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Adolescent Sexual Risk Behavior on the Internet

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Introduction

Understanding Adolescents' Sexual Risk Behavior on the Internet

The popularity of this new pastime among children has increased rapidly. This new invader of the privacy of the home has brought many a disturbing influence in its wake. Parents have become aware of a puzzling change in the behavior of their children. They are bewildered by a host of new problems; and find themselves unprepared, frightened, resentful, helpless.

Eisenberg, A. L. (1936). *Children and radio programs* (pp. 17-18). New York: Columbia University Press.[1]

While reading this quote, the thought may have crossed many that Eisenberg describes common worries about the influence of the internet on today's youth. However, Eisenberg wrote those lines almost 80 years ago, and he was concerned about a medium that today we consider quite harmless - the radio. Yet, it is striking how the concerns of his time resemble today's worries about the influence of the internet (Wartella & Jennings, 2001). As the radio was at that time, the internet is today the most popular media technology among youth. The internet can invade the privacy of children and adolescents more than the radio ever could (Madden, Cortesi, Gasser, Lenhart, & Duggan, 2012). Similarly, there are concerns about the influence of this new medium on the behavior of children and adolescents (Liau, Khoo, & Ang, 2005). As parents 80 years ago, some parents today may find themselves equally "unprepared, frightened, resentful, helpless" (European Commission, 2008; Madden et al., 2012).

[1] As cited in Wartella & Reeves (1985).

Although there seem to be recurrent concerns with the advent of each new medium (Wartella & Reeves, 1985; Wartella & Jennings, 2001), several striking differences between the internet and traditional media technologies emerge. One major difference is that adolescents can play a much more active role while engaging with the internet. For the first time, adolescents may play a crucial role in the creation and distribution of media content online, and they may have contact with a wide range of persons on the internet. Because of its interactive nature, the internet is closely intertwined with the social lives of adolescents.

One major concern about adolescents' online behavior is that adolescents are having sexual encounters with strangers online (European Commission, 2008; Wartella & Jennings, 2001). This online sexual risk behavior involves providing personal information online, talking about intimate, sexual topics with strangers on the internet, as well as searching for sexual partners online. It also includes 'sexting', i.e., sending sexual photos or messages via electronic devices. These behaviors are considered "risky" because they may lead to negative consequences (Lüders, Brandtzaeg, & Dunkels, 2009). For example, by providing intimate information online, adolescents may lose the control over their personal information (Moreno, 2009). Engaging in online sexual risk behaviors may also make adolescents more vulnerable to unwanted sexual solicitations (Mitchell, Finkelhor, & Wolak, 2007; Wolak, Finkelhor, & Mitchell, 2008).

Despite widespread worries about online sexual risk behavior (Madden et al., 2012; Turow, 1999; Wartella, 2001; Ybarra, Mitchell, Finkelhor, & Wolak, 2007), empirical evidence is still scarce. A few early studies have suggested that this behavior is indeed prevalent among US teenagers. For example, the National Campaign to Prevent Teen and Unplanned Pregnancy (2009) reported that 20% of US teenagers engage in sexting. However, there are still several major gaps in the literature. First, almost all studies have been conducted in the United States, making generalizations about European teenagers difficult. In addition, these studies took a predominantly descriptive approach by simply describing the prevalence of this behavior. Moreover, it has been argued that most studies "lack theoretical rigor", and that they ignore the offline lives of youth (Joinson, 2005; Livingstone & Haddon, 2008). Finally, all previous studies have investigated this behavior cross-sectionally, thereby making conclusions about causality and the development of this behavior over time impossible.

Due to these shortcomings in the literature, the public debate about online sexual risk behavior has remained simplified. It is thus necessary to provide a more comprehensive, empirical picture of the role of online sexual risk behavior in the lives of today's youth. By employing a longitudinal as well as a cross-national study in 20 European countries, the main aims of this dissertation are to investigate a) the prevalence

of online sexual risk behavior among Dutch and European adolescents, b) the demographic, cognitive, psychological, social, and cultural predictors of online sexual risk behavior, c) the relationship between online sexual risk behavior and offline sexual risk behavior, and d) the relationship between online sexual risk behavior and negative online experiences.

The dissertation thereby provides an extensive account of the various factors that influence adolescents' engagement in online sexual risk behavior. It also identifies the teens who are particularly susceptible to engaging in online sexual risk behavior, and it provides advice on how to protect vulnerable teens. Overall, the dissertation theoretically and empirically integrates online sexual risk behavior into the broader context of adolescent development and adolescent risk behavior.

Terminology – What is (Online Sexual) Risk Behavior?

There is a long tradition in developmental psychology to study risk behavior among adolescents (Boyer, 2006; Dahl, 2004; Jessor & Jessor, 1977). Adolescents' offline risk behavior comprises many different types of behaviors, such as alcohol or drug consumption, smoking, skipping school, stealing, and practicing unsafe sexual intercourse. Although these behaviors are very different in nature, at least three aspects unite them. First, engagement in all risk behaviors may have negative consequences. These consequences may be health-related, as is the case with smoking or using drugs, legal, social, or psychological. Jessor (1992) concludes that "the term 'risk behavior' refers, then, to any behaviors that can compromise these psychosocial aspects of successful adolescent development" (p. 378).

The second key aspect of risk behavior is that it is part of normal adolescent development. By engaging in risky behaviors adolescents test their limits; they experiment with "rules, roles, and relationships" (Siegel et al., 1994, p. 90). Although risk behavior may lead to negative consequences, it may also have positive and adaptive functions for adolescents. Therefore, engagement in risk behavior is not an 'indication of psychopathology' (Arnett, 1992, p. 343); instead it is often a normative part of adolescence. Finally, although engagement in risk behavior is generally higher during adolescence, not all adolescents engage in this behavior. Engagement in risk behavior is related to specific demographic, psychological, developmental, social, and cultural factors that in combination explain adolescents' risk behavior (Boyer, 2006; Igra & Irwin, 2003; Jessor, 1992; Kotchick, Shaffer, Forehand, & Miller, 2001).

Many types of *online* behaviors may also be considered risky. In this dissertation, the focus lies on one specific type of online risk behavior, namely online sexual risk behavior. We define online sexual risk behavior as the exchange of intimate, sexually

insinuating information or material with someone exclusively known online. In this dissertation four behaviors were investigated: 1) Searching for someone on the internet to talk about sex; 2) Searching for someone on the internet to have sex; 3) Sending a photo or video on which one is partly naked over the internet to someone only known online, and 4) Sending personal information over the internet to someone only known online. We limit our definition of online sexual risk behavior to sexual communication with *unknown* people for two reasons. First, communicating with strangers is one of the main concerns of parents about their children's online behavior (European Commission, 2008). This concern is based on the idea that individuals can easily hide their true identities online and adolescents may therefore become victims of sexual predators online. Second, previous research has shown that communicating with strangers online increases the chance of receiving unwanted sexual solicitation (Mitchell, Finkelhor, & Wolak, 2001, 2007; Wolak et al., 2008). Thus, communicating with unknown persons online may be more problematic for adolescents than communicating with known persons.

Online sexual risk behavior is similar to offline risk behavior in several respects. First, engaging in this behavior may also lead to potentially negative consequences. Possible negative consequences include unwanted sexual solicitations and the misuse of intimate information by others (Moreno et al., 2009). Second, despite the risky nature of this behavior, it may also play an adaptive role in the development of adolescents. For example, by communicating about sexual issues online, adolescents may learn to assert their sexual interests, may gain important information, and may learn to communicate about these topics with others (Subrahmanyam, Greenfield, & Tynes, 2004; Subrahmanyam & Smahel, 2011). Third, similar to offline risk behaviors, not all adolescents engage in this behavior. Specific demographic, psychological, developmental, social, and cultural factors can influence online sexual risk behavior. These factors determine which adolescents engage in this behavior and which do not (Ybarra et al., 2007).

Despite these similarities, online sexual risk behavior has some important unique characteristics. First, the easy accessibility of the internet may make the engagement in risk behaviors much easier than engagement in offline risks. All that is needed to engage in online sexual risk behavior is a computer with internet access. With the increasing popularity of mobile internet devices, the accessibility of the internet is enhanced even further. The second specific feature of online sexual risk behavior is the relative anonymity and reduced cues of online communication. This anonymity may encourage adolescents to try out behaviors in which they would not dare to engage in a non-anonymous offline situation (Chiou, 2006). The anonymous settings of online communication may be perceived as a safe place to experiment with their sexual identity. However, if identifiable

information is exchanged, these initially anonymous situations may easily be transferred to non-anonymous settings later. Moreover, it has been shown that the reduced cues of online communication increase disinhibition among adolescents (Schouten, Valkenburg, & Peter, 2007). Because of the unique characteristics of the internet, it is important to study online sexual risk behavior in addition to offline risk behaviors to understand the role of these rather new types of risk behavior in the broader context of adolescent' risk behavior.

Throughout this dissertation the terms 'online sexual risk behavior' and 'risky sexual online behavior' are used interchangeably.

Why Study Adolescents?

The main focus of this dissertation is online sexual risk behavior among adolescents. There are several reasons to assume that adolescents are more prone to engage in online sexual risk behavior compared to any other age group. The first reason is that there is no other period in life when individuals are more likely to engage in risk behavior (Dahl, 2004; Steinberg, 2007). This heightened propensity to engage in risk behavior has been related to the biological and social changes associated with puberty. Due to the hormonal changes that accompany puberty, adolescents develop a strong inclination towards sensations and strong emotional arousal (Arnett, 1992; Dahl, 2004; Steinberg, 2007). However, the capability to regulate impulses and emotions develops only gradually during the course of adolescence and young adulthood (Steinberg, 2007). In situations that are emotionally arousing, adolescents may have difficulties regulating impulses and may thus be more willing to engage in risk behavior.

The second reason is that during adolescence, individuals develop a strong sexual interest. During this period, adolescents become sexually mature. Due to the vast bodily and hormonal changes, adolescents are faced with the developmental goal of attaining a sexual identity (Breakwell & Millward, 1997; Buzwell & Rosenthal, 1996; Graber, Brooks-Gunn, & Galen, 1997). They also have to become used to their sexual desires; therefore, they explore their sexuality during this period (Crockett, Raffaelli, & Moilanen, 2003; Santelli, Lindberg, Abma, McNeely, & Resnick, 2000). The third reason why adolescents are especially susceptible to engage in risk behavior is that during this period, their social orientation shifts from parents to peers (Steinberg & Morris, 2001). Adolescents strive to attain independence from their parents and turn to their peers for support. Consequently, the behavior of peers becomes directive for adolescents. In this respect, it is not surprising that a large body of research has shown that peer influence is one of the most important and most consistent predictors of adolescent risk behavior (Michael & Ben-Zur, 2007).

Besides these basic developmental changes that accompany adolescence, communication research has also consistently shown that adolescents are more eager to adopt new media technologies compared to any other age group, and the internet is no exception to this rule. This eagerness may be related to adolescents' propensity for excitement and novelty. Moreover, the internet may fit the developmental needs of adolescents perfectly. It has been previously argued that specific characteristics of the internet, such as its anonymity, accessibility, and asynchronicity, make the internet attractive for adolescents (Valkenburg & Peter, 2011). As a result, adolescents may use the internet to explore their sexuality and satisfy their sexual interests.

Because of the developmental proneness towards risks and increased interest in sexuality on the one hand, and the huge popularity of the internet among adolescents on the other hand, it may be assumed that adolescents are the age group that is most likely to engage in online sexual risk behavior.

Methodological Context

The chapters presented in this dissertation are based on a four-wave longitudinal study as well as on a secondary analysis of a cross-national study. The longitudinal study was conducted among 1,765 Dutch adolescents aged 12 to 18 years. These adolescents received an online survey four times with 6-month intervals. This longitudinal dataset provided an excellent opportunity to establish the causality of predictors and behaviors as well as to investigate the development of online sexual risk behavior. Behaviors and perceptions can change quickly due to the vast hormonal, biological, and social changes during adolescence. The 6-month intervals were therefore appropriate to cover their quick changing developments during this period. In addition to adolescents, 1,026 Dutch adults (19- to 88-year olds) were also investigated in the first wave of data collection. This allowed us to compare the online behaviors, perceptions, and experiences of adolescents with those of adults.

To broaden the scope of this dissertation, in Chapter 7, a cross-national dataset was analyzed that comprised information about online sexual risk behavior among adolescents from 20 European countries. More specifically, the cross-national dataset included 14,946 internet-using adolescents aged 11 to 16 years. This study was conducted as part of the EU Kids Online project that charts the online experiences of European youth[2]. Comparative research across countries provides unique information in comparison to studies conducted within one country. First, the cross-national study allows us to compare the prevalence of online sexual risk behavior across several European countries. A second advantage is that

[2] See www.eukidsonline.net

it enables us to investigate cultural factors at the country level along with individual factors as predictors of online sexual risk behavior. Finally, comparative research provides the unique opportunity to examine whether individual predictors of online sexual risk behavior (such as age, gender, sensation seeking) are the same across countries or whether the predictive importance of these factors differs. Due to specific characteristics at the country level, some factors may be more important in one country than in another.

Outline of the Dissertation

This dissertation consists of six studies that have been published or submitted for publication as individual papers. Therefore, each chapter has its own abstract, introduction, discussion, and reference list and can be read individually. Together, they provide a comprehensive picture of adolescents' online sexual risk behavior. The dissertation concludes with a summary and general discussion of the main findings.

Chapter 2: Comparing Adolescents and Adults: Differences in Online Sexual Risk Behavior and Risk Perceptions

There have been widespread concerns that on the internet, adolescents are especially vulnerable and are more likely to engage in sexual risk behavior compared to adults. However, empirical evidence to support this assumption has been widely missing. The first study of this dissertation, therefore, examines this basic assumption by comparing the experiences with online sexual solicitation, and the engagement in online sexual risk behavior among 1,765 Dutch adolescents and 1,026 Dutch adults. Moreover, the study investigated age and gender differences in the perception of risks and benefits concerning online sexual risk behavior. The main finding of this study was that – in contrast to expectations – adults and adolescents did not differ much in their engagement in online sexual risk behavior and in their perceptions of this behavior. Overall, adolescent and young adult females were more likely to receive unwanted online sexual solicitations, while middle and late adolescent boys as well as adult men were more likely to engage in online sexual risk behavior. Across all age groups, the risks associated with online sexual risk behavior were perceived as high and the benefits as low.

Chapter 3: Psychological Predictors of Online Sexual Risk Behavior

Chapter 2 has shown that risk perceptions of online sexual risk behavior are high among adolescents. Overall, adolescents seem to be aware of the risks associated with this behavior and they do not see many benefits related to this behavior. Nevertheless, there

may be individual differences in risk and benefit perceptions among adolescents. The aim of Chapter 3 was to investigate whether individual differences in the perceptions associated with this behavior may lead to differences in risk engagement. More specifically, we examined whether adolescents who perceive fewer risks and more benefits, who feel less vulnerable, and who perceive to have more friends engaging in this behavior are more likely to engage in online sexual risk behavior. The results of autoregressive cross-lagged structural equation models showed that perceptions of risks, vulnerability and the perceived amount of friends who engage in online sexual risk behavior predicted risk engagement six months later. The perceived amount of friends engaging in this behavior was the most consistent and strongest predictor of online sexual risk behavior. These findings underline the importance of peers in adolescents' online sexual risk behavior.

Chapter 4: Social Predictors of Online Sexual Risk Behavior: The Role of Peers

The findings presented in Chapter 3 emphasize the importance of peers in the engagement in online sexual risk behavior. Chapter 4 further elucidates the role of peer norms. Social norms theory states that peer influence depends on adolescents' beliefs about the norms that are prevalent among their peers. Chapter 4 examined the influence of descriptive as well as injunctive peer norms on online sexual risk behavior across four waves. Two cross-lagged structural equation models supported the findings from the previous chapter, showing that adolescents are much more likely to engage in this behavior if they have friends who engage in this behavior. Descriptive peer norms consistently predicted subsequent online sexual risk behavior across all four waves. Furthermore, injunctive peer norms also predicted subsequent engagement in online sexual risk behavior, but not as strongly and consistently as descriptive peer norms. The findings suggest that similar to offline risk behaviors, what peers do or approve of influences problematic behaviors on the internet.

Chapter 5: The Development of Online Sexual Risk Behavior and its Relationship to Offline Sexual Risk Behavior

The fifth chapter examines two crucial aspects of online sexual risk behavior: the development of online sexual risk behavior from early until late adolescence as well as its relationship to offline sexual risk behavior. Using a group-based modeling approach, we found substantial variation in the developmental course of online and offline sexual risk engagement. In terms of engagement in online sexual risk behavior, three distinct groups were identified. The largest group of adolescents did not engage in online sexual risk behavior during adolescence (70%). The second group showed moderate levels of risk

engagement (24%), and the third group showed higher levels of risk engagement (6%). The moderate and high online risk groups followed the typical developmental pathway of risk behavior, with an increase from early to mid-adolescence, a peak in mid-adolescence, and a decline thereafter. Moreover, dual trajectory analysis revealed that online and offline sexual risk behaviors were highly related. Finally, this study showed that adolescents following heightened pathways of online sexual risk behavior were less satisfied with their lives, had higher levels of sensation seeking, came from less cohesive families, and were less educated.

Chapter 6: Online Sexual Risk Behavior and its Relationship to Negative Online Experiences

Chapter 5 indicated that adolescents may follow specific pathways of risk engagement during the course of adolescence. It may be expected that engaging in online sexual risk behavior frequently and consistently over time may be related to negative online experiences. The aim of Chapter 6 was to investigate whether following more 'problematic' pathways of online sexual risk behavior is related to three types of negative online experiences, unwanted online sexual solicitation, online harassment, and online rumination. As expected, those 6% of adolescents who followed a pathway of high risk behavior were more likely than all other adolescents to encounter negative online experiences across all four waves of data collection. Adolescents who showed the highest level of online sexual risk engagement are thus at risk of also encountering a wide range of negative online experiences.

Chapter 7: Comparing the Predictors of Sexting Across Europe

The aim of the final study of this dissertation was to broaden the scope by investigating online sexual risk behavior not only among Dutch adolescents, but also among adolescents in other European countries. By conducting a secondary analysis of a cross-national dataset including 20 European countries, this study examined individual and country characteristics that explain adolescent engagement in sexting. Moreover, the study investigated whether individual predictors vary across countries. Multilevel analysis revealed that age, sensation seeking, and frequency of internet use predicted sexting across all countries. The influence of gender varied across countries. Although country characteristics (traditionalism, GDP, broadband penetration) had no *direct* effect on adolescent sexting, traditionalism of a country significantly predicted gender differences in sexting. In countries that are more traditional, gender differences were stronger, with more boys engaging in this behavior compared to girls. In less traditional countries, these gender

differences were less apparent or even reversed. These findings suggest that when investigating sexting, and possibly online risk behavior in general, the broader cultural context should be considered to fully understand this behavior.

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2

Unwanted Online Sexual Solicitation and Risky Sexual Online Behavior Across the Lifespan

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Abstract

There are widespread concerns that on the internet, adolescents are especially vulnerable and take more risks than adults. However, research supporting this concern is still missing. The aim of this study was to explore whether (a) unwanted online sexual solicitation, (b) risky sexual online behavior, and (c) the perception of risks and benefits of risky sexual online behavior vary for males and females in adolescence and adulthood. We conducted an online survey with a representative sample of 1,765 Dutch adolescents (grouped as 12-13-, 14-15-, and 16-17-year-olds) and 1,026 Dutch adults (grouped as 18-29-, 30-50-, and 50-88-year olds). Results indicated that adolescents were more at risk of becoming a victim of unwanted online sexual solicitation than adults. However, they did not engage in more online sexual risks than adults. As expected, females were sexually solicited more often than males but took fewer online sexual risks than males. Across all adolescent and adult age groups, perceived risks of risky sexual online behavior were high while perceived benefits were low. Contrary to earlier theories, adolescents did not perceive fewer risks or more benefits of risky sexual online behavior than adults.

Unwanted Online Sexual Solicitation and Risky Sexual Online Behavior Across the Lifespan

In recent years, there have been growing concerns about the risks that the internet poses to adolescents (Liau, Khoo, & Ang, 2005; Livingstone & Haddon, 2008). Among these risks, sexual risks are considered especially alarming. The concerns about sexual risks on the internet primarily address two different issues: (1) being a victim of unwanted online sexual solicitation and (2) actively engaging in risky sexual online behavior. Unwanted online sexual solicitation can be defined as receiving unwanted requests to talk about sex or to do something sexual (Ybarra, Espelage, & Mitchell, 2007). Risky sexual online behavior can be defined as the active engagement in online sexual activities that may have negative consequences, for example, sexual contact with strangers on the internet or the distribution of sexual information to strangers. Whereas risky sexual online behavior involves the voluntary decision to act sexually online, online sexual solicitation is an unwanted request to do so.

Several studies investigated the prevalence of unwanted online sexual solicitation (Mitchell, Finkelhor, & Wolak, 2001, 2007b; Ybarra, Espelage et al., 2007). Most of these studies have focused on adolescents and report that around 13% to 23% of adolescents have become victims of unwanted online sexual solicitation (Livingstone, 2006; Mitchell et al., 2001, 2007b). Empirical studies on adolescents' risky sexual online behavior are still scarce. Most studies focus either on sexual online activities of adults (Bolding, Davis, Hart, Sherr, & Elford, 2005; Cooper, Mannson, Daneback, Tikkanen, & Ross, 2003; Daneback, Mansson, & Ross, 2007) or on online risk behaviors in general (Liau et al., 2005; Livingstone & Haddon, 2008; Ybarra, Mitchell, Finkelhor, & Wolak, 2007).

Studies on adolescents' unwanted online sexual solicitation and online risk behavior explicitly or implicitly assume that adolescents are especially vulnerable. This assumption is based on several conjectures. First, adolescents are massive users of the internet, and they use the internet for leisure time activities more than adults do (Hasebrink, Livingstone, & Haddon, 2008; Willoughby, 2008). Second, literature on offline solicitation (Raskauskas & Stoltz, 2007) and on offline sexual risk behavior shows that adolescents are involved in those behaviors more often than adults are (Greene, Krcmar, Walters, Rubin, & Hale, 2000; Igra & Irwin, 1996; Steinberg, 2007, 2008). This has been explained by increases in sexual awareness and sensation seeking during that period (Bouchey & Furman, 2003; Breakwell & Millward, 1997; Zuckerman, 1979; Zuckerman, Ball, & Black, 1990). Third, research on offline risks suggests that adolescents and adults differ in the perception of risks and benefits of risk behaviors (Goldberg, Halpern-Felsher, & Millstein, 2002; Halpern-Felsher, Biehl, Kropp, & Rubinstein, 2004).

That is, adolescents may fail to perceive specific risks associated with a risky behavior and, at the same time, overestimate the benefits of such behaviors.

Although all of these conjectures are plausible, empirical evidence showing that adolescents are more vulnerable online than adults is missing. To date, no study has compared unwanted online sexual solicitation and risky sexual online behavior among different adolescent and adult age groups on the basis of representative samples. Therefore, the aim of our study is to fill this research gap by conducting a study on the prevalence of unwanted online sexual solicitation and risky sexual online behavior over the lifespan. We thereby focus on six age groups: early, middle, and late adolescence, and emerging adulthood, middle, and late adulthood. In addition, given the importance of risk perception in theories of offline risk behavior, we compare how these age groups differ in their perceptions of risky sexual online behavior. More specifically, we compare their perceived risks and benefits of risky sexual online behavior. Finally, gender differences are regarded as a key variable both in risk research (Byrnes, Miller, & Schafer, 1999) and in research on unwanted online sexual solicitation (Mitchell, Finkelhor, & Wolak, 2007a; Ybarra, Espelage et al., 2007). Therefore, we also investigate gender differences in unwanted online sexual solicitation, risky sexual online behavior, and risk perceptions during the lifespan.

Age and Gender Differences in Unwanted Online Sexual Solicitation

Incidences of unwanted online sexual solicitation have been frequently reported in the literature (Mitchell et al., 2007a, 2007b; Mitchell, Wolak, & Finkelhor, 2008; Ybarra, Espelage et al., 2007). These unwanted requests may take serious and aggressive forms (Mitchell et al., 2007b), and most victims of unwanted online sexual solicitation reported strong negative feelings as a consequence, such as being upset and afraid (Mitchell et al., 2001). The prevalence of unwanted online sexual solicitation among adolescents has been extensively studied (Mitchell et al., 2001, 2007a; Mitchell et al., 2008; Ybarra, Espelage et al., 2007). For example, Mitchell et al. (2007) have shown that among adolescents aged 10 to 17, the frequency of unwanted online sexual solicitation decreased from 19% to 13% between 2000 and 2005. However, incidences of *aggressive* online sexual solicitation increased during that period. Among British youth, 23% had received unwanted sexual requests online (Livingstone, 2006).

Despite the growing research interest in unwanted online sexual solicitation, no study has compared unwanted online sexual solicitation for different age groups across the lifespan. Evidence for age differences within adolescent samples have been reported by Mitchell et al. (2001) and Mitchell et al. (2008). They have found that older adolescents (14-17) are more at risk for unwanted online sexual solicitation than younger ones (10-13).

However, it is yet unknown whether unwanted online sexual solicitation peaks in late adolescence and declines thereafter, or whether it stays on this level during emerging adulthood or even later.

There are several theoretical reasons to assume that older adolescents and emerging adults are particularly at risk of receiving unwanted online sexual solicitation. First, from a developmental perspective, adolescents may be especially at risk to receive unwanted online sexual solicitation because of the massive changes they undergo during this period. During adolescence, the need to relate to others increases (Sigelman & Rider, 2003). As a result, interacting with unknown people online may be appealing for adolescents in this period. However, interacting with unknown people is a decisive risk factor for unwanted online sexual solicitation (Mitchell et al., 2001). Older adults may be less interested in interacting with unknown people online and may, thus, decrease their risk of receiving unwanted online sexual solicitation. Moreover, receiving unwanted online sexual solicitation also seems to be related to a range of psychosocial problems, such as depression (Mitchell et al., 2001). These psychosocial problems often emerge in the course of adolescence and stay into emerging adulthood (Sigelman & Rider, 2003).

Second, younger people may also be more at risk because the level of internet use peaks in middle to late adolescence and emerging adulthood (Jones & Fox, 2009). Spending more time online may enhance the chance of receiving unwanted online sexual solicitation. Finally, age differences in unwanted online sexual solicitation may be based on the fact that younger people may just be the target group for perpetrators of online sexual solicitation.

Next to age, gender has been identified as an important risk factor of becoming a victim of unwanted online sexual solicitation (Mitchell et al., 2007b). Mitchell et al. (2001), for instance, have shown that 27% of female adolescents have been sexually solicited. In contrast, only 12% of male adolescents reported to have become a victim of unwanted online sexual solicitation. These results are not surprising because males have been identified as the main perpetrators of sexual solicitation (Finkelhor, Mitchell, & Wolak, 2000).

Although no study exists on online sexual solicitation in adults, we may assume that these gender differences exist across all age groups. However, this gender gap may decrease with age. It may be assumed that younger females are the main target group of perpetrators. If the prevalence of unwanted online sexual solicitation decreases for females with age, levels of unwanted sexual solicitation in older females and older males may become more similar. Due to a lack of research on age and gender differences in unwanted online sexual solicitation throughout the lifespan, these assumptions are preliminary. We, therefore, investigate by means of a research question (RQ1) rather than a hypothesis how

incidences of unwanted online sexual solicitation differ for males and females across the lifespan.

Age and Gender Differences in Risky Sexual Online Behavior

Risky sexual online behavior can be defined as the exchange of intimate, implicit or explicit sexual information or material with someone exclusively known online. Behaviors like searching for someone to talk about sex or have sex, and disclosing intimate information such as implicit or explicit sexual pictures or contact details to strangers online may be categorized as risky sexual online behavior. We limit our definition to communication with unknown people because research has shown that communicating with strangers online may lead to negative consequences, such as an increased likelihood of receiving unwanted sexual solicitation (Cooper, Morahan-Martin, Mathy, & Maheu, 2002; Mitchell et al., 2001, 2007b; Wolak, Finkelhor, & Mitchell, 2008). Moreover, previous research has shown that searching for sexual partners online may increase the risk of getting sexually transmitted diseases (McFarlane, Bull, & Rietmeijer, 2002). Other potential negative consequences include the misuse of intimate information by others (Moreno et al., 2009) and feelings of shame, guilt and embarrassment.

Research on risky sexual online behavior is still scarce. However, studies on age and gender differences in offline sexual risk behavior may be informative to make first assumptions about risky sexual online behavior. Engagement in risky sexual offline behavior increases during adolescence (Cubbin, Santelli, Brindis, & Braveman, 2005; Steinberg, 2008), peaks in mid-adolescence and decreases thereafter (Parsons, Siegel, & Cousins, 1997; Shaw, Wagner, Arnett, & Aber, 1992; Steinberg, 2005, 2007, 2008; Steinberg & Morris, 2001). The increase in offline sexual risk behavior during adolescence has been linked to the biological, cognitive, psychological, and social changes that individuals face during this period (Igra & Irwin, 1996; Lerner & Galambos, 1998). These changes also lead to an increase in sexual awareness and interest. For example, the attention for sexually relevant topics increases during adolescence and causes selective information processing (Miltner, Vorwerk, Weichold, & Silbereisen, 2001). The newly developed importance of sexuality also leads to sexual experimentation which may result in sexual risk behavior (Breakwell & Millward, 1997; Buzwell & Rosenthal, 1996).

Although evidence suggests that *offline* sexual risk behavior peaks in adolescence, it is unclear whether this also applies to risky sexual *online* behavior. Despite the lack of empirical studies on risky sexual online behavior, we assume that online risk behavior also peaks in adolescence. Adolescents are the main users of the internet. The internet's specific characteristics may appeal especially to adolescents in their need to satisfy their sexual curiosity. For example, it has been shown that the reduced cues that characterize most

online communication, increase online disinhibition among adolescents (Schouten, Valkenburg, & Peter, 2007). Moreover, young people today grew up with this rather new medium, and may easily integrate the internet into their sexual life (Cooper et al., 2003), whereas adults may have reservations toward this medium. Hence, it may be assumed that the internet offers a new space for sexual experimentation which fits the needs of adolescents more than any other age group.

Being a key variable in offline sexuality and risk behavior, gender differences have been extensively studied (Byrnes et al., 1999). For example, a meta-analysis by Byrnes, Miller and Schafer (1999) showed that males generally take more risks than females. Several theoretical approaches have tried to explain these gender differences. For example, it has been argued that men's higher risk taking is due to higher levels of sensation seeking (Zuckerman, 1979; Zuckerman et al., 1990), lower levels of arousal in response to risk behavior (Byrnes et al., 1999), or higher activity levels (Morrongiello & Rennie, 1998). Another possible explanation may be the different socialization of boys and girls (Block, 1983) and to the greater acceptance of risk behavior for men (Kelling, Zirkes, & Myerowitz, 1976). In sum, Wilson and Daly (Wilson & Daly, 1985) argue that risk behavior is an "attribute of the masculine psychology" (p. 61).

However, gender differences in sexual risk behavior may vary according to age. This may be due to different developmental trajectories of males and females. For example, girls mature faster and exit puberty at younger ages. Thus, girls may stop earlier with risk behaviors. Looking at gender differences in risk behavior across the lifespan, it has been shown that in offline sexual risk behavior, gender differences become smaller with age (Byrnes et al., 1999; Oliver & Hyde, 1993). In contrast, for online sexuality, McFarlane et al. (2002) show that more males than females report having sex with someone first met online and this gender gap even widens with age. However, existing research has only dealt with adults, and the focus lay on online sexuality in general and not specifically on risky sexual online behavior.

In sum, empirical evidence for gender and age differences in risky sexual online behavior is scarce. However, we may expect that males take more sexual risks online than females. We also expect that risky sexual online behavior, like offline sexual risk behavior, peaks in adolescence and declines thereafter. However, because of inconsistent evidence, we do not know if the gender gap grows or narrows across the lifespan. We therefore investigate by means of research question 2 how risky sexual online behavior differs for males and females during the lifespan.

Age and Gender Differences in the Perception of Risks and Benefits of Risky Sexual Online Behavior

Cognitive decision-making theories assume that risk behavior is a result of the weighing of potential costs and benefits (Bechara, 2003; Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993; Furby & Beyth-Marom, 1992; Hooper, Luciana, Conklin, & Yarger, 2004; Mellers, Schwartz, & Cooke, 1998; Steinberg, 2008). Heightened risk behavior during adolescence as compared to adulthood has been attributed to differences in perceived risks and benefits. Generally, it has been assumed that during adolescence, individuals believe in a personal fable, that is the erroneous believe that one is unique and invulnerable (Millstein & Halpern-Felsher, 2002). Due to this personal fable adolescents face difficulties in estimating the potential costs and benefits of a risk behavior (Goldberg et al., 2002; Rolison & Scherman, 2002). More specifically, adolescents may underestimate the risks and overestimate the benefits associated with risk-taking behaviors (Furby & Beyth-Marom, 1992; Goldberg et al., 2002; Halpern-Felsher & Cauffman, 2001). As a consequence of this biased estimation of risks and benefits, adolescents may engage in more risk behaviors than adults, who have a more realistic estimation of risks and benefits. In the transition from adolescence to adulthood, individuals may lose the belief in the personal fable and may become more realistic in their risk estimations.

