between the two concepts, in which the role of media is conceptualized as a dynamic, mutually reinforcing interplay between adolescents' selection of particular media content and the influence that this content has on them (Peter & Valkenburg, 2009; Slater, 2007). For example, Slater's (2007) reinforcing-spiral framework suggests that media content may not only affect a particular outcome variable, but this outcome variable may simultaneously influence (further) use of that particular media content. As applied to SEIM use and its relation to sexual behavior, this means that sexually active youth may selectively use SEIM, and this use may, in turn, lead to an increase in sexual activity. While this approach, by taking into account selection processes, certainly provides a more accurate explanation of potential relations between SEIM use and sexual behavior, it does so only for those who increase their SEIM use over time. Moreover, the model hypothesizes parallel increases only, while other co-occurring patterns are theoretically plausible. On the basis of the assumptions of the media practice model—that young people select media based on who they are or who they *wish* to be—it is equally likely that some adolescents increase in SEIM use when their sexual behavior does not progress as fast as they desire (e.g., SEIM as a substitute for real-life sex). Similarly, interest in SEIM may decrease as adolescents get more opportunities for real-life sexual behavior. In other words, the reinforcing-spiral framework does not take into account intraindividual and interindividual variation in media use that is implied by the media practice model. So far, no studies have examined whether sexual behavior develops differently for adolescents showing different patterns in SEIM use over time. This is an important shortcoming, as knowledge on different types of media users, their unique characteristics and etiology, and their co-occurring sexual development may guide health professionals by more efficiently identifying and targeting at-risk youth. Therefore, the second aim of this study was to describe the unique developmental changes in sexual behavior that adolescents in different SEIM use trajectories experience.

The Present Study

This study extended previous research by adopting a developmental and contextual perspective to examine the parallel changes in SEIM use and sexual behavior. Our goal was to develop a typology of adolescent SEIM users, in which we describe different developmental patterns or trajectories in SEIM use, factors that predict these trajectories, and the co-occurring changes in sexual behavior that are specific to each of these SEIM use

trajectories. The following research questions were addressed:

RQ1: Can different developmental trajectories of adolescents' SEIM use be distinguished?

Based on the media practice model notion that media use is active and purposive (Brown, 2000; Steele & Brown, 1995), dependent on the media user's situation at any particular moment, we hypothesized that multiple developmental trajectories of adolescents' SEIM use could be distinguished, characterized by different initial levels and changes over time. Given prior research revealing increases in sexual curiosity during adolescence (Savin-William & Diamond, 2004), we expected that at least one trajectory characterized by increases in SEIM use could be identified. However, we had no a priori hypotheses on the exact number and nature of other SEIM use trajectories.

RQ2: Which factors predict these SEIM use trajectories?

On the basis of earlier findings on the correlates of adolescents' use of sexualized media content, we formulated several hypotheses about the predictors of adolescents' SEIM use trajectories. Specifically, we expected that adolescents in trajectories characterized by a higher initial level and/or a stronger increase in SEIM use would, at the start of the study, report (a) an older age; (b) less often they were religious; (c) less disclosure to their parents about their whereabouts; (d) more permissive sexual attitudes; (e) a stronger sexual interest; (f) more opportunity to use the Internet in privacy; and (g) a higher degree of perceived realism regarding sexualized media content, compared to adolescents in trajectories characterized by a lower amount of SEIM use. Moreover, we explored whether and how educational level and communication about sex with parents predicted adolescents' SEIM use trajectories.

RQ3: How does sexual behavior develop for adolescents in different SEIM use trajectories?

On the basis of assumptions of the reinforcing-spiral framework (Slater, 2007) and previous studies demonstrating bidirectional positive influences between SEIM use and sexual outcomes (e.g., Bleakley et al., 2008; Peter & Valkenburg, 2009), we hypothesized that some adolescents would follow a pattern of parallel increases in SEIM use and sexual behavior. However, given the media practice model notion that young people select media from different backgrounds, dispositions, and interests, we also hypothesized other co-occurring patterns of SEIM use and sexual behavior would emerge. As this study was the first to identify different trajectories of adolescents' SEIM use, we had no a priori hypotheses

about the nature of transformations in sexual behavior for adolescents in different SEIM use trajectories.

Both theory and empirical research suggest that adolescents' sexual development is gender specific (Aubrey, Harrison, Kramer, & Yellin, 2003). In addition to biological differences in their pubertal and sexual development, boys and girls are confronted with different sexual scripts that partly determine the media they attend to and the way they interpret and apply these media (Brown, 2000; Steele & Brown, 1995). The present study, therefore, examined developmental trajectories of adolescents' SEIM use, the factors that predict these trajectories, and the developmental changes in sexual behavior that characterize each trajectory, for boys and girls separately.

Method

Sample and Procedure

Data for this study were collected as part of Project STARS (Studies on Trajectories of Adolescent Relationships and Sexuality; Dekovic, Van Aken, Ter Bogt, & Van Geert, 2010), a longitudinal research project on romantic and sexual development of Dutch adolescents. Adolescents were recruited from eight elementary and four secondary schools in several large cities and small municipalities throughout the Netherlands. Prior to the first measurement, both adolescents and their parents received letters, brochures, and flyers describing the aims of the study and the possibility to decline participation. Less than 10% of the approached adolescents either decided not to participate or were not allowed by their parents to take part in the study.

Adolescents were followed up across four waves, with six-month intervals between waves. The first measurement wave was conducted in fall 2011. At each wave, adolescents completed a questionnaire on computers at their school during regular school hours. Researchers and trained research assistants were present to supervise the data collection (i.e., introduce the project and the procedure, answer questions, and ensure maximum privacy from teachers and other students). Confidentiality of responses was guaranteed, as was the option to stop participation at any time. Adolescents received book gift certificates of increasing values after each completed questionnaire. This study was approved by the ethics board of the Faculty of Social and Behavioural Sciences of Utrecht University. An ethical protocol was developed should participants have any problems or questions concerning issues in this study.

