

Adolescents' Exposure to Sexually Explicit Internet Material, Sexual Uncertainty, and Attitudes Toward Uncommitted Sexual Exploration

Is There a Link?

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The link between adolescents' exposure to sexual media content and their sexual socialization has hardly been approached from an identity development framework. Moreover, existing research has largely ignored the role of adolescents' exposure to sexually explicit Internet material in that association. This study introduces two characteristics of adolescents' sexual self—sexual uncertainty and attitudes toward sexual exploration—and investigates these characteristics as potential correlates of adolescents' exposure to sexually explicit Internet material. Drawing from a sample of 2,343 Dutch adolescents aged 13 to 20, the authors find that more frequent exposure to sexually explicit Internet material is associated with greater sexual uncertainty and more positive attitudes toward uncommitted sexual exploration (i.e., sexual relations with casual partners/friends or with sexual partners in one-night stands). The findings call for more attention to adolescents' exposure to sexually explicit material on the Internet and identity-related issues.

Keywords: *pornography; youth; sexual socialization; teenagers*

In the past 30 years, our understanding of the relation between adolescents' exposure to sexual media content and their sexual socialization has advanced greatly (for reviews, see Escobar-Chaves et al., 2005; Ward, 2003). Early research studied teenagers' exposure to sexual media content and its outcomes with relatively straightforward designs, employing simple conceptual and operational definitions of media use and its effects. Recent research has combined experimental and correlational data (Ward, 2002) or has applied more demanding experimental and panel designs to demonstrate how sexual media content affects the formation of sexual attitudes or sexual initiation (e.g., Brown et al., 2006; Martino, Collins, Kanouse, Elliott, & Berry, 2005; Ward & Friedman, 2006). Scholars have also developed sophisticated conceptual and operational definitions of adolescents' exposure to sexual media content (e.g., the Sexual Media Diet Measure; Brown et al., 2006). Finally, we

have begun to understand the social-cognitive processes that underlie the effects of sexual media content (e.g., Martino et al., 2005).

However, despite progress in the field, there are two issues that require further research. First, with a few notable exceptions (Steele, 1999; Steele & Brown, 1995), research on the link between adolescents' exposure to sexual media content and their sexual socialization has rarely been integrated in an identity development framework. More specifically, studies have hardly dealt with two important characteristics of adolescent identity development: the uncertainty that may surround the formation of sexual beliefs and values and attitudes toward the exploration of sexual matters (e.g., Arnett, 1995; Brooks-Gunn & Graber, 1999; Brown, 2000; Buzwell & Rosenthal, 1996). This is surprising because scholars, for instance in the ego identity status paradigm, have generally outlined that uncertainty and the exploration of alternatives accompany the formation of the adolescent self (for a review, see Bosma & Kunnen, 2001; Marcia, 1966). Research in the ego identity status paradigm has documented these two characteristics also in the development of adolescents' *sexual* self (Marcia & Friedman, 1970; Schenkel & Marcia, 1972; Waterman & Nevid, 1977). Along these lines, media researchers have discussed a potential association between adolescents' uncertainty about sexual beliefs and values as well as their attitudes toward sexual exploration and the use of sexual media content. For example, in her review of research on the media's role in sexual socialization, Ward (2003) suggested, "Attention is . . . needed concerning the role of developmental transitions . . . and of the possible contributions of their accompanying *uncertainty and upheaval* [italics added] to the importance of media portrayals" (p. 378). Other researchers have tentatively suggested that adolescents use sexual media content for their identity work, which also includes attitudes toward sexual exploration (e.g., Arnett, 1995; Brown, 2000; Steele, 1999). It is the first goal of this study to address whether adolescents' use of sexual media content is related to uncertainty about sexual beliefs and values as well as to attitudes toward sexual exploration.

A second issue that calls for further research concerns the role of sexually explicit Internet material in the development of adolescents' sexual self. By sexually explicit Internet material, we mean (audio-)visual content on and from the Internet that depicts sexual activities in unconcealed ways, often with close-ups of (aroused) genitals and of oral, anal, and vaginal penetration. Scholars have repeatedly emphasized that to study the link between sexual media content and adolescents' sexual self means to take into account adolescents' exposure to sexually explicit Internet material (e.g., Brown et al., 2006; Thornburgh & Lin, 2002; Wolak, Mitchell, & Finkelhor, 2007). There is growing evidence that a considerable proportion of adolescents—especially males—get in contact with sexually explicit Internet material (Flood, 2007; Lo & Wei, 2005; Peter & Valkenburg, 2006a; Wolak et al., 2007). We do not imply that adolescents who use sexually explicit Internet material are morally wrong. However, the fact that a substantive number of adolescents are exposed to sexually

explicit Internet material raises the question of whether they are able to put into perspective the sexual and social reality shown in such material (e.g., Paul, 2005; Thornburgh & Lin, 2002).

Content analyses suggest that sexually explicit material depicts sexual realities that deviate from adolescents' sexual lives. Such material also presents sexual beliefs and values that conflict with those that youth learn in families and schools (Brosius, Weaver, & Staab, 1993; Cowan, Lee, Levy, & Snyder, 1988; Ertel, 1990). Consequently, when adolescents get in touch with other sexual realities and different sexual beliefs and values, they may change their attitudes toward the exploration of sexual matters. In addition, they may feel uncertain about their learned sexual beliefs and values. It is the second goal of this study to investigate these assumptions.

In this study, we focus on what we call sexual uncertainty and attitudes toward uncommitted sexual exploration. These concepts are relatively new in the field. Therefore, we first define the concepts. Next, we delineate their relation with existing constructs. Finally, we outline why and how sexual uncertainty and attitudes toward uncommitted sexual exploration may be related to adolescents' exposure to sexually explicit Internet material.