Empirical evidence for this cognitive decision-making approach has been far from consistent. Most studies failed to find differences between adolescents' and adults' ability to judge costs and benefits of offline risk behaviors (Beyth-Marom et al., 1993). However, in terms of online risk perceptions, studies have consistently shown that adults perceive more online risks than adolescents (Lenhart, 2005; Liau et al., 2005). These differences in risk perceptions may be due to the fact that adolescents today have grown up with the internet and are familiar with this medium. In contrast, adults may not be as familiar with the internet, especially with newer applications such as social network sites, instant messaging, and blogs. Consequently, adults may feel more uncomfortable with the internet.

Gender differences in perceived risks and benefits have also been found. Evidence for gender differences is consistent for both online and offline risk behavior. In general, females tend to evaluate risky behavior as more dangerous and less beneficial than males (Cohn, Macfarlane, Yanez, & Imai, 1995; Hillier & Morrongiello, 1998). Moreover, females tend to estimate their vulnerability as higher than males do (Kontos, 2004; Morrongiello & Rennie, 1998). The same pattern has also been found in studies on risk perceptions of online privacy (Youn, 2005; Youn & Hall, 2008).

Based on this evidence, we expect that females also perceive more risks and fewer benefits of risky sexual online behavior. However, existing evidence does not allow us to

specify whether this gender gap exists for all age groups or whether an interaction between age and gender exists. Moreover, we do not know whether adolescents or adults perceive risky sexual online behavior as riskier. We therefore investigate how perceptions of online sexual risks and benefits differ for males and females across the lifespan (RQ3).

Method

Sample and Procedure

To investigate the three research questions, we conducted an online survey. This survey was done among a representative sample of 1,765 Dutch adolescents and 1,026 Dutch adults. Sampling and fieldwork were done in May and June 2008 by Veldkamp, a Dutch research institute. Respondents were randomly selected from an existing nationally representative online panel administered by Veldkamp, which consists of more than 110,000 participants. In contrast to online convenience samples with their danger of self-selection biases, the pool of potential respondents was originally sampled *randomly* from the Dutch population and is continuously updated. Out of this pool, 2,092 adolescents and 1,267 adults were randomly contacted by email. If participants did not respond they received two reminder emails. A final response rate of 84% for the adolescent and of 81% for the adult sample was yielded. Forty-nine percent of the adolescents and 51% of the adults were female. The age range of the adolescent sample was 12 to 17 years. Of the adult sample, the age range was 18 to 88 years. Most of the adolescents (80.8%) lived with two parents (in line with official Dutch statistics: CBS, 2009). Participants came from urban as well as rural regions all over the Netherlands. Educational levels were equally distributed across the age groups.

Official statistics of the Netherlands reveal that, in 2008, the Netherlands has with 87% the highest percentage of households with home internet connections in the European Union (CBS, 2008). Nearly all Dutch younger than 25 years (98%) have home access to the internet (CBS, 2008). This high percentage of home internet access might prevent typical pitfalls of online surveys like a systematic sampling bias. Previous research has acknowledged that online surveys are especially useful when sensitive issues like sexuality are investigated (Mustanski, 2001; Peter & Valkenburg, 2006, 2009). Parental consent for participation of respondents younger than 18 years was obtained. At the beginning of the questionnaire, both adolescent and adult participants were asked for informed consent. Participants were informed that the survey would be about sexuality and the internet. We asked participants to fill in the questionnaire in privacy and emphasized that the answers would be analyzed only by the principal investigators. Participants were also informed that they could stop at any time if they wished. Completing the questionnaire took about 20

minutes. Participants received a 5 € coupon (approx. 7 USD) for participation. Before the beginning of the study, institutional approval was received.

Measures

Age. Adolescents were divided into three age groups to reflect the developmental stages of early adolescence (12 and 13 year olds: N = 568, M = 12.49 years, SD = 0.51) , middle adolescence (14 to 15 years olds: N = 606, M = 14.49 years, SD = 0.50), and late adolescence (aged 16 to 17: N = 591, M = 16.46 years, SD = 0.50) (Van Leijenhorst, Westenberg, & Crone, 2008). Adults were also separated into three groups. The first group included all adults between 18 and 29, and reflected emerging adulthood (N = 171, M = 24.00 years, SD = 3.21) (Arnett, 2007; Arnett & Eisenberg, 2007; Jones & Fox, 2009). The second and third adult group reflected middle (30 to 50 years old: N = 416, M = 40.15 years, SD = 6.08) and late adulthood (older than 50: N = 439, M = 63.99, years, SD = 8.85).

Unwanted online sexual solicitation. Unwanted online sexual solicitation was measured using two items. These items were largely based on items used in prior studies (Mitchell et al., 2001, 2007b; Mitchell et al., 2008). Participants were asked two questions: 1) How often in the past six months, did anyone ask you online to talk about sex when you did not want to? 2) How often in the past six months, did anyone ask you online to do something sexual when you did not want to? Response categories were 0 (*never*), 1 (*once*), 2 (*twice*), 3 (*three to five times*) and 4 (*six times or more*). The two items were strongly correlated, r = .75. The resulting online sexual solicitation scale had a mean score of 0.14 (SD = .53). All mean scores and standard deviations of this scale for each age group and gender are presented in Table 2.1.

Risky sexual online behavior. Because risky sexual online behavior is a rather new research topic, no validated measures exist. We based our items of risky sexual online behavior on previous research that has shown that engagement in these specific risk behaviors are related to negative experiences, such as unwanted sexual solicitation (Wolak et al., 2008; Ybarra, Mitchell et al., 2007). Moreover, searching for sexual partners online has been shown to be related to an increased risk of sexually transmitted diseases (McFarlane et al., 2002). We used four items. Participants were asked how often, in the last six months, they participated in each of the following activities: 1) Searched for someone on the internet to talk about sex; 2) Searched for someone on the internet to have sex; 3) Sent on the internet a photo or video on which they were partly naked to someone they knew only online, and 4) Sent an address or telephone number online to someone they knew only online. Response categories to all questions were 0 (*never*), 1 (*once*), 2 (*two times*), 3 (*three to five times*) and 4 *(six times or more*). These four items formed a one-

dimensional scale with a Cronbach's alpha of .75. Mean score of this scales was 0.14 (*SD* = 0.45). Mean scores for all age and gender groups are presented in Table 2.1.

Perception of online sexual risks. To assess the perceived risks of risky sexual online behavior, respondents were asked to indicate how dangerous they judged each of the former risk behaviors. This is a typical procedure used in offline risk research to assess perceptions of risks (Parsons et al., 1997; Siegel et al., 1994). Specifically, we asked participants: 1) "How dangerous is it to search on the internet for someone to talk about sex?" 2) "How dangerous is it to search on the internet for someone to have sex?" 3) "How dangerous is it to send on the internet photos or videos on which you are partly naked to someone you know only online?" 4) "How dangerous is it to send your address or telephone number online to someone you know only online?"

Response categories ranged from 0 (*not at all dangerous*) to 4 (*very dangerous*). The emerging four-item online-risk-perception scale resulted in a Cronbach's alpha of .79. The mean score of the risk perception scale was 3.29 (*SD* = 0.71). Mean scores of the specific age and gender groups are presented in Table 2.1.

Perception of online sexual benefits. Analogous to the risk-perception scale, respondents indicated how beneficial they judged each of the four risk behaviors (Parsons et al., 1997; Siegel et al., 1994). For example, participants were asked, "How beneficial is it for you to search on the internet for someone to talk about sex with?" Response categories ranged from 0 (*not at all beneficial*) to 4 (*very beneficial*) and resulted in a one-dimensional four-item scale with a Cronbach's alpha of .83. Mean score of the scale was 0.63 (*SD* = 0.82) (see Table 2.1 for all other means and standard deviations).

Internet communication. The amount of online communication may explain the amount of unwanted online sexual solicitation and risky sexual online behavior. Therefore, we included the frequency of participants' online communication as a control variable. Participants indicated how often they use instant messaging, internet chats, and social networking sites. Response categories ranged from 0 (*never*) to 10 (*every day*). Mean score of the scale was 3.39 (*SD* = 2.59).

Table 2.1. Means (and Standard Deviations) for all Scales by Age and Gender

		Unwanted online sexual solicitation scale	Risky sexual online behavior scale	Perceived Risks Scale	Perceived Benefits Scale
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Females					
	12 - 13	0.12 (0.46) $_{a}$	0.09 (0.36) $_{a}$	3.56 (0.54) $_{a}$	0.53 (0.80) $_{a, c}$
	14 - 15	0.31 (0.79) $_{b}$	0.12 (0.37) $_{a}$	3.39 (0.69) $_{b, c}$	0.67 (0.86) $_{c}$
	16 - 17	0.33 (0.75) $_{b}$	0.12 (0.38) $_{a}$	3.41 (0.60) $_{b, c}$	0.70 (0.87) $_{c}$
	18 - 29	0.21 (0.71) $_{a, b, c}$	0.08 (0.27) $_{a}$	3.27 (0.62) $_{b}$	0.68 (0.81) $_{a, c}$
	30 - 50	0.08 (0.41) $_{a, c}$	0.05 (0.26) $_{a}$	3.36 (0.61) $_{b, c}$	0.46 (0.66) $_{a, b}$
	50+	0.06 (0.34) $_{a, c}$	0.16 (0.61) $_{a}$	3.50 (0.63) $_{a, c}$	0.32 (0.54) $_{b}$
	TOTAL	0.20 (0.62)	0.11 (0.40)	3.43 (0.62)	0.57 (0.79)
Males					
	12 - 13	0.04 (0.23) $_{a}$	0.07 (0.27) $_{a}$	3.43 (0.64) $_{a}$	0.53 (0.79) $_{a}$
	14 - 15	0.09 (0.48) $_{a}$	0.16 (0.51) $_{a,b}$	3.11 (0.79) $_{b, c}$	0.78 (0.76) $_{b}$
	16 - 17	0.08 (0.38) $_{a}$	0.18 (0.48) $_{b}$	3.08 (0.73) $_{b, c}$	0.83 (0.81) $_{b}$
	18 - 29	0.03 (0.26) $_{a}$	0.19 (0.53) $_{b}$	3.00 (0.80) $_{b, c}$	0.73 (0.71) $_{a, b}$
	30 - 50	0.11 (0.53) $_{a}$	0.21 (0.58) $_{a, b}$	2.93 (0.81) $_{b}$	0.78 (0.72) $_{b}$
	50+	0.07 (0.40) $_{a}$	0.20 (0.62) $_{a, b}$	3.24 (0.76) $_{c}$	0.47 (0.67) $_{a}$
	TOTAL	0.08 (0.41)	0.16 (0.50)	3.15 (0.77)	0.69 (0.77)

Note. Means within a column with different subscripts differ significantly from each other (no comparisons between genders displayed).

Results

Data Analytical Approach

First, descriptive statistics of the prevalence of unwanted online sexual solicitation and risky sexual online behavior among the age and gender groups are presented. Second, to investigate age and gender differences for unwanted online sexual solicitation, risky sexual online behavior and perceptions of risks and benefits in risky sexual online behavior, we conducted ANOVAs for each dependent variable. Age (12-13 vs. 14-15 vs. 16-17 vs.18-29 vs. 33-50 vs. 50+) and gender were included as independent variables in all analyses. The frequency of internet communication was inserted as a control variable in

our analyses because it may present an alternative explanation of these effects. To further disentangle age effects, we conducted Dunnett's T 3 post-hoc tests for males and females separately. This type of post-hoc test was chosen because the assumption of variance homogeneity was not met. In addition, gender differences were further analyzed with additional t-tests.

Descriptives

Of the overall sample, 5.6% of the male adolescents and 19.1% of the female adolescents reported having been unwantedly sexually solicited on the internet at least once in the past six months. Of the adults, 4.6% of the males and 6.7% of the females reported having been sexually solicited online at least once. Table 2.2 depicts the percentages of participants who indicated to have experienced the specific incidences of unwanted online sexual solicitation at least once in the past six months. Percentages are presented according to age and gender. In the case of risky sexual online behavior, 18.2% of the male adolescents and 17.0% of the female adolescents reported having taken at least one of the online sexual risks once in the past six months. Of the adults, 18.7% of the men and 10.9% of the women have taken at least one of the online sexual risks at least once. The prevalence of each specific behavior for males and females in all age groups is depicted in Table 2.2. Among all behaviors, sending intimate pictures or videos to others had the lowest prevalence, whereas disclosing contact information had the highest prevalence.

Age and Gender Differences in Unwanted Online Sexual Solicitation

Research question 1 asked how prevalent incidences of unwanted online sexual solicitation are during adolescence and adulthood and how this differs for males and females. An ANOVA yielded a main effect for age, F (5, 2791) = 7.61, $p < .001$, $\eta^2 = .01$, a main effect for gender, F (1, 2791) = 26.73, $p < .001$, $\eta^2 = .01$, and an interaction effect for age and gender, F (5, 2791) = 6.10, $p < .001$, $\eta^2 = .01$. Controlling for frequency of internet communication yielded an additional main effect for this control variable, F (1, 2790) = 89.68, $p < .001$, $\eta^2 = .03$. This main effect suggests that participants who used the internet more frequently were also more often sexually solicited online.

Table 2.2. Percentages of Incidences of Unwanted Online Sexual Solicitation and Risky Sexual Online Behavior by Age and Gender

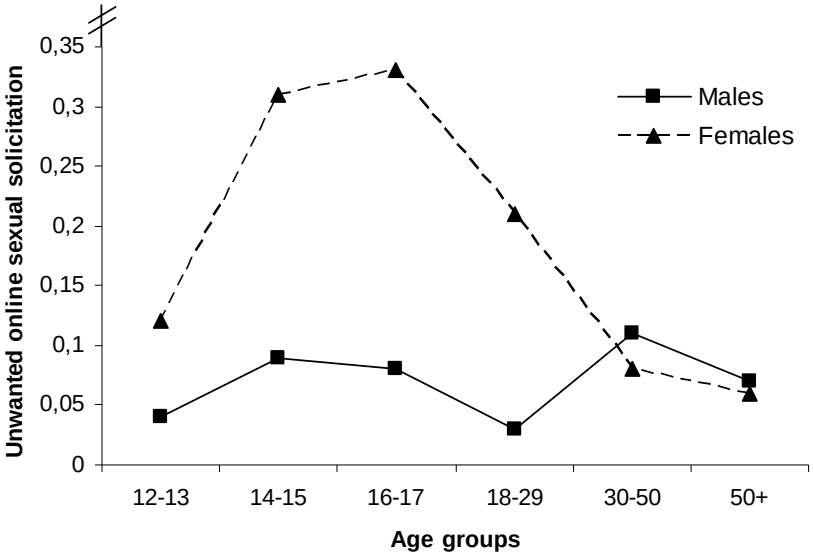
	12-13		14-15		16-17		18-29		30-50		50+	
Prevalence	Males *N* = 289 %	Females *N* = 279 %	Males *N* = 307 %	Females *N* = 299 %	Males *N* = 302 %	Females *N* = 289 %	Males *N* = 60 %	Females *N* = 111 %	Males *N* = 230 %	Females *N* = 186 %	Males *N* = 213 %	Females *N* = 226 %
Asked to talk about sex	2.8	10.0	6.2	18.1	6.6	23.5	1.7	13.5	4.8	4.8	3.8	4.4
Asked to do sth. sexual	1.7	6.1	2.3	13.7	3.6	13.5	1.7	6.3	3.9	2.7	2.3	2.7
Search to talk about sex	2.8	3.2	10.7	8.0	9.9	7.3	8.3	4.5	9.1	2.2	7.5	6.2
Search to have sex	2.1	1.8	6.2	3.7	5.6	4.8	6.7	1.8	7.8	1.1	7.5	5.3
Send nude photo/video	2.4	1.1	2.3	2.7	3.6	2.8	3.3	0.9	4.8	0.0	4.2	0.9
Disclose information	8.3	10.4	10.4	12.7	16.2	12.8	18.3	10.8	12.6	8.1	12.2	8.8

Note. N = 2,765; percentages of the unwanted online sexual solicitation items are based on the number of respondents who had experienced unwanted online sexual solicitation at least once in the past six months. Percentages of the online sexual risk behavior items are based on the number of respondents who had engaged in this behavior at least once in the past six months.

Post-hoc tests revealed no significant age differences for males. Hence, the prevalence of unwanted online sexual solicitation among males was equal across all age groups. For females, however, the youngest age group differed significantly in unwanted online sexual solicitation from the other two adolescent age groups ($p < .01$) but not from the three adult groups ($p < .001$). Female participants aged 14 to 17 differed from the youngest and the two oldest female age groups, but not from the young female adults (18-29 year olds). The mean scores (standard deviations) and significant differences among the age groups can be found in Table 2.1. Additional t-test analyses revealed that females aged 12-29 were significantly more sexually solicited online than males in this age group. No significant gender differences emerged for adults aged 30 and older (see Figure 2.1).

In sum, unwanted online sexual solicitation developed differently for males and females during adolescence and adulthood. Whereas levels of unwanted online sexual solicitation for males were very low throughout the lifespan, levels of unwanted online sexual solicitation for females differed according to age. Females, aged 14 to 29, were sexually solicited on the internet most often.

Figure 2.1. Mean Scores of Unwanted Online Sexual Solicitation for Males and Females across the Lifespan.



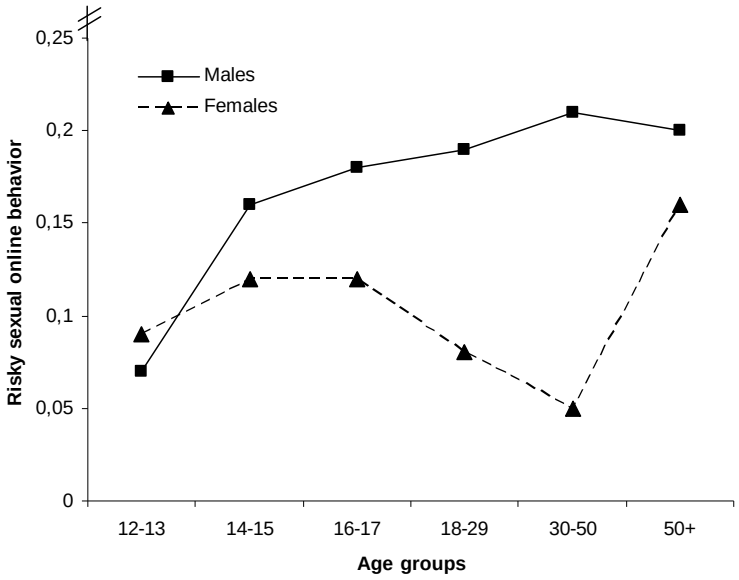
Note. The scale of unwanted online sexual solicitation ranges from 0 (*never*) to 4 (*six times or more*).

Age and Gender Differences in Risky Sexual Online Behavior

Research question 2 asked how risky sexual online behavior differs for males and females across the lifespan. The ANOVA yielded a significant main effect for age, F (5, 2791) = 2.81, $p < .05$, $\eta^2 = .005$, and for gender, F (1, 2791) = 10.74, $p < .01$, $\eta^2 = .004$, but no significant interaction effect. These main effects remained also after controlling for the frequency of internet use. The additional main effect for internet communication, F (1, 2790) = 47.86, $p < .001$, $\eta^2 = .02$, suggested that participants who used the internet more frequently, also engaged in more online sexual risks.

Post hoc tests revealed that for males, the youngest age group took significantly fewer risks than the late adolescent group ($p < .05$) and the middle adult group (30-50 year olds, $p < .05$). There were no other significant differences between the age groups. There were also no significant differences for the prevalence of risky sexual online behavior among the female age groups (see Table 2.1). Additional t-test analyses revealed that the only significant gender difference in risky sexual online behavior occurred for the middle adult group (30-50 years old, see Figure 2.2).

Figure 2.2. Mean Scores of Risky Sexual Online Behavior for Males and Females across the Lifespan.



Note. The scale of risky sexual online behavior ranges from 0 (*never*) to 4 (*six times or more*).

Age and Gender Differences in the Perception of Risks and Benefits of Risky Sexual Online Behavior

Research question 3 asked how the perceptions of online sexual risks and benefits develop across the lifespan. To answer research question 3 we conducted two ANOVAs with perceived risks and perceived benefits as dependent variables. For perceived risks, the ANOVA yielded a significant main effect for age, F (5, 2791) = 17.17, $p < .001$, $\eta^2 = .03$, for gender, F (1, 2791) = 94.33, $p < .001$, $\eta^2 = .03$, and an interaction effect for age and gender, F (5, 2791) = 2.52, $p < .05$, $\eta^2 = .01$. Post hoc tests indicated that for males, the youngest age group perceived significantly more risks than all other age groups ($p <= .05$). The two other adolescent groups and the adult groups did not differ in their risk perception, except for the oldest adult group that perceived more risks than the middle adult group. For females, a similar pattern arose. The youngest female adolescents perceived more risks of risky sexual online behavior than all other age groups, except the oldest adults. The oldest age group did also perceive significantly more risks than the young female adults ($p < .05$). The other female groups did not differ in their perceptions of risks (see Table 2.1). Additional t-test analyses revealed that females perceived more risks of risky sexual online behavior than males across all age groups.

The ANOVA for perceived benefits also yielded significant main effects for age, F (5, 2791) = 15.81, $p < .001$, $\eta^2 = .03$ and gender, F (1, 2791) = 14.54, $p < .001$, $\eta^2 = .01$ and a significant interaction effect for age and gender, F (5, 2791) = 2.27, $p < .05$, $\eta^2 = .004$. The significant age group differences are presented in Table 2.1. Males 30 and older perceived significantly more benefits than females. No other gender differences could be observed.

Discussion

The first aim of this study was to investigate age and gender differences in unwanted online sexual solicitation across the lifespan. Despite widespread assumptions that adolescents are more vulnerable online than adults, it has never been tested whether adolescents are more at risk than adults in terms of unwanted online sexual solicitation. This study is the first to compare age and gender differences in unwanted online sexual solicitation with representative samples of adolescents and adults. Our findings indicate that for males, levels of unwanted online sexual solicitation did not differ across the lifespan. That is, adolescent males were not more often sexually solicited online than adult males. For females, however, incidences of unwanted online sexual solicitation did differ across the lifespan. Middle and late adolescent females were sexually solicited most often

on the internet. This latter finding is in line with previous research (Mitchell et al., 2008; Ybarra, Espelage et al., 2007).

Our study extends previous research by showing that incidences of unwanted online sexual solicitation did not sharply decrease after adolescence. Young female adults (18-29 year olds) did not differ in their levels of unwanted online sexual solicitation from older adolescents (14-17 year olds). Therefore, not only adolescent girls, but also young female adults should be considered risk groups for unwanted online sexual solicitation.

Female adolescents and female emerging adults may be the predominant victims of unwanted online sexual solicitation for two reasons. First, young females may just be the main target group for perpetrators of sexual solicitation. Second, specific online activities may increase the risk of receiving unwanted online sexual solicitation. For example, female adolescents and emerging adults use the internet mainly for communication rather than entertainment (Weiser, 2000). Our findings suggest that more frequent use of online communication, such as chatting and instant messaging, increases the chance of unwanted online sexual solicitation. Thus, the preference for online communication of young females may have increased their risk of receiving unwanted online sexual solicitation. Moreover, prior research has shown that young females use the internet to self-disclose and to share intimate details online (Mazur & Kozarian, 2010; Moreno et al., 2009; Schouten et al., 2007). Online self-disclosure may help them to relate to others and to form their identity, one of the main challenges during adolescence and emerging adulthood (Calvert, 2002). However, in their online self-presentation some girls may give implicit or explicit cues to others that may provoke sexual requests even if they did not intend to do so (Moreno et al., 2009).

Although age differences in the prevalence of unwanted online sexual solicitation were not as distinct as expected, incidences of unwanted online sexual solicitation may still have different consequences for girls and women. While these incidences may be as undesirable for a 13 year old girl as for a 29 year old woman, younger girls may be more emotionally and cognitively vulnerable to such messages than adults. In contrast to an inexperienced young girl, a woman in her late 20s may be better able to cope with such incidences. This suggests that, although adolescents and emerging adults do not differ much in their levels of unwanted online sexual solicitation, adolescents may be more vulnerable and more in need for protection than adults.

The second aim of our study was to investigate age and gender differences in risky sexual online behavior. Our study is one of the first to investigate this specific kind of online risk behavior for males and females across the lifespan. Findings suggest that for females engagement in risky sexual online behavior did not differ across the lifespan. Female adolescents engaged in the same amount of risk behavior as female adults. For

males, however, we found increased levels of risk behavior for late adolescents in contrast to early adolescents. Levels of online risk behavior for late adolescents and adults remained stable over the lifespan. This finding is in contrast to offline risk behavior that typically peaks during adolescence (Steinberg, 2007). Thus, risky sexual online behavior does not seem to follow the typical developmental trajectories of risk behavior but remains on the same level during late adolescence and adulthood.

One reason for the relative stability of engagement in risky sexual online behavior may be that engagement in risky sexual online behavior reflects stable personality characteristics, such as extraversion or curiosity that are only slightly age dependent (Giambra, Camp, & Grodsky, 1992). According to this reasoning adolescents and adults who engage in online sexual risks share the same underlying characteristics. Another possibility is that in contrast to other risk behaviors which may lose their fascination after some time, sexual interest does not decline after adolescence (DeLamater & Friedrich, 2002). Sexuality remains an important part of adulthood and by engaging in risky sexual online behavior these sexual needs may be satisfied. Finally, it could also be that differences between adolescent and adult use of the internet for sexual risk behavior could not be revealed because adolescents did not have the possibilities to use the internet for such behavior as much as they wanted because their internet use may be restricted and monitored by their parents (Livingstone & Haddon, 2008; Mitchell, Finkelhor, & Wolak, 2005; Rai et al., 2003).

The finding that adolescents were not more risk prone than adults does not suggest that risk taking in adolescence can be neglected. From a normative perspective, risk behavior has different meanings for adolescents and adults (Parsons et al., 1997). For example, for adults it might be considered normative to give away private information when searching for sexual partners online. This is based on the assumption that adults are able to cope with potentially negative consequences of such behavior. In contrast, for adolescents such behavior is considered to be more problematic because negative consequences may be detrimental to their development. Thus, although adolescents seem to behave similar to adults online, the potentially negative consequences of these behaviors may still be more problematic for adolescents than for adults.

Despite their potentially negative consequences, it is important to note that risk behaviors help to fulfill important developmental tasks during adolescence (Igra & Irwin, 1996; Jessor, 1992). Risk behaviors may help the adolescent to affirm autonomy and maturity, to gain peer acceptance, and to cope with anxiety and frustration (Jessor, 1992). Especially, sexual risk behaviors may be functional because sexuality belongs to the main developmental tasks individuals have to face during adolescence. Online sexual risk behaviors, therefore, may help adolescents to experiment with sexuality and to develop a

sexual identity (Breakwell & Millward, 1997). Thus, engagement in risky sexual online behavior does not necessarily have to be detrimental to adolescent development but could also facilitate healthy development.

Similar to age differences, also gender differences were not very distinct. Risky sexual online behavior tended to be higher among males, but this gender difference was only significant for the middle adult age group (30-50 year olds). During adolescence and emerging adulthood levels of male and female risky sexual online behavior did not differ. This finding is in contrast to previous research that has revealed gender gaps in sexuality and risk behavior (Byrnes et al., 1999).

This non-existing gender gap for young people in our study may be partly due to our Dutch sample. Recent studies have found narrowing gender gaps in sexuality in several liberal western countries, including the Netherlands (Meston, Trapnell, & Gorzalka, 1996; Schalet, 2000). This may be due to changing attitudes about traditional gender roles in liberal, western societies (Meston et al., 1996). In the Netherlands, teenage sexuality is considered a normal and natural part of development (Schalet, 2000). Thus, adolescent girls may experiment with their sexuality similar to boys. Therefore, within-sex variance in sexual risk behavior may be much more important than between sex variance to explain such behavior (Breakwell & Millward, 1997; Buzwell & Rosenthal, 1996). In cultures that still hold traditional gender roles, gender may still be important in explaining sexual online behavior. For example, a survey among Taiwanese adolescents has shown that female adolescents were much less willing to sexually self-disclose online than males because they still endorse the traditional female stereotype (Chiou & Wan, 2006).

The final aim of this study was to reveal age and gender differences in the perception of risks and benefits of risky sexual online behavior. In line with previous research on risk perception, females tended to perceive more risks and fewer benefits than males (Cohn et al., 1995; Hillier & Morrongiello, 1998). In contrast to expectations, adolescents did not perceive fewer risks and more benefits than adults. Older adolescents (14-17 years) did not differ in their risk perception and engagement in risky sexual online behavior from adults. The youngest participants (12-13 years) actually perceived the most risks and fewest benefits. In contrast to public and parental concerns, adolescents – especially the youngest ones – seem to be very risk-aware in terms of risky sexual online behavior. An explanation of this risk-awareness of young adolescents is that they have less experience with actual behavior and are more responsive than older adolescents to what they are told by parents and teachers (Millstein & Halpern-Felsher, 2002). Older adolescents have more experience with this behavior, and may observe that it not necessarily leads to negative consequences. Lack of experience may also explain why risk perceptions tended to increase for the oldest age group (50 +). Adults older than 50 may

have the least experience with the internet and may base their risk judgment not on their own experiences but on media coverage about this issue (Ponte, Bauwens, & Mascheroni, 2009).

Limitations and Suggestions for Future Research

Our study has several limitations that need to be addressed in future research. First, our data is cross-sectional. Therefore, we cannot rule out that age differences are due to cohort effects instead of developmental effects. Second, our measures of unwanted online sexual solicitation and risky sexual online behavior were limited to only few items. Although our items were based on previous research and theoretical considerations, they do not present established measurements. The interpretation of our results should, thus, be limited to the online behaviors we measured. To advance this research field, future studies should develop and validate new scales to measure online risk behavior and perceptions.

Third, although participants in this study were selected by probability sampling from an online panel that was also randomly sampled originally, we can not fully preclude the possibility of a self-selection bias for people who participate in an online panel. There is a small chance that people who eventually agree to participate in online samples may still differ in some unknown characteristics from people who do not agree to be part of an online panel. Moreover, we do not know why some people refused to answer the questionnaire. Although the response rate of 84% was sufficiently high, there might still have been a systematic bias.

Finally, we did not assess the psychological consequences, neither of receiving unwanted online sexual solicitation nor of risky sexual online behavior. Therefore, we cannot draw any conclusions about the dangers of experiencing and engaging in these behaviors. Previous research has shown that only a minority of incidences of unwanted sexual solicitation on the internet takes on serious forms (Mitchell et al., 2007b), and that negative experiences are related to the number of problematic online behaviors rather than specific online behaviors (Ybarra, Mitchell et al., 2007). These earlier findings suggest that most of the behaviors may not lead to negative consequences, unless adolescents engage in such behaviors more frequently. Future research is needed to disentangle the relationship between online sexual behaviors and negative (or positive) consequences.

Conclusion

In conclusion, this study has produced three important new insights. First, incidences of unwanted online sexual solicitation for females peaked in adolescence but were still prevalent among emerging adults. Second, adolescents behaved similarly to adults in terms of risky sexual online behavior. In contrast to public concerns, adolescents did not engage in

more online sexual risk than adults. Third, all participants – and especially the youngest – were very risk aware. Adolescents, therefore, did not perceive fewer risks or more benefits than adults. Generally, our results suggest that most adolescents are well aware of potential online threats. This study suggests that the fears and expectations of adults about the sexual risk behavior of adolescents online are largely unfounded. This is not to say that risky sexual online behavior does not occur, but it is certainly not a mass phenomenon among adolescents.

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3

Assessing Causality in the Relationship Between Adolescents' Risky Sexual Online Behavior and Their Perceptions of this Behavior

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Abstract

The main aim of this study was to investigate the causal nature of the relationship between adolescents' risky sexual behavior on the internet and their perceptions of this behavior. Engagement in the following online behaviors was assessed: searching online for someone to talk about sex, searching online for someone to have sex, sending intimate photos or videos to someone online, and sending one's telephone number and address to someone exclusively known online. The relationship between these behaviors and adolescents' perceptions of peer involvement, personal invulnerability, and risks and benefits was investigated. A two-wave longitudinal study among a representative sample of 1,445 Dutch adolescents aged 12 to 17 was conducted (49% females). Autoregressive cross-lagged structural equation models revealed that perceived peer involvement, perceived vulnerability, and perceived risks were all significant predictors of risky sexual online behavior six months later. No reverse causal paths were found. When the relationships between perceptions and risky sexual online behavior were modeled simultaneously, only perceived peer involvement was a determinant of risky sexual online behavior. Findings highlight the importance of addressing peer involvement in future interventions to reduce adolescents' risky sexual online behavior.

Assessing Causality in the Relationship Between Adolescents' Risky Sexual Online Behavior and Their Perceptions of this Behavior

Engagement in risk behaviors peaks during adolescence. Adolescents are over-represented in nearly every category of risk behavior, such as drug use, alcohol consumption, smoking, skipping school, and unsafe sexual activities (Benthin, Slovic, & Severson, 1993; Boyer, 2006; Dahl, 2004; Furby & Beyth-Marom, 1992; Parsons, Siegel, & Cousins, 1997; Steinberg, 2008). The rise of the internet may provide adolescents with many new outlets to engage in risk behaviors (Liau, Khoo, & Ang, 2005; Livingstone & Haddon, 2008; Livingstone & Helsper, 2007). Of these potential new risks, sexual online behaviors have been considered particularly alarming (Liau et al., 2005; Ybarra, Mitchell, Finkelhor, & Wolak, 2007).