The longitudinal sample consisted of 1,297 participants (53.3% boys), and represented five age cohorts of adolescents in five consecutive grades: the final year of elementary school (sixth grade) and the first four years of secondary school (seventh through tenth grade). To enable the identification of multiple SEIM

use trajectories within a relatively homogeneous age sample, for the current study we selected only eighth through tenth grade participants. At baseline (T_1), 787 adolescents (412 boys, 52.4%) with an average age of 14.33 years ($SD = 1.07$) filled out the questionnaire. Most participants had a Dutch (i.e., self and both parents born in the Netherlands; 88.2%) or Western (4.3%) background; others had a non-Western background. Adolescents were enrolled in different educational tracks, with 34.4% in vocational education programs and 65.6% in college/university preparatory programs. The majority of adolescents reported a heterosexual orientation (93.4%).

Because of the graduation of several tenth graders after T_2 , some of our participants could not complete subsequent questionnaires at their school. Despite various invitations by mail or phone to complete these questionnaires at home, it was not possible to retain all baseline participants in the study. At T_2 , T_3 , and T_4 the number of participants was 723 (91.9%), 700 (89.0%), and 628 (79.8%), respectively. A total of 584 (74.2%) participants had complete data (i.e., all four waves). Participants who missed one or more measurement waves were relatively more often boys, $\chi^2(1, N = 787) = 14.98, p < .001$, older, $t(785) = -6.28, p < .001$, and nonreligious, $\chi^2(1, N = 787) = 9.23, p = .002$, compared to participants who completed all questionnaires. In addition, they more often had a non-Western background, $\chi^2(1, N = 787) = 5.80, p = .016$, a lower educational level, $\chi^2(1, N = 787) = 65.22, p < .001$, and a heterosexual orientation, $\chi^2(1, N = 787) = 5.91, p = .015$. Finally, they reported higher baseline levels of SEIM use, $t(285.80) = -4.58, p < .001$, and sexual experience, $t(257.24) = -7.09, p < .001$, compared to those who completed all questionnaires.

Measures

SEIM use. Adolescents' SEIM use was assessed with one item. Based on research on the wording of sensitive questions (Bradburn, Sudman, & Wansink, 2004), this item read as follows: "Many teenagers sometimes look at pornography on the Internet. We would like to know how this is for you. How often do you use the Internet to view a porn Web site (a Web site with pictures or movies that show nudity or people having sex)?" The response categories were 1 = *Never*, 2 = *Less than once a year*, 3 = *Less than once a month*, 4 = *One to three times a month*, 5 = *Once or twice a week*, 6 = *Three times a week or more*.

Sexual behavior. To assess sexual behavior, participants initially were asked two questions: "Have you ever French-kissed somebody?" and "Have you ever had sex with another person? By sex we mean everything from touching or caressing to intercourse." Respondents answered with 0 = *No* or 1 = *Yes*. Those who indicated *Yes* on the second question received follow-up questions

about their experience with different sexual behaviors: naked touching or caressing, performing or receiving manual sex, performing or receiving oral sex, and vaginal or anal intercourse (0 = *No*, 1 = *Yes*). These items were combined into one variable measuring the level of adolescents' sexual experience, ranging from 0 = *Inexperienced with all behaviors* to 5 = *Experience with all behaviors*. Table 1 shows the frequencies of the separate behaviors and the average sexual behavior score. Cronbach's α of these items ranged from .79 to .88 across waves.

Covariates. To examine which factors predicted adolescents' unique development of SEIM use, we incorporated several demographic, social contextual, personal, and media variables in the model. These variables were measured at T₁.

Adolescents' educational level was operationalized as vocational education (0) versus college/university preparatory education (1). Religiosity was determined as whether adolescents were religious (0 = *No*, 1 = *Yes*). Adolescents' disclosure to parents about their whereabouts was assessed using five items (e.g., "How often do you tell your mother/father about who your friends are?"; $\alpha = .79$), scored on a 6-point scale (1 = *Never*, 6 = *Very often*). Frequency of communication with parents about sexuality was measured with four items reflecting sexual conversation topics (e.g., "What you like and do not like to do in terms of sex"; $\alpha = .84$), scored on a 6-point scale (1 = *Never*, 6 = *Very often*). Permissive sexual attitudes were assessed by measuring adolescents' attitude toward five statements of a sexually permissive nature (e.g., "I don't need to be in a relationship to have sex with someone"; $\alpha = .73$), scored on

a 6-point scale (1 = *Completely disagree*, 6 = *Completely agree*). Sexual interest was measured by adolescents' agreement or disagreement to four statements (e.g., "I think about sex a great deal of the time"; $\alpha = .88$), scored on a 6-point scale (1 = *Completely disagree*, 6 = *Completely agree*). Privacy of Internet use was determined by asking adolescents whether they had a computer with Internet connection in their own bedroom (0 = *No*, 1 = *Yes*). Finally, perceived realism was measured by adolescents' attitude toward four statements on the realistic or educational nature of sex on the Internet (e.g., "The Internet gives reliable information on sex and relationships"; $\alpha = .82$), scored on a 6-point scale (1 = *Completely disagree*, 6 = *Completely agree*).

Planned missingness. To curb the length of the extensive questionnaire used in the larger study and to minimize potential data loss due to weariness, we limited the number of items for several concepts in the questionnaire at T₁ with the use of a planned missingness design (Graham, 2009). Specifically, for permissive sexual attitudes and perceived realism, adolescents were presented with two core items and one randomly selected item within the scale, filling out a total of three out of the four or five items in the original scale. The missing items were subsequently imputed using expectation-maximization estimation (EM; Dempster, Laird, & Rubin, 1977) in SPSS Version 20.