Defining Sexual Uncertainty and Attitudes Toward Uncommitted Sexual Exploration

Sexual uncertainty refers to the extent to which adolescents are not clear about their sexual beliefs and values. This uncertainty may show in weakly integrated and temporally unstable sexual beliefs and values. Sexual uncertainty is a cognitive construct. It centers on the structure of adolescents' sexual beliefs and values, that is, the extent to which these beliefs and values are clearly defined. The concept of sexual uncertainty does not deal with the accuracy and the actual content of adolescents' sexual beliefs and values, nor does it center on the development of adolescents' sexual orientation. Moreover, the concept does not focus on how adolescents evaluate themselves as sexual persons and how such evaluations define their sexual self-esteem.

The concept of attitudes toward uncommitted sexual exploration refers to adolescents' positive or negative views of sexual experimentation in a casual, nonrelational setting. Adolescents who have a positive attitude toward uncommitted sexual exploration place a high value on sexual experimentation. To explore sexual matters, they consider casual relationships, in a developmental sense, as more suitable for young people than committed relationships. In contrast, adolescents who have a negative attitude toward uncommitted sexual exploration do not consider the exploration of their sexuality a central developmental task. Accordingly, they reject the notion that casual relationships are more appropriate for youth than are committed relationships.

Similar to the sexual uncertainty construct, the concept of attitudes toward uncommitted sexual exploration is not a normative concept. It does not imply that adolescents who hold positive attitudes toward uncommitted sexual exploration are morally wrong, and it does not suggest that adolescents with negative attitudes adhere to old-fashioned moral standards. Our choice of this concept is motivated by its relevance for the exploration characteristic of adolescents' sexual development (Brooks-Gunn & Graber, 1999; Buzwell & Rosenthal, 1996). Furthermore, there is growing evidence that sexual exploration in a casual setting occurs frequently among adolescents (Manning, Giordano, & Longmore, 2006; Manning, Longmore, & Giordano, 2005). Finally, scholars have emphasized that adolescents no longer distinguish between premarital and marital sexual partners (Manning et al., 2005). Rather, they point to adolescents' classification of sexual partners as steady partners, as casual partners/friends, or as "one-night-stand" partners (Ellen, Cahn, Eyre, & Boyer, 1996). In this study, the term uncommitted refers to sexual relations with casual partners/friends or with sexual partners in one-night stands.

Demarcating Sexual Uncertainty and Attitudes Toward Uncommitted Sexual Exploration From Existing Concepts and Theories

Sexual uncertainty, sexual self-concept, and self-concept clarity. Sexual uncertainty overlaps with the sexual self-concept (e.g., Breakwell & Millward, 1997; Buzwell & Rosenthal, 1996) and with the construct of self-concept clarity (Campbell, 1990; Campbell et al., 1996). The sexual-self concept refers to adolescents' perceptions of their "qualities" in the sexual domain. Self-concept clarity is defined as the degree to which the contents of an individual's self-concept are confidently described, consistently organized, and stable over time (Campbell et al., 1996). Sexual uncertainty, the sexual self-concept, and self-concept clarity can all be related to the primary task of adolescence, the development of a firm sense of oneself as a (sexual) person.

However, there are several aspects that conceptually distinguish sexual uncertainty on the one hand from the sexual self-concept and self-concept clarity on the other. First, both the sexual self-concept and self-concept clarity have a broader focus than sexual uncertainty. Although the sexual self-concept deals with the various contents of the sexual self (Buzwell & Rosenthal, 1996), sexual uncertainty centers only on the structure of the sexual beliefs and values. Self-concept clarity focuses on the structure of the entire self-concept (Campbell, 1990). Sexual uncertainty, in contrast, is limited to how clearly sexual beliefs and values are organized.

A second difference between sexual uncertainty on the one hand and the sexual self-concept and self-concept clarity on the other refers to the role of each concept in its nomological network. Unlike sexual uncertainty, the sexual self-concept has both a knowledge component, which describes who or what an adolescent is in sexual terms, and an evaluative component, which taps how an adolescent feels about his or her sexuality (Buzwell & Rosenthal, 1996). These components are used to categorize adolescents, for example, according to their sexual styles (Buzwell &

Rosenthal, 1996). Self-concept clarity is partly conceived of as a predictor of self-esteem (Campbell, 1990). In this study, sexual uncertainty is primarily seen as a potential correlate of adolescents' exposure to sexual media content, most notably sexually explicit Internet material.

Attitudes toward uncommitted sexual exploration and permissiveness without affection. The construct of attitudes toward uncommitted sexual exploration is conceptually similar to what Reiss (1960) called permissiveness without affection, as opposed to permissiveness with affection. But Reiss's concepts refer to the acceptability of sex under the condition of affection in a committed relationship (permissiveness with affection) or under the condition of desire in an uncommitted encounter or relationship (permissiveness without affection). The concept of attitudes toward uncommitted sexual exploration deals with the value adolescents place on sexual experimentation and with their beliefs about the relational contexts that enable them to discover what they like sexually. Thus, Reiss's concepts focus only on the relational conditions under which sex is acceptable for adolescents but do not refer to the importance that youth attach to sex. Our concept centers on the significance of sexual exploration for adolescents and deals with the perceived relational conditions under which sex can be optimally explored.

Sexual uncertainty, attitudes toward uncommitted sexual exploration, and ego identity status theory. The general notion that uncertainty and the exploration of alternatives accompany the formation of a firm sense of self or identity bears resemblance with Marcia's (1966) ego identity status theory (for a review, see Bosma & Kunnen, 2001). Partly drawing on Erikson's (1968) theory of identity formation, ego identity status theory classifies adolescents' and young adults' identity development with the help of the two variables *commitment* and *exploration*. Commitment refers to an unwavering adherence to learned or self-made choices and standards in a particular domain, such as occupation, ideology, or sexuality. Exploration (originally termed *crisis*) is defined as the inspection of meaningful alternatives in a given domain.