During adolescence the importance of sexuality strongly increases (Buzwell & Rosenthal, 1996) and sexual curiosity peaks. To satisfy this sexual curiosity, adolescents may use the internet in unsafe ways. For example, they may send intimate information to strangers or search for sexual partners online. Previous research has indicated that these behaviors could lead to negative consequences, such as receiving unwanted requests for sexual pictures (Mitchell, Finkelhor, & Wolak, 2007a; Ybarra et al., 2007), or making unsafe sexual contacts, which increase the risk of contracting sexually transmitted diseases (McFarlane, Bull, & Rietmeijer, 2002). In sum, using the internet for sexual exploration may be potentially harmful for adolescents.

Despite public concerns (Ponte, Bauwens, & Mascheroni, 2009), little empirical research has investigated adolescents' risky sexual online behaviors. The few existing studies exploring this issue have focused mainly on the prevalence of these behaviors among the youth. Why adolescents engage in risky sexual activities has rarely been investigated (Livingstone & Haddon, 2008). Past research has examined more general predictors such as sociodemographic variables, parental monitoring, and the use of chat rooms (Lenhart, 2005; Liau et al., 2005; Livingstone & Helsper, 2007). More theoretically derived predictors have not been investigated to date. To advance our understanding of adolescents' risky sexual online behavior, the present study investigates theoretically derived cognitive predictors of risk behavior.

Theories concerning the predictors of adolescents' offline risk behavior can typically be divided into three groups: biological, psychological/cognitive, and environmental/social (Igra & Irwin, 1996). Our study focuses on cognitive predictors as adolescents' cognitions about risk behavior play a fundamental role in understanding their engagement in such behavior. Three types of relevant cognitions have been discussed in the literature. First, adolescents' perceptions of the involvement of their peers in risk behavior has been shown to predict subsequent risk engagement (Iannotti & Bush, 1992).

Second, adolescents' perceptions of the risks and benefits of this behavior are related to the engagement in risk behavior (Parsons et al., 1997). Third, adolescents' perceptions of invulnerability, that is, their presumed tendency to underestimate the chance that they will experience negative consequences when engaging in risk behavior may influence their risk behavior (Greene, Krcmar, Walters, Rubin, & Hale, 2000). All of these three cognitive approaches received strong empirical support in offline risk research among adolescents.

Despite the importance of these cognitions in explaining offline risk behavior, no study has yet investigated whether perceived peer involvement, perceptions of risks and benefits, and perceived invulnerability influence risky sexual behavior on the internet. Studying these predictors is crucial in understanding why adolescents engage in online sexual behaviors. Moreover, no study has compared the relative predictive power of these distinct cognitive approaches by testing them against one another. Although each cognitive approach has found strong empirical support in offline risk research, they have yet to be studied together. Finally, the majority of studies on perceptions and risk behavior are cross-sectional. Hence, the causal direction of the relationships between perceptions and risk behavior have never been demonstrated (Goldberg, Halpern-Felsher, & Millstein, 2002). While it is often assumed that perceptions cause risk behavior, it may also be possible that perceptions are consequences of risk behavior (Festinger, 1957) or that the relationship between perceptions and risk behavior is reciprocal (Gerrard, Gibbons, Benthin, & Hessling, 1996). In light of the above research, this study had two goals. First, it investigates the causal nature of the relationships between perceptions of peer involvement, risks, benefits, and invulnerability and adolescents' engagement in risky sexual online behavior. Second, the study aims to single out which of these perceptions are the most important determinants (or consequences) of risky sexual online behavior. As a result, this study deepens our understanding of adolescents' engagement in risky sexual online behavior.

Defining Risky Sexual Online Behavior

In a broad sense, risk behaviors can be defined as all behaviors involving potentially negative consequences (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993; Boyer, 2006; Gullone & Moore, 2000). In accordance with this definition, many online behaviors can be classified as risky. Previous research has identified online risk behaviors as hacking, downloading illegal content (Livingstone & Bober, 2004), providing personal information online (Youn, 2005), meeting someone face-to-face who was first met online (Liau et al., 2005), and risky sexual behaviors (Ybarra et al., 2007). Risky sexual online behavior can be specified as the exchange of intimate, sexually insinuating information or material with someone exclusively known online.

We limit our definition of risky sexual online behavior to communication with unknown people for two reasons. First, communicating with strangers is one of the main concerns parents raise about their children's online behavior (European Commission, 2008). This concern is based on the idea that true identities can be easily hidden online and adolescents may therefore become victims of sexual predators online. This parental fear may be fuelled by media coverage, which predominantly depicts young people as the targets of online perpetrators (Ponte, Bauwens, & Mascheroni, 2009). Second, previous research has shown that communicating with strangers online increases the chance of receiving unwanted sexual solicitation (Mitchell, Finkelhor, & Wolak, 2001; Wolak, Finkelhor, & Mitchell, 2008). Thus, communicating with unknown persons online may be more problematic for adolescents than communicating with known persons.

The following behaviors may be categorized as risky sexual online behaviors: a) searching online for someone to talk about sex, b) searching online for someone to have sex c) sending intimate photos or videos to someone online and, d) disclosing personal information like telephone numbers and addresses to someone online. Engaging in these behaviors has been shown to increase the likelihood of negative experiences, such as unwanted aggressive sexual solicitation online (Cooper, Morahan-Martin, Mathy, & Maheu, 2002; Mitchell, Finkelhor, & Wolak, 2007b). Other potentially negative consequences include the misuse of intimate information by others (Moreno et al., 2009) and feelings of shame, guilt and embarrassment. In addition, searching for sexual partners online may increase the risk of getting sexually transmitted diseases (McFarlane et al., 2002). While few adolescents may engage in these behaviors, as with many other risk behaviors, it is necessary to investigate them as their negative consequences may be serious. Moreover, examining the predictors of risky sexual online behaviors may aid our understanding of *why* adolescents engage in these online behaviors.

Perceived Peer Involvement

During adolescence, individuals' social orientation shifts markedly from parents to peers (Guyer, McClure-Tone, Shiffrin, Pine, & Nelson, 2009; Michael & Ben-Zur, 2007). Peer behavior becomes directive for adolescents. Offline risk research has consistently shown that adolescents who perceive their friends to engage in a certain risk behavior are more likely to also engage in this behavior (Andrews, Tildesley, Hops, & Li, 2002; Gardner & Steinberg, 2005; Jaccard, Blanton, & Dodge, 2005). This holds for sexual risk behaviors, such as not using contraceptives or having various sexual partners (DiIorio et al., 2001; Millstein & Moscicki, 1995; Prinstein, Meade, & Cohen, 2003; Rai et al., 2003).

Research on peer influence suggests that the *perceived* behavior of peers is more important than *actual* peer behavior in explaining adolescent risk behavior (Arnett, 2007;

Iannotti & Bush, 1992; Unger & Rohrbach, 2002). This is in line with cognitive developmental theories suggesting that it is not the actual environment that influences behavior but the subjective interpretation of the environment (Iannotti & Bush, 1992; Inhelder & Piaget, 1958). Adolescents who perceive more friends to engage in a specific risk behavior may appraise this behavior as socially acceptable and become more willing to engage in this behavior in the future (Gibbons, Helweg-Larson, & Gerrard, 1995; Sofronoff, Dalgliesh, & Kosky, 2005). This reasoning reflects social norms theory, which states that behavior is influenced strongly by perceptions of behavior and social group norms, even if this perception is incorrect (Scholly, Katz, Gascoigne, & Holck, 2005).

However, perceived peer involvement may also be a consequence of risk behavior. Adolescents who engage in a specific behavior consistently overestimate the number of peers who do the same (Heilbron & Prinstein, 2008; Sofronoff et al., 2005). This phenomenon is known as the false-consensus effect. Adolescents who engage in risky activities project their own behavior onto their friends, thereby normalizing their behavior (Bauman & Ennett, 1996; Gerrard et al., 1996). In a longitudinal study, Gerrard et al. (1996) demonstrated a reciprocal relationship between estimations of peer participation and risk behavior. This suggests that the relationship between perceived peer involvement and risk behavior may be complex and perceptions of peer behavior may cause, as well as reflect, adolescent risk behavior.

Given the importance of perceived peer behavior in offline risk behavior, we assume that perceived peer involvement will have a substantial influence on adolescents' online risk behavior. Similar to offline risk behavior, adolescents may talk about their online behavior and share their online experiences. If adolescents perceive their friends to engage in risky sexual online behavior, they may believe that this is the acceptable norm among their friends. To conform to this peer norm, they may subsequently also engage in risky sexual online behaviors even if their perceptions of their peers' behavior were incorrect. Moreover, adolescents who engage in risky sexual online behavior may project this behavior onto their peers in order to normalize their own behavior. Therefore, we expect a reciprocal relationship between perceived peer influence and risky sexual online behavior.

Perceived Risks and Benefits

Decision-making theories posit that adolescents' estimations of risks and benefits influence their participation in risky behaviors (Furby & Beyth-Marom, 1992). In general, adolescents who take risks perceive fewer risks associated with the behavior than adolescents who refrain from risk taking (Goldberg et al., 2002; Parsons et al., 1997). Similarly, adolescents who take risks perceive greater benefits than adolescents who do not

take risks. For example, smokers (Halpern-Felsher, Biehl, Kropp, & Rubinstein, 2004), drinkers (Goldberg et al., 2002) and adolescents who have unprotected sex (Johnson, McCaul, & Klein, 2002), perceive these specific behaviors as less risky and more beneficial than adolescents who do not smoke, do not drink, and do not have unsafe sex (Benthin et al., 1993; Gerrard et al., 1996).

The causality of this relationship, however, is not clear. Instead of merely predicting risk behaviors, perceptions of risks and benefits may also be a consequence. This assumption is in line with cognitive dissonance theory (Festinger, 1957) in that adolescents who engage in risky behaviors may deny potentially negative consequences and emphasize the benefits of this behavior to justify their behavior. Finally, the relationship may be reciprocal (Gerrard et al., 1996), which implies that risk and benefit perceptions influence risk behaviors and engagement in risks also leads to subsequent changes in perceptions of risks and benefits.

The predictive power of perceived risks and benefits depends on the risk behavior studied (Johnson et al., 2002). Parsons et al. (1997), for instance, showed that perceived risks predict illegal drug consumption three months later, but fail do so for other risk taking behaviors, such as drink and drive and sexual risks. In contrast, perceived benefits predicted all risk-taking behaviors. To date, no study has investigated the longitudinal relationship between perceived risks and benefits and risky sexual behaviors on the internet. Some studies have indicated that adolescents perceive the risks of online risk behaviors as high (e.g., Liau et al., 2005). However, we do not know how these perceptions influence engagement in risky sexual online behaviors and whether these perceptions are predictive or reflective of risk behavior. Based on the findings from offline risk research, we expect a reciprocal relationship.

Perceived Invulnerability

It is often assumed that due to cognitive development during this period, adolescents are particularly susceptible to a personal fable (Boyer, 2006; Vartanian, 2000), that is, the erroneous belief that one is unique and invulnerable (Elkind, 1967, 1985; Ryan & Kuczkowski, 1994; Vartanian, 2000). This perceived invulnerability has long been regarded as the main reason why adolescents engage in risks (Greene et al., 2000). Perceived invulnerability is closely related to low perceptions of risks. However, personal fable research assumes that even if adolescents have high risk perceptions, they may still fail to feel personally vulnerable (Johnson et al., 2002). For example, adolescent smokers may understand that smoking is dangerous generally but fail to acknowledge that smoking cigarettes may have negative consequences for them personally.

Several studies have supported this assumption by indicating that individuals who participate in risk behaviors perceive themselves as being less vulnerable (Greene et al., 2000; Morrongiello & Rennie, 1998). Goldberg et al. (2002), for instance, demonstrated that perceived invulnerability predicted smoking six months later. Similar to the perceptions of risks and benefits, the relationship between perceived invulnerability and risk behavior may also be reciprocal. Specifically, perceived invulnerability may lead to more risk behavior, and engagement in risks may subsequently lead to perceptions of invulnerability in an attempt to justify this behavior. To date, perceptions of invulnerability relating to online sexual risk behaviors have not been assessed. Although some studies have indicated that, in general, adolescents are very risk-aware when online (Youn, 2005), we do not know whether adolescents feel *personally* vulnerable to the negative consequences of online risk behaviors. Moreover, we do not know the causal direction of the relationship between perceptions of invulnerability and risk behavior. Based on offline risk research we anticipate a reciprocal relationship.

The Present Study

The present study aims to deepen our understanding of adolescents' risky sexual behavior on the internet by focusing on cognitive explanations for such behavior. Based on offline risk theories, we hypothesize that risky sexual online behavior is reciprocally related to perceptions of peer involvement, perceptions of risks and benefits of this behavior, and to perceived vulnerability to potentially negative consequences of risky sexual online behavior. More specifically, we hypothesize, first, that adolescents who perceive more friends to engage in this behavior are more likely to subsequently engage in risky sexual online behavior (H1a). In addition, engagement in risky sexual online behavior will lead to perceptions of increased peer involvement, in an attempt to normalize own behaviors (H1b). Second, adolescents who perceive more risks relating to risky sexual online behavior are less likely to subsequently engage in this behavior (H2a). In addition, adolescents who engage in risky sexual online behavior will perceive fewer risks associated with this behavior (H2b). Third, adolescents who perceive more benefits associated with risky sexual online behavior are more likely to subsequently engage in this behavior (H3a). Moreover, adolescents who engage in risky sexual online behavior will perceive more benefits of this behavior (H3b). Fourth, adolescents who perceive themselves as being vulnerable to potentially negative consequences of risky sexual online behavior are less likely to subsequently engage in risky sexual online behavior (H4a). Finally, adolescents who engage in risky sexual online behavior will perceive themselves as less vulnerable to negative consequences to justify their engagement in this behavior (H4a).

In addition to identifying the causal structure of perceptions and risky sexual online behavior, this study also aims at comparing the relative strength of these perceptions. More specifically, we investigate which perception is related most strongly to risky sexual online behavior. Most studies of offline risk perceptions have focused on one kind of cognition and have not tested the predictive ability of several indicators against one another. Such an approach may help our understanding of which of these perceptions has the strongest predictive ability for risky sexual online behavior and may thus be important to help prevent such behavior. Finally, to strengthen the internal validity of our causal model, we include a range of control variables. Previous research has shown that gender, age, and frequency of internet communication may influence risky sexual online behavior (Lenhart, 2005; Liau et al., 2005; Livingstone & Helsper, 2007). Moreover, we include sexual experience and relationship status as two additional control variables due to their immediate plausibility as alternative explanations of adolescents' risky sexual online behavior.

Method

Sample and Procedure

A two-wave online panel study among a nationally representative sample of Dutch adolescents between the ages of 12 and 17 (M = 14.5, SD = 1.68) was conducted. The first wave was fielded in May 2008, the second wave six months later, in November 2008. Sampling and fieldwork were done by Veldkamp, a Dutch research institute. Respondents were selected from an existing nationally representative online panel of 10,990 Dutch adolescents. In contrast to online convenience samples, with their danger of self-selection biases, the pool of potential respondents was originally sampled randomly from the Dutch population and is continuously updated. In the first wave, 2,092 adolescents were randomly contacted. The response rate was 84% (N = 1,765). Of these 1,765 adolescents, 1,445 also completed the questionnaire in the second wave, resulting in an attrition rate of 18%. Of the final sample, 49% of the participants were female and 98.5% were of Dutch nationality. The majority (80.8%) of the adolescents lived with two parents (in line with official Dutch statistics). Participants came from urban as well as rural regions all over the Netherlands. Educational levels were equally distributed between primary education, and lower and higher secondary education.

To ensure that panel attrition did not reduce the generalizability of our sample, we checked for systematic differences between adolescents who completed the second survey and those who did not. The age of the participants who dropped out (M = 14.66, SD = 1.71) did not differ significantly from the age of participants who did not drop out (M =

14.49, *SD* = 1.68), *t*(1763) = 1.7, *p* = .09. They also did not differ in their educational levels, *t*(1763) = 1.56, *p* = .12 or levels of risky sexual online behavior *t*(1763) = 0.63, *p* = .53. Thus, panel attrition did not reduce the generalizability of the findings.

Official statistics from the Netherlands reveal that nearly all (98%) Dutch youth younger than 25 years of age have access to the internet at home (Duimel & De Haan, 2007). This high percentage of home internet access may prevent the typical pitfalls of online surveys, such as a systematic sampling bias. Previous research has acknowledged that online surveys are especially useful when sensitive issues like sexuality are investigated (Mustanski, 2001; Peter & Valkenburg, 2006). Institutional approval and parental consent for adolescents' participation was obtained. At the beginning of the questionnaire, participants were informed that the survey would be about sexuality and the internet. We asked participants to fill in the questionnaire in private and emphasized that the answers would be analyzed only by the principal investigators. Participants were also informed that they could stop at any time they wished. Completing the questionnaire took about 20 minutes and respondents received a 5 € coupon for each completed survey.

Measures

Risky sexual online behavior. Since risky sexual online behavior is a rather new research field, no validated measures exist. We based our items of risky sexual online behaviors on previous research that has shown that engagement in these specific risk behaviors are related to negative experiences, such as unwanted sexual solicitation (Wolak et al., 2008; Ybarra et al., 2007). Moreover, searching for sexual partners online has been shown to be related to an increased risk of sexually transmitted diseases (McFarlane et al., 2002). We used four items. Participants were asked how often, in the last six months, they participated in each of the following activities: 1) Searched for someone on the internet to talk about sex; 2) searched for someone on the internet to have sex; 3) sent on the internet a photo or video on which they were partly naked to someone they knew only online, and 4) sent an address or telephone number online to someone they knew only online.

Response categories to all questions were 0 (*never*), 1 (*once*), 2 (*two times*), 3 (*three to five times*) and 4 *(six times or more*). These four items formed a one-dimensional scale with a Cronbach's alpha of .71 at Time 1 and .70 at Time 2. Mean scores (with standard deviations in parentheses) of the scale were 0.13 (0.41) at Time 1 and 0.11 (0.37) at Time 2. The prevalence of all behaviors is displayed in Table 3.1. Since the prevalence of these behaviors was very low, we computed each variable into a binary variable 0 (never), 1 (engaged in specific risk). The four resulting binary risky sexual online behavior variables were added into a count variable of risky sexual online behavior. This new

variable could take values from 0 to 4 (*M* = 0.25, *SD* = 0.65 for Wave 1; *M* = 0.22, *SD* = 0.60 for Wave 2), and was used in all further analyses.

Perceived peer involvement in risky sexual online behavior. Based on research on perceived peer involvement in an offline context (Iannotti & Bush, 1992; Rai et al., 2003), respondents in our study judged the online risk involvement of their peers by estimating how many of their friends engaged in each of the four risky sexual online behaviors. The wording of the four items was as follows: 1) "How many of your friends search on the internet for someone to talk about sex?" 2) "How many of your friends search on the internet for someone to have sex?" 3) "How many of your friends send on the internet photos or videos on which they are partly naked to someone they know only online?" 4) "How many of your friends send an address or telephone number online to someone they know only online?" Response categories ranged from 0 (*no one*) to 4 *(nearly all of my friends*). The four items resulted in a one-dimensional scale with a Cronbach's alpha of .71 at Time 1 and .73 at Time 2. Mean scores of the scale were *M* = 0.41 (*SD* = 0.53) at Time 1 and *M* = 0.38 (*SD* = 0.50) at Time 2. Table 3.1 depicts the mean scores of perceived peer involvement for each behavior.

Perceived risks of risky sexual online behavior. Respondents were asked to indicate how dangerous they judged each of the previously mentioned risk behaviors. This is a typical procedure used in offline risk research to assess perceptions of risks (Parsons et al., 1997; Siegel et al., 1994). Specifically, we asked participants: 1) "How dangerous is it to search on the internet for someone to talk about sex?" 2) "How dangerous is it to search on the internet for someone to have sex?" 3) "How dangerous is it to send on the internet photos or videos on which you are partly naked to someone you know only online?" 4) "How dangerous is it to send your address or telephone number online to someone you know only online?"

Response categories ranged from 0 (*not at all dangerous*) to 4 (*very dangerous*). The emerging four-item online-risk-perception scale resulted in a Cronbach's alpha of .79 for both time points. Mean scores (with standard deviations in parentheses) of the scale were 3.32 (0.69) at Time 1 and 3.33 (0.68) at Time 2. As can be seen in Table 3.1, adolescents judged each of the four risky sexual online behaviors as very dangerous.

Perceived benefits of risky sexual online behavior. Analogous to the risk perception scale, respondents indicated how beneficial they judged each of the four risk behaviors (Parsons et al., 1997; Siegel et al., 1994). For example, participants were asked, "How beneficial is it to search on the internet for someone to talk about sex?" Respondents could rate the benefits of each behavior from 0 (*not at all beneficial*) to 4 (*very beneficial*). The four items were added to a scale resulting in a Cronbach's alpha of .84 and .85 at Time

1 and Time 2 respectively. Mean scores of the scale were *M* = 0.68 (*SD* = 0.82) at Time 1 and *M* = 0.66 (*SD* = 0.80) at Time 2 (see Table 3.1 for the mean scores for each behavior).

Perceived vulnerability to negative consequences of risky sexual online behavior. Likewise to perceived risks and benefits, perceived vulnerability was assessed with one question for each risk behavior (Morrongiello & Rennie, 1998). For example, "How likely is it that *you* get into trouble if you search for someone on the internet to talk about sex?" Response categories ranged from 0 (*not at all likely*) to 4 (*very likely*). The four-item additive scale resulted in a Cronbach's alpha of .82 and .84 at Time 1 and Time 2 respectively. Mean scores of the scale were *M* = 3.16 (*SD* = 0.82) at Time 1 and *M* = 3.17 (*SD* = 0.81) at Time 2.

Control variables. We included a set of control variables in our model: gender, age, frequency of internet communication, sexual experience, and relationship status. These control variables were based on either previous research (Lenhart, 2005; Liau et al., 2005; Livingstone & Helsper, 2007) or on theoretical assumptions. Although not previously examined, we assumed that sexual experience and relationship status may be two plausible confounds of engagement in risky sexual online behavior. For our analyses we needed the control variables only at Time 1. Thus, only Time 1 mean scores are reported.

Age and gender. Measures of age and gender were straightforward. Females were coded as 0, males as 1. Frequencies, means and standard deviations are reported in the description of the sample above.

Frequency of internet communication. Participants indicated how often they use instant messaging, internet chats, and social networking sites. Response categories ranged from 0 (*never*) to 10 (*every day*). The three variables built an additive scale (*M* = 4.53; *SD* = 2.20).

Sexual experience. Sexual experience was measured by asking respondents how many partners they had had sexual intercourse with so far (*M* = 0.28; *SD* = 0.95).

Relationship status. Whether adolescents were currently in a relationship was measured with one item: "Are you currently in a romantic relationship?" Adolescents who were single were coded 0 (83.9%), and adolescents who were in a relationship were coded 1 (16.1%).

Table 3.1. Prevalence of all Risky Sexual Online Behaviors and Mean Scores (Standard Deviations) of Perceptions

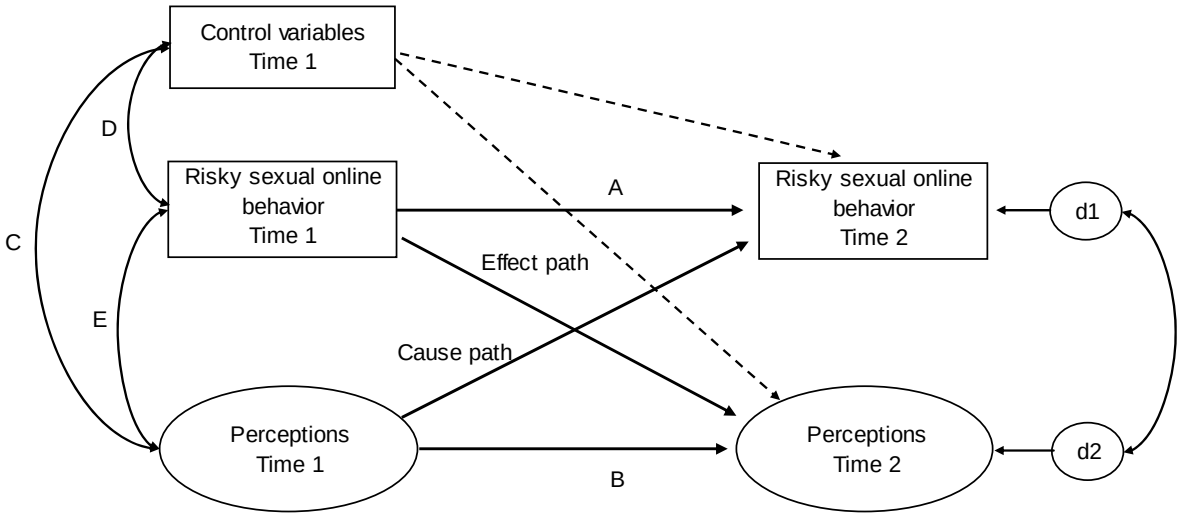
	Prevalence Risky Sexual Online Behavior		Perc. Peer Involvement		Perceived Risk		Perceived Benefits		Perceived Vulnerability	
Risky Online Behaviors	Time 1 % (*N*)	Time 2 % (*N*)	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)
Search to Talk About Sex	7.1 (103)	6.2 (90)	0.45 (0.74)	0.43 (0.73)	3.03 (1.08)	3.03 (1.03)	0.79 (1.02)	0.86 (1.03)	2.97 (1.11)	2.95 (1.08)
Search to Have Sex	4.4 (64)	3.5 (50)	0.21 (0.55)	0.21 (0.56)	3.52 (0.86)	3.47 (0.85)	0.56 (0.98)	0.62 (0.99)	3.40 (0.94)	3.35 (0.94)
Send Nude Photo/Video	2.3 (33)	2.5 (36)	0.24 (0.62)	0.22 (0.55)	3.47 (0.80)	3.52 (0.74)	0.50 (0.95)	0.45 (0.90)	3.28 (0.98)	3.31 (0.93)
Disclose Information	11.6 (167)	9.9 (143)	0.73 (0.82)	0.66 (0.81)	3.32 (0.85)	3.32 (0.84)	0.71 (0.94)	0.71 (0.94)	3.03 (1.01)	3.07 (0.97)

Note. N = 1,445; percentages are based on the number of respondents who had engaged in risky sexual online behaviors at least once in the past six months.

Data Analysis

Autoregressive cross-lagged models. The first aim of this study was to investigate the causal relationship between risky sexual online behaviors and the perceptions of peer involvement, risks, benefits, and vulnerability. To do so, we analyzed four autoregressive cross-lagged panel models. Our hypothesized model is presented in Figure 3.1. The model includes stability coefficients for both variables (path A and B). These autoregressive effects eliminate a considerable proportion of potentially confounding variance and increase the validity of influence of a specific construct at Time 1 on the construct at Time 2 (Schlüter, Davidov, & Schmidt, 2006). The two cross-lagged paths represent the causal longitudinal relationship between perceptions and risky sexual online behavior. We named the path from perceptions at Time 1 to risky sexual online behavior at Time 2 "cause path", and the reverse path "effect path". The two-way arrows C, D, and E reflect the covariance between risk behavior, perceptions at Time 1 and the control variables. To control for potentially confounding variables, we included the five control variables in the model. The dashed lines represent the influence of the covariates at Time 1 on perceptions and risky sexual online behavior at Time 2.

Figure 3.1. Hypothesized Model of the Causal Relationship Between Risky Sexual Online Behavior and Perceptions at Time 1 and Time 2



Our hypothesized model (Figure 3.1) was tested with structural equation modeling for each of the four perceptions separately. The variable for risky sexual online behavior was a manifest count variable of participation in risky behavior. All perception variables in our models represented latent variables. For all of these variables, two 2-item parcels were

used as indicators of the latent construct. These item parcels were built according to the factorial algorithm procedure (Matsunaga, 2008). First, a factor analysis was performed with the four items intended to measure each variable. The factor analyses resulted in one-factorial solutions for all variables, a requirement for item-parceling (Little, Cunningham, & Shahar, 2002). In a second step, the item parcels are composed according to the factor loadings of each item. The first parcel contains the items with the first and fourth factor loading and the second parcel contains the items ranked two and three on the factor. This procedure emphasizes the equal distribution of item-specific components across parcels (Matsunaga, 2008). In our models, we allowed error terms of the same indicators to correlate over time. Moreover, we correlated the disturbance terms between perceptions at Time 2 and risky sexual online behavior at Time 2. For all control variables, manifest variables were used.

As can be seen in Table 3.1, our variables were not normally distributed. Thus, the assumption of multivariate normality of the variables was not met. To check whether the skewness may have affected the analyses, we ran bootstrap analyses for the structural equation models. This method is used to alleviate problems resulting from violations of normality assumptions (Efron & Tibshirani, 1993). 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. We estimated a bootstrap bias-corrected 95% confidence interval for all values of interest (500 bootstrap samples, N = 1,445 each). If this interval includes zero, a given estimate is not significant.

Results

Descriptive Statistics and Zero-Order Correlations

In the first wave, 248 adolescents (17.2%) reported having engaged, at least once, in one of the four risk behaviors. In the second wave, 224 adolescents (15.5%) reported having engaged in risky sexual online behaviors in the last six months. Table 3.2 provides the zero-order correlation matrix for the four-item risky sexual online behavior scale and the perceptions of peer involvement, risks, benefits, and vulnerability for the two waves. As Table 3.2 shows, all variables were significantly correlated with each other. Engagement in risky sexual online behavior had moderate stability over time (r = .38, p < .01). These online behaviors were moderately and positively related to perceived peer involvement at both waves (r = .43, p < .01 and r = .45, p < .01, respectively). As expected, risky sexual online behavior was negatively related to perceived risks at both waves (r = -.28, p < .01 and r = -.24, p < .01), and positively related to perceived benefits

(r = .31, p < .01 and r = .26, p < .01). As expected, there was also a negative relationship between risky sexual online behavior and perceived vulnerability for Wave 1 and Wave 2 (r = -.25, p < .01 and r = -.22, p < .01, respectively).

Table 3.2. Zero-Order Correlations Between Risky Sexual Online Behavior and Risk-Related Perceptions

	1		2		3		4		5	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
1. Risky Sexual OnlineBehavior										
T1	-									
T2	.38	-								
2. Peer Involvement										
T1	.43	.26	-							
T2	.28	.45	.46	-						
3. Risks										
T1	-.28	-.17	-.33	-.26	-					
T2	-.15	-.24	-.19	-.37	.52	-				
4. Benefits										
T1	.31	.16	.43	.24	-.47	-.33	-			
T2	.19	.26	.22	.41	-.35	-.50	.47	-		
5. Vulnerability										
T1	-.25	-.15	-.27	-.24	.72	.46	-.40	-.30	-	
T2	-.14	-.22	-.16	-.32	.41	.75	-.27	-.40	.45	-

Note. All correlations are significant with p < .01.

Causal Relationships Between Risky Sexual Online Behavior and Perceptions

The correlations in Table 3.2 already demonstrate significant relationships between perceptions and risky sexual online behavior. To analyze the causality of these relationships, we tested the hypothesized model as shown in Figure 3.1 for all perceptions. The coefficients of the cause and effect paths, and the indicators of model fit are presented in Table 3.3. The model fit for the four hypothesized models were good. The CFI's of the four models were all above .95, and the RMSEA values were below .05.

Our first hypothesis (H1a) stated that adolescents who perceive more friends to engage in risks are more likely to engage in risky sexual online behavior six months later. H1a was supported as the relationship between perceived peer involvement at Time 1 and risky sexual online behavior at Time 2 (= cause path) was significant, ß = .13, B = .16, SE = .04, p < .05 (bootstrap bias-corrected 95% confidence interval [bc 95% CI]: .04/.33).
Hypothesis 1b predicted that the reverse relationship would also be significant. As the effect path was not significant, ß = .07, B = .06, SE = .03, *ns* (bc 95% CI: -.02/.14) this

hypothesis was not supported. Therefore, perceptions of peer involvement and engagement in risky sexual online behavior were not reciprocally related. Instead, perceptions of peer involvement at Time 1 influenced subsequent online risk behavior. Engagement in risky sexual online behavior, however, did not influence subsequent perceptions of peer behavior.

Hypothesis 2a, which predicted that perceived risks negatively influence engagement in risky sexual online behaviors, received support. As expected, the relationship between perceived risks at Time 1 and risky sexual online behavior at Time 2 was significant, ß = -.06, *B* = -.07, *SE* = .03, *p* = .05 (bc 95% CI: -.15/.00). The reverse relationship, as stated in Hypothesis 2b, was not significant, ß = .03, *B* = .06, *SE* = .03, *ns* (bc 95% CI: -.02/.14). Therefore, this hypothesis also failed to find support.