Strategy of Analysis

First, we aimed to identify distinct developmental trajectories of adolescents' SEIM use. For this purpose, we performed latent class growth curve analyses (LCGA)

Table 1. Descriptive Statistics of SEIM Use and Sexual Behavior for Boys and Girls

Variable	Possible Range	N Range Across Waves	T ₁		T ₂		T ₃		T ₄	
			M (SD)	%						
Boys										
SEIM use	1–6	307–412	2.64 (1.79)		2.89 (1.85)		3.18 (1.78)		3.39 (1.90)	
Sexual behavior	0–5	307–412	0.87 (1.31)		0.98 (1.42)		1.17 (1.58)		1.21 (1.67)	
French kissing	no/yes	307–412		47.1		50.9		55.0		50.5
Naked touching or caressing	no/yes	307–412		12.6		15.4		19.1		22.1
Manual sex (performing/receiving)	no/yes	307–412		11.7		13.2		18.5		19.5
Oral sex (performing/receiving)	no/yes	307–412		8.5		10.5		12.5		14.3
Vaginal or anal intercourse	no/yes	307–412		7.0		7.8		12.0		14.0
Girls										
SEIM use	1–6	321–375	1.11 (0.46)		1.13 (0.53)		1.21 (0.73)		1.25 (0.79)	
Sexual behavior	0–5	321–375	0.70 (1.10)		0.87 (1.29)		1.08 (1.52)		1.23 (1.62)	
French kissing	no/yes	321–375		44.5		49.7		52.7		57.0
Naked touching or caressing	no/yes	321–375		7.5		11.4		17.3		20.6
Manual sex (performing/receiving)	no/yes	321–375		8.8		11.9		17.3		19.3
Oral sex (performing/receiving)	no/yes	321–375		4.0		6.8		11.5		13.7
Vaginal or anal intercourse	no/yes	321–375		5.1		7.1		10.1		12.1

Note. Statistics for specific sexual behaviors represent proportions of participants indicating experience with these behaviors. SEIM = sexually explicit Internet material.

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in Mplus (Version 7.11; Muthén & Muthén, 2013). This analytical technique allows for the identification of subgroups (classes) of individuals, characterized by similar response patterns on variables of interest, within a heterogeneous sample. Underlying these response patterns are two latent variables that represent growth curves: the initial level (intercept) and the rate of change (slope). LCGA assumes that each class is characterized by a unique latent growth trajectory, and that this trajectory is identical for all individuals within the class. That is, the variances around the intercept and the slope are estimated to be zero. We modeled linear growth in SEIM use and estimated the LCGAs separately for boys and girls. Cases with partially missing data were included in model estimations using full information maximum likelihood, except for nine boys and five girls who had missing values on the covariates (Enders & Bandalos, 2001).

To determine the optimal number of latent trajectories in SEIM use, we compared models with one up to five trajectories on the Bayesian information criterion (BIC), the bootstrapped likelihood ratio test (BLRT), and the entropy. Lower BIC values point to a relatively better fit of the model to the data, while significant BLRT results indicate that adding an extra trajectory significantly improves the model (Nylund, Asparouhov, & Muthén, 2007). The accuracy of the classification of individuals in latent trajectories is judged with the entropy, where values of .8 or higher indicate a good classification (Celeux & Soromenho, 1996). Moreover, at each stage, we considered theoretical meaningfulness of the latent trajectories and the number of individuals within each trajectory.

Second, we examined which demographic, social contextual, personal, and media factors predicted adolescents' SEIM use trajectories by performing a multinomial regression analysis. In interpreting the results of this analysis, the trajectory characterized by the lowest SEIM use was taken as the reference category.

Third, we examined and compared initial levels of and rates of change in sexual behavior for adolescents in different SEIM use trajectories. For this purpose, we used multigroup latent growth curve modeling (LGM) on sexual behavior, with grouping based on the SEIM use trajectories that were identified and saved in the first step. We modeled linear growth in sexual behavior. The fit of this model was evaluated by examining the comparative fit index (CFI), the Tucker Lewis index (TLI) and the root mean square error of approximation (RMSEA). Specifically, CFIs and TLIs greater than .90 and RMSEAs less than .08 were considered as evidence of an adequate model fit (Kline, 1998). We tested for group differences in initial levels of and rates of change in sexual behavior by independently constraining intercept and slope means to be equal across pairs of SEIM use trajectories.

Results

SEIM Use Trajectories

Table 1 shows descriptive statistics of SEIM use and sexual behavior in the overall sample of boys and girls. On average, both boys and girls reported a low yet slightly increasing level of SEIM use. However, for boys these mean scores translated into a frequency of use of several times a year, whereas girls' mean scores reflected practically no use.

Supporting our hypothesis, results of the LCGA analysis showed that, for both boys and girls, distinct developmental trajectories of SEIM use could be identified within their overall sample; the BIC value generally decreased when more classes were added, while the BLRT tests repeatedly indicated that models with an extra class were preferred over the previously tested model. However, for boys, estimation failed to converge for the five-class model. Nonconvergence is typical for overspecified mixture models, indicating that a more parsimonious model should be preferred (Nylund et al., 2007). Hence, the model with four classes was chosen as the optimal model for boys. Entropy of this model was high (.92), indicating that boys were adequately assigned to the trajectory that best matched their response patterns. Similarly, for girls, a three-class model appeared to be the optimal model, as estimating a fourth class resulted in nonconvergence of the model. Entropy of this model was excellent (.99). Model fit estimates of these analyses are available from the first author upon request.