Sexual uncertainty and attitudes toward uncommitted sexual exploration differ in their type, their scope, and their function from the concepts of commitment and exploration in ego identity status theory. First, commitment and exploration are essentially behavioral variables (Bosma & Kunnen, 2001). In contrast, sexual uncertainty and attitudes toward uncommitted sexual exploration are essentially cognitive variables. Second, regarding their scope, commitment and exploration can be applied to any developmental task to determine adolescents' identity status. With their focus on sexual matters, sexual uncertainty and attitudes toward uncommitted sexual exploration are narrower in scope. Finally, as far as the function of commitment and exploration is concerned, ego identity status theory uses the concepts as diagnostic tools to classify adolescents in one of the four identity statuses mentioned above. This study is not interested in the classification of adolescents into identity statuses. Rather, the study conceptualizes sexual uncertainty and attitudes toward uncommitted sexual

exploration as representatives of two aspects of adolescents' sexual self-development and investigates them as predictors or outcomes of adolescents' exposure to sexual media content.

Linking Sexual Uncertainty and Attitudes Toward Uncommitted Sexual Exploration to Exposure to Sexually Explicit Internet Material

Media content in general and sexual media content in particular may be used as a toolkit for adolescents' identity work (Brown, 2000; Steele, 1999). However, adolescents' increasing access to, and use of, sexually explicit Internet material—material that is not meant for minors—has led to concerns about whether youth are able to make sense of the reality depicted in that material (e.g., Paul, 2005). More specifically, scholars have voiced the idea that uncontrollable, possibly age-inappropriate information may conflict with or replace information about sexual matters that is traditionally provided by families, schools, and peer groups (e.g., Arnett, 1995; Thornburgh & Lin, 2002; Wolak et al., 2007). The sexual and social reality depicted in sexually explicit Internet material may confront adolescents with beliefs and values that typically present deviations from, or alternatives to, the beliefs and values learned in families, schools, and, to a lesser extent, peer groups (Brosius et al., 1993; Cowan et al., 1988; Ertel, 1990; Thornburgh & Lin, 2002). As sociologists have generally demonstrated, when people are confronted with alternatives to traditional beliefs and values, the simultaneous requirement to explore these alternatives and to make choices is often accompanied by uncertainty (e.g., Bauman, 1997; Beck, 1992; Luker, 2006). This pattern may also apply to the development of adolescents' sexual selves. Adolescents' exposure to sexually explicit Internet material may be connected with the exploration of the sexuality depicted in sexually explicit Internet material as well as an uncertainty about sexual beliefs and values—exactly the two crucial characteristics of sexual self-development that require further research. In what follows, we specify this reasoning with respect to the key variables of this study: sexual uncertainty and attitudes toward uncommitted sexual exploration.

Sexual uncertainty. To date, research has not paid much attention to a potential association between adolescents' sexual uncertainty and their exposure to sexually explicit Internet material. However, studies on adolescents' use of sexually nonexplicit media content suggest that sexual uncertainty may (a) be an antecedent of adolescents' use of sexually nonexplicit media content or may (b) present the outcome of exposure to such media content. As far as adolescents' *use* of media is concerned, Steele and Brown (1995), for example, reported that teenagers turn to traditional media to reassure themselves about their gender identity and to find guidance about gender expectations. Similarly, teenagers have been found to use sexual media content to learn the rules, rituals, and skills in the world of sex and romance (Brown, Dykers, Steele, &

White, 1994). As far as the *outcome* of exposure to sexually nonexplicit media content is concerned, there is some evidence that children and early adolescents react with confusion to such content (Cantor, Mares, & Hyde, 2003). Likewise, Steele (1999) has reported that adolescents who were confronted with sexual media messages experienced uncertainty as a result of the divergence between the values that they encountered in the media and the values that their parents taught them.

These two groups of findings may be tentatively reinterpreted in the light of sexual uncertainty. Because adolescents may have been uncertain about their sexual beliefs and values, they used the media for guidance and confirmation of sexual issues. Conversely, because adolescents used sexual media content, they may have become sexually uncertain. Overall, this suggests an association between sexual uncertainty and adolescents' exposure to sexually nonexplicit media content.

There are several reasons why this association may also occur for adolescents' exposure to sexually explicit Internet material. First, because of its predominantly visual character, sexually explicit material is very likely to leave an imprint on adolescents' memories (Greenberg, Linsangan, & Soderman, 1993). Second, the sexual beliefs and values implied in sexually explicit material deviate from the sexual beliefs and values that most adolescents encounter in their sexual socialization. Content analyses have shown that sexually explicit material depicts sex as a predominantly physical, self-indulgent, occasionally aggressive activity between uncommitted partners, with women typically being portrayed as easily available (e.g., Brosius et al., 1993; Cowan et al., 1988; Ertel, 1990). The social and emotional aspects of sex as well as precautions and undesirable consequences are unimportant. Also, in their type, frequency, and intensity, the sexual techniques and practices displayed do not correspond with the sexual experiences of the majority of adolescents and adults (Ertel, 1990). Finally, sexually explicit material is extremely homogeneous in plots, narratives, types of personae, and general messages (Ertel, 1990). A homogeneous structure of media messages, in turn, is an important condition for strong associations between media messages and people's cognitions (Peter, 2004). As a result, we hypothesize,

Hypothesis 1: More frequent exposure to sexually explicit material will be related to a greater degree of sexual uncertainty.

Attitudes toward uncommitted sexual exploration. To our knowledge, no study has directly investigated the link between exposure to sexually explicit material and attitudes toward uncommitted sexual exploration. However, there are at least two reasons why such an association may exist. First, research on the conceptually similar construct of sexual permissiveness has shown that adolescents who more frequently consume sexually explicit material on the Internet or in traditional media are more sexually permissive (Lo, Neilan, Sun, & Chiang, 1999; Lo & Wei, 2005). Second, the essential characteristics of attitudes toward uncommitted sexual exploration clearly overlap with those of sexually explicit material: Sex typically takes

place in an uncommitted, casual context, and sexual experimentation is highly visible in the exploration of various sexual techniques, different sexual practices, and multiple partners (Brosius et al., 1993; Ertel, 1990). As a result, we hypothesize,

Hypothesis 2: Greater exposure to sexually explicit Internet material will be related to more positive attitudes toward uncommitted sexual exploration.