The model for perceived benefits was not supported as neither the effect, ß = -.01, *B* = .04, *SE* = .03, *ns* (bc 95% CI: -.02/.09), nor the cause path were significant, ß = -.01, *B* = .02, *SE* = .05, *ns* (bc 95% CI: -.05/.11). Thus, adolescents' perceptions of the benefits of risky sexual behavior were not significantly related to risky sexual online behavior (H3a and H3b).

The influence of perceived vulnerability at Time 1 on risky sexual online behavior at Time 2 was significant, ß = -.06, *B* = -.06, *SE* = .02, *p* < .05 (bc 95% CI: -.12/-.01), as stated in Hypotheses 4a. The reverse relationship was not significant. Therefore, H4b failed to find support, ß = -.01, *B* = -.01, *SE* = .03, *ns* (bc 95% CI: -.08/.06).

In sum, three causal paths – those of perceived peer involvement, perceived risks, and perceived vulnerability at Time 1 to risky sexual online behavior at Time 2 – were significant. However, none of the effect paths from risky sexual online behavior at Time 1 to perceptions of these behaviors at Time 2 were significant.

Table 3.3. Indicators of the Four Autoregressive Cross-Lagged Models

	Standardized betas		Model fit		
Perceptions	Cause path	Effect path	Chi-square	CFI	RMSEA (90% CI)
Peer involvement	.13*	.07	35.28**	.99	.03 [.02; .05]
Risks	-.06*	.03	26.83*	1.00	.03 [.01; .04]
Benefits	.04	.02	20.03	1.00	.02 [.00; .04]
Vulnerability	-.06*	-.01	17.01	1.00	.02 [.00; .03]

Note. * p < .05, ** p < .01. The cause path goes from perceptions at Time 1 to risky sexual online behavior at Time 2. The effect path goes from risky sexual online behavior at Time 1 to perceptions at Time 2.

Relative Influences of Perceptions on Risky Sexual Online Behavior

The results of the structural equation models showed that peer involvement at Time 1 had the strongest influence on online sexual risk taking at Time 2 (see Table 3.3). To investigate whether the other predictors provided additional explanatory value over and above the effect of peer involvement, we conducted a linear OLS regression analysis predicting the engagement in risky sexual online behavior at Time 2. Because our variables are not normally distributed, homoscedasticity in the errors cannot be assumed. We, therefore, analyzed our regression model with heteroscedasticity-consistent standard errors (Long & Ervin, 2000). Time 1 online sexual risk behavior, all control variables, and perceptions of peer involvement, risks, benefits, and vulnerability were entered into the regression. Overall the model accounted for 17% of the variance. Of the perception variables, only perceived peer involvement at Time 1 was a significant predictor of risky sexual online behavior at Time 2, $\beta = .12$, $SE = .05$, $t(1444) = 2.28$, $p < .05$. No additional variance was explained by perceived risks ($\beta = -.02$, *ns*), benefits ($\beta = -.01$, *ns*), and vulnerability ($\beta = -.02$, *ns*). Of the control variables, only frequency of internet communication was a significant predictor of risky sexual online behavior, $\beta = .02$, $t(1444) = 2.97$, $p < .01$.

Discussion

In identifying the emerging challenges and issues in the field of online risks, Livingstone and Haddon (2008) call for the investigation of adolescents' perceptions of online risk behavior to understand why youth engage in such online risks. Our study responded to this call by focusing on four theoretically based perceptions (i.e., perceived peer involvement, risks, benefits, and personal vulnerability), that may influence adolescents' risky sexual online behaviors. Moreover, we responded to the call for longitudinal research to understand the causal relationship between perceptions and risky sexual online behavior (Benthin et al., 1993; Goldberg et al., 2002; Ybarra et al., 2007). As a result, our study contributes substantially to our understanding of adolescents' engagement in risky sexual online behavior.

Our study yielded two important findings. First, in contrast to our expectations, we did not find a reciprocal relationship between the engagement in risky sexual online behavior and the perceptions of peer involvement, risks, benefits, and vulnerability. These perceptions were causes but not consequences of risky sexual online behavior. In separate structural equation models, perceived peer involvement, perceived risks, and perceived vulnerability predicted adolescents' engagement in risky sexual online behavior at Time 2. Perceived benefits had no impact on subsequent online sexual risk behaviors. Second,

comparing the relative predictive ability of the perceptions of peer involvement, risks, benefits, and vulnerability in a regression analysis, perceived peer involvement remained the only predictor of the engagement in risky sexual online behavior. These findings emphasize the importance of perceptions, particularly of perceived peer involvement, in the explanation of adolescent risky sexual online behavior.

Our finding that perceptions of peer involvement, risks, and vulnerability are predictors but not consequences of risky sexual online behavior is not in line with previous offline risk behavior research, which notes a reciprocal relationship between perceptions and risk behavior (Gerrard et al., 1996). In our study, engagement in risky sexual online behavior had no influence on subsequent perceptions of peer involvement, personal vulnerability, and perceptions of risks and benefits of this behavior. This divergence from Gerrard et al. (1996) may be due to different statistical procedures (we used more conservative analyses) or, more likely, due to the different risk behaviors assessed (we assessed risky sexual online activities while Gerrard et al. (1996) focused on smoking, drinking, and reckless driving). The prevalence of risky sexual online behavior in our sample was very low. In contrast to more common risk behaviors such as drinking, most adolescents' may have less experience with this behavior and may engage in this behavior far less often. Engagement in risky sexual online behavior seems to be a rather explorative behavior which is not pursued frequently by adolescents. Therefore, the perceptions about this behavior adolescents hold may be less stable and thus hard to assess in six-month time lags.

While our results suggest that perceptions are causes but not consequences of risk behavior, we do not fully discard a reciprocal relationship. First, it may be that participants have had experience with risky sexual online behavior before the start of the study and also hold prior perceptions about this behavior. For example, it may be that adolescents' perceptions at Time 1 were based on past risk experiences which were not assessed in our study. Second, the causal relationship may be more volatile and may thus change during the six month time period between Wave 1 and Wave 2. For example, in an attempt to reduce dissonance, participants in online risk behavior may rationalize this by reducing their risk perception in the moment they engage in the behavior. This would reflect an online judgment of consequences rather than stable perceptions that could be assessed six months later.

Predictors of Risky Sexual Online Behavior

Cross-sectionally, our study showed that the engagement in risky sexual online behavior was related to perceptions of peer involvement, risks, benefits, and vulnerability of this behavior. More specifically, adolescents who engaged in these sexual online

behaviors perceived more friends to engage in these behaviors, perceived fewer risks and more benefits, and felt personally less vulnerable to negative consequences than adolescents who did not engage in risky sexual online behaviors. This is in line with several other cross-sectional studies on offline risk behavior (Halpern-Felsher et al., 2004; Parsons et al., 1997).

Longitudinally, however, only perceived peer involvement, perceived risks, and perceived vulnerability predicted risky sexual online behavior. Moreover, the strength of these associations was rather weak. In contrast to earlier cross-sectional studies of offline risk behavior (Goldberg et al., 2002; Moore & Parsons, 2000; Siegel et al., 1994), the perceived benefits related to the engagement in risky sexual online behavior had no impact on subsequent engagement in risky sexual online behavior. One reason why perceived benefits did not influence risky sexual online behavior may be that the potential benefits of online sexual risk behavior are not as clear to adolescents as benefits associated with traditional risk behaviors, such as drinking and smoking. In comparison to traditional risk behaviors, online sexual risk activities are not as common and are still new for adolescents. For example, the prevalence of drinking and smoking among adolescents often exceeds 50% (Goldberg et al., 2002; Pomery, Gibbons, Reis-Bergan, & Gerrard, 2009). In contrast, only around 15% to 17% of Dutch adolescents engaged in risky sexual online behavior. With little previous experience in risky sexual online behavior, it may be difficult for adolescents to see the benefits of such behavior.

In terms of perceived risks and vulnerability, we also found only small effects on subsequent online sexual behavior. These effects had no predictive ability above the effect of perceived peer involvement. This is in line with most recent theories of adolescent risk behavior, such as fuzzy-trace theory or the prototype willingness model (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Rivers, Reyna, & Mills, 2008). These theories suggest that engagement in risk behavior is based on heuristics and affect (Gerrard et al., 2008), rather than on reason and systematic processing. The prototype willingness model (Gerrard et al., 2008), for example, assumes that risk behavior often reflects reactions to specific situations rather than planned, intended behavior. For risky sexual online behavior, this suggests that adolescents may perceive many risks and only few benefits when they *reason* about online risk behaviors. In a specific situation, however, decisions may be based on contextual factors such as peer behavior. Therefore, future studies should investigate more elaborately the role of situational factors in adolescent online behaviors.

The Role of Perceived Peer Involvement in Risky Sexual Online Behavior

Perceived peer involvement was the only predictor of risky sexual online behavior after controlling for other perception variables. That perceived peer involvement is an

important predictor of adolescent risk behavior is consistent with previous research on offline risk behavior (Bauman & Ennett, 1996; Boyer, 2006; Iannotti & Bush, 1992; Jessor, 1992; Michael & Ben-Zur, 2007; Rai et al., 2003). Our finding that peer influence is also important for online sexual risk activities suggests that adolescents' online behavior does not differ much from their offline behavior. The perceived behavior of peers is also directive for online risk behaviors. What adolescents do online, even if pursued solitarily in front of their computer, is still directly or indirectly influenced by their friends' behavior.

Although we do not know whether adolescents' perceptions of peer behavior are based on actual behavior of peers or incorrect estimations of peer involvement, the findings suggest that adolescents' future risk behavior can be partly predicted by their perceptions of their friends' behavior. This fact may be important for prevention. If based on incorrect estimations of peer behavior, raising awareness of potential misperceptions may be an influential tool in preventing such behavior (Scholly et al., 2005; Schroeder & Prentice, 1998). If perceived peer influence reflects real peer behavior, it may be beneficial to help adolescents find strategies to resist peer influence. Moreover, it has been shown that parental monitoring may moderate the influence of detrimental peer influence (Rai et al., 2003). To find the most effective strategies for prevention of risky sexual online behavior, future research should disentangle the underlying mechanisms in the relationship of perceived peer involvement and adolescent engagement in risky sexual online behavior.

Contributions, Limitations and Suggestions for Future Research

Our study has several limitations that need to be addressed in future research. First, to assess risky sexual online behavior, we used only four items. Since online risk behavior constitutes a rather new research field, no validated scales exist. Although our items were based on previous research and theoretical considerations, they do not present established measurements. The interpretation of our results should, thus, be limited to the four online behaviors we measured.

Second, we did not assess whether adolescents experienced any negative consequences from their engagement in risky sexual online behavior. Therefore, we cannot draw any conclusions about the dangers of engaging in these behaviors. However, the behaviors were judged as very dangerous by the adolescents themselves. This may be an indicator of their riskiness. Future research is needed to assess the negative (or positive) consequences of online risk engagement.

Third, while our findings suggest that adolescents' behavior is caused by their perceptions of peer behavior, an alternative explanation for this causal relationship cannot be fully ruled out. It may be that adolescents associate selectively with similar friends. Selective association means that adolescents become friends with similar peers. So, even if

our longitudinal results show that peer behavior came before risk behavior it may be that the adolescents were already similar in their tendency to engage in risk behavior. Thus, the initiation of risk behavior may result from similar tendencies rather than from peer influence (Arnett, 2007).

Fourth, the statistical associations between perceptions and risky sexual online behavior were not very strong. This may be because the prevalence of risky sexual online behavior was low. Most of the adolescents did not engage in any of the risky sexual online behaviors. Therefore, the rather weak associations between perceptions of peer involvement, risks, and vulnerability with subsequent risk behavior may be partly the result of lacking variance in the distribution of our data.

Fifth, although the present study provides some support for a causal relation, causation cannot be decisively determined with longitudinal designs. Although perceptions occurred before engagement in risky sexual online behavior, this relationship may have also been based on third variables that were not investigated in this study, such as personality characteristics. While this possibility may not be ruled out with our design, we, nevertheless, believe that our results are at least an indication of causality. Further research is desirable to definitely establish causality between perceptions and risk behavior.

Despite these limitations, our study offers important insights into the rather new research field of adolescents' online risk behavior. By conducting a longitudinal study with a representative sample of Dutch adolescents, this study is the first to empirically test the relationship between adolescents' engagement in risky sexual online behavior and their perceptions of this behavior. Even while controlling for a range of potentially confounding variables, our findings indicate that perceptions of peer involvement, risks, and vulnerability influence subsequent online risk engagement. Testing the relative influence of several cognitive predictors, previously only investigated separately, perceived peer involvement remained the only predictor of risky sexual online behavior.

Online risk research may constitute an important new field in adolescent risk research. Adolescents are the defining users of the internet. Spending considerable leisure time online, they may transfer previous offline activities into their online life. Thus, potentially risky online activities may substantially contribute to adolescent development and should be researched further.

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4

The Influence of Descriptive and Injunctive Peer Norms on Adolescents' Risky Sexual Online Behavior

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Abstract

The aim of this study was to investigate the influence of descriptive and injunctive peer norms on the engagement in risky sexual online behavior. A four-wave longitudinal study among a representative sample of 1,016 Dutch adolescents (12-17 years old) was conducted. Two autoregressive cross-lagged structural equation models were analyzed to investigate the relationship between perceptions of peer norms and risky sexual online behavior. The findings of this study indicate that both, descriptive and injunctive peer norms, predicted adolescents' engagement in risky sexual online behavior. The effect of descriptive peer norms was stronger and more consistent over the four waves. As expected, perceptions of peer norms were predictors, but not consequences, of risky sexual online behavior. The findings suggest that problematic behaviors on the internet are influenced by perceptions of what peers do, or approve of, in ways similar to offline risk behaviors.

The Influence of Descriptive and Injunctive Peer Norms on Adolescents' Risky Sexual Online Behavior

Adolescents today spend considerable parts of their leisure time on the internet. While using the internet, adolescents may engage in rather risky online behavior, such as sending intimate information to strangers online or searching for sexual partners online (Livingstone, & Helsper, 2008; Ybarra, Mitchell, & Finkelhor, 2007). Although increasing numbers of studies have focused on the prevalence of adolescents' risky sexual online behavior, less is known about *why* adolescents engage in these behaviors. Specifically, online risk research has been criticized for ignoring the offline lives of youth, including their friends and peers, when explaining online activities (Livingstone & Haddon, 2008).

Among the influences in adolescents' offline lives, peers may play an important role in explaining risky online behavior. During adolescence, individuals' social orientation shifts markedly from parents to peers (Guyer, McClure-Tone, Shiffrin, Pine, & Nelson, 2009; Michael & Ben-Zur, 2007). As a consequence, peer norms become directive for adolescents and strongly influence their risk behavior (Arnett, 2007; Bauman & Ennett, 1996). The aim of the present study is to investigate the influence of peer norms on adolescents' risky sexual online behavior.

Social Norms Theory

One of the theories that explains why peers influence adolescents' risk behavior is social norms theory (Berkowitz, 2005). This theory assumes that peer influence is based on adolescents' beliefs about the norms that are prevalent among their peers (Berkowitz, 2005). Social norms can typically be divided into descriptive and injunctive peer norms (Borsari & Carey, 2003). Descriptive peer norms are adolescents' perceptions about the quantity and frequency of a certain risk behavior among peers. Injunctive peer norms are beliefs about the approval of a behavior among peers. Descriptive and injunctive norms are adolescents' subjective beliefs about their peers' behavior and approval (Borsari & Carey, 2003), and therefore, they may be based on misperceptions of peer norms (Prentice & Miller, 1993, 1996; Schroeder & Prentice, 1998).

A growing number of studies conducted within social norms theory have indicated that adolescents' problem behavior is influenced by descriptive and injunctive peer norms (Berkowitz, 2005; Borsari & Carey, 2003; Prentice & Miller, 1993, 1996; Schroeder & Prentice, 1998; Rimal & Real, 2003; Larimer, Turner, & Mallett, 2004). Individuals are willing to comply with perceived group norms because they are afraid of sanctions, such as being excluded from the group (Rimal & Real, 2003). The norms that are prevalent within a group are constructed and disseminated through communication (Rimal & Real, 2003). Most

of the studies on social norm theory focus on prevalent problem behaviors which generally take place in a social context, such as smoking or drinking alcohol (Borsari & Carey, 2003). For these types of behaviors, social norms within a group may be clearly articulated because adolescents typically talk about these behaviors and engage in them together.

Less is known about the impact of perceived peer norms on adolescents' risky sexual online activities. The influence of peers may be different for risky online activities because, in contrast to typical adolescent risk behaviors, such as drinking or smoking, adolescents may not engage in risky online activities in a group context. Engagement in risky sexual online behavior is much more private, and peer pressure may be weaker. Moreover, previous studies have shown that these behaviors are uncommon among adolescents (Baumgartner, Valkenburg, & Peter, 2010a; Liau, Khoo, & Ang, 2005). As a result, adolescents may have less knowledge about the existing group norms concerning risky sexual online behavior. Nevertheless, the findings of a recent study suggest that perceptions of descriptive peer norms affect risky sexual online behavior (Baumgartner, Valkenburg, & Peter, 2010b). Adolescents who perceived their friends engaging in risky sexual online behavior, such as sending intimate pictures or videos to strangers online, were likely to subsequently engage in these behaviors as well. This finding indicates that perceptions of descriptive peer norms may be important even in the context of less prevalent and more private behaviors.

Whereas the aforementioned study suggests that online behavior is related to descriptive peer norms, the role of injunctive peer norms in risky sexual online behavior is still unclear. However, it seems plausible to assume that perceiving others to approve of risky sexual online behavior may lead to an increased willingness to engage in these behaviors. For example, Real and Rimal (2007) and Larimer et al. (2004) have shown that injunctive peer norms may be even more predictive of intentions to drink alcohol than descriptive peer norms. Especially for less prevalent behaviors, such as engagement in risky sexual online behavior, assumptions about peer approval may be influential. Even if adolescents do not think that their friends engage in these behaviors, they may have implicit assumptions about their friends' opinions concerning these behaviors. Adolescents may be willing to engage in risky sexual online behavior only if they believe their friends would approve of such behavior.

Causal Relationship Between Perceived Peer Norms and Behavior

While the relationship between peer norms and risky behaviors has often been demonstrated, the causality of the effect is less clear. Most studies in social norms theory have investigated only the effect of social norms on risky behavior. However, risky behavior may equally well have an influence on subsequent perceptions of peer norms. This inverse causal relationship between behavior and perceived peer norms is compatible with cognitive

dissonance theory (Festinger, 1957) and the false consensus effect (Ross, Greene, & House, 1977). To avoid cognitive dissonance when engaging in risky sexual online behavior, individuals may justify their behavior by claiming that others do the same thing. By exaggerating the number of friends who engage in this behavior, adolescents may downplay possible negative consequences of such behavior. Thus, adolescents may cognitively normalize their behavior by judging their peers' behavior and approval to be consistent with their own behavior and perceptions. Within social norm theory, it has often been assumed that perceived peer norms are not based on accurate estimations of peer behavior but on misperceptions. These misperceptions may be the result of cognitive dissonance processes leading to a false consensus effect, that is, the tendency of people to overestimate their similarity with others (Lewis, Lee, Patrick, & Fossos, 2007; Ross, et al., 1977). Therefore, perceptions of descriptive and injunctive norms may not only be predictors but also consequences of individuals' engagement in risky sexual online behavior (Gerrard, Gibbons, Benthin, & Hessling, 1996; Lewis, Lee, Patrick, & Fossos, 2007).

Current Study

The present study investigates the role of injunctive and descriptive peer norms in the explanation of risky sexual online behavior by using a four-wave longitudinal design. We expect that descriptive and injunctive peer norms have an influence on risky sexual online behavior over and above the effect of other predictors such as age, gender, and frequency of online communication. Moreover, we investigate whether peer norms are predictors or consequences of risky sexual online behavior. By investigating the role of social norms for risky sexual online behavior, the current study advances our knowledge in three respects. First, the study sheds light on the predictors of engagement in risky sexual online behavior. Knowing these predictors is important in order to prevent such behavior in the future. Many prevention programs have successfully used a social norms intervention strategy (Berkowitz, 2005; Schroeder & Prentice, 1998, Mattern & Neighbors, 2004). These prevention programs normally target perceptions of either descriptive or injunctive peer norms. Prevention programs targeting peer norms can be effective only if it is known whether and which of these perceptions influence risky sexual online behavior.

Second, this study may advance social norms theory by testing whether it is also applicable to less prevalent and more intimate online behaviors. If social norms are predictors of sexual online behavior, the validity of the social norms approach could be extended to online behaviors. Finally, the present study may advance the knowledge of the causal relationship between perceived peer norms and risky sexual online behavior.

Method

Procedure

A four-wave longitudinal study with a representative sample of 1,765 Dutch adolescents was conducted. Adolescents were surveyed four times with a six-month time lag. Participants were 12 to 17 years of age with a mean age of 14.49 years (*SD*=1.68) in the first wave. Sampling and fieldwork were performed by Veldkamp, a Dutch research institute. In the first wave, 1,765 adolescents completed the questionnaire (initial response rate: 84%). Of the 1,765 adolescents who completed the first questionnaire, 1,445, 1,206, and 1,016 participated in waves 2, 3, and 4, respectively. The attrition rates ranged from 18% to 16%. We only included the 1,016 adolescents who participated in all four waves in the analyses (50.3% females). Institutional approval and parental consent for adolescents' participation were obtained.

Measures

Risky sexual online behavior. Risky sexual online behavior was assessed with four items. Participants indicated on a 5-point scale ranging from 0 (*never*) to 4 (*six times or more*) how often, in the last six months, they had participated in one of the following activities: 1) searching for someone on the internet with whom to talk about sex; 2) searching for someone on the internet with whom to have sex; 3) sending a photo or video in which they were partly naked to someone they only knew online; and 4) sending an address or telephone number online to someone they only knew online. Because the prevalence of these behaviors was very low, we recoded the variables into binary variables, 0 (*never*) and 1 (*engaged in risks at least once*). The resulting four binary risky sexual online behavior variables were added, resulting in a count variable of risky sexual online behavior. This new variable had values from 0 to 4. Mean scores (standard deviations in parentheses) for the four waves were 0.24 (0.61), 0.21 (0.58), 0.17 (0.54), 0.17 (0.51), respectively.

Descriptive peer norms. To measure descriptive peer norms, adolescents indicated for each of the four risk behaviors on a 5-point scale ranging from 0 (*no one*) to 4 (*nearly all of my friends*) how many of their friends showed this behavior. Cronbach's alpha of the resulting scales ranged from .72 to .78 for the four waves. Mean scores (standard deviations in parentheses) for the four waves were 0.41 (0.51), 0.38 (0.49), 0.40 (0.55), 0.40 (0.51), respectively.

Injunctive peer norms. Injunctive peer norms were measured by asking adolescents to rate how much their friends approved of each of the risky sexual online behaviors. For example, one question read "What do your friends think of searching on the internet for someone to talk about sex?" Answer categories ranged form 0 (*not at all ok*) to 4 (*very*

acceptable). Cronbach's alpha for the four items ranged from .78 to .82 in the four waves. Mean scores (standard deviations in parentheses) were 0.74 (0.75), 0.73 (0.70), 0.74 (0.73), 0.75 (0.71), respectively.

Control variables. Gender, age, and frequency of internet communication were included as control variables. Gender and age were included because it may be assumed that engagement in online risk behavior varies according to age and gender (Baumgartner et al., 2010a). Moreover, susceptibility to peer influence may also be influenced by age and gender (Steinberg & Monahan, 2007). The frequency of internet communication was included because it has been a predictor of risky online behavior in previous research (Baumgartner et al., 2010b; Livingstone & Helsper, 2007). To measure the frequency of internet communication, participants indicated how often they use instant messaging, internet chats, and social networking sites. The response categories ranged from 0 (*never*) to 10 (*every day*). The three variables composed an additive scale, with means scores (standard deviations in parentheses) of 4.52 (2.18), 4.65 (2.16), 4.84 (2.15), 4.82 (2.13).

Data Analysis

Autoregressive cross-lagged models. To investigate the influence of descriptive and injunctive peer norms on risky sexual online behavior, we analyzed two autoregressive cross-lagged panel models (see Figures 4.1 and 4.2). By including autoregressive effects, the model controls for past behavior in each wave and thus increases the validity of the influence of a specific construct at Time *N* on the construct at Time *N*+1 (Schlüter, Davidov, & Schmidt, 2006). The cross-lagged paths represent the causal-correlational relationship between peer norms and risky sexual online behavior. To control for potentially confounding variables, we included the three control variables in the model.

The two models were tested with structural equation modeling. The variable for risky sexual online behavior was a manifest count variable of participation in risky behavior. The peer norm variables in our models represented latent variables. For these variables, two 2-item parcels were used as indicators of the latent construct (Matsunaga, 2008). Error terms of the same indicators over time and disturbances within time were correlated. For all control variables, manifest variables were used. To check whether the skewness of the variables may have affected the analyses, we ran bootstrap analyses for the models (bias-corrected 95% confidence interval, 1000 bootstrap samples, N=1,016 each) (Efron & Tibishirani, 1993).

Results

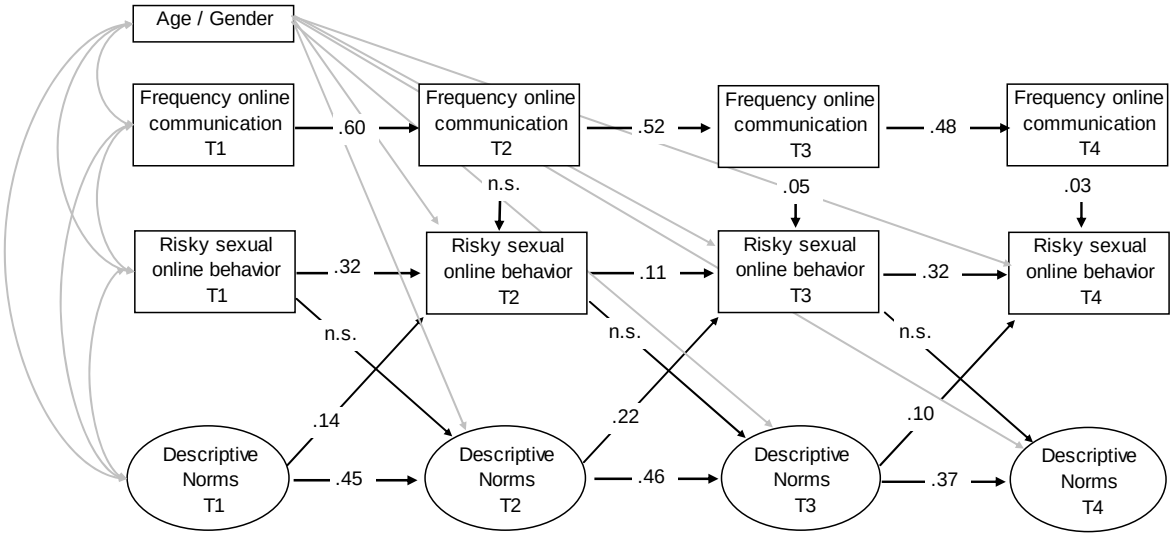
Cross-lagged Models

To analyze whether descriptive peer norms predicted risky sexual online behavior, we analyzed the model as shown in Figure 4.1. The model indicated an excellent fit to the data (CFI = .99, RMSEA = .02 [90% CI: .01/.03]), SRMR = .02, $\chi 2/df=1.56$). Engagement in risky sexual online behavior had a moderate stability over time. As can be seen in Figure 4.1, descriptive peer norms predicted engagement in risky sexual online behavior in all of the waves. More specifically, descriptive peer norms at Time 1 had a significant effect on risk engagement at Time 2, $B = .14$, $SE = .08$, $p < .05$ (bootstrap bias-corrected 95% CI [bc 95% CI]: .004/.32). Time 2 descriptive norms predicted Time 3 risk engagement, $B = .22$, $SE = .06$, $p < .01$ ([bc 95% CI]: .13/.34), and Time 3 peer norms predicted Time 4 risk engagement, $B = .10$, $SE = .04$, $p < .01$ ([bc 95% CI]: .03/.19). None of the reverse paths from risk engagement to descriptive peer norms was significant. The effects of descriptive peer norms on risk engagement were significant despite controlling for past behavior, sex, age, and frequency of internet communication.

Analyzing the model for injunctive peer norms yielded similar but less consistent results. The model fit for injunctive peer norms was also excellent (CFI = 1.00, RMSEA = .01 [90% CI: .00/.02], SRMR = .02, $\chi 2/df = 1.20$). As can be seen in Figure 4.2, injunctive norms at Time 1 did not predict risky sexual online behavior at Time 2, $B = .03$, $SE = .03$, $p = .24$ ([bc 95% CI]: -.02/.11). Estimations of injunctive norms at Time 2 and Time 3, however, were significant predictors of subsequent online risk engagement, $B = .10$, $SE = .03$, $p < .01$ ([bc 95% CI]: .04/.17) for Time 2 on Time 3 and $B = .04$, $SE = .02$, $p = .05$ ([bc 95% CI]: .00/.09) for T3 on T4. Moreover, for injunctive peer norms, none of the reverse paths from risk engagement to injunctive peer norms was significant.

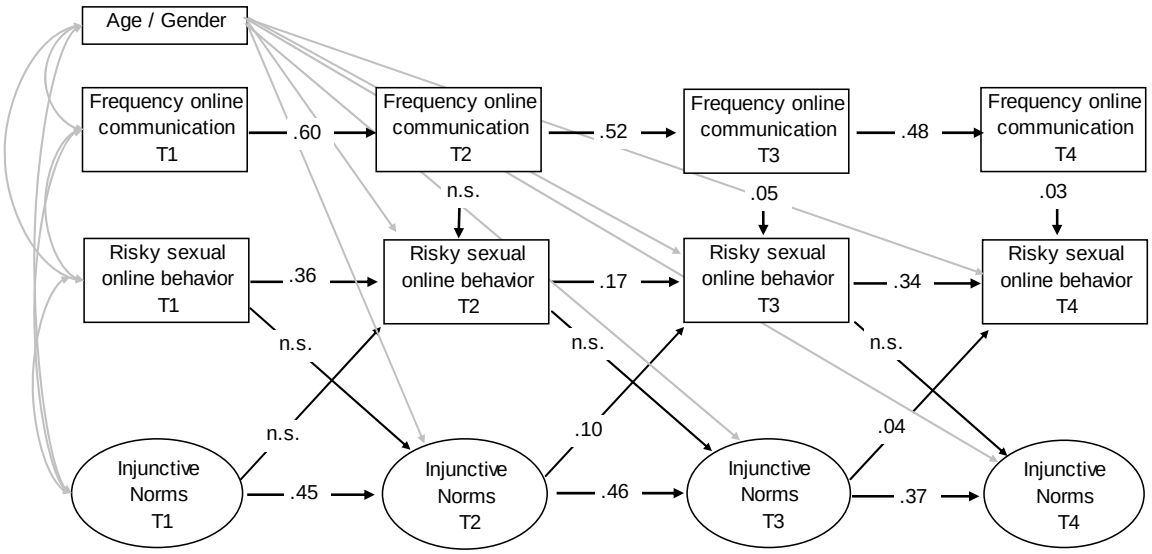
The frequency of internet communication had a small but significant influence on risk behavior at Time 3 and 4 ($B = .05$, $p < .01$; $B = .03$, $p < .01$). Age was negatively related to risky sexual online behavior only at Time 4, and this effect was small ($B = -.02$, $p < .05$). Gender was a significant predictor of risky sexual online behavior for Time 2 and Time 3 ($B = -.08$, $p < .05$; $B = -.09$, $p < .01$), with boys engaging in somewhat more risky behavior.

Figure 4.1. Model of the Influence of Descriptive Peer Norms on Risky Sexual Online Behavior



Note. To simplify presentation, observed indicators and their correlated measurement errors over time as well as correlated disturbances of indicators within time are not shown. Also, regression paths of the same factors between Time 1 and Time 3, Time 1 and Time 4, and Time 2 and Time 4 are not presented.

Figure 4.2. Model of the Influence of Injunctive Peer Norms on Risky Sexual Online Behavior



Note. To simplify presentation, observed indicators and their correlated measurement errors over time as well as correlated disturbances of indicators within time are not shown. Also, regression paths of the same factors between Time 1 and Time 3, Time 1 and Time 4, and Time 2 and Time 4 are not presented.

Discussion

This study showed that descriptive and injunctive peer norms predicted adolescents' engagement in risky sexual online behavior. The effect of descriptive peer norms, however, seemed to be stronger and more consistent than the effect of injunctive peer norms in the four waves. This finding suggests that the perceived behavior of peers may be more important in the explanation of adolescents' risky sexual online behavior than what adolescents perceive their peers to approve of.

The finding that descriptive norms consistently predicted risk engagement is in line with previous findings showing that, especially for socially unapproved behavior, descriptive peer norms are more directive for behavior than injunctive peer norms (Manning, 2009). Adolescents may only have vague assumptions about their friends' general approval of risky sexual online behavior. Therefore, the perceived behavior of peers may carry an important informational component suggesting that it may be acceptable to engage in a specific behavior.[31] Thus, adolescents may be inclined to engage in risky sexual online behavior if they perceive their friends to engage in it (Buunk & Bakker, 1995). Friends' perceived behavior may thus be a more tangible indicator of peer norms than the estimations of peer approval.