Table 2 shows the average growth factors (initial levels and rates of change) of the SEIM use trajectories for boys (see Figure 1) and girls (see Figure 2). The most common trajectory for both boys (34.5%) and girls

Table 2. *Estimated Growth Factors of SEIM Use Trajectories for Boys and Girls, Derived from LCGA Models*

SEIM Trajectory	N (%)	M (SE) Intercept	M (SE) Linear Slope
Boys (N = 403)			
1. Nonuse/infrequent use	139 (34.5)	1.14 (.04)***	0.12 (.04)**
2. Strongly increasing use	88 (21.8)	1.41 (.06)***	1.22 (.06)***
3. Occasional use	94 (23.3)	3.45 (.06)***	0.18 (.06)**
4. Decreasing use	82 (20.4)	5.45 (.06)***	-0.29 (.07)***
Girls (N = 370)			
1. Stable nonuse/ infrequent use	339 (91.6)	1.04 (.01)***	0.00 (.00)
2. Strongly increasing use	19 (5.1)	1.13 (.11)***	0.96 (.10)***
3. Stable occasional use	12 (3.3)	3.12 (.22)***	0.00 (.00)

Note. Models with more than one class are estimated with the set of covariates. Due to missing values on the covariates, in these models $N=403$ for boys and $N=370$ for girls. SEIM = sexually explicit Internet material.

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

DEVELOPMENTAL PROFILES OF ADOLESCENTS USING SEIM

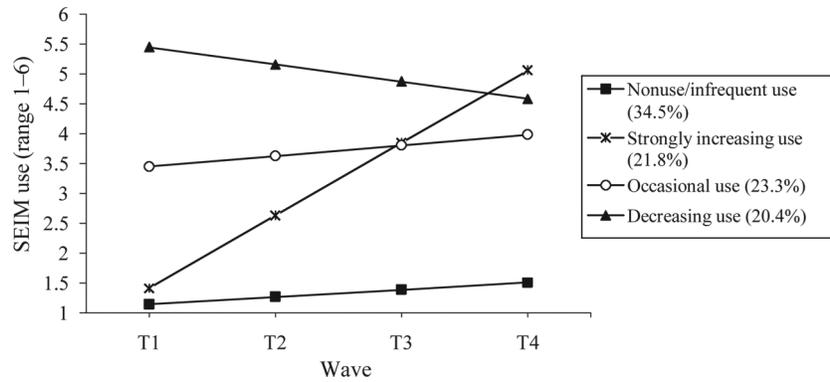


Figure 1. Four trajectories of boys' SEIM use during adolescence.

(91.6%) was characterized by adolescents whose SEIM use was consistently close to no use, although a slight increase in use over time was apparent for boys. Hence, trajectory 1 was labeled Nonuse/Infrequent Use (Stable Nonuse/Infrequent Use for girls). A second trajectory identified for both boys (21.8%) and girls (5.1%) consisted of adolescents with an initial level close to no use but with a strong increase in SEIM use over time. Trajectory 2 was therefore labeled Strongly Increasing Use. Furthermore, a substantial group of boys (23.3%) and a small group of girls (3.3%) had moderate (i.e., between less than once a month and one to three times a month) initial levels of SEIM use, which for boys slightly increased over the course of the study. This third trajectory was labeled Occasional Use (Stable Occasional Use for girls). Finally, for boys only, a fourth trajectory (20.4%) was characterized by boys whose initial levels of SEIM use were relatively high (i.e., more than once per week) but decreased over time. This trajectory was labeled Decreasing Use.

Predictors of SEIM Use Trajectories

Tables 3 and 4 show the results of the multinomial regression analyses of boys' and girls' SEIM use trajectories on a set of demographic, social contextual, personal, and media use characteristics. The coefficients

shown in Tables 3 and 4 indicate how much higher or lower (in log odds) adolescents in each trajectory scored on the predictor variables compared to their peers in the lowest trajectory.

Boys. As becomes clear from Table 3, personal characteristics especially seem to play an important role in predicting differences in boys' SEIM use development during adolescence. Specifically, compared to boys in the Nonuse/Infrequent Use trajectory, boys in all other trajectories reported significantly more permissive sexual attitudes and a stronger sexual interest at the start of the study. However, differences in boys' SEIM use development were also predicted by demographic, social contextual, and media use characteristics. For instance, it was found that boys in the Occasional Use and Decreasing Use trajectories were relatively older at the start of the study than their peers in the trajectory characterized by the lowest SEIM use throughout adolescence. Moreover, compared to boys in the Nonuse/Infrequent Use trajectory, boys in the Decreasing Use trajectory were found to disclose less to their parents about their whereabouts, and boys in the Occasional Use trajectory were found to communicate more frequently with their parents about sexual matters. Finally, boys in the Decreasing Use and Occasional Use trajectories reported more often that they could access the Internet in private (i.e., in their own

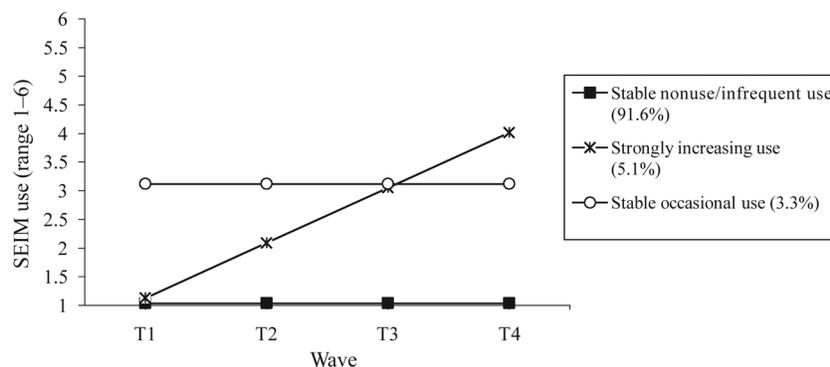


Figure 2. Three trajectories of girls' SEIM use during adolescence.