Control variables. Prior research has suggested that there may be rival explanations for our hypothesized associations. We hence included the following set of control variables in our model: gender (Buzwell & Rosenthal, 1996; Manning et al., 2005), age (Cantor et al., 2003; Manning et al., 2005), ethnicity (Brown et al., 2006), sexual orientation (Huffaker & Calvert, 2005), parental control (Sieverding, Adler, Witt, & Ellen, 2005), adolescents' religiosity (Miller et al., 1997), perceived sexual experience of peers (Miller et al., 1997), own sexual experience (Billy, Landale, Grady, & Zimmerle, 1988), relationship status (Miller et al., 1997), sensation seeking (Peter & Valkenburg, 2006a), and life satisfaction (Peter & Valkenburg, 2006a).

Method

Sample and Procedure

In May and June 2006, an online survey was conducted among 2,343 Dutch adolescents and postadolescents aged 13 to 20. We included postadolescents because the development of the sexual self may not be completed in adolescence (Erikson, 1968), and, generally, large parts of "identity work" seem to occur only in late adolescence and early adulthood (Steinberg & Morris, 2001). Respondents were interviewed online. For the study of sensitive issues, online surveys, or, more generally, computer-mediated surveys, have proven superior to other modes of interviewing (e.g., Mustanski, 2001). In 2005, more than 95% of Dutch adolescents had home access to the Internet (Duimel & De Haan, 2007). As a result, problems typically associated with online surveys such as systematically biased samples may be less troublesome in the Netherlands than in countries where adolescents' Internet access is more limited.

Sampling and fieldwork were done by Qrius, a Dutch research institute specializing in research among adolescents. Respondents were recruited, by means of a quota sample, from an existing online panel managed by Qrius. The members of Qrius's online panel had been sampled in all parts of the Netherlands. The sample was chosen by participants' gender and age. In surveys on sensitive issues, respondents' gender and age generally affect their willingness to participate and respond (e.g., Ross, Daneback, Mansson, Tikkanen, & Cooper, 2003; Wiederman, 1993). The resulting sample mirrored the national distributions of age and gender among Dutch adolescents. Prior to the implementation of the survey, institutional approval, parental

consent for minors' participation, and adolescents' informed consent were obtained. Adolescents were notified that the study would be about sexuality and the Internet and that they could stop the survey at any time they wished.

We took the following measures to improve the confidentiality and privacy of the answering process (Mustanski, 2001). On the introduction screen of the online questionnaire, we emphasized that the answers would be analyzed only by us, the principal investigators, and would remain confidential. We also explained that there was no possibility for the principal investigators to identify who had filled in the questionnaire. Qrius did not link respondents' answers in our questionnaire to their names and contact information and provided us with only the answers to our questionnaire. Finally, we asked the respondents to make sure that they completed the questionnaire in privacy. This procedure has proven successful in other studies on sensitive issues (e.g., Peter & Valkenburg, 2006a). Completing the questionnaire took on average between 10 and 15 minutes.

Measures

Exposure to sexually explicit Internet material. We largely followed an operationalization used by Peter and Valkenburg (2006a), which has been shown to be valid and reliable. Respondents were asked to indicate how often, in the 6 months prior to the interview, they had intentionally looked at (a) pictures with clearly exposed genitals, (b) movies with clearly exposed genitals, (c) pictures in which people were having sex, and (d) movies in which people were having sex. Adolescents were informed that the question was about sexually explicit, pornographic Internet content. Moreover, adolescents were told that looking at such content did not imply being online but could also refer to sexually explicit material downloaded from the Internet. The response categories were 1 (*never*), 2 (*less than once a month*), 3 (*one to three times a month*), 4 (*once a week*), 5 (*several times a week*), 6 (*every day*), and 7 (*several times a day*). The items formed a unidimensional scale (explained variance = 88%), with a Cronbach's alpha of .95 ($M = 2.04$, $SD = 1.41$).

Sexual uncertainty. Because we were mainly interested in the structure of adolescents' sexual beliefs and values, the selection of the items that tapped this construct was inspired by the items in Campbell et al.'s (1996) Self-Concept Clarity Scale. However, Campbell et al. were interested in the structure of a person's *global* self-concept. In contrast, our measure specifically aims at the extent to which adolescents are unclear about their sexual beliefs and values. Therefore, we modified Campbell et al.'s global items into items that more specifically reflected adolescents' certainty about their sexual beliefs and values. Respondents were asked to what extent they concurred with the following items, which all started with, "As far as sex is concerned . . .": (a) "my beliefs often change," (b) "I am not sure about what I like and what I dislike," (c) "I wonder what I really want," (d) "my opinions vary,"

(e) “I think one day like this and another day like that,” and (f) “it is difficult for me to form a clear opinion.” Response categories ranged from 1 (*disagree entirely*) to 5 (*agree entirely*). In the online questionnaire, the items were randomized. The items loaded on one factor (explained variance = 74%). The resulting scale had a Cronbach’s alpha of .93 ($M = 2.35$, $SD = 0.88$).

Attitudes toward uncommitted sexual exploration. To operationalize this construct, we developed items specifically for this study. However, we geared to scales that tapped related concepts such as recreational and relational orientations toward sex (e.g., Buzwell & Rosenthal, 1996; Ward, 2002). Respondents were asked to what extent they agreed or disagreed with the following six items: “It is important to gather experience with multiple sexual partners,” “It is important to try out as many sexual things as possible before you start with a steady relationship,” “You can only find out about your sexual preferences if you do not start too early with a steady relationship,” “When you are young, you have to enjoy your sexual freedom. You can start with a steady relationship later,” “It is important to have had many sexual partners before you start with a steady relationship,” and “To find out about your sexual preferences, uncommitted relationships are the best.” Response categories ranged from 1 (*disagree entirely*) to 5 (*agree entirely*). The items were randomly presented to the respondents. They loaded on one factor (explained variance = 64%), and the resulting scale had a Cronbach’s alpha of .89 ($M = 2.34$, $SD = 0.83$).

Age and gender. The measurement of age ($M = 16.4$, $SD = 2.29$) and gender was straightforward. Females were coded with 0 (49%), males with 1 (51%).