The findings of this study are important for the prevention of risky sexual online behavior. The effect of descriptive peer norms was consistent over the four waves and was stronger than the effect of age, gender, and frequency of online communication. Because descriptive norms were more predictive of subsequent engagement in risky sexual online behavior than injunctive peer norms, potential preventions should target descriptive peer norms rather than injunctive norms. Several studies have shown that social norm interventions targeting adolescents' perceptions of peer norms are successful (Berkowitz, 2005; Schroeder & Prentice, 1998). These interventions normally raise the awareness of potential overestimations of peer behavior. By showing adolescents that most peers do not engage in a certain behavior and that their perceptions of their friends' behavior are most likely inflated, the influence of peer norms can be reduced (Berkowitz, 2005; Schroeder & Prentice, 1998)

This study also has implications for social norms theory. The finding that social norms are also important in the explanation of less prevalent intimate online behaviors suggests that social norms theory has a broader scope than is generally assumed. Moreover, using multiple time assessments, the finding that peer norms consistently predicted behavior further supports social norms theory. Most important, however, our causal-correlational design showed that peer norms predicted engagement in risky sexual online behavior, whereas an inverse relation could not be found. This finding suggests that perceptions of the prevalence of peer behavior and of peers' approval of this behavior influence future behavior

and not vice versa. The relationship between peer norms and risk behavior is thus not based on cognitive dissonance strategies but on the willingness of individuals to comply with prevailing peer norms. Thus, the findings strengthen previous theoretical assumptions that perceived norms influence behavior, rather than that they are correlates or consequences of behavior.

The findings of this study should be interpreted within the limitations of this study. To assess risky sexual online behavior, we used four items. Although our items were based on previous research and theoretical considerations, they do not present established measurements. The interpretation of our results, thus, should be limited to the four online behaviors we measured. Nevertheless, the study underlines the importance of perceived peer behavior and peer approval in adolescents' online activities. Future research should therefore further investigate the role of peers in adolescents' risky online behaviors.

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5

Developmental Pathways of Online and Offline Sexual Risk Behavior During Adolescence: A Dual Trajectory Approach

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Abstract

This study investigated the developmental pathways of online and offline sexual risk behavior from early to late adolescence. Moreover, we examined how online and offline sexual risk behaviors are related and which factors predict them. Dual trajectory analysis revealed that adolescents followed three different developmental pathways of online sexual risk behavior: no risk (70.2%), moderate risk (23.7%), and high risk (6.1%). The high-risk group followed an adolescence-limited developmental pathway. For offline sexual risk behavior, we identified a no risk (90.6%) and an increasing pathway (9.4%). Further analyses suggested that online and offline sexual risk behaviors are related and had common predictors (i.e., sensation seeking, low educational level, gender).

Developmental Pathways of Online and Offline Sexual Risk Behavior During Adolescence: A Dual Trajectory Approach

One of the main tasks individuals face during adolescence is the development of sexuality (Buzwell & Rosenthal, 1996; Lerner & Galambos, 1998; Raffaelli & Crockett, 2003). For most adolescents, this period is characterized by an increased interest in sexuality and the initiation of sexual activities. Although these activities are part of normal adolescent development, some adolescents may also engage in sexual risk behaviors during this period, such as unprotected sex (Kotchick, Shaffer, & Forehand, 2001; Lerner & Galambos, 1998). Today, adolescents increasingly turn to the Internet to satisfy their sexual curiosity and to explore their sexuality (Boies, Cooper, & Osborne, 2004; Subrahmanyam, Smahel, & Greenfield, 2006; Valkenburg & Peter, 2011). Some adolescents may also use the Internet in more problematic ways, for example to send intimate information to strangers online or to search for sexual partners (Baumgartner, Valkenburg, & Peter, 2010a). In recent years, there has been growing interest into this new form of adolescent sexual risk behavior (Baumgartner, Valkenburg, & Peter, 2010b; Ybarra, Mitchell, Finkelhor, & Wolak, 2007).

Despite growing research on both online and offline risk behavior, not much is known about the development of these behaviors during adolescence and about individual differences in this development. This lack is striking because individuals do not undergo comparable changes in sexuality during any other period in their lives and adolescents may strongly differ in how they handle sexual risks in this period (Dahl, 2004). Whereas some adolescents may not engage in these risk behaviors at all, others may show heightened developmental pathways of sexual risk behavior. The first aim of this study, therefore, was to investigate longitudinally the specific pathways of online and offline sexual risk behavior during adolescence.

Because of the novelty of online sexual risk behavior, we also lack an understanding of how online and offline sexual risk behaviors are related. More specifically, we do not know whether online sexual risk behavior displaces offline sexual risk behavior or whether the two behaviors co-occur over time. In addition, we do not know whether the same or different psychological and social factors predict problematic pathways of online and offline sexual risk behavior. Knowing how these two types of behavior are related and whether they are influenced by common or different factors may help us prevent these behaviors more effectively. If the predictors for online and offline sexual risk behavior differ, interventions for online sexual risk behavior should be different from those for offline sexual risk behavior. Therefore, the second and third aim of this study were to investigate the relationship between the developmental pathways of online

and offline sexual risk behavior, and to examine the psychological and social antecedents of both types of sexual risk behavior.

Offline sexual risk behavior is a multidimensional construct, reflecting a number of different behaviors (Raffaelli & Crockett, 2003). It has been conceptualized either broadly (encompassing various sexual behaviors) or narrowly (focusing on only one specific sexual risk behavior; Kotchick et al., 2001). In this study, we focus on one specific type of offline sexual risk behavior, casual sex. We focus on this specific risk behavior because it has been argued that casual sex is an increasingly occurring form of sexual encounters among youth (Bogle, 2008; Heldman & Wade, 2010; Stinson, 2010). Moreover, casual sex has been related to higher risks of contracting STIs (Heldman & Wade, 2010).

Similar to offline sexual risk behavior, also online sexual risk behavior is multifaceted. In this study, we define online sexual risk behavior as the exchange of intimate, sexually oriented information or material with someone exclusively known online (Baumgartner et al., 2010a).

Developmental Trajectories of Online and Offline Sexual Risk Behavior

It has been well established that risk taking peaks in adolescence (Arnett, 1996; Boyer, 2006; Dahl, 2004). This heightened risk taking has been attributed to the interplay between the socio-emotional and the cognitive-control systems (Steinberg, 2005, 2008). With the physiological, physical, and hormonal changes that accompany puberty, the socio-emotional system becomes more assertive (Dahl, 2004; Steinberg, 2008), which leads to an increase in reward-sensitivity, sensation-seeking and risk-taking. In contrast, the cognitive-control system only develops gradually. Many psychosocial capacities that inhibit risk behavior, such as emotion regulation and impulse control, are not yet fully developed in early to mid-adolescence. Therefore, adolescents are not always able to successfully regulate their impulses in risky situations and are more prone to engage in risk behaviors (Steinberg, 2008).

Although all adolescents undergo these biological changes, some adolescents handle these changes better than others and, therefore, engage in less problematic behavior during this period (Compas, Hinden, & Gerhardt, 1995; Dahl, 2004). One of the first conceptualizations of different risk engagement pathways was Moffitt's account of adolescence-limited delinquency (Moffitt, 1993). Moffitt suggested that juvenile delinquency comprises at least two different categories of individuals. The first group shows an adolescence-limited pathway with the typical increase in risk engagement until mid-adolescence and a decrease thereafter. A second group, the life-time persistent offenders, shows stable patterns of risk engagement throughout adolescence and adulthood.

Few studies have identified different trajectories of offline sexual risk behavior during adolescence. Murphy, Brecht, Herbeck, and Huang (2009) and Moilanen, Crockett, Raffaelli, and Jones (2010) described four pathways of sexual risk behavior during mid-adolescence to young adulthood. Both studies identified two groups that were comparable to the *adolescence-limited* and the *life-time persistent* group proposed by Moffitt (1993). However, both studies discovered two additional groups. One of these groups included a substantial number of adolescents who showed no sexual risk engagement over time. The other included adolescents who only started to engage in online sexual risk behavior in the transition to young adulthood. Murphy et al. (2009) and Moilanen et al. (2010) focused only on adolescents aged 15 or older. However, it has been shown that younger adolescents (e.g., 12-13 year-olds) may also be prone to engage in sexual risk behaviors (de Graaf, Meijer, Poelman, & Vanwesenbeeck, 2005). Therefore, to fully understand the onset and development of sexual risk behavior, it is necessary to also include younger adolescents.

Research on the development of *online* sexual risk behavior is scarce. A cross-sectional study on age differences in online sexual risk behavior found a slight increase in the engagement in online sexual risk behavior from early (12-13 years old) to late adolescence (16-17 years old); (Baumgartner et al., 2010b). This study also suggested that engagement in online sexual risk behavior varies considerably among adolescents. However, because this study was cross-sectional and investigated only differences in group averages, it was not able to identify distinct developmental pathways.

We expect that the pathways of online and offline sexual risk behavior differ. Specific characteristics of the Internet may affect the onset of online sexual risk behavior and the number of adolescents who engage in these behaviors. Internet research has shown that, especially for sensitive issues, adolescents benefit from the accessibility and perceived controllability of Internet-based communication (Peter & Valkenburg, 2006; Schouten, Valkenburg, & Peter, 2007). The accessibility of the internet gives young adolescents the opportunity to explore their sexuality at an earlier age (Valkenburg & Peter, 2011). The perceived controllability of internet communication gives adolescents a sense of safety, which allows them to interact more freely with others (Valkenburg & Peter, 2011). Therefore, we expect that adolescents not only start earlier with online sexual risk behaviors but also engage more often in online than in offline sexual risk behaviors.

Relationship Between Online and Offline Sexual Risk Behavior

Two contrasting hypotheses have been formulated about the association between online and offline behavior: the displacement and the co-occurrence hypothesis (Valkenburg, Sumter, & Peter, 2011). These hypotheses can also be applied to the relationship between online and offline sexual risk behavior. The displacement hypothesis

(Lee & Kuo, 2002) posits that online activities are a substitution for offline activities, and thus predicts that online sexual risk behavior displaces offline sexual risk behavior. According to this hypothesis online and offline sexual risk behaviors are not or negatively related. The second hypothesis, the co-occurrence hypothesis, states that online and offline activities co-occur over time (Subrahmanyam, Kraut, Greenfield, & Gross, 2000; Valkenburg, et al., 2011). This hypothesis thus predicts that online and offline sexual risk behaviors are positively related.

The co-occurrence hypothesis seems to be most consistent with previous research on risk behavior. Individuals who engage in one type of risk behavior are typically more susceptible to engage in other types of risk behavior as well (Hair, Park, Ling, & Moore, 2009; Igra & Irwin, 1996; Kotchick et al., 2001). For example, sexual risk behavior has been related to heightened substance use (Guo et al., 2002) and to higher levels of delinquency (Aalsma, Tong, Wiehe, & Tu, 2010). Moreover, research that compared online and offline behaviors has found that online and offline behaviors are positively related (Valkenburg et al., 2011). Therefore, we predict that adolescents who show heightened pathways of online sexual risk behavior will also show heightened pathways of offline sexual risk behavior.

Predictors of Online and Offline Sexual Risk Behavior

According to Moffitt's taxonomy, several psychological and social factors determine which developmental pathways adolescents follow. This implies that adolescents who follow a specific developmental pathway of risk behavior differ in these factors from adolescents who follow another developmental pathway. Sexual risk behavior is related to a wide range of psychological and social factors (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002; Kotchick et al., 2001). To investigate differences between adolescents who follow specific developmental risk pathways, we focus on two psychological factors, sensation seeking and life satisfaction, and one social factor, family cohesion. We chose those psychological and social factors because they are all consistent predictors of offline sexual risk behavior (Igra & Irwin, 1996). Because studies on online sexual risk behavior are rather new, it is unknown whether these factors are also related to online sexual risk behavior. Using predictors that have been well established for offline sexual risk behavior allows comparing the antecedents of online and offline sexual risk behavior.

Sensation seeking has been defined as a personality trait that is characterized as the willingness to engage in risks in order to increase stimulation and arousal (Zuckerman, 1990). Adolescents with high levels of sensation seeking are likely to engage in all sorts of behaviors that promise novel and varying sensations (Zuckerman, 1990). Therefore, it is

not surprising that individuals with high levels of sensation seeking have a higher number of sexual partners (Bancroft et al., 2004; Donohew et al., 2000), are more likely to engage in casual sex (Seto, Lalumiere, & Quinsey, 1995), and to have unprotected sex (Kalichman, Simbayi, Jooste, Vermaak, & Cain, 2008). Sensation seeking has also been related to online sexual behaviors, such as compulsive sexual online behaviors (Cooper, Delmonico, & Burg, 2000) and usage of online pornography (Peter & Valkenburg, 2006, 2011). Therefore, we expect that adolescents who follow heightened pathways of online and offline sexual risk behavior also have higher levels of sensation seeking than adolescents who abstain from sexual risk behavior.

Similarly, we expect that adolescents who differ in their developmental pathways of online and offline sexual risk behavior also differ in life satisfaction. Adolescents who are dissatisfied with their lives are more prone to engage in various risk behaviors, including sexual risk behavior (MacDonald, Piquero, Valois, & Zullig, 2005; Valois, Zullig, Huebner, Kammermann, & Drane, 2002). Likewise, adolescents who are less satisfied with their lives are more likely to engage in online risks (Livingstone & Helsper, 2007). These adolescents may use the internet as a substitution for missing offline gratifications (Baker & Moore, 2008; Peter & Valkenburg, 2006). We therefore expect that adolescents who follow heightened pathways of online and offline sexual risk behavior are less satisfied with their lives than adolescents who do not engage in online and offline sexual risk behavior.

As for social antecedents, we chose family cohesion because it has been shown to be a valid indicator of overall quality of family relationships (De Graaf, van de Schoot, Woertman, Hawk, & Meeus, 2012; Olson, 2000). Adolescents from coherent and supportive families report fewer sexual partners (Luster & Small, 1997), later sexual onset (De Graaf et al., 2012), fewer incidences of unprotected sexual intercourse and are less likely to engage in sexual intercourse with strangers (Metzler, Noell, Biglan, Ary, & Smolkowski, 1994). In families in which family cohesion is low and emotional support is lacking, adolescents may seek out support in romantic and sexual relationships (De Graaf et al., 2012). These adolescents may also look for emotional support on the Internet. Although for online risk behavior family quality has rarely been studied, poor emotional bonding is associated with higher levels of online harassment among youths (Ybarra & Mitchell, 2004). Moreover, adolescents from less cohesive families may be less monitored by their parents and may thus have more freedom to engage in sexual risk behavior, both online and offline. Therefore, we expect that adolescents who follow heightened pathways of online and offline sexual risk behavior have less coherent families than adolescents who do not engage in online and offline sexual risk behavior.

Method

Sample and Procedure

The data used in this study were drawn from a four-wave panel study with six months time intervals. Fieldwork was done by a Dutch research agency. This agency has a large online access panel consisting of 10,990 Dutch adolescents. Participants in the online access panel were originally recruited from random samples in traditional telephone, face to face, or mail surveys. From the participants in the online access panel, 2,092 adolescents were selected randomly and contacted by email. 1,765 agreed to participate in the study (response rate: 84.4%). Answering the online questionnaire took approximately 20 minutes. Institutional approval from the ethics board of the university, as well as parental and informed consent were obtained prior to participation. The participants received 5€ (approx. 7$) for each completed questionnaire.

Of the 1,765 adolescents who completed the first questionnaire, 1,445, 1,206, and 1,016 also participated in Waves 2, 3, and 4, respectively. The attrition rates ranged from 18% to 16%. The retention rate of the sample was thus satisfactory. To check whether the rate of attrition was correlated with the outcome of interest, we conducted a logistic regression analysis with a dichotomous variable indicating whether participants were missing or not at Wave 4 as the dependent variable. Online and offline sexual risk behavior at Time 1 as well as demographic variables (i.e., age, gender, education) were entered as independent variables. None of these variables had a significant influence on the drop-out of participants (all $p > .13$).

Three participants were excluded from the analyses because of inconsistent age information. The final sample, therefore, consisted of 1,762 adolescents (49% females). To analyze the data, we arranged the data according to the logic of an accelerated cohort-sequential design with age as the time variable. For example, we included all data for 16-year olds for the time point of age 16, no matter at which of the four waves a given subject was 16 years old. As an example, a participant who was 12 years old when s/he received the first questionnaire contributed data for ages 12, 12.5, 13, and 13.5. Because of this accelerated cohort-sequential design, we could cover an age range between 12 and 19.5 years in half year intervals. Previous research has shown that cohort-sequential designs adequately approximate true longitudinal designs and are suitable for modeling developmental trends (Duncan, Duncan, & Hops, 1996).

Because of the accelerated design, there was a different number of participants in each age group (12 years, $N = 70$; 12.5 years, $N = 206$; 13 years, $N = 321$; 13.5 years, $N = 433$; 14 years, $N = 437$; 14.5 years, $N = 475$; 15 years, $N = 469$; 15.5 years, $N = 460$; 16

years, $N = 458$; 16.5 years, $N = 463$; 17 years, $N = 463$; 17.5 years, $N = 474$; 18 years, $N = 362$; 18.5 years, $N = 226$; 19 years, $N = 106$; 19.5 years, $N = 26$).

Measures

Online sexual risk behavior. We assessed online sexual risk behavior with four items used in previous research (Baumgartner et al., 2010a; Ybarra, Mitchell et al., 2007). These items were inspired by academic and public discussions (Ponte, Bauwens, & Mascheroni, 2009). These items have been linked to negative consequences, such as receiving unwanted sexual solicitation on the Internet (Mitchell et al., 2007). Participants indicated on a 5-point scale ranging from 0 (*never*) to 4 (*six times or more*) how often, in the last six months, they had participated in one of the following activities: 1) searched for someone on the Internet to talk about sex; 2) searched for someone on the Internet to have sex; 3) sent a photo or video in which they were partly naked to someone they only knew online; and 4) sent an address or telephone number online to someone they only knew online. Because the prevalence of these behaviors was very low, we transformed each variable into a binary variable 0 (*never*), 1 (*engaged in specific risk*). The four resulting binary online sexual risk behaviors were added into a count variable of online sexual risk behavior. This new variable could take values from 0 to 4 ($M = 0.25$, $SD = 0.65$ for Wave 1; $M = 0.22$, $SD = 0.60$ for Wave 2; $M = 0.19$, $SD = 0.58$ for Wave 3; $M = 0.17$, $SD = 0.51$ for Wave 4), and was used in all further analyses.

Offline sexual risk behavior. Risky sexual offline behavior, conceptualized as casual sexual intercourse, was measured using two items. Adolescents were asked (a) how often in the past six months they had sex with someone they had just met and (b) whether they had sex without condom with someone they had just met. Response categories ranged from 0 (*never*) to 4 (*six times or more*). These two variables were scored dichotomously (never vs. once or more in the past six months) and combined into a single count variable which could take values from 0 to 2. Means (standard deviations in parentheses) for the four waves were 0.07 (0.33), 0.06 (0.31), 0.04 (0.26), 0.05 (0.27), respectively.

Predictors. Three variables were included as predictors: sensation seeking, life satisfaction, and family cohesion. Because we assumed that these variables would predict risk behavior, we only included these variables as measured at Time 1 in the analyses.

Sensation seeking. We used the five items of the Brief Sensation Seeking Scale (Hoyle et al., 2002) that had the highest factor loadings in previous studies (Peter & Valkenburg, 2008) (e.g., "I would love to have new and exciting experiences, even if they are illegal"). Response categories ranged from 1 (*does not apply at all*) to 5 (*applies completely*). The five items formed a unidimensional scale with a Cronbach's alpha of .87 ($M = 2.09$, $SD = 0.88$).

Life satisfaction. Life satisfaction was operationalized with the five-item Satisfaction-with-Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Response categories ranged from 1 (*does not apply at all*) to 5 (*applies completely*). The five items formed a unidimensional scale with a Cronbach's alpha of .87. Higher scores indicated more life satisfaction (M = 3.45, SD = 0.74).

Family cohesion. This construct was measured with four items from a Dutch adaptation of the Family Adaptability and Cohesion Evaluation Scales (Olson, 1996, 2000). The following four items from the cohesion subscale were used: 1) If you want something in our family, you have to take care of it yourself; 2) In my family, everybody mainly focuses on his/her own affairs; 3) In our family, everyone goes his own way; and 4) In our family, everyone decides for him/herself what suits him/her best. Response categories ranged from 1 (*does not apply at all*) to 5 (*applies completely*). Scores were reverse coded so that higher scores indicated more family cohesion. The four items formed a unidimensional scale with a Cronbach's alpha of .84 (M = 3.53, SD = 0.81).

Control variables. Because educational level and gender predict offline sexual risk behavior (De Graaf et al., 2005; Murphy et al., 2009; Petersen & Hyde, 2010), we included these variables as control variables. We operationalized education with a three-point scale reflecting the levels of the Dutch education system. Participants were asked to indicate the educational level they were attending at the moment or, if they were no longer following an education, the highest level they had completed. The youngest participants (12 year-olds), who have not yet been assigned to a specific educational level, were asked to which educational level they were expected to be assigned. Dutch children are typically able to give an accurate estimation of their subsequent educational level based on a national compulsory test they have to take at age 11. The scale ranged from 1 (*lowest education level*) to 3 (*highest educational level*) (M = 1.72, SD = 0.81).

Data Analytical Approach

The analyses were conducted in three steps. First, we separately identified the different developmental pathways of online and offline sexual risk behavior. To identify different pathways of online and offline sexual risk behavior, we used semiparametric group based modeling (Nagin, 1999). This approach assumes that, within a given population, different groups of individuals exist whose engagement in a specific behavior follows distinct developmental pathways. In contrast to standard growth curve modeling, the main advantage of the group-based approach is that it allows to model distinctive developmental trajectories within a population (Nagin, 2005). Group-based modeling is especially suitable for our data because we expected strong inter-individual variations for the development of both online and offline sexual risk behavior.

To select the number of groups that best represent the heterogeneity in developmental trajectories, we followed the suggestions by Nagin (2005). The Bayesion Information Criterion (BIC) was used as a test statistic for model selection. The selection of the model with the largest BIC is recommended (Nagin, 2005). Models with progressively more groups were tested until model fit could not be further improved. After identifying the number of groups that best fit the model, different shapes for the trajectories (linear, quadratic, and cubic) were tested. Each individual in the sample was then assigned to the specific group that best fits his or her behavioral profile.

Once the ideal number of groups has been identified, model adequacy is tested with the average posterior probabilities of group membership. The posterior probabilities of group membership measure each individual's likelihood of belonging to his or her assigned group (Nagin, 2005). Nagin (2005) recommends that the average posterior probabilities should exceed a minimum of .70 for each group. An average posterior probability of above .70 indicates that, on average, individuals are well assigned to their groups.

In the second step of data analysis, the overlap between online and offline sexual risk behavior is investigated by conducting a dual trajectory analysis. This allows us to test whether pathways of online and offline sexual risk behavior co-occur. This analysis relates the developmental trajectories of the two behaviors in a single summary statistical model (Nagin, 2005). The main advantage of the dual trajectory model is that it estimates the joint probabilities of membership in trajectory groups across behaviors. These joint probabilities are a summary of the developmental linkages between the two studied outcomes (Nagin, 2005).

In the third and final step of data analysis, we conducted multinominal logistic regressions to analyze the predictors of group membership for online and offline sexual risk behavior.

Results

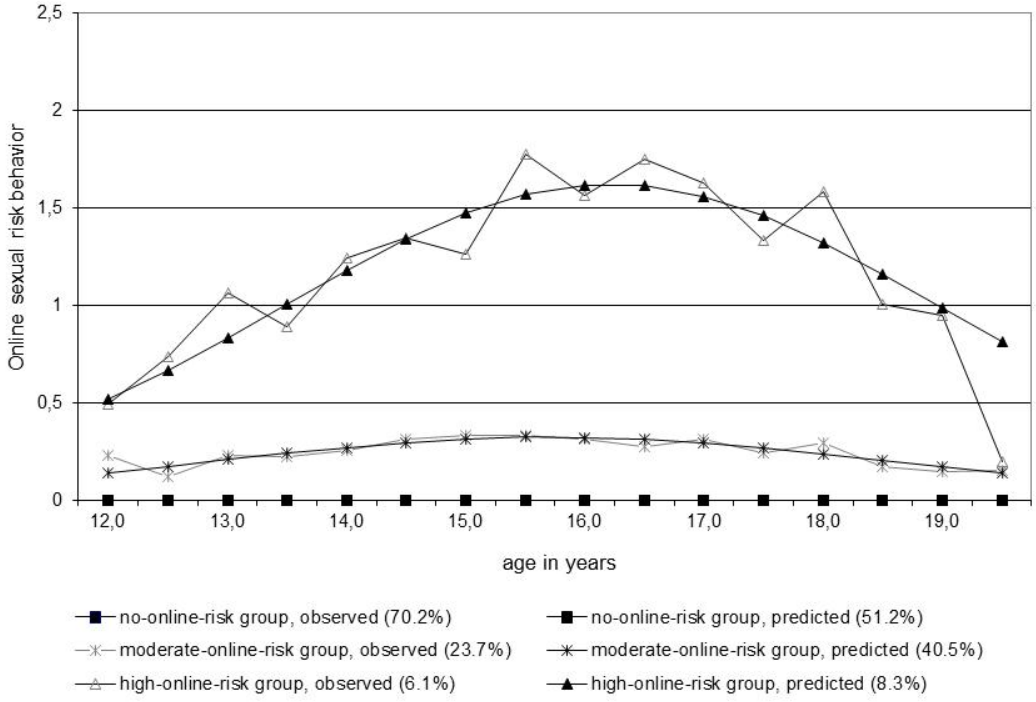
Trajectories of Online Sexual Risk Behavior

Using the group-based approach, we tested one-group to four-group models of trajectories for online sexual risk behavior. The trajectories were modeled using the zero-inflated Poisson (ZIP) model. The ZIP model is particularly useful for count variables when the data provides more zeros than expected under the Poisson assumption (Nagin, 2005). The BIC continued to improve until the three group solution (BIC values: -3259.11, -2898.58, -2823.02, and -2837 for the one-, two-, three-, and four-group solutions, respectively). Therefore, the three group model was selected as the best fitting model. To identify the shapes of the trajectories, we subsequently analyzed models with different

shapes (linear, quadratic, cubic). Again, the model with the highest BIC was selected. The final model resulted in a three-group model with one group that was specified to have zero probability of risk engagement throughout the time period to account for adolescents who did not engage in online sexual risk behavior at all (Muthén, 2004) and two quadratic curves (BIC = -2811.85).

The three trajectory groups of the final model are displayed in Figure 5.1. The first group, 'no-online-risk,' consisted of 70.2% of the sample and represents those who did not engage in online sexual risk behavior during adolescence. 23.7% of the adolescents belonged to the second group 'moderate-online-risk.' This group showed low levels of risk engagement over time. Although these adolescents engaged in low levels of online sexual risk behavior, the shape shows a slight increase in mid-adolescence (15-16 years) and a decline thereafter. The final group, 'high-online-risk,' comprised 6.1% of the adolescents. These adolescents showed elevated levels of risk engagement over time and followed the typical curvilinear risk behavior trajectory, with an increase in risk behavior from early to mid-adolescence and a decline of risk engagement from mid- to late-adolescence. The APPs of group membership were all above .73, indicating that individuals were well matched to their assigned group.

Figure 5.1. The Development of Online Sexual Risk Behavior



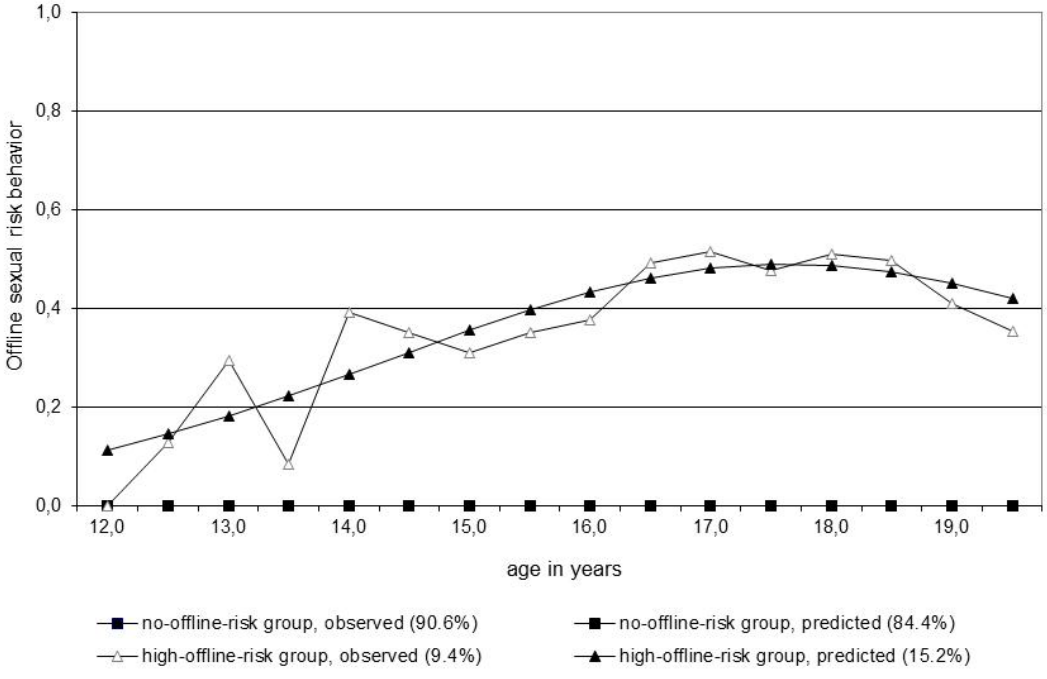
Note. Figure 5.1 displays the estimated and predicted curves for the three online sexual risk behavior groups.

Trajectories of Offline Sexual Risk Behavior

For offline sexual risk behavior, two groups fit the data best. The BIC for this model was -1069.31. For the one and three group model, the BICs were -1234.99 and -1061.82, respectively. A four group model did not converge. One group was specified to have zero probability of risk engagement. For the second group, a quadratic shape fit the data best (final BIC = -1058.10). The trajectories of the two groups are displayed in Figure 5.2. Average posterior probabilities for the two offline groups indicated that the individuals were well matched to their assigned groups, with .94 for the no-offline-risk group and 1.0 for the high offline risk group. Similar to online sexual risk behavior, one large group of adolescents did not engage in offline sexual risk behavior (90.6%). Adolescents in the second group, 'high-offline-risk,' showed increasing levels of offline sexual risk behavior until age 18 which then slightly levels off (9.4%).

Comparing the developmental trajectories of online and offline sexual risk behavior, it shows that the 'high-online-risk' group starts at higher levels in early adolescence (12-13 years) and increases faster than the 'high-offline-risk' group. However, whereas the 'high-offline-risk' group continues to increase until age 18 and levels off only slightly after that time, the 'high-online-risk' group peaks in mid-adolescence (15-16 years) and declines thereafter.

Figure 5.2. Development of Offline Sexual Risk Behavior



Note. Figure 5.2 displays the estimated and predicted curves for both offline sexual risk behavior groups.

Dual Trajectory Model of Online and Offline Sexual Risk Behavior

The second aim of the study was to investigate the relationship between the trajectories of online and offline sexual risk behavior. To investigate whether the co-occurrence or displacement hypothesis were supported, we analyzed a dual trajectory model. This model jointly estimates the trajectories of online and offline sexual risk behavior based on the results of the single trajectories. Model estimation of the dual trajectory model resulted in a BIC of -3786.78.

Table 5.1 displays the joint probabilities of online and offline sexual risk behavior groups. Panel A of Table 5.1 shows the probability of belonging to the two offline trajectories conditional on online group memberships. This panel indicates that if an individual belonged to the 'no-online-risk' group, he or she had a very high probability of belonging to the 'no-offline-risk' group (99%). Thus, adolescents who took no online risks were also not likely to engage in offline sexual risk behavior. Similarly, if adolescents belonged to the 'high-online-risk' group, the probability that they also belonged to the 'high-offline-risk' group was 76%. This finding suggests that adolescents who engaged in high levels of online sexual risk behavior were also very likely to engage in offline sexual risk behavior. If adolescents belonged to the 'low-online-risk' group, the likelihood that they engaged in offline sexual risk was lower (18%) than the likelihood that they did not engage in offline sexual risk behavior (82%).

Panel B of Table 5.1 reports the probability of online group membership conditional on the two offline sexual risk groups. This table shows that adolescents who did not engage in offline sexual risks had a probability of only 2.5% of belonging to the 'high-online-risk' group. The probability of being in the 'no-online-risk' group was also higher (59%) than being in the 'moderate-online-risk' group (39%) for adolescents who do not engage in offline sexual risks. Panel C of Table 5.1 depicts the joint probabilities of membership in the online and offline sexual risk behavior groups.

Overall, the findings provided strong support for the co-occurrence hypothesis, but not for the displacement hypothesis. Thus, engagement in online and offline sexual risk behavior was closely related.