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Table 3. *Multinomial Regression Analysis of Boys' SEIM Use Trajectories on Demographic, Social Contextual, Personal, and Media Use Characteristics Measured at T₁ (N = 403)*

Predictor	Nonuse/Infrequent Use <i>B (SE)</i>	Strongly Increasing Use <i>B (SE)</i>	Occasional Use <i>B (SE)</i>	Decreasing Use <i>B (SE)</i>
Demographic				
Age	—	0.31 (0.19)	0.57 (0.18)**	0.90 (0.19)***
Educational level	—	-0.33 (0.44)	-0.15 (0.37)	-0.07 (0.43)
Contextual				
Religiosity	—	-0.60 (0.40)	-0.66 (0.34)	-0.65 (0.42)
Disclosure to parents	—	-0.13 (0.21)	-0.25 (0.20)	-0.56 (0.25)*
Communication with parents	—	0.43 (0.30)	0.67 (0.23)*	0.60 (0.23)
Personal				
Permissive attitudes	—	0.63 (0.22)**	0.70 (0.21)**	1.00 (0.25)***
Sexual interest	—	0.90 (0.37)*	1.42 (0.32)***	1.95 (0.35)***
Media use				
Privacy Internet use	—	0.55 (0.36)	0.72 (0.36)*	1.06 (0.43)*
Perceived realism	—	0.09 (0.22)	0.46 (0.21)*	0.38 (0.25)

Note. The reported coefficients are unstandardized and represent multinomial regression coefficients using the trajectory Nonuse/Infrequent Use as the reference class. SEIM = sexually explicit Internet material.

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

bedroom) and, for the latter group only, that they perceived sexualized Internet content to be more realistic and instructive than their peers in the Nonuse/Infrequent Use trajectory.

Girls. For girls, sexual interest appeared to be the most important predictor of differences in SEIM use development during adolescence; compared to girls in the Stable Nonuse/Infrequent Use trajectory, girls in the Strongly Increasing Use and Stable Occasional Use trajectories reported a stronger sexual interest at the start of the study. Moreover, it was found that girls in the Stable Occasional Use trajectory perceived sexualized Internet content to be more realistic and instructive than their counterparts in the lowest SEIM use trajectory.

None of the demographic and social contextual variables significantly predicted girls' SEIM use trajectories.

Transformations in Sexual Behavior for Different SEIM Use Trajectories

Boys. To investigate whether the development of sexual behavior during adolescence would differ for boys in the four SEIM use trajectories, we examined initial levels and developmental changes in boys' reports of their sexual behavior, using a multigroup LGM model on sexual behavior. The fit of this model was adequate: although the complexity of our model resulted in an RMSEA value above the recommended cutoff (.10), the CFI and TLI were both .98. Table 5 shows

Table 4. *Multinomial Regression Analysis of Girls' SEIM Use Trajectories on Demographic, Social Contextual, Personal, and Media Use Characteristics Measured at T₁ (N = 370)*

Predictor	Stable Nonuse/Infrequent Use <i>B (SE)</i>	Strongly Increasing Use <i>B (SE)</i>	Stable Occasional Use <i>B (SE)</i>
Demographic			
Age	—	-0.10 (0.25)	0.23 (0.26)
Educational level	—	-0.87 (0.52)	0.08 (0.64)
Contextual			
Religiosity	—	0.81 (0.51)	0.20 (0.74)
Disclosure to parents	—	-0.55 (0.30)	-0.11 (0.50)
Communication with parents	—	0.13 (0.37)	-0.20 (0.43)
Personal			
Permissive attitudes	—	-0.56 (0.40)	0.21 (0.35)
Sexual interest	—	1.16 (0.46)*	2.27 (0.55)***
Media use			
Privacy Internet use	—	-0.22 (0.51)	1.22 (1.18)
Perceived realism	—	0.17 (0.36)	1.11 (0.42)**

Note. The reported coefficients are unstandardized and represent multinomial regression coefficients using the trajectory Stable Nonuse/Infrequent Use as the reference class. SEIM = sexually explicit Internet material.

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

Table 5. Estimated Growth Factors of Sexual Behavior for Boys and Girls in Different SEIM Use Trajectories, Derived From Multigroup LGM Model

SEIM Trajectory	N (%)	M (SE) Intercept	M (SE) Linear Slope
Boys (N = 403)			
Nonuse/infrequent use	139 (34.5)	0.36 (.07)***	0.09 (.03)**
Strongly increasing use	88 (21.8)	0.61 (.10)***	0.26 (.05)***
Occasional use	94 (23.3)	1.19 (.15)***	0.22 (.05)***
Decreasing use	82 (20.4)	1.60 (.18)***	0.29 (.06)***
Girls (N = 370)			
Stable nonuse/infrequent use	339 (91.6)	0.63 (.06)***	0.22 (.03)***
Strongly increasing use	19 (5.1)	1.05 (.28)***	0.47 (.14)**
Stable occasional use	12 (3.3)	2.38 (.62)***	0.12 (.07)

p* < .01. *p* < .001.

the average growth factors (initial levels and rates of change) of sexual behavior for each of the boys' SEIM use trajectories (see Figure 3).

Boys in the four SEIM use trajectories differed in their initial levels of sexual behavior. Specifically, boys in the Nonuse/Infrequent Use trajectory indicated a significantly lower initial level of sexual behavior

compared to boys in the Strongly Increasing Use trajectory, Wald $\chi^2(1) = 4.00, p = .046$, boys in the Occasional Use trajectory, Wald $\chi^2(1) = 24.84, p < .001$, and boys in the Decreasing Use trajectory, Wald $\chi^2(1) = 40.17, p < .001$. In addition, boys in the Strongly Increasing Use trajectory reported a lower initial level of sexual behavior compared to boys in the Occasional Use trajectory, Wald $\chi^2(1) = 10.09, p = .002$, and boys in the Decreasing Use trajectory, Wald $\chi^2(1) = 22.40, p < .001$.