Ethnicity. As with other Netherlands-based research (Peter & Valkenburg, 2006a), we operationalized respondents’ ethnicity as a dichotomy, where 0 meant *non-Dutch* (9.2%) and 1 meant *Dutch* (90.8%).

Sexual orientation. We asked respondents whether they felt attracted to males or females. Drawing on Kinsey, Pomeroy, and Martin’s (1948) conceptualization of an individual’s sexual orientation as a continuous rather than a categorical variable, we used a 5-point scale to measure respondents’ degree of attraction to the same or opposite sex. The response categories were 1 (*males only*), 2 (*mainly males, but also females*), 3 (*both males and females*) 4 (*mainly females, but also males*) and 5 (*females only*). The values were recoded separately for male and female adolescents. As a consequence, for both genders, higher values indicated a tendency toward a heterosexual orientation; lower values represented a tendency toward a gay or lesbian sexual orientation. Of the respondents, 89.0% felt exclusively attracted to the opposite sex, 1.7% felt exclusively attracted to the same sex, and the remaining 9.3% reported varying degrees of attraction to both sexes.

Parental control. Similar to Sieverding et al.'s (2005) study, parental control was tapped with three items: "My parents know where I am in my spare time," "My parents know what I am doing at night," and "My parents know my friends." The anchors of the response scale were 1 (*does not apply at all*) and 5 (*applies completely*). The three items loaded on one factor (explained variance = 65%). Cronbach's alpha for the scale was .73 ($M = 3.75$, $SD = 0.70$).

Religiosity. Whether adolescents are religious was measured with one item: "I am religious." Response categories ranged from 1 (*does not apply at all*) to 5 (*applies completely*) ($M = 2.40$, $SD = 1.35$).

Perceived sexual experience of peers. We asked adolescents whether they thought that the majority of their peers had already had sexual intercourse. Response categories were 1 (*the majority of my peers has not had sexual intercourse*), 2 (*there are about as many of my peers who have had sexual intercourse as there are peers who have not had sexual intercourse*), and 3 (*the majority of my peers has had sexual intercourse*) ($M = 1.94$, $SD = 0.90$).

Sexual experience. We used seven items to measure adolescents' sexual experience: French kissing, touching of the partner under his or her clothing, masturbation of the partner, cunnilingus, fellatio, vaginal sex, and anal sex. We explained sexual terms wherever necessary. Adolescents could answer with no (coded 1) or yes (coded 2). The seven items loaded on one factor in a factor analysis (explained variance = 60%). Subsequently, they were added up, and the sum was divided by 7. The resulting alpha was .89 ($M = 1.44$, $SD = 0.35$).

Relationship status. Adolescents' relationship status was measured with one question: "Are you currently in a romantic relationship?" Adolescents who were single were coded 0 (66.8%), and adolescents who were in a relationship were coded 1 (33.2%).

Sensation seeking. We used the Brief Sensation Seeking Scale (BSSS), developed by Hoyle, Stephenson, Palmgreen, Lorch, and Donohew (2002), with response categories ranging from 1 (*disagree entirely*) to 5 (*agree entirely*). However, unlike in Hoyle et al.'s study, the eight items did not cluster in four empirically distinguishable subdimensions. Instead, a factor analysis yielded only two interpretable factors. The first factor comprised the first three items of the BSSS and largely tapped the desire for travel and adventure. Our second factor consisted of Items 4 to 8 of the BSSS and captured adolescents' tendencies toward (illegal) sensation seeking and risk taking. Conceptually, this factor seems more closely related to the topic of this study. As a result, we formed a sensation seeking scale with only Items 4 to 8 of the BSSS. The resulting alpha was .83 ($M = 3.36$, $SD = 0.81$).

Life satisfaction. We used the five-item Satisfaction With Life Scale developed by Diener, Emmons, Larsen, and Griffin (1985). Examples of items of this scale are “I am satisfied with my life” and “In most ways my life is close to my ideal.” Response categories ranged from 1 (*disagree entirely*) to 5 (*agree entirely*). The items loaded on one factor (explained variance = 67%). Cronbach’s alpha for the scale was .87 ($M = 3.36$, $SD = 0.81$).

Data Analysis

We ran multiple regressions to analyze the association between adolescents’ exposure to sexually explicit Internet material on the one hand and sexual uncertainty and attitudes toward uncommitted sexual exploration on the other. Multiple regression analysis is based on the assumption that there is no multicollinearity among the independent variables, that is, that no independent variable is a perfect linear function of one or more other independent variables. Because some of our measures may be strongly correlated, we checked for multicollinearity among the variables. We found no evidence of multicollinearity. All variance inflation factors were clearly below the critical value of 4. Multiple regressions also assume the variables to have normal distributions. Shapiro-Francia tests for univariate normality revealed that the measures of exposure to sexually explicit Internet material, sexual uncertainty, attitudes toward uncommitted sexual exploration, parental control, religiosity, perceived sexual experience of peers, sensation seeking, life satisfaction, and sexual experience were not normally distributed. Mardia’s measure of multivariate kurtosis indicated that the assumption of multivariate normality was also not met.

To alleviate the problems that result when the assumption of univariate and multivariate normality is violated, scholars have suggested the bootstrap method (Efron & Tibshirani, 1993). In the bootstrap method, a computer generates a series of data sets that would be obtained if the estimation study were repeated many times. Each bootstrap sample results from sampling, *with replacement*, from the original data. In all the bootstrap samples, the value of interest is computed. The most desirable characteristic of bootstrapping is that it constitutes a nonparametric approach that estimates values of interest without making assumptions about the distribution type of the variables or the sampling distribution of the statistic. As a result, the bootstrap method produces more accurate results if assumptions of parametric statistics such as the normal distribution of variables and test statistics are violated. Because the assumptions of parametric tests are often not met in sex-related research (Weinhardt, Forsyth, Carey, Jaworski, & Durant, 1998), the bootstrap method may thus offer important additional information on the validity of our estimates. Therefore, we tested our hypotheses not only with multiple regression analyses on the basis of normal theory but also with multiple regression analyses on the basis of the bootstrap method.