Table 5.1. Relationship of Online Sexual Risk Behavior and Offline Sexual Risk Behavior

A. Probability of Offline Group Membership Conditional on Online Group Membership

	No-online-risks	Moderate-online-risks	High-online-risks
No-offline-risks	0.99	0.82	0.24
High-offline-risks	0.01	0.18	0.76
Total	1.0	1.0	1.0

B. Probability of Online Group Membership Conditional on Offline Group Membership

	No-offline-risks	High-offline-risks
No-online-risks	0.59	0.03
Moderate-online-risks	0.39	0.51
High-online-risks	0.02	0.46
Total	1.0	1.0

C. Joint Probability of Online Groups and Offline Groups

	No-offline-risks	High-offline-risks	
No-online-risks	0.50	0.00	
Moderate-online-risks	0.33	0.08	
High-online-risks	0.02	0.07	
Total			1.0

Predictors of Group Membership

Table 5.2 displays the distribution of gender and education for each trajectory group. To predict the three online sexual risk groups, we conducted a multinomial logistic regression with sensation seeking, life satisfaction, family cohesion, gender, education, and amount of online communication as independent variables (see Table 5.3). Higher levels of sensation seeking and lower life satisfaction significantly predicted being in the 'moderate-online-risk' or 'high-online-risk' group in comparison to the 'no-online-risk' group.

Moreover, adolescents from less coherent families were more likely to belong to the 'moderate-online-risk' or 'high-online-risk' group. Adolescents following lower levels of education were more likely to be in the 'high-' or 'moderate-online-risk' groups in comparison to the 'no-online-risk' group. Finally, adolescents who spent more time with online communication were more likely to belong to the 'high-' or 'moderate-online-risk' groups in comparison to the 'no-online-risk' group. Online communication and gender also significantly differentiated between adolescents in the 'moderate-' and 'high-online-risk' group with more boys and adolescents who spend more time communicating online belonging to the 'high-online-risk' group.

A logistic regression analysis with the two offline sexual risk groups as the dependent variable showed that sensation seeking and educational level were significant predictors of offline sexual risk behavior.

Table 5.2. Distribution of Gender and Education for Online and Offline Sexual Risk Behavior Groups

	Gender		Education		
	Males	Females	Low level	Middle level	High level
No-online-risk (N=1237), %	49.4	50.6	48.0	27.2	24.8
Moderate-online-risk (N = 417), %	52.8	47.2	55.9	23.1	21.1
High-online-risk (N = 108), %	62.0	38.0	62.4	25.7	11.9
No-offline-risk (N = 1597)	50.2	49.8	49.3	26.8	23.9
High-offline-risk (N = 165)	58.2	41.8	64.9	19.5	15.6

Note. Gender differences: for online sexual risk behavior $\chi^2 = 7.06$, *Cramer's V* = 0.06; $p < .05$. For offline sexual risk behavior $\chi^2 = 3.79$, *Cramer's V* = 0.05; $p = 0.05$.
Differences in education: for online sexual risk behavior behavior $\chi^2 = 16.21$, *Cramer's V* = 0.07; $p = 0.01$. For offline sexual risk behavior $\chi^2 = 13.77$, *Cramer's V* = 0.09; $p < 0.01$.

Table 5.3. Results of the (Multinomial) Logistic Regressions for the Online and Offline Sexual Risk Groups

			95% CI for odds ratio		
	B(SE)		Lower	Odds ratio	Upper
No-online-risk vs. Moderate-online-risk					
Intercept	-0.37	(0.58)			
Sensation seeking	0.38	(0.08)***	1.25	1.47	1.71
Life satisfaction	-0.26	(0.09)**	0.65	0.77	0.92
Family cohesion	-0.26	(0.08)**	0.66	0.77	0.91
Gender	-0.16	(0.14)	0.65	0.85	1.12
Education	-0.14	(0.07) †	0.74	0.87	1.02
Online communication	0.12	(0.03)***	1.05	1.12	1.20
No-online-risk vs. High-online-risk					
Intercept	-0.73	(1.02)			
Sensation seeking	0.39	(0.14)**	1.13	1.47	1.93
Life satisfaction	-0.30	(0.16) †	0.55	0.74	1.01
Family cohesion	-0.50	(0.13)**	0.45	0.61	0.81
Gender	-0.78	(0.22)**	0.28	0.46	0.74
Education	-0.33	(0.15)*	0.63	0.72	0.98
Online communication	0.32	(0.06)***	1.23	1.38	1.55
Moderate-online-risk vs. High-online-risk					
Intercept	-0.36	(0.97)			
Sensation seeking	0.01	(0.14)	0.76	1.01	1.33
Life satisfaction	-0.04	(0.15)	0.70	0.96	1.32
Family cohesion	-0.25	(0.14)	0.58	0.78	1.05
Gender	-0.63	(0.23)*	0.32	0.53	0.88
Education	-0.18	(0.15)	0.61	0.83	1.15
Online communication	0.21	(0.06)**	1.09	1.23	1.39
No-offline-risk vs. High-offline-risk					
Constant	-3.37	(.78)***			
Sensation seeking	0.88	(.11)***	1.94	2.41	3.00
Life satisfaction	-0.13	(.12)	0.70	0.88	1.10
Family cohesion	-0.16	(.11)	0.69	0.85	1.05
Gender	-0.04	(.18)	0.68	0.96	1.37
Education	-0.40	(.12)**	0.53	0.03	0.85

Note. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. For online sexual risk behavior, $R^2 = .10$ (Cox & Snell), .13 (Nagelkerke). Model $\chi^2(12) = 146.32$, $p < .001$.
For offline sexual risk behavior, $R^2 = 0.06$ (Cox & Snell), .13 (Nagelkerke). Model $\chi^2(5) = 98.33$, $p < .001$.

Discussion

This study examined the developmental pathways of online and offline sexual risk behavior from early to late adolescence. Using a group-based modeling approach, we found substantial variation in the developmental course of online and offline sexual risk engagement. For engagement in online sexual risk behavior, three distinct groups were identified. One large group of adolescents did not engage in online sexual risk behavior during adolescence. A second group showed moderate levels of risk engagement, and a third group showed higher levels of risk engagement. The 'moderate-' and 'high-online-risk' groups followed the typical developmental pathway of risk behavior, with an increase from early to mid-adolescence, a peak in mid-adolescence, and a decline thereafter (Dahl, 2004; Jessor, 1992; Steinberg & Morris, 2001). The 'high-online-risk' group is comparable to the adolescence-limited group proposed by Moffitt (1993). This finding suggests that online sexual risk behavior follows pathways similar to many offline risk behaviors. During adolescence, individuals may show a heightened engagement not only in offline risk behavior but also in online risk behavior.

Identifying these groups advances our understanding of the rather new phenomenon of online sexual risk behavior. In contrast to public concerns and fears (Ponte et al., 2009), the majority of adolescents behaved responsibly online. Engagement in online sexual risk behavior is, similar to many types of offline risk behavior, not a mass phenomenon among youth; rather, it is confined to a small group of adolescents.

The identified developmental pathways of online sexual risk behavior extend previous findings on age differences in online sexual risk behavior. A previous cross sectional study that averaged the levels of online sexual risk engagement for several adolescent and adult age groups did not reveal any age differences for middle adolescents and adults (Baumgartner et al., 2010b). This result may be due to the cross-sectional nature of that study, which investigated different individuals for each age group. Another reason may be that averaging the levels of online sexual risk engagement masks important differences across individuals. Even if our 'high-online-risk' group decreases its online sexual risk behavior in the transition to adulthood, this group may still retain a certain level of online risk during adulthood. It is also possible that some individuals engage in online sexual risk behavior only later in life because of specific life events. Future research is needed to understand the developmental course of online sexual risk behavior not only in adolescence but also in adulthood.

For offline sexual risk behavior, we identified two distinctive trajectories. Similar to online sexual risk behavior, we found one large group that showed no risk engagement over the course of adolescence. This finding indicates that the majority of adolescents in the sample did not engage in offline sexual risk behavior at all. However, one small group

showed increasing levels of risk engagement over the course of adolescence. This group started at low levels of risk engagement at age 12, increased their risk engagement until age 18 when it slightly leveled off.

These two trajectories were also found in previous research on the development of offline sexual risk behavior (Moilanen et al., 2010; Murphy et al., 2009). However, previous research has identified two more groups: a constantly-high group and a decreasing group (Moilanen et al., 2010). Moreover, the high risk group in previous studies consisted of more individuals than in our study. These differences may be due to the inclusion of younger age groups in our sample. The decreasing-risk groups in previous studies typically decreased their behavior only in their early twenties (Moilanen et al., 2010; Murphy et al., 2009). Such a group could not be identified with our adolescent sample. These differences may be also due to the broader conceptualization of risk behavior in previous study. Previous research has also included items such as whether adolescents ever had sex and the numbers of sexual partners (Kotchick et al., 2001). By including these more general items, previous studies may have found more inter-individual variation. The study extends previous findings by showing that adolescents that follow the high offline sexual risk trajectory may already start engaging in these risks early in adolescence.

A second important finding of this study is that the developmental trajectories of online and offline sexual risk behavior were closely related. The results clearly support the co-occurrence hypothesis of online and offline sexual risk behavior. The displacement hypothesis could not be supported. The finding that online and offline sexual risk behavior co-occur is in line with previous studies on the relationship between online and offline behavior (Valkenburg et al., 2011). This finding is also in line with previous studies that have established that risk behaviors are typically linked (Kotchick et al., 2001). This study was the first to reveal a relationship between online and offline sexual risk behaviors. Most importantly, our findings show that nearly all of the adolescents who engaged in high levels of risky sexual offline behavior also engaged in increased levels of online sexual risk behavior. This finding suggests that adolescents who engage in high levels of offline sexual risk behavior also use the Internet for sexual experimentation.

There are at least two explanations for the strong overlap between online and offline sexual risk behavior. The first explanation is that engagement in one behavior increases the likelihood of engaging in the other behavior (Igra & Irwin, 1996). For example, searching for sexual partners online may subsequently lead to casual sex with these partners. It may also be that adolescents first experiment with their sexuality online before they dare or have the possibility to engage in sexual behaviors offline. Our findings partly support this argument because online sexual risk behavior peaked earlier during

adolescence than offline sexual risk behavior. It may thus be that online sexual risk behavior is a precursor of offline sexual risk behavior.

The second explanation for the strong overlap between both behaviors is that they are determined by common factors (Igra & Irwin, 1996). The results showed that high levels of sensation seeking and lower education in particular were predictors of both behaviors. These factors also predict a variety of other risk behaviors (Arnett, 1996). Some adolescents may thus be predisposed by psychological as well as social factors to engage in a variety of risk behaviors.

Determining the predictors of online and offline sexual risk behavior allows us to identify adolescents in high-risk groups and potentially tailor preventions to these adolescents. Adolescents engaging in online sexual risk behavior were less satisfied with their lives, had higher levels of sensation seeking, came from less cohesive families and were lower educated. Moreover, these adolescents spent more time with online communication. It seems that adolescents who are troubled in their everyday lives may turn to the internet as a substitution for missing offline gratifications (Wolak, Mitchell, & Finkelhor, 2003). Therefore, parents, teachers, and practitioners may be well advised to pay particular attention to adolescents who are not satisfied with their lives in order to prevent potentially adverse online sexual risk behavior in this group. Concerning the prevention of online and offline sexual risk behavior, the findings suggest that public campaigns may particularly center on adolescent sensation seekers and choose formats and techniques that these adolescents value (Morgan, Palmgreen, Stephenson, Hole, & Lorch, 2003; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001). Finally, the findings suggest that prevention programs should target low-educated adolescents in particular.

Some limitations of the study should be noted. First, the measurement of online sexual risk behavior is limited to sexual online communication with strangers. Other potentially risky sexual online behaviors, such as sending sexual material to friends, have not been investigated in this study. The interpretation of the findings should thus be limited to the four behaviors we measured. For future studies it would be desirable to include additional sexual risk behaviors. To further advance our understanding of the meaning of online activities in adolescent sexual development, it may also be important to investigate developmental pathways of healthy online sexual behavior. Similarly, offline sexual risk behavior in this study was conceptualized as engaging in casual sexual intercourse. Although this behavior is considered a particularly ‘risky’ form of offline sexual risk behavior (Heldman & Wade, 2010), it would be desirable for future studies to incorporate a broader measurement of offline sexual behavior to fully reflect adolescents sexual development and not only the development of risky sexual behavior.

In sum, the present study provides a detailed picture of the developmental pathways of online and offline sexual risk behavior as well as the interrelations of these two behaviors. The findings suggest that adolescents' online and offline behaviors are closely related. Although online and offline sexual risk taking is behaviorally very different (e.g. searching for sexual partners online vs. engaging in casual sex), the same adolescents engage in high levels of online and offline sexual risk behavior. In particular for adolescents who are prone to engage in high levels of offline sexual risk behavior, the Internet may be a place to experiment with their sexuality before engaging in offline sexual risk behavior. Thus, to fully comprehend the development of adolescents' sexual risk behavior, researchers should also take adolescents' sexual online behavior into account.

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6

Adolescents' Online Sexual Risk Behavior and its Relationship to Negative Online Experiences

Abstract

The aim of this study was to investigate whether adolescents who follow heightened pathways of online sexual risk behavior during adolescence are more likely to encounter negative online experiences, such as online sexual solicitation, online harassment, and online rumination. Repeated-measures ANOVA showed that adolescents assigned to three online sexual risk groups identified in the previous chapter, differed significantly in their negative online experiences. The 6% of adolescents who followed the high online risk trajectory experienced the highest levels of online sexual solicitation, online harassment, and online rumination. Adolescents who did not engage in online sexual risk behavior were also less likely to be sexually solicited or harassed online, and to ruminate about experiences they made online. Engaging in online sexual risk behavior, therefore, was related to these negative online experiences.

Adolescents' Online Sexual Risk Behavior and its Relationship to Negative Online Experiences

The findings presented in the previous chapter indicated that adolescents differ in their developmental pathways of online sexual risk behavior during the course of adolescence. Whereas many adolescents did not engage in these risk behaviors at all, others showed heightened developmental pathways of online sexual risk behavior. The results presented in Chapter 5 also indicated that adolescents who showed heightened pathways of online sexual risk behavior differed from adolescents who did not engage in online sexual risk behavior in specific personality characteristics, in their family situation, and education.

Engaging in online sexual risk behavior may have all kinds of negative as well as positive consequences for adolescents. As with most risk behaviors, occasional engagement in risk behavior may not be problematic and may even be adaptive for adolescent development (Jessor, 1992). Showing stable patterns of risk behavior may be more problematic and may increase the likelihood of negative outcomes (Compas, Hinden, & Gerhardt, 1995). For example, Ybarra, Mitchell, Finkelhor, and Wolak (2007) showed that engagement in various types of online risks is more influential in explaining online harassment and online sexual solicitation than is engagement in one specific risky online behavior. However, this study investigated patterns of online risks cross-sectionally without considering the stability of this behavior over time. Therefore, it is still unknown how different developmental pathways of risk behavior are related to negative online experiences. Previous research suggests at least three potentially negative outcomes of online risk behavior that deserve attention: online harassment, online sexual solicitation, and online rumination (Livingstone, Haddon, Görzig, & Olafsson, 2010; Ybarra et al., 2007).

The aim of the present chapter is to examine how the developmental pathways of online sexual risk behavior are related to these three types of negative online experiences.

Negative Online Experiences

Online sexual solicitation and online harassment can be subsumed under the term online victimization (Ybarra et al., 2007). Online sexual solicitations are unwanted requests to talk about sex online or to act sexually on the internet. Previous research has shown that a small but consistent number of adolescents experiences incidences of sexual solicitation on the internet (Baumgartner, Valkenburg, & Peter, 2010; Mitchell, Finkelhor, & Wolak, 2001). Most studies have suggested that girls are more often sexually solicited online than boys. Mitchell et al. (2001), for instance, showed that 27% of female

adolescents have been sexually solicited. In contrast, only 12% of male adolescents indicated that they were victims of unwanted online sexual solicitation. Similarly, Baumgartner et al. (2010) showed that 19% of female adolescents but only 6% of male adolescents have been sexually solicited online in the past half year. Research has shown that in nearly half of the incidences perpetrators of sexual solicitations were other youths, or young adults aged between 18 and 25 years (Wolak, Mitchell, & Finkelhor, 2006). In most incidences, youths had met the perpetrators of online sexual solicitations online (86%). Thus, youth receive online sexual solicitations mainly from strangers with whom they communicate on the internet (Wolak et al., 2006).

Communicating with strangers on the internet, therefore, increases the chance of receiving unwanted online sexual solicitations. Mitchell, Finkelhor, and Wolak (2007) also indicated that in particular, talking to strangers about sex online increases the chance of receiving unwanted online sexual requests. Therefore, it may be assumed that engaging in online sexual risk behavior is related to online sexual solicitation. Adolescents who talk about sex online or who search for sexual partners online are more likely to encounter persons online who send them sexual requests that adolescents do not appreciate. We hypothesize:

> *H1*: Adolescents who follow pathways of heightened online sexual risk behavior experience incidences of online sexual solicitation more often than do adolescents who follow pathways of less online sexual risk behavior or who do not engage in online sexual risk behavior.

A second type of online victimization is online harassment. Online harassment occurs when someone acts aggressively against another person on the internet. These aggressive acts include bullying or harassing someone online and the spreading of the victims' personal information to others (Tokunaga, 2010). Similar to online sexual solicitation, also specific online behaviors can predict online harassment. For example, Ybarra et al.'s (2006) study indicated that the use of chat rooms, blogs, and instant messaging predict online harassment. Moreover, frequency of internet use and posting personal information online have been related to online harassment (Walrave & Heirmann, 2009). Accordingly, we expect that adolescents who engage in higher levels of online sexual risk behavior are more likely to being harassed online. Adolescents who send sexual pictures to others may risk that this material is forwarded to others without their consent. Moreover, disclosing sexual information to strangers online may make them vulnerable to data misuse. We, therefore, hypothesize:

H2: Adolescents who follow pathways of heightened online sexual risk behavior experience incidences of online harassment more often than do adolescents who follow pathways of less online sexual risk behavior or who do not engage in online sexual risk behavior.

Online rumination refers to recurring thoughts about negative online experiences. Online rumination occurs when adolescents experience something on the internet that distresses them. These distressing experiences may result in prolonged worries. In a European study it has been shown that 3% to 26% of the adolescents, depending on the country of the study, had encountered something on the internet that had bothered them afterwards (Livingstone et al., 2010). In the Netherlands, where the present study was conducted, 21% of the adolescents had been bothered by internet experiences (Livingstone et al., 2010). Online rumination is worrisome because it may lead to psychological problems. Adolescents who frequently worry about their online experiences may be less satisfied with their lives and may develop internalizing problems.

We expect that adolescents who frequently engage in online sexual risk behavior may also encounter various incidences online that may bother them afterwards. We, therefore, hypothesize:

H3: Adolescents who follow pathways of heightened online sexual risk behavior report more online rumination than adolescents who follow pathways of less online sexual risk behavior or who do not engage in online sexual risk behavior.

Although it has been previously assumed that online sexual risk behavior is related to negative online experiences, research supporting this claim is still missing. Based on the online risk groups identified in the previous chapter, the current chapter examines the relationship between online sexual risk behavior and negative online experiences. Previous research reported two important factors that predict negative online experiences, gender and online communication (Baumgartner et al., 2010; Mitchell et al., 2001; Walrave & Heirmann, 2009). In general, girls are more likely to be victimized online and to ruminate about negative online experiences than boys (Livingstone et al., 2010). Moreover, the frequency of online communication is also related to being victimized, with adolescents who communicate online more frequently being more likely to experience negative incidences. Therefore, we included these two variables as control variables in our analyses.

Method

Sample and Data Analytical Approach

The data used in this study were drawn from the four-wave panel study among 1,765 Dutch adolescents. We took the three groups of adolescents who followed specific developmental pathways in the previous chapter as a starting point (see Figure 5.1). To investigate whether these three risk groups differ in negative online experiences at all four time points, repeated-measures ANOVA were conducted. Instead of looking at the average level of negative online experiences across the four waves, the repeated-measures ANOVAs allow for investigating group differences for each time point thereby indicating whether the effects are consistent over time. The trajectory groups were taken as independent variables and the three types of negative online experiences as dependent variables. Because repeated-measures ANOVA cannot handle missing data, only those adolescents who participated in all four waves were included in the analyses (N = 1,016).

Measures

Negative online experiences. Three types of negative online experiences were included in the study: unwanted online sexual solicitation, online harassment, and online rumination.

Unwanted online sexual solicitation. Online sexual solicitation was measured using two items. Participants were asked two questions: 1) 'How often in the past six months did anyone ask you online to talk about sex when you did not want to?' 2) 'How often in the past six months did anyone ask you online to do something sexual when you did not want to?' Response categories were 0 (*never*), 1 (*once*), 2 (*twice*), 3 (*three to five times*) and 4 (*six times or more*). An index was calculated by taking the mean score of the two variables. Correlations of the two items for the four time points were .75, .73, .73, and .64, respectively. Mean scores of the scale were (M = 0.16, SD = 0.56 for Time 1; M = 0.10, SD = 0.42 for Time 2; M = 0.10, SD = 0.45 for Time 3; M = 0.09, SD = 0.41 for Time 4).

Online harassment. We assessed online harassment by asking participants to rate how often in the past six months 'have you been harassed on the internet', 'have you been bullied on the internet', and 'did someone send personal information from you to someone else when you did not want that? Frequency of online harassment was rated on a five point scale, ranging from 0 (*never*) to 4 (*six times or more*). An index was calculated by taking the mean score of the three variables. Cronbach's alpha ranged from .70 to .77 at the four time points. Mean scores of the scale were (M = 0.25, SD = 0.57 for Time 1; M = 0.19, SD = 0.48 for Time 2; M = 0.17, SD = 0.44 for Time 3; M = 0.13, SD = 0.42 for Time 4).

Online rumination. Online rumination was measured with the following two questions: 1) How often in the past six months did you ruminate about something that had happened on the internet? 2) How often in the past six months did you keep thinking about something that had happened to you on the internet? Response categories ranged from 0 (*never*) to 4 (*very often*). The two items correlated strongly at all four waves, with correlation coefficients ranging from .81 to .89. Mean scores (standard deviations in parentheses) for this scale were 0.54 (0.85), 0.43 (0.74), 0.40 (0.76), and 0.32 (0.65), respectively.

Control variables. Frequency of online communication and gender were included as control variables in the analyses. Frequency of online communication was assessed with three items. Participants were asked to indicate how frequently they use instant messaging, internet chats, and social networking sites. Response categories ranged from 0 (*never*) to 10 (*every day*). The mean score of the three items was taken as an indication of the frequency of online communication at each time point. For the analyses, an average score for online communication at all four time points was calculated. The mean score of this index was 4.76 (*SD* = 1.80).

Results

At the four time points of data collection, 12.3%, 8.6%, 7.5%, and 7.3% of the adolescents reported being sexually solicited at least once in the past six months. Likewise, 28.1%, 22.5%, 20.9%, and 16.4% reported being harassed online at least once in the past six months. For online rumination, 37.9%, 32.3%, 28.3, and 24.8% of the adolescents reported having at least once in the past six months ruminated online in the four waves. Online sexual solicitation and online harassment correlated moderately between .52 and .60 at the four time points. Correlations between online sexual solicitation and online rumination ranged from .25 to .34 and correlations between online rumination and online harassment ranged from .35 to .40.

To investigate whether adolescents in the three online sexual risk groups differ in their experience of negative online incidences, three repeated-measures ANOVAs were conducted with the three groups as independent variable and the three negative online experiences as dependent variables. Gender and frequency of online communication were included as control variables in all ANOVAs. Figure 6.1 displays the results of these ANOVAs. Table 6.1 displays all means and standard deviations for the three online risk groups.

Hypothesis 1 stated that adolescents following heightened developmental pathways of online sexual risk behavior experience incidences of online sexual solicitation more often compared to adolescents who follow pathways of less online sexual risk behavior. In line with Hypothesis 1, the repeated-measures ANOVA with online sexual solicitation as

dependent variable yielded a significant main effect of group membership, $F(2, 1011) = 82.90$, $p < .001$, *partial* $\eta^2 = .14$ (see Figure 6.1 and Table 6.1). This main effect indicates that adolescents assigned to three different risk groups differed in their experience of online sexual solicitation. More specifically, adolescents assigned to the high online risk group experienced significantly more online sexual solicitation than adolescents in the other two groups. Games-Howell post-hoc tests indicated that all three groups differed significantly from each other in their level of online sexual solicitation (all $p < .001$). These findings support Hypothesis 1. In addition, the analysis yielded a small but significant main effect of the frequency of online communication, $F(1, 1011) = 10.49$, $p < .01$, *partial* $\eta^2 = .01$, and for gender, $F(1, 1011) = 27.43$, $p < .001$, *partial* $\eta^2 = .03$, and a significant interaction effect of group membership by time, $F(6, 3033) = 5.51$, $p < .001$, *partial* $\eta^2 = .01$. This interaction effect of group membership by time is most likely due to the slight decrease in online sexual solicitation at Time 2. The main effects of gender and frequency of online communication suggest that more females than males experienced online sexual solicitations and that adolescents who communicated more often online were more likely to experience online sexual solicitations.

Hypothesis 2 stated that adolescents who follow heightened pathways of online sexual risk behavior experience incidences of online harassment more frequently compared to adolescents who follow pathways of less online sexual risk behavior. As expected, the repeated-measures ANOVA yielded a significant main effect of group membership on online harassment, $F(2, 1011) = 89.45$, $p < .001$, *partial* $\eta^2 = .15$. Post-hoc analyses revealed that all three online risk groups differed significantly in their experience of online harassment, with the high risk group experiencing the highest levels of harassment and the no risk group the lowest levels (all $p < .001$). Hypothesis 2 was therefore supported (see Figure 6.1 and Table 6.1). In addition, a significant main effect of frequency of online communication, $F(1, 1011) = 23.80$, $p < .001$, *partial* $\eta^2 = .02$, and a significant main effect of gender, $F(1, 1011) = 16.65$, $p < .001$, *partial* $\eta^2 = .02$ were found. No main effect of time and no interaction effect were found. The main effects of gender and frequency of online communication suggests that females experienced higher levels of online harassment than males and that adolescents who communicated online more frequently were more likely to experience online harassment.

Hypothesis 3 stated that adolescents who follow pathways of heightened online sexual risk behavior report more online rumination compared to adolescents who follow pathways of less online sexual risk behavior. In line with Hypothesis 3, the repeated-measures ANOVA yielded a significant main effect of group membership, $F(2, 1011) = 85.34$, $p < .001$, *partial* $\eta^2 = .14$. Subsequent post-hoc tests showed that all three online risk groups differed significantly in their experience of online rumination with the high risk

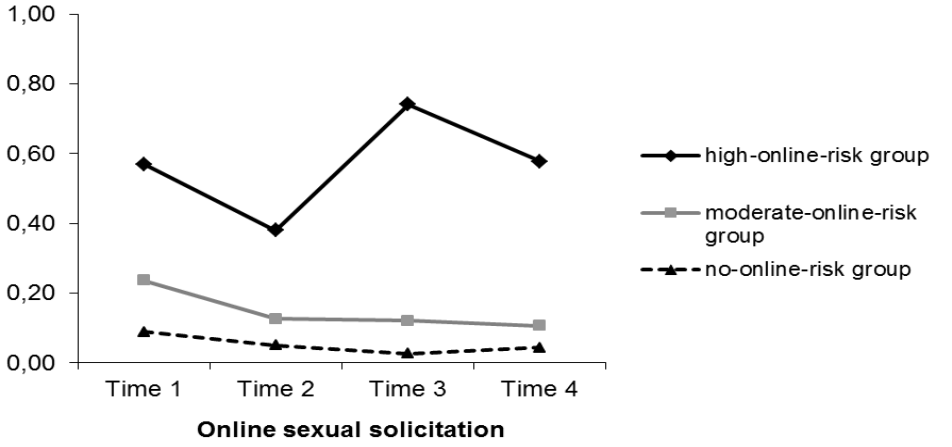
group experiencing the highest levels and the no risk group the lowest levels of online rumination (all $p < .001$). Hypothesis 3 was therefore also supported (see Figure 6.1 and Table 6.1). Moreover, the ANOVA yielded a significant main effect of frequency of online communication, $F(1, 1011) = 7.58$, $p < .01$, *partial* $\eta^2 = .01$ on online rumination. No main effect of gender and time were found. There were also no significant interaction effects. The main effect for the frequency of online communication suggests that adolescents who spend more time communicating online are also more likely to ruminate about negative online experiences.

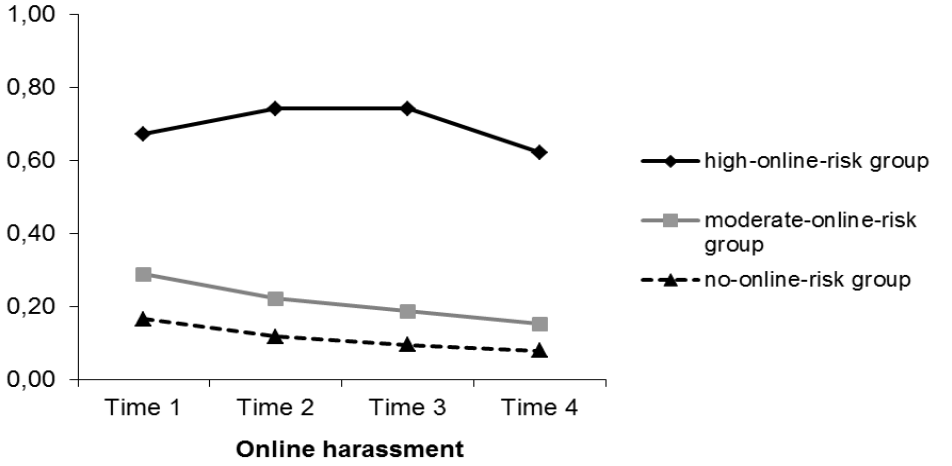
Because all three dependent variables were skewed, we conducted additionally Kruskal-Wallis tests to account for the skewness of the data. These tests are non-parametric and can therefore be used for non-normally distributed data. The findings from the Kruskal-Wallis tests supported the findings from the repeated-measures ANOVAs. The three online risk groups differed significantly from each other in their experiences of online sexual solicitation ($H_{t1}(2) = 100.18$, $H_{t2}(2) = 83.81$, $H_{t3}(2) = 146.96$, $H_{t4}(2) = 75.75$, all $p < .001$), online harassment ($H_{t1}(2) = 85.29$, $H_{t2}(2) = 82.94$, $H_{t3}(2) = 75.84$, $H_{t4}(2) = 73.92$, all $p < .001$), and online rumination ($H_{t1}(2) = 96.92$, $H_{t2}(2) = 89.59$, $H_{t3}(2) = 57.52$, $H_{t4}(2) = 78.91$, all $p < .001$).

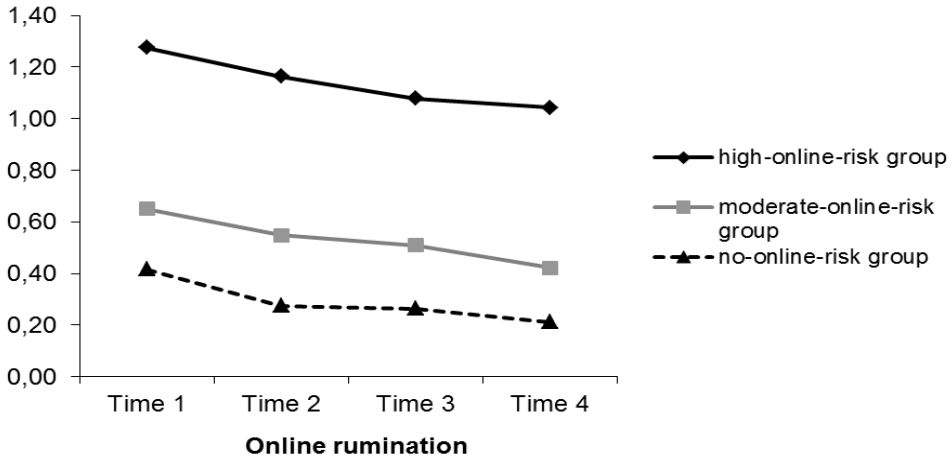
Table 6.1. Means and Standard Deviations for the Negative Online Experiences

	No-online-risk group M (SD)	Moderate-online-risk group M (SD)	High-online-risk group M (SD)
Online sexual solicitation			
Time 1	0.09 (0.40)	0.24 (0.68)	0.57 (1.00)
Time 2	0.05 (0.30)	0.13 (0.42)	0.38 (0.81)
Time 3	0.02 (0.24)	0.12 (0.44)	0.74 (1.10)
Time 4	0.04 (0.26)	0.11 (0.41)	0.58 (1.07)
Online harassment			
Time 1	0.17 (0.47)	0.29 (0.55)	0.67 (0.85)
Time 2	0.12 (0.35)	0.22 (0.51)	0.74 (0.93)
Time 3	0.09 (0.30)	0.19 (0.43)	0.74 (0.87)
Time 4	0.08 (0.27)	0.15 (0.42)	0.62 (1.04)
Online rumination			
Time 1	0.42 (0.75)	0.65 (0.91)	1.28 (1.12)
Time 2	0.28 (0.57)	0.55 (0.77)	1.16 (1.20)
Time 3	0.26 (0.60)	0.51 (0.83)	1.08 (1.22)
Time 4	0.21 (0.51)	0.42 (0.72)	1.04 (1.06)

Figure 6.1. Group Differences in Online Sexual Solicitation, Online Harassment, and Online Rumination for the Three Online Sexual Risk Groups







Discussion

The aim of the present study was to investigate whether following specific pathways of online sexual risk behavior is related to negative online experiences. In line with our expectations, all three risk groups differed clearly in their experience of online victimization. More specifically, adolescents who followed the high online risk trajectory experienced higher levels of online sexual solicitation and online harassment compared to adolescents who followed pathways of low or no risk engagement. Even adolescents who engaged in low levels of online sexual risk behavior were more at risk of experiencing these online victimizations compared to those who did not engage in online sexual risk behavior. However, most pronounced was the difference between the high risk group and the other two.