In addition to these initial level differences, differences in rates of change in sexual behavior between boys' SEIM use trajectories were observed. Specifically, although sexual behavior increased significantly over time for boys in all four SEIM use trajectories, this increase was less steep for boys in the Nonuse/Infrequent Use trajectory than for boys in the Strongly Increasing Use trajectory, Wald $\chi^2(1) = 8.37, p = .004$; boys in the Occasional Use trajectory, Wald $\chi^2(1) = 5.60, p = .018$; and boys in the Decreasing Use trajectory, Wald $\chi^2(1) = 8.81, p = .003$.

Girls. For girls, a similar multigroup LGM model on sexual behavior was estimated (CFI = .98; TLI = .98; RMSEA = .10). Table 5 and Figure 4 show the results of

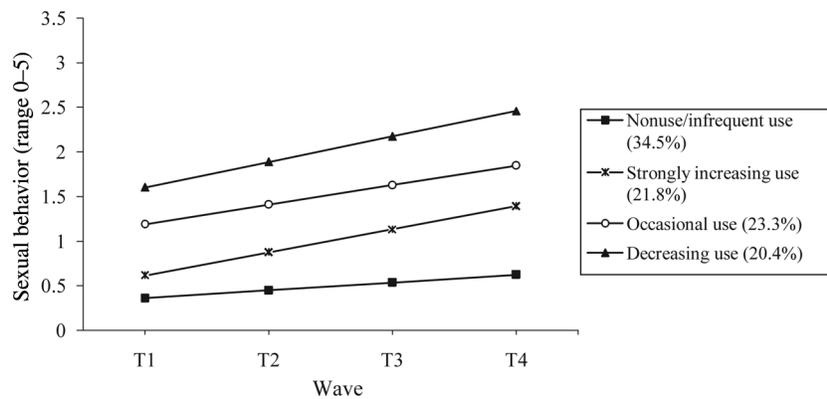


Figure 3. Development of sexual behavior during adolescence for boys in different SEIM use trajectories.

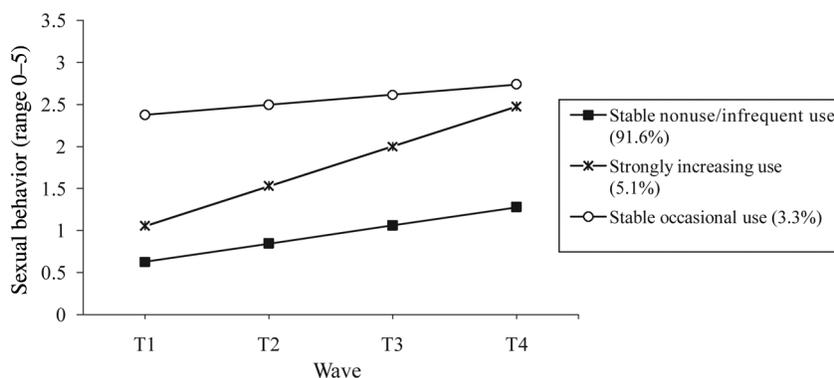


Figure 4. Development of sexual behavior during adolescence for girls in different SEIM use trajectories.

this model. Girls in the three SEIM use trajectories differed in their initial levels of sexual behavior. Specifically, girls in the Stable Occasional Use trajectory reported a significantly higher initial level of sexual behavior than girls in the Stable Nonuse/Infrequent Use trajectory, Wald $\chi^2(1) = 8.00$, $p = .005$, and a marginally higher initial level of sexual behavior than girls in the Strongly Increasing Use trajectory, Wald $\chi^2(1) = 3.82$, $p = .051$.

Moreover, while sexual behavior increased significantly over time for girls in the Stable Nonuse/Infrequent Use and Strongly Increasing Use trajectories, the slope of sexual behavior for girls in the Stable Occasional Use trajectory appeared nonsignificant. However, this difference in rate of change in sexual behavior between girls' SEIM use trajectories was only significant when comparing girls in the trajectory characterized by the highest use of SEIM with those in the Strongly Increasing Use trajectory, Wald $\chi^2(1) = 5.00$, $p = .025$.

Discussion

Previous studies linking adolescents' use of SEIM to their engagement in sexual behavior have failed to fully take into account the intraindividual and interindividual variation that characterizes media use and, as such, the possibility that sexual behavior changes differently for adolescents showing different patterns in SEIM use. The goal of the current study was to develop a typology of adolescent SEIM users that incorporates different developmental patterns or trajectories in SEIM use, factors predicting these trajectories, and the co-occurring changes in sexual behavior specific to each of these SEIM use trajectories.

Consistent with our hypotheses, findings revealed multiple trajectories of boys' and girls' SEIM use, characterized by unique initial levels and changes over time, which were predicted by demographic, social contextual, personal, and media use characteristics. Moreover, adolescents in different SEIM use trajectories differed in their initial levels of sexual behavior and, to some extent, in their progress over time. Next, we discuss these findings and their implications for healthy sexual development during adolescence.

SEIM Use Trajectories

Our results showed that four developmental trajectories of boys' SEIM use can be distinguished, which, on the basis of their initial levels and changes over time, can be labeled as Nonuse/Infrequent Use, Strongly Increasing Use, Occasional Use, and Decreasing Use. This finding highlights two important characteristics of boys' SEIM use: (1) there is great variation *among* boys in their use of SEIM, and (2) boys' SEIM use is a

dynamic process, showing variation *within* individuals over time. For instance, the hypothesized Strongly Increasing Use trajectory may reflect the notion that heightened sexual curiosity occurring during adolescence (Savin-Williams & Diamond, 2004) may for some boys translate into an increased interest in using SEIM. However, the presence of the Decreasing Use trajectory indicates that this is by no means a process that is common for all boys. As such, our results highlight the diverse and dynamic nature of the (male) media audience, and, consequently, the importance of studying sexualized media use from a developmental perspective that takes into account both intraindividual and interindividual variation in use.