Results

Correlations and Descriptive Findings

As shown in Table 1, male adolescents were more likely than female adolescents to be exposed to sexually explicit Internet material ($r = .46, p < .001$). Older adolescents used sexually explicit Internet material more often than younger adolescents did ($r = .12, p < .001$). Table 2 illustrates these relationships by means of adolescents' exposure to pictures on the Internet in which people are having sex (i.e., one of the items that we used to measure adolescents' general exposure to sexually explicit Internet material). In the 6 months prior to the interview, 27.8% of male adolescents had looked at pictures of people having sex "at least once a week," whereas only 3.1% of the female adolescents had done so. Regarding age differences, Table 2 shows that 18.6% of the 19- and 20-year-olds looked at such pictures, as opposed to 13.4% of the 13- and 14-year-olds.

Table 1 indicates that, on the basis of zero-order correlations, male adolescents were slightly more sexually uncertain than female adolescents ($r = .05, p < .05$). Younger adolescents were more likely to be sexually uncertain than older adolescents ($r = -.07, p < .01$). Table 2 illustrates these relationships by means of one item that we used to operationalize sexual uncertainty (i.e., "As far as sex is concerned, my beliefs often change."). Of the male respondents, 14.0%, and 13.0% of the female respondents, agreed or agreed completely with this item. Of the 13- and 14-year-olds, 17.5% agreed or agreed completely with the item, compared to 10.4% of the 20-year-olds.

As Table 1 shows, male adolescents had more positive attitudes toward uncommitted sexual exploration than female adolescents ($r = .28, p < .001$). Younger adolescents held more positive attitudes toward uncommitted sexual exploration than older adolescents did ($r = -.08, p < .001$). Table 2 exemplifies these relationships with the item, "To find out about your sexual preferences, uncommitted relationships are the best." Of the female adolescents, 13.1% agreed or agreed completely with this item, as opposed to 27.1% of the male adolescents. More than one fourth of the 13- and 14-year-olds (i.e., 26.6%) agreed or agreed completely with the item, whereas this figure was nearly 10 percentage points lower for the 19- and 20-year-olds (i.e., 16.8%).

Hypothesis Testing

Hypothesis 1 predicted a positive relationship between exposure to sexually explicit Internet material and sexual uncertainty. Similarly, Hypothesis 2 stated that more frequent exposure to sexually explicit Internet material would be linked to more positive attitudes toward uncommitted sexual exploration. As shown in Table 3, our multiple regression analyses controlled for gender, age, sexual orientation,

Table 1
Zero-Order Correlations Among Key and Control Variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|--------------------------------------|---------|---------|---------|---------|--------|--------|---------|---------|---------|---------|--------|--------|-----|
| 1. Sexual uncertainty | | | | | | | | | | | | | |
| 2. Attitudes toward exploration | .25*** | | | | | | | | | | | | |
| 3. Exposure to SEIM | .16*** | .34*** | | | | | | | | | | | |
| 4. Male | .05* | .28*** | .46*** | | | | | | | | | | |
| 5. Age | -.07** | -.08*** | .12*** | -.01 | | | | | | | | | |
| 6. Heterosexual orientation | -.02 | -.05* | -.07** | .02 | -.01 | | | | | | | | |
| 7. Dutch ethnicity | -.03 | -.04 | -.08*** | -.06** | .07** | .00 | | | | | | | |
| 8. Parental control | -.07** | -.16*** | -.16*** | -.09*** | -.05* | .03 | .07** | | | | | | |
| 9. Perceived sexual experience peers | -.08*** | .05* | .12*** | -.09*** | .57*** | -.05* | .01 | -.09*** | | | | | |
| 10. Religiosity | .01 | -.16*** | -.03 | -.01 | -.04 | .00 | -.20*** | .07** | -.12*** | | | | |
| 11. In relationship | -.10*** | -.15*** | .00 | -.11*** | .28*** | .01 | .02 | .00 | .30*** | -.02 | | | |
| 12. Sexual experience | -.06** | .05* | .16*** | -.07** | .56*** | -.02 | .06** | -.11*** | .58*** | -.13*** | .48*** | | |
| 13. Life satisfaction | -.08*** | -.05* | -.07** | .09*** | -.01 | .09*** | .08*** | .23*** | -.04 | .04 | .07*** | -.04 | |
| 14. Sensation seeking | .06** | .37*** | .25*** | .24*** | -.06** | -.03 | -.05* | -.18*** | .10*** | -.09*** | .01 | .18*** | .01 |

Note: $N = 2,343$. SEIM = sexually explicit Internet material.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.

Table 2
Illustrative Items of Exposure to Sexually Explicit Internet Material, Sexual Uncertainty, and Attitudes Toward Uncommitted Sexual Exploration and Their Distribution by Gender and Age

| | Gender | | Age | | | |
|---|------------|----------|--------------|--------------|--------------|--------------|
| | Female (%) | Male (%) | 13 to 14 (%) | 15 to 16 (%) | 17 to 18 (%) | 19 to 20 (%) |
| Exposure to sexually explicit Internet material item: "Pictures in which people are having sex" | | | | | | |
| <i>Never</i> | 79.1 | 41.7 | 69.6 | 61.2 | 57.1 | 51.4 |
| <i>Less than once a week^a</i> | 17.9 | 30.5 | 17.0 | 24.1 | 26.6 | 30.0 |
| <i>At least once a week^a</i> | 3.1 | 27.8 | 13.4 | 14.6 | 16.4 | 18.6 |
| Sexual uncertainty item: "As far as sex is concerned, my beliefs often change" | | | | | | |
| <i>Disagree and disagree completely^a</i> | 62.2 | 59.4 | 53.7 | 58.2 | 65.5 | 66.1 |
| <i>Partly agree, partly disagree</i> | 24.8 | 26.6 | 28.8 | 27.2 | 23.3 | 23.5 |
| <i>Agree and agree completely^a</i> | 13.0 | 14.0 | 17.5 | 14.6 | 11.2 | 10.4 |
| Attitudes toward uncommitted sexual exploration item: "To find out about your sexual preferences, uncommitted relationships are the best" | | | | | | |
| <i>Disagree and disagree completely^a</i> | 57.7 | 36.5 | 36.7 | 46.8 | 50.0 | 54.6 |
| <i>Partly agree, partly disagree</i> | 29.2 | 36.4 | 36.7 | 34.5 | 31.6 | 28.6 |
| <i>Agree and agree completely^a</i> | 13.1 | 27.1 | 26.6 | 18.7 | 18.4 | 16.8 |

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

a. Recoded (for information on original response scales, see the method section).

ethnicity, parental control, perceived sexual experience of peers, religiosity, relationship status, sexual experience, life satisfaction, and sensation seeking. Despite the inclusion of these control variables, strong positive associations between exposure and both sexual uncertainty ($B = .118, p < .001$) and attitudes toward uncommitted sexual exploration ($B = .120, p < .001$) emerged.