This finding can be related to previous studies showing that engagement in multiple types of online risk behavior is more likely to lead to online victimization than engagement in only one specific type of online risk behavior (Ybarra et al., 2007). Our study extends these findings by showing that recurrent and consistent risk engagement is most strongly related to online victimization in contrast to more incidental risk engagement. This indicates that preventions should target particularly adolescents in the high-online-risk group.

It is important to note that the majority of adolescents did not engage in online sexual risk behavior; thus these adolescents were not likely to be solicited or harassed online. This indicates that one important risk factor for online victimization is the active engagement in online sexual risk behavior. Previous studies have shown that adolescents who harassed others on the internet were more likely to be harassed online themselves (Kowalski & Limber, 2007). Our study shows that not only harassing others online but also online sexual risk behavior is related to online victimization experiences. Together, these findings suggest that adolescents may be able to actively influence their risk of being victimized online by changing their online behaviors.

As expected, the three developmental pathways of online sexual risk behavior were also related to online rumination. This indicates that adolescents following pathways of heightened risk engagement are more likely to have online experiences that worry them afterwards. This study did not assess the cause of these worries. It could be that these worries are due to online victimization experiences (Ybarra, Mitchell, Wolak, & Finkelhor, 2006). Ybarra et al. (2006) and Livingstone et al. (2010) showed that not all adolescents are upset by victimization experiences. Many adolescents are not worried by these incidences. However, some aggressive victimization experiences may be worrisome and upsetting for adolescents. The findings of our study suggest that adolescents who engage in online sexual risk behavior may indeed experience more aggressive online incidences that

trouble them afterwards. It could also be that adolescents who engage in online sexual risk behavior have other negative online experiences that bother them afterwards which were not assessed in this study. The finding is of concern because worrying a lot about negative online experiences may be a predictor of future psychological problems, such as low psychological well-being and depression.

Interestingly, the results show that although the frequency of general online communication had a significant effect on online victimization, this effect was much smaller compared to the effect of online sexual risk behavior. This indicates that not the frequency of online communication per se but sexual communication with strangers online may be related to negative online experiences. To prevent this behavior, adolescents' online communication should not be restricted per se; instead, parents and teachers should make adolescents aware of the fact that sexual online communication with strangers may lead to online victimization experiences.

The finding that online sexual risk behavior is related to negative online experiences extends the results from the previous chapter. In Chapter 5, we showed that adolescents belonging to the high-online-risk group differ in sensation seeking, life satisfaction, family cohesion, and education from adolescents in the moderate- and no-online-risk group. The findings from the previous chapter, however, suggested that adolescents following moderate and high levels of online sexual risk behavior did not differ in sensation seeking, life satisfaction, family cohesion, and education. Adolescents following these two developmental pathways were therefore similar on these dimensions. The findings of the present study, however, show that it is still essential to distinguish the two groups that followed two different pathways of risk engagement because they differed highly in their negative online experiences. Although these adolescents were similar on personality and social characteristics, they differed in their negative online experiences.

Although the findings clearly show a strong relationship between risk behavior and negative online experiences, it cannot be conclusively argued that engaging in these behaviors *caused* these negative online experiences. It may also be that the relationship is due to other online experiences that these adolescents have in common. The six-month time intervals of our studies did not allow making more detailed predictions about the causality of the relationship. Future research is needed to investigate short-term and immediate consequences of online sexual risk behavior.

In sum, the present study is the first to provide a detailed picture of the relationship between following specific developmental pathways of online sexual risk behavior and negative online experiences. The findings suggest that in particular youth who engage in risky sexual online behavior experience negative online incidences. This is problematic because being a victim of online harassment may lead to serious psychosocial problems

(Tokunaga, 2010). Therefore, to prevent these negative online experiences, it may be advisable to make youth aware of the potential negative consequences of online sexual risk engagement.

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7

Does Country Context Matter?
Investigating the Predictors of Teen Sexting Across Europe

This chapter has been submitted for publication as:
Baumgartner, S. E., Sumter, S. R., Peter, J., Valkenburg, P. M., & Livingstone, S. (submitted). Does country context matter? Investigating the predictors of teen sexting across Europe.

Abstract

The aim of this study was to investigate (a) individual and country characteristics that explain adolescents' engagement in sexting and (b) individual predictors that vary across countries. At the individual level, we investigated age, gender, sensation seeking, and frequency of internet use. At the country level, we investigated traditionalism, gross domestic product, and broadband penetration. The sample consisted of 14,946 adolescents (49.7% boys) aged 11 to 16 from 20 European countries. Using multilevel modeling, our findings indicated that age, sensation seeking, and frequency of internet use predicted sexting across all countries. The influence of gender varied across countries. Although country characteristics had no direct effect on adolescent sexting, traditionalism significantly predicted gender differences in sexting. In countries that are more traditional, gender differences were stronger with more boys compared to girls engaging in this behavior. In less traditional countries, these gender differences were less apparent or even reversed.

Does Country Context Matter?
Investigating the Predictors of Teen Sexting Across Europe

Sexting – the sending or posting of sexual photos or messages via electronic devices – has received considerable attention from media and researchers. Studies investigating this phenomenon have investigated mainly the prevalence of this behavior as well as age and gender as predictors of this behavior. The prevalence rates differ highly across studies, ranging from 2% to 20% (Livingstone, Haddon, Görzig, & Olafsson, 2011a; Mitchell, Finkelhor, Jones, & Wolak, 2012; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2009). Concerning the predictors of sexting, several studies concluded that older adolescents are more likely to sext than younger adolescents (Lenhart, 2009; Livingstone et al., 2011a; Mitchell et al., 2012). Findings on gender differences, however, are inconclusive. While some studies reported no gender differences in sexting (Hinduja & Patchin, 2010; Lenhart, 2009), other studies repored that more boys than girls send sexts (Baumgartner, Valkenburg, & Peter, 2010; de Graaf, Meijer, Poelman, & Vanwesenbeeck, 2005; Dowdell, Burgess, & Flores, 2011). Moreover, few studies also reported that more girls than boys engage in sexting (Mitchell et al., 2012; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2009).

The differences in prevalence and predictors of sexting, particularly gender differences, may partly result from the characteristics of the country in which the studies were conducted. The vast majority of studies on sexting investigated this behavior in one specific country while cross-national comparisons are widely missing. As a result, contextual factors at the country level have often been ignored. However, it is important to consider the context for at least two reasons. First, the differences in prevalence and frequency of sexting across countries may be due to specific characteristics of a country. For example, in countries with higher internet penetration, adolescents may have more opportunities to engage in this behavior. Second, predictors of sexting may vary across countries. Whereas in some countries, specific individual predictors may have a strong influence on sexting because of particular characteristics of these countries, the same factors may have no or only a weak influence in other countries where these particular characteristics are absent. Investigating contextual factors next to individual factors across different countries may thus provide a more comprehensive picture of youth sexting.

The present study employs data from the EU Kids Online II project, conducted with 14,946 adolescents, 11 to 16-years old, from 20 European countries. This dataset provides a unique opportunity to study sexting from a cross-national perspective. More specifically, the aim of this study is to investigate the factors that explain why adolescents engage in sexting at the individual and the contextual level. At the individual level, we investigate age, gender, and sensation seeking. At the contextual level, we investigate traditionalism.

Frequency of internet use, gross domestic produc, and broadband penetration are included as control variables. Moreover, the study investigates whether individual predictors vary across countries and whether characteristics of the country can explain these variations.

Individual Level Predictors of Sexting

Although in many countries only a minority of adolescents engages in sexting (Lenhart, 2009; Livingstone et al., 2011a; Livingstone & Görzig, 2012), it is important to identify these adolescents to be able to effectively prevent this behavior. Specific individual characteristics at least partly determine whether an adolescent engages in sexting. To date, age and gender are the most frequently studied predictors of sexting. Studies conducted in the U.S. (Lenhart, 2009; Mitchell et al., 2012; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2009) and in Europe (Livingstone et al., 2011a) consistently report that older adolescents are more likely to engage in sexting compared to younger adolescents. The increase in sexting behaviors during this age period may be explained by the strong increase in sexual interest during this period (DeLamater & Friedrich, 2002) as well as with an increased use of the internet and mobile phones (Lenhart, Madden, & Hitlin, 2005; Livingstone et al., 2011a). Mid-adolescents are much more interested in sexuality than early adolescents. In addition, older adolescents use the internet more and at the same time, their parents may supervise and monitor their use less frequently. They may thus have more opportunities to engage in sexting.

Gender differences in sexting are less conclusive. Although typically boys are more likely to use the Internet to satisfy their sexual interests than girls (e.g. by using sexually explicit internet material) (Peter & Valkenburg, 2011), the results on gender differences in sexting are mixed. In the US, Mitchell et al. (2012) reported that more girls than boys send sexts (Mitchell et al., 2012). Several other studies reported no gender differences (Hinduja & Patchin, 2010; Lenhart, 2009). In a qualitative study, Ringrose et al. (2012) examined the meanings of sexting for boys and girls. They found that in the case of sexting, as with many types of sexual behavior, a strong double-standard prevailed. Boys frequently pressured girls into sending sexual pictures, however, girls and boys did not approve of girls sending sexual messages. Furthermore, it was perceived as normal for boys to produce and show off with these images of themselves (Ringrose, Gille, Livingstone, & Harvey, 2012).

In addition to age and gender, psychological characteristics of youth may determine their sexting behavior. One of the most consistent predictors of adolescents' online and offline sexual behavior is sensation seeking. Individuals with high levels of sensation seeking typically report higher numbers of sexual partners (Bancroft et al., 2004; Donohew et al., 2000), they are more likely to engage in casual sex (Seto, Lalumiere, & Quinsey,

1995), and to have unprotected sex (Kalichman, Heckman, & Kelly, 1996). Sensation seeking has also been related to online sexual behaviors, such as compulsive sexual online behaviors (Cooper, Delmonico, & Burg, 2000), usage of online pornography (Peter & Valkenburg, 2006), and engagement in online sexual risk behavior (Baumgartner, Sumter, Valkenburg, & Peter, 2012). Adolescents with high levels of sensation seeking typically search for stimulations in their lives. They may be willing to send sexting messages because they value the excitement and may be less likely to consider potential negative consequences.

Bringing the Context in: Country Differences in Sexting

Most studies on the predictors of adolescents' online behavior and their sexting behavior in particular considered only individual characteristics. Although individual factors are important in explaining behavior, evidence also suggests that broader contextual variables may also influence adolescents' online behavior. Many theories of adolescent development consider the social and cultural context in which children grow up as an important determinant of their behavior (Bronfenbrenner, 1979; Igra & Irwin, 1996). However, empirical studies that considered the broader context are largely missing (Kotchick, Shaffer, & Forehand, 2001). To investigate the influence of country characteristics on teen sexting, it is necessary to compare different countries with each other. Comparing sexting across countries provides the opportunity to not only compare prevalence rates across countries, but also explain these country differences with specific country characteristics. Taking country characteristics into consideration thus helps to explain why sexting is more likely to occur in specific countries and less likely to occur in others.

Cultural values prevailing in a society are one of the most important country characteristics that may influence sexting behavior. Cultural values shape the daily practices, attitudes, and behaviors of a society (Schwartz & Boehnke, 2004). Values are supported and fortified by institutions, such as schools, families, and media and thereby influence the attitudes and behaviors of individuals within a society (DeLamater, 1981; Sprecher, Hatfield, Cortese, Potapova, & Levitskaya, 1994). In this study, we focus on one specific value, namely traditionalism. According to Schwartz' theory of basic human values, traditionalism is defined as "respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide" (Schwartz, 1994).

Traditional countries are characterized by conservative worldviews, unequal gender roles, and restrictive sexual attitudes (Boehnke, 2011; Wood & Eagly, 2010). Previous research has shown that risk taking is less prominent in traditional countries (Arnett & Balle-Jensen, 1993; Kloep, Gueney, Cok, & Simsek, 2009). This may be due to the

restrictive upbringing of children in traditional cultures (Alwin & Felson, 2010). In particular, in terms of sexuality, traditional countries may strongly restrict adolescents' behavior (Sharabany, Eshel, & Hakim, 2008; Widmer, Treas, & Newcomb, 1998).

Although European countries are homogeneous in many aspects, differences in cultural values persist within these countries (Widmer et al., 1998). In particular, the northwestern European countries, such as Sweden, Denmark, and Norway, are characterized by more permissive sexual attitudes (Arnett & Balle-Jensen, 1993; Weinberg, Lottes, & Shaver, 1995) compared to southern European and some eastern European countries, like Italy and Poland (Widmer et al., 1998). These differences in values are observable, for example, in different sex education programs at schools (Parker, Wellings, & Lazarus, 2009). Adolescents in traditional countries may thus be less likely to engage in sexual behaviors. It may therefore be assumed that sexting is less prevalent in traditional countries.

Interactions Between Individual Level and Country Level Characteristics

National research on the individual predictors of sexting typically assumes, at least implicitly, that the effects of these individual factors are generalizable to other countries. However, whether this is true, has rarely been tested. Country characteristics may not only have a direct effect on adolescents' sexting behavior, but may also moderate the effects of individual predictors on sexting. Due to specific characteristics of a country, some individual characteristics may have a stronger effect on sexting in one country than in another.

As discussed above, traditional values are strongly related to specific gender roles (Sprecher et al., 1994; Wood & Eagly, 2010). These values determine whether women are subjected to more or less social restrictions concerning the expression of their sexuality (DeLamater, 1981). As a result, countries can be characterized as sexually restrictive (traditional) or sexually permissive (non-traditional). Sexually permissive and restrictive countries have different views concerning gender-appropriate sexual behavior. In sexually restrictive countries, traditional gender roles promote sexual passiveness of women and dominance and agency of men (Kiefer & Sanchez, 2007; Marston & King, 2006). In these countries, the sexuality of women is subjected to more social restrictions compared to the sexuality of men (Weinberg et al., 1995). In contrast, in more sexually permissive countries, such as the Scandinavian countries, it is normative for women to express their sexual wishes and desires (Weinberg et al., 1995). In these countries, female sexuality is characterized by more active sexual behaviors of women. Gender differences in permissive societies are generally much less pronounced than in traditional, sexually restrictive societies (Petersen & Hyde, 2010).

It may therefore be expected that in less traditional societies, gender differences in sexting are less pronounced compared to more traditional countries. This is in line with a recent meta-analysis (Petersen & Hyde, 2010) that found smaller gender differences in sexual behaviors in countries with greater gender equity. In permissive societies, it is more appropriate for adolescent girls to express their sexuality. Thus, they may be more willing to send sexual messages or pictures. In countries that are more more traditional, this behavior may be perceived as inappropriate for adolescent girls. In these countries, more boys than girls may engage in sexting. Inconsistent gender differences found in previous studies on sexting may therefore at least partly be explained by the traditionalism of a country.

Although the effects of cultural values may be most prominent for culturally determined individual characteristics, such as gender, it may also influence the relation of sensation seeking and age with sexting. For example, Arnett (1992) suggests that whether sensation seeking leads to risk behavior among adolescents depends on the social context of these adolescents. Arnett (1992) argues that sensation seeking makes risk behaviors more likely but it is the broader context of the socialization environment including cultural values which determines whether adolescents have the possibility to express this behavior. According to Arnett (1992), societies differ in the degree of restrictiveness they impose on individuals and the range of individual differences perceived as acceptable. In restrictive societies, sensation seeking may be expressed to a lesser degree because in these societies, adolescents are restricted in their behavior and norms (Arnett, 1992; Arnett & Eisenberg, 2007). It may thus be argued that in traditional countries, which are typically characterized by more restrictive upbringing of children, the influence of sensation seeking on adolescents' sexting behavior is weaker than in countries with a more liberal upbringing.

The same may hold for age differences. In traditional, sexually restrictive countries, teenage sexuality may be perceived as inappropriate. In less traditional countries, teenage sexuality is perceived as a part of normal adolescent development and may therefore be less restricted (Weinberg et al., 1995; Widmer et al., 1998). In these countries, adolescents may thus engage in sexual behaviors at younger ages. Therefore, in these countries, age differences in sexting may be less pronounced.

The Present Study

Because most previous studies have investigated sexting in one specific country, mainly in the US, it is not clear yet whether the predictors of sexting found in these studies are generalizable to other countries and contexts. The aim of the present study, therefore, was to investigate the predictors of adolescent sexting in 20 European countries. The study thereby examines individual as well as country characteristics that influence sexting.

Based on theoretical reasoning and previous findings, we expect that individual characteristics, such as age, gender, and sensation seeking, have an influence on youth sexting. More specifically, we predict that older adolescents are more likely to engage in sexting. Moreover, we expect that adolescents with higher levels of sensation seeking are more likely to sext. The dominant view in the literature seems to suggest that individual characteristics are the driving force behind risk behavior. At the same time, we observe a variety in prevalence rates and strength of predictors, which might partly reflect national diversity. This diversity calls for an approach that considers the context of the study and its participants. Thus, in addition to the individual factors, we expect that traditionalism as a country characteristic predicts sexting behavior. We assume that sexting is less prevalent in countries that are more traditional. Finally, this study examines whether the effects of individual characteristics vary across countries. We assume that contextual factors may explain some of the inconclusive findings reported in previous studies. In particular, we expect that gender differences are greater in countries that are more traditional compared to less traditional countries. Moreover, we expect that the influence of sensation seeking on sexting is less strong in traditional countries and that age differences in sexting are larger in traditional countries.

Because previous studies have shown that the frequency of internet use influences on adolescents' online sexual risk behavior (Baumgartner, Sumter, Peter, & Valkenburg, 2012), we included this variable as a control variable at the individual level. Moreover, we included hte percentage of broadband penetration and gross domestic product as control variables at the country level because both indicators related to youth encountering online risks in previous studies (Lobe, Livingstone, Olafsson, & Vodeb, 2011).

To investigate individual and country characteristics across 20 countries, we employed multilevel modeling. Multilevel modeling is the most appropriate method for analyzing data with a hierarchical structure (i.e., individuals nested within countries). Multilevel modeling can be used to investigate the effect of country characteristics by simultaneously controlling for the effects of individual characteristics (Hox, 2010; Snijders & Bosker, 1999). Moreover, it allows us to examine cross-level interactions as postulated for the interaction between traditionalism and the individual predictors.

Method

Sample and Procedure

We conducted a secondary analysis of the data collected as port of the EU KIDS Online II project.[3] Within this project, 25,142 internet using children aged 9 to 16 from 25 European countries were interviewed about their online experiences. By means of random stratified sampling, approximately 1,000 children were interviewed in spring and summer of 2010 in each country. The survey was administered to the children in their homes. The interview consisted of a face-to-face interview and a self-completion part for sensitive questions. Questions about sexual experiences, including sexting, were only administered to adolescents aged 11 to 16. This resulted in a sample of 18,709 adolescents aged 11 to 16. Of the 25 European countries, data for all contextual variables were available only for 20 countries. The included countries were: Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Netherlands, Norway, Poland, Portugal, Spain, Slovenia, Sweden, and the United Kingdom. The final sample consisted of 14,946 adolescents (49.7% boys) with a mean age of 13.49 (*SD* = 1.39). A detailed description of the recruitment and sampling procedures can be found elsewhere (Livingstone, Haddon, Görzig, & Olafsson, 2011b).

Measures

Sexting. Sexting was measured by asking participants whether they have sent or posted a sexual message (example: words, pictures or videos) of any kind on the internet in the past 12 months. Answer options were "yes", "no", "don't know", or "prefer not to say" (7.8%). The last two options were treated as missing answers in the analyses.

Sensation seeking. Sensation seeking was measured with the two-item short sensation seeking scale (Stephenson, Hoyle, Palmgree, & Slater, 2003). The two items were "I do dangerous things for fun" and "I do exciting things even if they are dangerous". Response categories were 0 (*not true*), 1 (*a bit true*), and 2 (*very true*). Answers to these two questions were added, so that the final variable could take values ranging from 0 to 4, *M* = 0.80 (*SD* =1.07).

Internet use. The frequency of internet use was measured with three questions. "How often do you use the internet?" Response categories were: 1 (*every day or almost*

[3] The EU Kids Online project is a research network including 25 European countries. The aim of the project is to chart the online experiences of European children. The project is core funded by the EC Safer Internet Program. More information about the project, the data, as well as further findings can be found here: www.eukidsonline.net.

every day), 2 (*once or twice a week*), 3 (*once or twice a month*), or 4 (*less than once a month*). Moreover, participants indicated the time spent on the internet "on a normal school day" and "on a normal non-school day". Response categories ranged from "none at all" to "more than four hours" in half hour intervals. Out of these three questions, internet use in minutes per day was calculated, $M = 104.43$ ($SD = 64.84$).

Traditionalism. The indicator of traditionalism was taken from the European Social Survey 5 (2010). The European Social Survey regularly investigates values in 26 European countries. Values in the European Social Survey were measured with a modified version of the Portrait Values Questionnaire (Schwartz et al., 2001). Each item describes a person with specific values, and participants have to evaluate how similar they are to this person. Response categories ranged from 1 (*very much like me*) to 6 (*not like me at all*). Two items measured traditionalism. Items were reversed coded so that higher values indicated more traditionalism (ranging from 0 to 5). The mean score of these two items for each individual within a specific country was aggregated to receive a general indicator of traditionalism for each country. These means were weighted using a design and a population weight (for more information on these weights and their calculation see European Social Survey 5, 2010). Mean traditionalism ratings ranged from 2.83 for Norway to 3.98 for Cyprus (see Table 7.1). All following analyses are based on these weighted traditionalism scores. Because there is a discussion on whether the scores of the Portrait Values Questionnaire need to be corrected for individual differences in the use of response scales, we also calculated these corrected values (see European Social Survey 5, 2010). None of the reported findings differed if the corrected scores were used in the analyses. We, therefore, report findings based on the uncorrected values.

Gross-domestic product per capita (GDP). The GDP has been widely considered an indicator of a country's standard of living. GDPs ranged from 4,800 € for Bulgaria to 64,500 € for Norway (see Table 7.1).

Broadband penetration. As an indicator of technological infrastructure, the percentage of broadband penetration within a country was used. Broadband penetration ranged from 13.9% in Bulgaria to 38.4% in the Netherlands (see Table 7.1).

Data Analytical Approach

For descriptive data analysis the EU Kids Online data was weighted using a weight that accounts for country-specific design as well as for country-specific non-response effects. The country-specific design weight corrects for unequal probabilities of participant selection. The country-specific non-response weight adjusts for biases due to under- or over-representation of specific respondent types. The weight is adjusted according to key

demographic variables such as age, gender, religion, and education (see Livingstone et al., 2011b).

To investigate whether the individual as well as country level variables influence sexting, we conducted multilevel analysis using the statistical program HLM 6 (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). Multilevel analysis was used because it takes into account that individuals are clustered within countries and that there is variance within the countries as well as between the countries (Hox, 2010). Because of the hierarchical data structure, we have two data levels, the individual level (1st level) as well as the country level (2nd level).

Because the outcome variable 'sexting' was a binary variable, a multilevel logistic regression model was used based on a Bernoulli distribution. The parameters were estimated using the penalized quasi likelihood procedure with higher-order Laplace approximation. The Laplace procedure is meant to produce the most accurate estimates in cases of binary dependent variables (Guo & Zhao, 2000; Hox, 2010). All continuous individual and country level variables, except for gender, were entered grand-mean centered in the analysis (Hox, 2010).

The multilevel models were analyzed using a stepwise procedure (Hox, 2010). The first model was an "empty" model with no predictor variables included, also called the intercept-only model. The intercept-only model estimates whether countries differ in the outcome variable 'sexting'. In the second model, fixed effects for all individual level predictors were added. An effect is fixed if it is expected that this effect does not differ across countries. Thus, the overall effects of these variables across all countries are estimated. The third model included also the effects of the variables at the country level. This model allows us to estimate whether the country variables explain variance in sexting between countries. The fourth model was a random coefficient model. In this model, it is examined whether any of the slopes of the individual level variables differ between countries. If a slope significantly varies between countries, it implies that the effect of this variable differs across countries. The fifth and final model included the cross-level interactions. Interaction terms between all individual level variables that had a significant slope variation in the previous model and the country level variable traditionalism were added. This model examined whether country differences in traditionalism can explain the random slope variances of the individual level variables.

To investigate the model fit of the multilevel models, the deviance was calculated for each model. The smaller the deviance, the better the model fit. If the deviance of a model is significantly smaller than the deviance of the previous one, this indicates that model fit has improved (Hox, 2010; Raudenbush et al., 2004).

Results

Descriptives

Table 7.1 depicts the prevalence of sexting for adolescent boys and girls in the 20 European countries. In most countries, only 1% to 5% of boys and 1% to 4% of girls engaged in sexting. Only in the Czech Republic and Sweden, prevalences for sexting were much higher for both boys (10.3% and 12.9%) and girls (10.1% and 10.2%). In most countries, more boys than girls engaged in sexting. This gender difference was most pronounced in Cyprus, Italy, and Germany. Only in Finland, Denmark, and Norway, more girls than boys engaged in sexting. In a few countries, gender differences were very small (e.g. in the Czech Republic, Estonia, and the Netherlands). As expected, older adolescents were more likely to engage in sexting. Among the 11 to 13 year olds, only 1.5% engaged in sexting, whereas among 14 to 16 year olds, 4.6% engaged in sexting.

Multilevel Modeling

All multilevel models are depicted in Table 7.2. The first model (M1) was the intercept-only model and included no predictors. The model indicated that the probability of engaging in sexting across all countries is 0.026. The significant country level intercept indicated that sexting varies across countries, p <.001. Ten percent of the variance in sexting was between countries.[4]

Model 2 (M2) included the fixed effects of the first level predictors: age, gender, sensation seeking, and frequency of internet use. As expected, older adolescents were significantly more likely to engage in sexting than younger adolescents, p < .001. Adolescents with higher levels of sensation seeking and adolescents who use the internet more frequently were also significantly more likely to engage in sexting, p < .001 and p < .001., respectively. Gender had no significant influence on sexting across all countries.

Model 3 (M3) additionally included the effects for the country level predictors. This model thus investigated whether traditionalism, controlled for broadband penetration and GDP, has an influence on youth sexting beyond the effects of individual level characteristics. However, none of the country level predictors had a significant influence on sexting indicating that country characteristics had no direct effect on the prevalence of sexting in a country.

[4] The second-level variance was calculated as follows: u0/(u0+π) = 0.371/(0.371+3.29) = 0.10 (see Hox, 2010)

In the next model (M4), we assessed whether the slopes for age, gender, sensation seeking, and frequency of internet use had significant variance components. A significant variance component of a random slope of an individual level predictor indicates that the effect of this predictor varies across countries. Only the variance component for the random slope for gender was significant (variance component for gender = 0.30, $df = 19$, $\chi^2 = 45.40$, $p = .001$, all other variance components <= .003, all p at least >= .28). This indicates that, as expected, gender differences in sexting varied across countries. The effects of age, sensation seeking, and frequency of internet use were the same in each country.

The final model (M5) was conducted to investigate whether traditionalism could explain the varying gender differences across countries. Thus, the cross-level interaction between gender and traditionalism was included in this model. The interaction between traditionalism and gender was significant, $p < .05$. This indicates that traditionalism could partly explain gender differences in sexting across countries. In countries that were more traditional, gender differences were more pronounced, with more boys engaging in sexting. In less traditional countries, these gender differences were smaller, indicating that equal amounts of girls and boys engaged in sexting.

The model fit, as indicated by the deviance, significantly improved in each step of the modeling process. Only the fit of Model 2 and Model 3 did not significantly differ because the inclusion of the second level predictors did not improve the model. The explained variance at the second level only changed marginally from 10 % to 8% because the second level characteristics had no direct influence on sexting.

Table 7.1. Percentages of Sexting for Boys and Girls and Country Characteristics per Country

	Percentage Sexting			Country Characteristics		
	Boys %	Girls %	Total %	Traditionalism Mean	GDP in 1000 €	Broadband Penetration %
Belgium	5.3	3.6	4.4	3.41	32.60	30.00
Bulgaria	0.5	1.3	0.9	3.64	4.80	13.90
Cyprus	5.2	0.6	3,8	3.98	21.60	23.20
Czech Republic	10.3	10.1	10.2	3.06	14.20	20.40
Denmark	0.3	1.7	1.1	2.91	42.50	31.30
Estonia	2.2	3.8	3.0	3.17	10.70	26.00
Finland	2.8	3.0	2.9	2.95	33.60	29.10
France	4.9	1.6	3.1	3.14	29.80	31.50
Germany	4.1	0.6	2.4	3.26	30.30	31.30
Greece	3.1	0.7	2.0	3.73	20.10	18.60
Hungary	1.7	0.3	1.0	3.50	9.70	19.70
Ireland	4.4	2.6	3.5	3.28	34.90	22.90
Netherlands	1.1	0.7	0.9	2.98	35.40	38.40
Norway	1.3	2.2	1.8	2.83	64.50	35.30
Poland	2.6	1.1	1.9	3.50	9.30	14.90
Portugal	3.4	2.6	3.0	3.30	16.20	19.60
Slovenia	4.1	1.1	2.6	3.74	17.30	23.60
Spain	1.8	0.8	1.3	3.52	22.80	22.50
Sweden	12.9	10.2	11.5	2.95	37.00	31.90
UK	4.0	3.0	3.5	3.20	27.40	30.60

Table 7.2. Findings of the Multilevel Analysis

	M1		M2		M3		M5	
	Coefficient (S.E.)	Odds Ratio (CI)	Coefficient (S.E.)	Odds Ratio (CI)	Coefficient (S.E.)	Odds Ratio (CI)	Coefficient (S.E.)	Odds Ratio (CI)
Fixed Effects								
Individual level			-0.18	0.83	-0.18 (0.11)	0.83	-0.31	0.74
Gender			(0.11)	(0.68, 1.03)		(0.66, 1.05)	(0.21)	(0.49, 1.10)
Age			0.26***	1.30	0.26***	1.30	0.26***	1.30
			(0.04)	(1.21, 1.39)	(0.05)	(1.18, 1.42)	(0.05)	(1.18, 1.43)
Sens. seeking			0.49***	1.63	0.49***	1.63	0.49***	1.63
			(0.67)	(1.43, 1.85)	(0.07)	(1.43. 1.85)	(0.07)	(1.41, 1.88)
Internet use			0.01***	1.01	0.01***	1.01	0.01***	1.01
			(0.00)	(1.00, 1.01)	(0.00)	(1.00, 1.01)	(0.00)	(1.00, 1.01)
Country level					-0.69	0.51	-0.06	0.94
Traditionalism					(1.11)	(0.05, 5.75)	(1.04)	(0.11, 8.49)
GDP					0.00	1.00	0.00	1.00
					(0.00)	(1.00, 1.00)	(0.00)	(1.00, 1.00)
Broadband					-0.01	0.99	-0.01	0.99
					(0.04)	(1.00, 1.00)	(0.05)	(0.90,1.10)
Cross-level interact.							-1.78*	0.17
Gender x Traditional.							(0.76)	(0.04, 0.75)
Intercept	-3.67***	0.03	-3.98***	0.02	-3.98***	0.02	-3.97***	0.02
	(0.17)	(0.02, 0.04)	(0.22)	(0.01, 0.03)	(0.25)	(0.01, 0.03)	(0.27)	(0.01,0.03)
Random Effects								
Intercept	0.37***		0.36***		0.33***		0.34***	
country level	(0.14)		(0.13)		(0.12)		(0.13)	
Deviance	28858.04		27801.57		27800.39		27779.13	

Note. Model 4 is not included in this table. All variance components of M4 are mentioned in the text.

Discussion

Although sexting has received much research attention in recent years, it has been investigated mainly from a national perspective, predominantly in the US. Therefore, most of our knowledge about sexting is based on US American studies. Because the knowledge of sexting in Europe is limited, we do not know whether findings from the US can be generalized to European countries. The aim of the present study, therefore, was to broaden our understanding of sexting by investigating the predictors of this behavior among 20 European countries. By taking a cross-national perspective, this study was able to delineate individual as well as country characteristics that influence sexting. The study has three main findings.

The first finding is that the individual level characteristics age and sensation seeking are universal predictors of sexting, as the effects of these two characteristics were the same across all 20 countries. Older adolescents and adolescents with higher levels of sensation seeking were more likely to engage in sexting. In line with studies conducted with US teenagers, sexting seems to increase during adolescence (Hinduja & Patchin, 2010; Lenhart, 2009; Mitchell et al., 2012). This may be due to the typical developmental changes that individuals undergo in this period, in particular pubertal development. Hormonal changes that characterize puberty have been consistently linked to an increase in sexual curiosity and exploration (DeLamater & Friedrich, 2002). Sexting may be considered as a part of these developments. The current study does not allow us to determine whether sexting peaks in middle or late adolescence or whether the prevalence of sexting even further increases during adulthood. The report of the National Campaign to Prevent Teen and Unplanned Pregnancy (2009) reported that young adults are even more likely to engage in sexting compared to adolescents. In contrast, Baumgartner et al. (2012) have shown that the prevalence of online sexual risk behavior, including sexting, decreases in the transition to adulthood. Further studies need to investigate the development of these behaviors in more detail. The strong influence of individual characteristics on adolescents' sexting behavior emphasizes the importance of personality characteristics to explain this behavior. This indicates that these two characteristics influence adolescents' sexting behavior regardless of which European country these adolescents live. However, this is not the case for all individual characteristics.