Three out of four SEIM use trajectories distinguished for boys were also identified within our sample of girls. However, contrary to boys, nearly all girls followed the trajectory characterized as Stable Nonuse/Infrequent Use; only a small minority showed a pattern of Strongly Increasing Use or Stable Occasional Use. Previous studies have shown that boys report more SEIM use than girls (e.g., Lo & Wei, 2005; Peter & Valkenburg, 2006). The explanations for this difference may vary: SEIM may cater especially to male notions of sex and may therefore be viewed as distasteful by girls (e.g., made by men, for men); girls may prefer less explicit or less visual sexualized content; or they may experience a social desirability bias which causes them to underreport their actual SEIM use (Löfgren-Mårteson & Månsson, 2010). Nevertheless, a previous study among Dutch adolescents found that 20 to 30% of girls between the ages of 13 and 18 reported using SEIM in the six months prior to the interview (Peter & Valkenburg, 2006). In addition, in a U.S. study covering the same age range, 13.4% of the girls indicated they had actively sought sexual content on pornography websites in the past 30 days (Bleakley, Hennessy, & Fishbein, 2011). It may be that the lower prevalence rates found among our sample of girls are a result of the relatively low age group followed in the current study. Future studies targeting older adolescents could point out whether the distribution of girls across the different SEIM use trajectories changes over the course of adolescence. These studies would also benefit from including other types of sexualized content on the Internet, such as more female-centered depictions of sex, or written text describing sexual acts.

Predictors of SEIM Use Trajectories

Our findings further indicated that the development of SEIM use can be predicted by several demographic, social contextual, personal, and media use characteristics. For both boys and girls, sexual interest was the most important factor in predicting differences in SEIM use development; adolescents in trajectories characterized by a higher initial level and/or a stronger increase in SEIM use reported stronger levels of sexual interest

at the start of the study compared to adolescents in the (Stable) Nonuse/Infrequent Use trajectory. Moreover, boys in trajectories characterized by more frequent SEIM use had more permissive sexual attitudes at baseline, whereas both boys and girls in the (Stable) Occasional Use trajectory perceived sexualized Internet content to be more realistic and instructive than their peers in the lowest SEIM use trajectories. These findings are in line with the assumptions of both the selective exposure theory (Zillman & Bryant, 1985) and the media practice model (Brown, 2000; Steele & Brown, 1995), which suggest that adolescents seek out media content that is consistent with their personal dispositions and interests. Hence, some adolescents may turn to SEIM more than others because it meets their sexual interests, because it portrays sexuality in a way that is consistent with their own beliefs, or because they hope to learn about sexuality by viewing SEIM.

Other factors, however, also seem to play a role in the selection and use of SEIM. For instance, boys in the trajectories characterized by the highest initial levels of SEIM use more often had access to the Internet in their own bedroom, increasing opportunities to view SEIM in privacy. Moreover, boys in the Occasional Use trajectory were found to communicate more frequently with their parents about sexual topics. This open communication about sexuality may increase boys' acceptance of sexual feelings and interests as a normal part of adolescence and, as such, lower potential barriers to using SEIM to meet these interests. On the other hand, boys in the Decreasing Use trajectory were found to disclose less to their parents about their whereabouts. This could indicate that there is also a group of boys for whom SEIM use is part of a more autonomous and concealed behavioral pattern. SEIM use may be considered a private and adult-oriented activity, and may therefore increase adolescents' feelings of autonomy and self-control—processes that are key to adolescent development (Buhrmester & Prager, 1995).

Besides sexual interest and perceived realism of sexualized Internet content, none of the assessed factors emerged as significant predictors of girls' SEIM use trajectories. This, however, might reflect a problem of limited power, given that girls' Strongly Increasing Use and Stable Occasional Use trajectories consisted of a small number of individuals. Nevertheless, our findings confirm that the development of SEIM use can be predicted by a range of factors and that SEIM use should therefore be studied as a context-dependent behavior (Brown, 2000).

Co-Occurring Changes in Sexual Behavior

Finally, our findings demonstrated that adolescents in different SEIM use trajectories differentially engage in and change their sexual behavior. Specifically, while an overall tendency of increasing engagement in sexual

behavior exists, boys and girls in different SEIM use trajectories vary in their initial levels of sexual behavior and, to some extent, their degree of increase in sexual activity over time.

Boys and girls in the (Stable) Nonuse/Infrequent Use trajectories reported the lowest initial levels of sexual behavior and, for boys only, the weakest increase in sexual behavior over the course of the study. The relatively low engagement in both SEIM use and sexual behavior may reflect the relatively low level of sexual interest these adolescents reported at the start of the study. As noted, the selective exposure perspective (Zillmann & Bryant, 1985) and the media practice model (Brown, 2000; Steele & Brown, 1995) state that adolescents seek out media content that matches their interests and dispositions. Hence, adolescents who are less sexually interested will be less drawn to sexualized media content.

Boys and girls in the Strongly Increasing Use trajectories reported the second lowest initial levels of sexual behavior but relatively strong increases over time. Hence, both in terms of SEIM use and real-life sexual behavior, these adolescents increased relatively rapidly during the course of the study. This finding suggests there is a group of adolescents for whom sexual curiosity peaks relatively late in adolescence, which results in a catch-up with peers with regard to sexually related matters. The parallel increases in SEIM use and sexual behavior are also consistent with the assumptions of the reinforcing-spiral framework (Slater, 2007). That is, SEIM use and sexual behavior may reinforce each other over time, which in the long run may lead to elevated levels of both processes.