Table 3 also displays the results of the multiple regression analyses on the basis of the bootstrap procedure. The column labeled "Bca 95% CI(B)" shows the bias-corrected and accelerated 95% confidence intervals of each unstandardized regression coefficient, computed on the basis of 1,000 bootstrap samples ($N = 2,343$ each). If the confidence interval includes zero, the unstandardized coefficient does *not* significantly differ from zero. For example, the 95% bias-corrected and accelerated 95% confidence interval of religiosity as a predictor of sexual uncertainty ranged from $-.027$ to $.032$. This interval thus included zero. Consequently, the effect of religiosity on sexual uncertainty did not significantly differ from zero. Regarding exposure to sexually explicit Internet material, the 95% bias-corrected and accelerated confidence

Table 3
Exposure to Sexually Explicit Internet Material and Its Relationship With Sexual Uncertainty and Uncommitted Sexual Exploration

| | Sexual Uncertainty | | | Attitudes Toward Uncommitted Sexual Exploration | | | |
|-----------------------------------|--------------------|--------------|---------|---|--------------|---------|---------------------------|
| | <i>B</i> | <i>SE(B)</i> | β | <i>B</i> | <i>SE(B)</i> | β | Bca 95% CI(<i>B</i>) |
| Male | -.114** | .042 | -.07 | -.195 | .035 | .12 | .128 |
| Age | -.005 | .010 | -.01 | -.026 | .009 | -.14 | -.067 |
| Heterosexual orientation | -.003 | .026 | -.00 | -.060 | .022 | -.02 | -.070 |
| Dutch ethnicity | -.018 | .062 | -.01 | -.149 | .052 | -.02 | -.163 |
| Parental control | -.049 | .027 | -.04 | -.104 | .022 | -.06 | -.118 |
| Perceived sexual experience peers | -.069** | .026 | -.07 | -.116 | .022 | .07 | .026 |
| Religiosity | .004 | .014 | .01 | -.027 | .011 | -.12 | -.099 |
| In relationship | -.113** | .044 | -.06 | -.196 | .036 | -.16 | -.343 |
| Sexual experience | -.068 | .073 | -.03 | -.207 | .061 | .07 | .040 |
| Life satisfaction | -.056* | .023 | -.05 | -.103 | .019 | -.00 | -.041 |
| Sensation seeking | .035 | .024 | .03 | -.021 | .020 | .24 | .205 |
| Exposure to SEIM | .118*** | .015 | .19 | .085 | .012 | .20 | .091 |
| Constant | 2.804 | .246 | | 2.328 | .207 | | |
| <i>R</i> ² | | | .051*** | | | | .261*** |
| Adj. <i>R</i> ² | | | .046 | | | | .258 |

Note: *N* = 2,343. SEIM = Sexually explicit Internet material; Bca 95% CI(*B*) = Bias-corrected and accelerated 95% confidence interval of the unstandardized regression coefficient *B*.

p* < .05, two-tailed. *p* < .01, two-tailed. ****p* < .001, two-tailed.

interval of the unstandardized coefficient was between .085 and .150 when sexual uncertainty was the dependent variable. When attitudes toward uncommitted sexual exploration was the dependent variable, the confidence interval of the unstandardized coefficient of exposure to sexually explicit Internet material ranged from .091 to .145. None of the two confidence intervals thus contained zero. This indicated that, also on the basis of bootstrapped results, both the association between exposure to sexually explicit Internet material and sexual uncertainty and the relation between exposure to such material and attitudes toward uncommitted sexual exploration significantly differed from zero.

Hypotheses 1 and 2 were thus supported regardless of whether they were tested with traditional parametric tests or with the bootstrap method. The more frequently adolescents consumed sexually explicit Internet material, the more sexually uncertain they were. With greater exposure to sexually explicit Internet material, adolescents also held more positive attitudes toward uncommitted sexual exploration. As the beta coefficients in the two models in Table 3 indicate, exposure to sexually explicit Internet material was the strongest correlate of sexual uncertainty ($\beta = .19$) and, after sensation seeking, the second strongest correlate of attitudes toward sexual exploration ($\beta = .20$). Exposure to sexually explicit Internet material thus had a considerable share in the explained variance of both models.

In the multiple regression analyses, we technically specified exposure to sexually explicit Internet material as the independent variable and sexual uncertainty and attitudes toward uncommitted sexual exploration as dependent variables. However, our findings should not be read as if exposure to sexually explicit Internet material causally precedes greater sexual uncertainty and more positive attitudes toward sexual exploration. On the basis of the cross-sectional design of the study, we can currently specify only associations between the variables.

Discussion

Researchers have recently requested that the association between adolescents' exposure to sexual media content and their sexual socialization be approached more strongly from an identity development framework (e.g., Ward, 2003). In an initial attempt to address this request, the present study has focused on adolescents' sexual uncertainty and their attitudes toward uncommitted sexual exploration as aspects that may accompany the development of the sexual self. In response to calls for more research on the implications of adolescents' use of sexually explicit Internet material (e.g., Brown et al., 2006; Flood, 2007; Thornburgh & Lin, 2002; Wolak et al., 2007), the study has further shown that exposure to sexually explicit Internet material is associated with greater sexual uncertainty and more positive attitudes toward uncommitted sexual exploration. In what follows, we deal with the implications of our study for the linkage between the development of adolescents' sexual self and

their use of sexually explicit Internet material. We also specify the relation of our findings to previous research.

Development of the Sexual Self and Use of Sexually Explicit Internet Material

Our study contributes to a small research strand that has documented that adolescents' use of sexual media content is related to the development of their sexual self (Steele, 1999; Steele & Brown, 1995). More specifically, our study shows that the development of adolescents' sexual self may be connected to a type of sexual media content that became available only a few years ago—sexually explicit material on the Internet. Based on existing research (e.g., Brooks-Gunn & Graber, 1999; Marcia & Friedman, 1970; Schenkel & Marcia, 1972; Waterman & Nevid, 1977), we focused only on sexual uncertainty and attitudes toward uncommitted sexual exploration as two aspects of the development of adolescents' sexual self. However, the consistency and robustness of our findings suggest that other aspects of adolescents' sexual self may also be associated with adolescents' exposure to sexually explicit Internet material (Buzwell & Rosenthal, 1996). For example, Buzwell and Rosenthal (1996) found that adolescents with an unassured sexual style were extremely low in sexual self-efficacy, an important component of adolescents' sexual self. Assuming that sexual uncertainty and an unassured sexual style are positively related, we would expect that exposure to sexually explicit Internet material would be negatively associated with sexual self-efficacy. Because the sexual self is a multidimensional concept (Brooks-Gunn & Graber, 1999; Buzwell & Rosenthal, 1996), many more such linkages between our concepts and other dimensions of the sexual self seem possible. The sexual self-concept may thus allow us to gain more encompassing insights into the relationship between adolescents' exposure to sexually explicit Internet material and their identity development.

However, even with its currently limited scope, the developmental perspective of this study already illustrates that the ramifications of adolescents' exposure to sexually explicit Internet material may be further reaching than previous research has suggested. There is some first evidence that exposure to sexually explicit Internet material is related to sexually permissive attitudes, more lenient views of extramarital sex, recreational attitudes toward sex, and stronger notions of women as sex objects (Lo & Wei, 2005; Peter & Valkenburg, 2006b, 2007). Our study also shows that characteristics of adolescents' sexual development, such as sexual uncertainty and sexual exploration, are linked with exposure to sexually explicit Internet material. These results tentatively suggest that a developmental perspective may benefit not only our knowledge of correlates of adolescents' developing sexual self but also our understanding of the significance of sexually explicit Internet material in adolescents' lives.

Relation of Our Findings With Previous Research

The finding that greater sexual uncertainty is connected with a more frequent use of sexually explicit Internet material resonates with recent research in two ways. First, the finding may illustrate general mechanisms with which sociologists have described life in late modern societies (e.g., Bauman, 1997; Beck, 1992; Luker, 2006). As the increased choice among life alternatives has augmented people's uncertainty about their biographies, the increased choice among sexual beliefs and values may augment adolescents' sexual uncertainty. Sexually explicit Internet material presents sexual beliefs and values that differ from the beliefs and values that adolescents are taught in families and schools. When adolescents try to make sense of the conflicting sexual beliefs and values, they may feel uncertain about which beliefs and values to support.

Second, our finding that exposure to sexually explicit Internet material and sexual uncertainty is associated corresponds loosely with studies that show that adolescents turn to media for sexual information and advice (e.g., Steele, 1999; Subrahmanyam, Smahel, & Greenfield, 2006; Suzuki & Calzo, 2004). Sexually uncertain adolescents may be more likely to look for information in sexually explicit Internet material than sexually certain adolescents. However, whether sexually explicit Internet material is a trustworthy and realistic source of sexual information has been doubted (Thornburgh & Lin, 2002; Wolak et al., 2007). Therefore, we need more research on this topic to establish to what extent adolescents indeed learn from sexually explicit Internet material and how the learned content, in turn, affects adolescents' sexual development.

Our result that adolescents held more positive attitudes toward uncommitted sexual exploration when they used sexually explicit Internet material more often merges with previous research on sexual permissiveness and attitudes toward recreational sex (Lo & Wei, 2005; Peter & Valkenburg, 2006b). At the same time, our result goes beyond existing research in that it focuses on attitudes toward a phenomenon that only recently received research attention (Manning et al., 2005; Manning et al., 2006): adolescents' sexual exploration in an unaffectionate, nonrelational context. Our study presents an additional correlate of attitudes toward uncommitted sexual exploration, namely, exposure to sexually explicit material on the Internet. We need more research before we can elaborate on cause-effect issues. But if the signs of a shift away from sexual permissiveness with affection to attitudes toward uncommitted sexual exploration bear up against further, more rigorous scrutiny, the role of sexually explicit Internet material should not be overlooked when we try to understand these changes in adolescent sexuality.

Like results from any other study that investigates links between underexplored concepts in a cross-sectional context, the findings of this study may suffer from limited internal validity. To emphasize, because of its cross-sectional design, our study was not able to specify whether exposure to sexually explicit Internet material causes

sexual uncertainty and positive attitudes toward uncommitted sexual exploration or whether adolescents who are sexually uncertain and hold positive attitudes turn to sexually explicit Internet material. We therefore caution readers against prematurely using our findings as proof that sexually explicit Internet material causes changes in adolescents' sexual selves. Longitudinal research among adolescents and experimental research among young adults may help us to tackle this important internal validity issue.

Furthermore, our study may not be generalizable beyond the context of rich, rather liberal Western countries. The study was conducted in the Netherlands, a country often cited for its pragmatic approach toward adolescent sexuality and its liberal policy toward sexually explicit material (Drenth & Slob, 1997; UNICEF, 2001). We cannot preclude that the specific cultural background of the Netherlands has shaped our results. Hence, we urge readers not to generalize our findings to less sexually liberal cultures. We need comparative research in sexually diverse cultures to disentangle the various external validity issues. The more evidence from different designs and cultural contexts we accumulate, the more encompassing our understanding of this phenomenon will eventually become.

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