Parallel increases in SEIM use and sexual behavior were also observed for boys in the Occasional Use trajectory, albeit less pronounced. It could be argued that these boys' SEIM use is part of the sexual curiosity and experimentation often found to emerge in early adolescence. The same explanation may hold for the girls in the Stable Occasional Use trajectory, even though no "spiral up" or reinforcing pattern was found for this group. At the start of the study, these boys and girls not only were more sexually interested but also perceived sexualized Internet content as significantly more realistic and instructive than their peers in the trajectories characterized by the lowest amount of SEIM use. Hence, it might be that these adolescents use SEIM as a learning source or as a way to validate their own sexual behavior. This idea again fits the selective exposure perspective (Zillmann & Bryant, 1985) and the media practice model (Brown, 2000; Steele & Brown, 1995), in that sexually interested and motivated youth are more likely to use SEIM because this material reflects their interests, dispositions, and experiences.

Other adolescents, however, did not fit into this pattern. Boys in the Decreasing Use trajectory reported the highest initial levels in both SEIM use and sexual

behavior, but whereas their sexual behavior increased over the course of the study, their SEIM use decreased. The finding that a decrease in SEIM use co-occurs with an increase in sexual behavior contradicts both results from prior studies (e.g., Bleakley et al., 2008; Owens et al., 2012) and assumptions of the reinforcing-spiral framework that media selection and media influence reinforce each other over time (Slater, 2007). Instead, this finding points to an alternative explanation that better fits with the media practice model (Brown, 2000; Steele & Brown, 1995). That is, adolescents may be interested in using SEIM due to insufficient real-life opportunities to satisfy their sexual needs. If opportunities for real-life sexual behavior increase, SEIM may become less relevant and discarded as a media preference. Future studies should test this assumption.

Limitations and Implications

This study has several limitations. First, to assess the existence of multiple patterns of SEIM use among a relatively homogeneous age sample, our sample consisted of eighth through tenth grade students followed over a 1.5-year period. Research has pointed out that hormonal changes during puberty cause a strong increase in sexual interest (Savin-Williams & Diamond, 2004); it is therefore important that future studies replicate our analyses among a sample of pre- or early adolescents to examine how and for whom this increase in sexual interest translates into changes in SEIM use and sexual behavior. Second, results of the LCGA analysis on SEIM use should be interpreted with caution (Nagin, 2005). Some of the trajectories identified for girls contained a small number of individuals. This may explain why some variables that have earlier been shown to predict exposure to sexualized media content have not emerged as significant predictors of girls' SEIM use in the current study (e.g., permissive attitudes, privacy of Internet use). Moreover, the number of developmental trajectories found may vary as a function of the number of measurements, the age range studied, the covariates included, and the operationalization of SEIM use. With respect to the latter, future studies would benefit from a measure of SEIM use that includes information on the length of use. It is conceivable that less frequent though more elaborate sessions of SEIM use have similar effects as or greater effects than frequent short sessions. Third, as prevalence rates of both SEIM use and sexual behavior might differ across countries and age groups (e.g., Bleakley et al., 2011; Peter & Valkenburg, 2006; De Graaf, Kruijer, Van Acker, & Meijer, 2012), we should be cautious in generalizing our results to the overall population of adolescents. Fourth, due to its design, causal inferences cannot be made from the current study. It is thus unclear whether transformations in SEIM use were the result of changes in sexual behavior, whether changes in sexual behavior

were the result of transformations in SEIM use, or both. On a similar note, we did not measure adolescents' motives for (e.g., for arousal), or context of, using SEIM (e.g., alone, with romantic partners, with friends), or their evaluations of the material. Therefore, we cannot state with certainty that, for instance, SEIM use functions as a substitute for real-life sexual experience for some boys. Moreover, we do not know whether adolescents showing different SEIM use trajectories differentially interpret and apply what they see in SEIM and how this affects their views about sex and sexual relationships.

This study was the first to apply a developmental and contextual perspective to the study of adolescents' SEIM use, and, consequently, to offer a detailed description of the intraindividual and interindividual variation in this type of media use and the co-occurring changes in sexual behavior. Results of the current study may guide future research examining other aspects of adolescents' developing sexuality (e.g., sexual attitudes, self-esteem, satisfaction), the direction of effects, and the underlying processes in the parallel developments of SEIM use and adolescents' sexuality.

Despite these limitations, the current study has important theoretical and practical implications. While media-effect studies so far have reported how SEIM use in general is related to earlier and more progressed sexual behavior—and, in doing so, have sparked widespread public concerns about adolescents' exposure to this omnipresent phenomenon—results of the current study offer a differentiated picture of the co-occurring processes of SEIM use and sexual behavior during adolescence. Our results show that a typology of SEIM users exists, characterized by different developmental patterns in SEIM use that are embedded in different personal backgrounds, and that each shows unique changes in sexual behavior. This implies that a general theory on how sexualized media content relates to other aspects of adolescents' developing sexuality may not adequately capture the developmental dynamics underlying certain subgroups of media users.

More importantly, our approach and findings may guide health professionals and intervention developers by increasing knowledge on healthy, explorative versus unhealthy and risky patterns of media use. Insights into the different co-occurring developments of SEIM use and sexual behavior, including the predictors of these developments, may improve the efficient identification of at-risk subgroups of individuals. For instance, our study identified a subgroup of boys, characterized by parallel increases in SEIM use and sexual behavior, who perceived sexualized Internet content as more realistic and reported more permissive sexual attitudes. Even though in the current study these boys did by no means show extraordinary levels of SEIM use or sexual behavior, similar groups with higher concurrent levels or increases in SEIM use and sexual behavior may benefit from tailored educational messages informing

them about responsible sexual behavior, including guidance on how to interpret the often one-sided messages distributed in SEIM (Braun-Courville & Rojas, 2009). At the same time, our study may reduce undue concerns among parents and professionals about the effects of the new media environment. It shows that the abundance of and easy access to SEIM do not lead to overall heavy use of this material—not among adolescent boys and even less so among adolescent girls. We see no reason for a moral panic over youth uniformly and passively influenced by SEIM. That is not to say that future studies should not further explore when, why, and in what doses SEIM use is accommodating or hindering healthy sexual and romantic development.

Funding

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