The second and possibly most important finding of this study is that, although country characteristics had no direct effect on adolescent sexting, traditionalism significantly predicted gender differences in sexting. Taken all countries together, gender had no effect on sexting. However, we found that gender differences varied across countries. Whereas in some countries, more males than females engaged in sexting (e.g. Cyprus, Italy, Germany), in other countries more girls than boys engaged in sexting (e.g.

Denmark, Finland, Norway). In some countries equal numbers of boys and girls engaged in sexting (e.g. the Netherlands, Czech Republic). The prevailing values in a country could partly explain varied gender differences. In countries that are more traditional, gender differences were stronger, with more boys compared to girls engaging in this behavior. In traditional countries, girls may be more restricted in their behavior, particularly in their sexual behavior. In these countries, girls may be less able to express their sexuality. In less traditional countries, these gender differences were less apparent or even reversed.

This finding is in line with previous findings showing that gender differences in sexuality tend to be smaller in permissive societies (Petersen & Hyde, 2010). Thus, our results strongly support the idea that biological factors alone cannot explain gender differences in adolescent risk behavior (Perry & Pauletti, 2011; Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000). Although biological differences between boys and girls may make a specific behavior more likely, the cultural context also determines whether adolescent girls and boys engage in this behavior (Block, 1983).

Our finding that the influence of gender on sexting varied across countries, whereas the influence of sensation seeking did not, is not surprising. Gender and gender-appropriate behavior is highly culturally determined. The effect of sensation seeking as a psychological variable is less culturally influenced, and may therefore be similar across countries. These findings are in contrast to Arnett (1992) who argued that the extent to which sensation seeking is related to risk behavior depends on the restrictiveness of the socialization environment. Although we found no evidence for this claim in our study, the effect of sensation seeking on sexting may still vary in societies that differ more strongly in their values than the European countries in this study. Moreover, Arnett (1992) explicitly argued that the socialization environment also includes parents, peers, schools, and neighborhoods. These less distal factors may still determine the strength of sensation seeking. For example, restrictive parenting may limit an adolescent's manifestation of sensation seeking, independent of the restrictiveness of the country as a whole.

The finding that the effects of age and sensation seeking did not differ across countries is somewhat reassuring considering that most studies are conducted within one nation and that often these findings are generalized to other contexts. Although it is crucial to consider the cultural context when investigating the effects of culturally determined variables like gender, a focus on a single country may be warranted if the factors studied are psychological and the findings are generalized to countries with comparable characteristics.

The final finding of this study is that in contrast to the strong effects of the individual characteristics, country characteristics had no direct influence on adolescent sexting above the effects of individual characteristics. Contextual factors at the country

level may thus be less important in explaining individual behavior than personality characteristics. This is not surprising because the country characteristics we studied are much more distal factors than individual characteristics. Moreover, the European countries in this study were homogenous in many aspects, including the prevalence of sexting. Only Sweden and the Czech Republic deviated strongly from the other countries in their sexting rates. This indicates that there may still be specific characteristics at the country level that explain the high prevalence rates in Sweden and the Czech Republic in contrast to other countries. Therefore, future studies should include other characteristics at the country level that may be able to account for these country differences. For example, factors that are more strongly related to online safety, such as safety programs at schools or country specific internet policies.

Limitations

Several limitations should be considered when interpreting the results of this study. One of the main problems when studying rare behaviors such as sexting is that the data was highly skewed. In the case of sexting, only few adolescents in each country engaged in this behavior. Skewed data are challenging for many common statistical methods and may lead to biased coefficient estimations. We tried to evade estimation problems by using a binary outcome variable. Logistic regressions are relatively robust to skewed data. Moreover, we estimated coefficients using Laplace numerical integration which has been shown to be the most robust estimation method (Guo & Zhao, 2000; Hox, 2010). Typically, logistic regressions conducted with skewed data lead to underestimations of the effects (King & Zeng, 2001). The reported results are therefore more likely to be too conservative rather than too lenient. Nevertheless, some caution is required when interpreting and generalizing the findings.

Moreover, the study was limited to 20 European countries. Out of the 25 countries included in the EU Kids Online project, only 20 countries were analyzed for which traditionalism values were available (see ESSS-5). Therefore, the interpretation of the findings should be limited to those specific 20 countries. More studies are needed to investigate whether findings are further generalizable.

Conclusion

In sum, the present study shows that when investigating sexting, and possibly online risk behavior in general, the broader cultural context cannot be ignored. Although we found no direct influence of country characteristics on adolescent sexting behavior, country context still mattered. Despite the relative similarity of the 20 countries that were investigated in this study, gender differences varied across these countries and this

variation was partly explained by traditional values. It may be expected that these country differences are even more pronounced when comparing countries that are more diverse, such as western and non-western countries.

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8

Summary and Discussion

Adolescents today spend considerable amounts of their leisure time on the internet. Because adolescence is marked by a strong increase in sexual interest, individuals during this developmental period may turn to the internet to satisfy their sexual curiosity and to explore their sexuality (Boies, Cooper, & Osborne, 2004; Subrahmanyam & Smahel, 2011; Valkenburg & Peter, 2011). At the same time, this period is marked by an increased propensity to engage in risk behaviors (e.g. Dahl, 2004; Steinberg, 2007). Therefore, it has been argued that the internet may provide adolescents with new opportunities to engage in sexual risk behavior. Despite many concerns about this behavior, empirical evidence has been scarce. Therefore, the aim of this dissertation was to provide a comprehensive picture of online sexual risk behavior during adolescence. More specifically, this dissertation investigated a) the prevalence of online sexual risk behavior among Dutch adolescents, b) the demographic, cognitive, psychological, social, and cultural predictors of online sexual risk behavior, c) the relationship between online sexual risk behavior and offline sexual risk behavior, and d) the relationship between online sexual risk behavior and negative online experiences. Figure 8.1 displays an overview of the main findings of this dissertation.

Prevalence and Predictors of Online Sexual Risk Behavior

One of the main findings of this dissertation is that online sexual risk behavior is confined to a small group of adolescents (Chapter 2, Chapter 5). Most Dutch adolescents do not engage in this behavior during the course of adolescence. The prevalence of this behavior in the Netherlands seems to be comparable to other European countries. As Chapter 7 reveals, the prevalence of sexting among teenagers from 20 European countries was rather low (below 5% in most European countries). This finding is in line with recent

nationally representative studies from the United States showing that sexting is limited to a few adolescents (Lenhart, 2009; Mitchell, Finkelhor, Jones, & Wolak, 2012). Interestingly, the prevalence of online sexual risk behavior did not differ among adolescents and adults (Chapter 2). These findings qualify previous concerns about the extent of this behavior among youth. In contrast to parental and public fears (European Commission, 2008; Turow, 1999; Wartella, 2001), online sexual risk behavior is not a mass phenomenon among teens; instead, it is confined to a small group of adolescents.

Although only a small group of adolescents regularly engages in online sexual risk behavior, it is important to know who these adolescents are. This dissertation identified several predictors of online sexual risk behavior. These predictors can be categorized into demographic (age, gender, education), cognitive (risk perceptions), psychological (sensation seeking, life satisfaction), social (family cohesion, peer norms), and cultural factors (traditionalism).

Demographic Predictors

Concerning age differences, most previous studies have shown that older adolescents are more likely to engage in online sexual risk behavior than younger adolescents (Lenhart, 2009; Mitchell et al., 2012). However, developmental theories of risk behavior suggest a peak in risk behavior in mid-adolescence (Dahl, 2004). In Chapter 5, we investigated the development of online sexual risk behavior during the course of adolescence. The findings from the trajectory analysis suggest that online sexual risk behavior peaks in mid-adolescence and decreases thereafter. These findings are in line with the results from the cross-national analysis showing that in all 20 European countries, mid-adolescents are most likely to engage in sexting. The findings that online sexual risk behavior decreased in the transition to adulthood in Chapter 5 somewhat contradicts the findings reported in Chapter 2, which suggested limited differences between adolescents and adults in risk engagement. These differences in findings may be due to the fact that in Chapter 2, we compared different groups of adults and adolescents cross-sectionally whereas in Chapter 5, adolescents were followed longitudinally. Most adolescents in Chapter 5 seemed to decrease their online sexual risk behavior during the transition to adulthood. However, it is likely that some individuals only start engaging in online sexual risk behavior later during adulthood. These adults were not captured in the trajectory analysis in Chapter 5. Further research is needed to investigate the development of this behavior during the transition and throughout adulthood.

Gender differences in online sexual risk behavior in the Dutch sample were limited (see Chapter 2). The engagement of Dutch boys and girls in online sexual risk behavior did not differ in the cross-sectional study in Chapter 2. However, boys were somewhat more

likely to belong to the high online sexual risk group in Chapter 5. One reason for this may be that boys are more consistent in this behavior over time whereas girls may only try it once and stop thereafter. Interestingly, gender differences in sexting varied across European countries. The findings presented in Chapter 7 showed that in countries that are more traditional, boys were more likely to engage in sexting compared to girls. In less traditional countries, such as Sweden, Norway, and Denmark, gender differences were smaller. In these countries, similar amounts of girls and boys engaged in sexting.

Next to age and gender, educational level was also a predictor of online sexual risk behavior. The educational level of adolescents is a consistent predictor of many types of risk behavior (de Graaf, Meijer, Poelman, & Vanwesenbeeck, 2005; Murphy et al., 2009; Petersen & Hyde, 2010). Educational level consistently predicts risk behavior for several reasons. Adolescents following lower education often have parents with lower educational levels and frequently come from lower socio-economic status. Previous research has shown that children of parents with lower educational level are exposed to more health-related risk behaviors, including sexual risk behavior (Santelli, Lowry, Brener, & Robin, 2000; Vesely et al., 2004). Moreover, it has been shown that adolescents who have lower expectations for their future – including the expectation of following higher education - are more likely to engage in health risk behaviors (Harris, Duncan, & Boisjoly, 2002; McDade et al., 2011). Poor future expectations may lead to a 'nothing to lose'-attitude (Harris, Duncan, & Boisjoly, 2002) that may result in a preference for immediate pleasure and a disregard of potential negative consequences. Finally, adolescents following lower education have been found to be more sexually active compared to adolescents following higher educational levels (de Graaf et al., 2005) and may therefore be more prone to engage in sexual activities on the internet.

Cognitive Predictors

Overall, Chapter 2 showed that adolescents perceive the risks associated with online sexual risk behavior as high, and the benefits as low. Adolescents' perceptions of risks and benefits were comparable to those of adults. Adolescents thus seem to acknowledge the dangers associated with this behavior as much as adults do. Chapter 3 further revealed that perceptions of risks and personal vulnerability to potential negative consequences predicted subsequent engagement in online sexual risk behavior six months later. This indicates that adolescents who engage in this behavior perceived this behavior as less risky and considered themselves as less vulnerable to negative consequences. Estimations of risks may therefore have an influence on online sexual risk behavior. If adolescents are aware of the potential dangers associated with this behavior, they are less likely to subsequently engage in online sexual risk behavior. This finding is consistent with

several studies on the predictors of offline risk behavior which emphasized the importance of risk perceptions (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993; Gerrard, Gibbons, Benthin, & Hessling, 1996). However, when considering the perceptions of peer behavior, perceptions of risks and vulnerability were no longer significant. This indicates that the perceived behavior of peers is more important than are perceptions of risks and vulnerability.

Psychological Predictors

Sensation seeking was one of the most consistent predictors of online sexual risk behavior (Chapter 5, Chapter 7). Adolescents with high levels of sensation seeking were more likely to engage in online sexual risk behavior. This holds for all 20 European countries that we studied. This finding is consistent with studies, which have shown that sensation seeking is one of the most important predictors of many types of offline risk behaviors (Arnett, 1996; Zuckerman, 1990). This dissertation showed that this is also the case for online risk behavior. Adolescents with high levels of sensation seeking are characterized by the willingness to engage in risks in order to increase stimulation and arousal (Zuckerman, 1990). Engaging in online sexual risk behavior may provide these high levels of arousal.

Adolescents with lower levels of life satisfaction were also more likely to engage in online sexual risk behavior. This is in line with previous studies which showed that adolescents who are dissatisfied with their lives are more likely to engage in various risk behaviors, including sexual risk behavior (MacDonald, Piquero, Valois, & Zullig, 2005; Schwartz et al., 2011; Valois, Zullig, Huebner, Kammermann, & Drane, 2002). Several factors may explain decreased life satisfaction among adolescents, such as lack of social support, negative life events, family and school problems. Adolescents who are dissatisfied with their lives may turn to the internet as a substitution for missing offline gratifications (Baker & Moore, 2008; Livingstone & Helsper, 2007; Peter & Valkenburg, 2006). Engaging in online sexual communication with strangers may thus serve as a coping strategy to deal with various offline problems and with lack of offline support from family and friends.

Social Predictors

This dissertation investigated three social predictors, descriptive and injunctive peer norms as well as family cohesion. Descriptive peer norms are estimations of the amount of friends that engage in a specific behavior. Injunctive peer norms are perceptions of the approval of this behavior among friends. In this dissertation, perceived peer norms were the most important and consistent predictors of online sexual risk behavior. Adolescents

who had more friends who engaged in online sexual risk behavior were more likely to subsequently engage in this behavior as well. Moreover, if adolescents had friends who approved of this behavior, they were also more likely to engage in online sexual risk behavior (Chapter 4). This finding emphasizes the role of peers in the engagement in online sexual risk behavior. Similar to many types of offline risk behavior (e.g., Ali & Dwyer, 2011), also for online sexual risk behavior the behavior of peers is directive.

In addition to peers, family environment influences adolescents' engagement in online sexual risk behavior. Chapter 5 shows that adolescents who have less cohesive families are more likely to belong to the 'high-online-risk' group. Adolescents who feel that they are not able to turn to their family if they have problems may be more likely to talk to strangers on the internet. Adolescents from less cohesive families may also be less supervised in their online and offline behavior by their parents. They may thus have more opportunities to engage in online sexual risk behavior.

Cultural Predictors

In contrast to the demographic, cognitive, psychological, and social factors investigated in this study, cultural factors at the country level had no direct influence on adolescents' engagement in one specific type of online sexual risk behavior – sexting (see Chapter 7). This is not surprising because the prevalence of sexting in the 20 European countries investigated in this study was comparable, except for two countries (Sweden and Czech Republic). In these countries, sexting was more prevalent. Although the countries' traditionalism, broadband penetration, and gross domestic product had no direct effect on sexting, traditionalism explained gender differences in sexting. This indicates that these broader, more distal country level factors may still influence individual behavior.

In sum, these findings emphasize that predictors at several levels influence online sexual risk behavior. Age, sensation seeking, and descriptive peer norms emerged as the strongest and most consistent predictors of online sexual risk behavior.

Relationship to Offline Sexual Risk Behavior

Another main finding of this dissertation is that adolescents who engage in online sexual risk behavior were also more likely to engage in offline sexual risk behavior. Chapter 5 shows that online and offline sexual risk behaviors were highly related. The overlap between these two behaviors may have two different reasons. The first explanation is that some adolescents may be predisposed by psychological, social, as well as demographic factors to engage in various risks, including online and offline sexual risk behavior. A second explanation is that online sexual risk behavior leads to engagement in offline sexual risk behavior. For example, adolescents may first experiment with this

behavior on the internet before they dare to engage in sexual activities offline. Our findings partly support this argument because online sexual risk behavior peaks earlier during adolescence compared to offline sexual risk behavior. It may thus be that online sexual risk behavior is a precursor of offline sexual risk behavior (Chapter 5). Future research is needed to disentangle the causal relationship between online and offline sexual risk behavior.

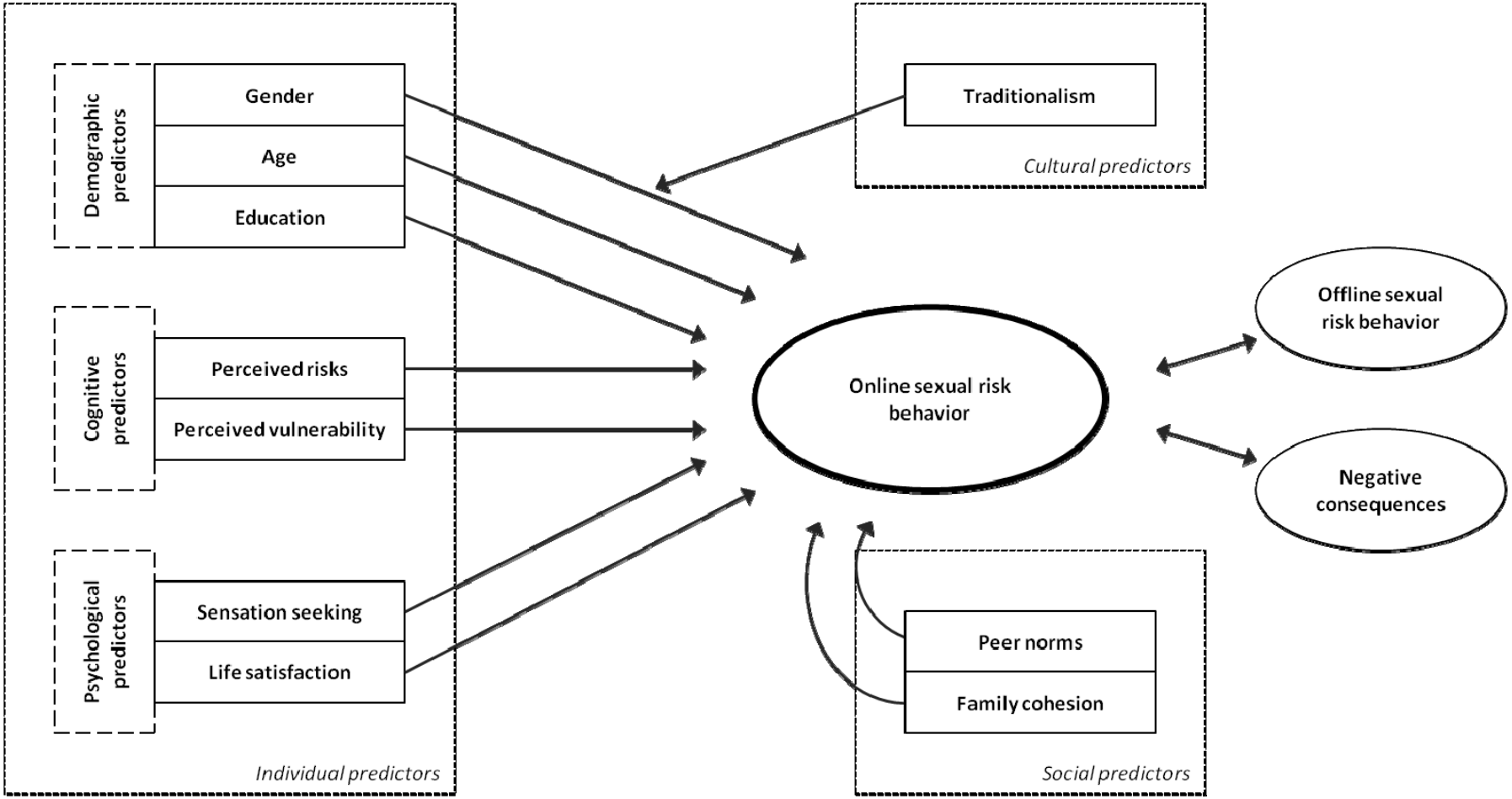
Relationship to Negative Online Experiences

The final finding of this dissertation was that adolescents who engage in online sexual risk behavior are more likely to become victims of online sexual solicitation and online harassment. It seemed that adolescents who engage in online sexual risk behavior become more vulnerable to these types of negative online experiences. These adolescents were also more likely to encounter online experiences that worried them afterwards. It may thus be assumed that engaging in online sexual risk behavior puts adolescents at risk for these negative online experiences. Another possibility, however, is that these negative online experiences are based on other online activities that these adolescents share. Future research needs to investigate the causal relationship between online sexual risk behavior and negative online experiences.

Online Sexual Risk Behavior in the Broader Context of Adolescent Sexual Development

One of the main developmental tasks of adolescence is the development of a sexual identity (e.g., Crockett, Raffaelli, & Moilanen, 2003; DeLamater & Friedrich, 2002; Lerner & Galambos, 1998). An individual's sexual identity comprises sexual self-esteem, sexual self-efficacy, and consistent beliefs about their sexual self-image (Breakwell & Millward, 1997; Buzwell & Rosenthal, 1996). Adolescents today might use the internet to construe their sexual identity and explore their sexuality (Boies, Cooper, & Osborne, 2004; Subrahmanyam & Smahel, 2011). The internet provides them with the perfect opportunity not only to receive vast amounts of sexual information and sexual content, but also to discuss intimate sexual topics with friends and strangers. Online sexual risk behavior must be placed within this broader context of adolescent sexual development. Engaging in online sexual risk behavior during adolescence may fulfill several goals. For example, searching people online to talk about sexuality may reflect affiliative needs and may fulfill adolescents' need for intimacy (Boies et al., 2004; Weiser, 2000). Similarly, by sending nude pictures of themselves to others online, adolescents may receive positive feedback that may enhance their self-esteem. In these cases, online sexual risk behavior may have an adaptive function.

Figure 8.1. Overview of Main Findings



However, engaging in online sexual risk behavior may also be dysfunctional and may interfere with healthy sexual development. This may be the case if it leads to negative consequences, such as being harassed online, losing control over personal information, or feeling shame and guilt. It may also be worrisome if this behavior led to actual (unsafe) sexual encounters offline. The findings of this dissertation suggest that online sexual risk behavior is related to these negative consequences most strongly when adolescents engage in it frequently and consistently. Engaging in online sexual risk behavior once or twice during adolescence may be developmentally appropriate and may not lead to negative consequences. However, adolescents who engaged in higher levels of online sexual risk behavior were more likely to engage in offline sexual risk behavior (Chapter 5) and become victims of online harassment and solicitation (Chapter 6). Consistent engagement in risk may also be problematic because it may replace offline interactions with peers and may lead to social isolation (Weiser, 2000).

Overall, this dissertation has shown that for many young people, engaging in online sexual risk behavior is not a part of typical sexual development during adolescence. For those who engage in online sexual risk behavior, it may fulfill developmental needs. However, engaging in this behavior frequently and consistently may also be related to negative consequences and dysfunctional development.

Limitations and Future Research

The present dissertation gave a comprehensive account of various predictors of online sexual risk behavior. However, those predictors explained only a part of the variance in online sexual risk behavior. This indicates that other factors, which have not been studied in this dissertation, may also influence this behavior. Most importantly, this dissertation focused on individual and social characteristics. The survey-based methods employed in this dissertation could capture these more stable factors very well. However, situational, incidental and more short-term predictors have not been studied. Recent theories on adolescent risk behavior posit that the engagement in risk behavior is based on heuristics and affect (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Rivers, Reyna, & Mills, 2008) rather than on reason and systematic processing. In a specific situation, the decision to engage in risk behavior may depend on situational factors, such as peer behavior (Baker & Maner, 2009; Gardner & Steinberg, 2005). Moreover, strong emotional or arousing situations may increase the likelihood of engagement in risk behavior (e.g., Pham, 2007). Studying these situational factors may further deepen our understanding of specific situations in which online sexual risk behavior occurs.

This dissertation focused mainly on sexual online communication with strangers. However, we did not investigate who these strangers were and how adolescents have met

them. In many cases, these strangers may have been same-aged peers (Livingstone, Haddon, Görzig, & Olafsson, 2011). To better understand the consequences of this behavior, it becomes important to know more about the type of online contacts. We limited online sexual risk behavior to communication with strangers because previous research has suggested that such communication is more dangerous than is communication with friends (Mitchell, Finkelhor, & Wolak, 2001; Wolak, Finkelhor, & Mitchell, 2008). However, to fully understand online sexual activities, it may be desirable for future research to also examine sexual online communication with friends.

The finding that only a minority of adolescents engages in online sexual risk behavior posed challenges to data analyses. The low prevalence rate led to highly skewed data that was not normally distributed. Many conventional statistical methods are not able to handle skewed data. In this dissertation we, therefore, used a variety of methods – such as bootstrapping, semi-parametric tests, and zero-inflated Poisson models – that were able to do deal with this issue. For future studies it may be useful to employ other approaches to study this behavior. For example, it may be helpful to collect data within specific risk groups (e.g. lower educated adolescents) and to compare these with comparable samples of adolescents who do not engage in this behavior (e.g. case-control studies, King & Zeng, 2001).

Practical Implications

The findings of this dissertation may be of interest to parents, teachers, practitioners, and policy makers. The predictors of online sexual risk behavior identified in this dissertation may be informative for the prevention of this behavior. One of the most important predictors of this behavior was peer norms (Chapter 4). Because peer norms are a strong indicator of all types of risk behaviors, it may be beneficial to help adolescents find strategies to resist peer influence. Interventions may also directly target the *perceptions* of peer behavior. It has been shown that the perceptions of peer behavior are often inflated (Berkowitz, 2005, Martens et al., 2006). To prevent online sexual risk behavior, it may thus be helpful to raise the awareness of potential overestimations of peer behavior. If adolescents were informed that most of their peers do not engage in online sexual risk behavior and that their perceptions of their friends' behavior are likely to be inflated, the influence of these peer norms can diminish (Berkowitz, 2005; Schroeder & Prentice, 1998). Moreover, it has been shown that parental monitoring may moderate the influence of detrimental peer influence on the engagement in online sexual risk behavior (Rai et al., 2003). Therefore, parents may be advised to mediate and monitor the internet use of their children.

This dissertation also indicated that adolescents who engage in high levels of online sexual risk behavior seem to be troubled. These adolescents were less satisfied with their lives and were more likely to come from less cohesive families. Therefore, parents, teachers, and practitioners should pay particular attention to these teens in order to prevent potentially adverse online sexual risk behavior. Providing social support to adolescents who are dissatisfied with their lives or lack social support from their family may be a potential preventive factor for the engagement in online sexual risk behavior.

Moreover, the findings suggest that public campaigns may center particularly on adolescent sensation seekers and choose formats and techniques that these adolescents value (Morgan, Palmgreen, Stephenson, Hole, & Lorch, 2003; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001). In addition, the findings suggest that prevention programs should target low-educated adolescents in particular. This can be done by implementing preventions in lower education schools and using techniques that adolescents with lower education prefer, such as simple language, illustrated materials, and digital technologies (Pignone, DeWalt, Sheridan, Berkman, & Lohr, 2005). Finally, this dissertation has shown that online sexual risk behavior peaks in mid-adolescence (Chapter 5). Thus, the preventions of online sexual risk behavior may be most effective in early adolescence before this behavior peaks. Parents and teachers of early adolescents may be well advised to discuss the risks associated with online risk behavior.

Concluding Remarks

Recurrently, there have been concerns about the influence of new media on children and adolescents (Wartella & Jennings, 2001). Some of these concerns have been refuted while others have been supported by scientific scrutiny. To overcome an uninformed public discussion, this dissertation provided a detailed account of online sexual risk behavior among adolescents. On the one hand, this dissertation identified a small group of adolescents who engage in online sexual risk behavior. Although the percentage of adolescents engaging in this behavior seems rather low, it still comprises a considerable number of adolescents in absolute terms. These adolescents constitute a risk group that deserves special attention, not only because of their engagement in online sexual risk behavior, but also because this behavior has been linked to offline sexual risk behavior, online victimization experiences, and low life satisfaction. Thus, these adolescents may be particularly vulnerable. On the other hand, the findings of this dissertation suggest that the vast majority of adolescents do not engage in online sexual risk behavior. This finding may be reassuring for many parents who worry about their child's online sexual risk behavior. Although the internet may have become an important part of adolescent sexual development, most adolescents behave responsibly and safely on the internet.

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Nederlandse Samenvatting

Tegenwoordig brengen adolescenten veel van hun vrije tijd door op het internet. Gezien de belangrijke rol die seksualiteit speelt tijdens deze fase van de ontwikkeling, is het aannemelijk dat adolescenten het internet gebruiken om hun seksuele nieuwsgierigheid te bevredigen en hun seksualiteit verder te ontdekken (Boies, Cooper, & Osborne, 2004; Subrahmanyam & Smahel, 2011; Valkenburg & Peter, 2011). Tegelijkertijd wordt deze ontwikkelingsfase gekenmerkt door een toename in risicogedrag (e.g. Dahl, 2004; Steinberg, 2007). Daarom wordt gesteld dat het internet adolescenten nieuwe mogelijkheden biedt om seksueel risicogedrag te vertonen. Ondanks de vele zorgen die bestaan over dit probleem, is wetenschappelijk onderzoek beperkt. Het doel van dit proefschrift is om hier verandering in te brengen door een volledig beeld te schetsen van online seksueel risicogedrag tijdens de adolescentie.

In dit proefschrift is gekeken naar a) de prevalentie van online seksueel risicogedrag onder Nederlandse adolescenten, b) de demografische, cognitieve, psychologische, sociale en culturele voorspellers van online seksueel risicogedrag, c) de relatie tussen online en offline seksueel risicogedrag, en ten slotte d) de relatie tussen online seksueel risicogedrag en negatieve online ervaringen.

Methode

De hoofdstukken van dit proefschrift zijn gebaseerd op zowel een longitudinale als een cross-nationale studie. De longitudinale data omvat 1,765 Nederlandse adolescenten in de leeftijd van 12 tot 18 jaar. Deze adolescenten zijn op vier momenten met tussenpozen van zes maanden ondervraagd. De longitudinale dataset maakte het mogelijk om de ontwikkeling van online seksueel risicogedrag tijdens deze periode in kaart te brengen, alsmede de voorspellers en uitkomsten vast te stellen. Tijdens het eerste meetmoment hebben tevens 1,026 Nederlandse volwassenen (19 tot 85 jaar oud) deelgenomen aan de studie. Door zowel adolescenten als volwassenen te ondervragen was het mogelijk om online gedragingen, percepties en ervaringen te vergelijken tussen deze twee groepen.

Om de focus van dit proefschrift te verbreden en niet alleen uitspraken te doen over Nederlandse adolescenten, is een cross-nationale dataset geanalyseerd. Deze bestond uit informatie over het online seksueel risicogedrag van 14,946 adolescenten in de leeftijd van 11 tot 16 jaar die afkomstig waren uit 20 Europese landen (EU Kids Online project). In het bijzonder onderzoekt deze studie één specifiek type online seksueel risicogedrag, namelijk

sexting. Sexting is het versturen of plaatsen van seksuele berichten via elektronische apparaten. Vergelijkend onderzoek tussen landen verschaft unieke informatie en heeft verschillende voordelen. Ten eerste maakt een cross-nationale studie het mogelijk de prevalentie van online seksueel risicogedrag tussen verschillende Europese landen te vergelijken. Ten tweede maakt zo'n studie het mogelijk om culturele factoren tussen landen te vergelijken met individuele factoren als voorspellers voor online seksueel risicogedrag. Ten slotte biedt het de unieke mogelijkheid te onderzoeken of individuele voorspellers van online seksueel risicogedrag voor de verschillende landen overeenkomen of verschillen.

Belangrijkste Bevindingen

Hoofdstuk 2. In de eerste studie van dit proefschrift worden de ervaringen met online seksueel risicogedrag en ongewilde online seksuele verzoeken onder 1,765 Nederlandse adolescenten en 1,026 Nederlandse volwassenen vergeleken. Daarnaast werd gekeken naar leeftijd- en sekseverschillen in de voordelen en nadelen die worden toegeschreven aan online seksueel risicogedrag (risico-percepties). De belangrijkste bevinding was dat – in tegenstelling tot de verwachtingen – volwassenen en adolescenten weinig verschillen in online seksueel risicogedrag en hun inschatting van de bijbehorende voor- en nadelen. Jongens en mannen vanaf 14 jaar vertoonden het meeste online seksueel risicogedrag. Daarnaast ontvingen meisjes en vrouwen tussen de 14 en 29 jaar het vaakst ongewilde online seksuele verzoeken. Alle leeftijdsgroepen schatten de nadelen van online seksueel risicogedrag hoog in en schatten de voordelen laag in.

Hoofdstuk 3. In hoofdstuk 2 wordt aangetoond dat adolescenten de nadelen die samenhangen met online seksueel risicogedrag hoog inschatten. Desondanks zijn er individuele verschillen in de risicopercepties omtrent online seksueel risicogedrag. In hoofdstuk 3 wordt daarom onderzocht in hoeverre de individuele verschillen in deze percepties gerelateerd zijn aan gedragsverschillen. We hebben gekeken of adolescenten die minder nadelen en meer voordelen zien, degenen die zich minder kwetsbaar voelen, en degenen die denken dat hun vrienden risico's nemen, zelf meer online seksueel risicogedrag vertonen. De inschatting van de nadelen, hun eigen kwetsbaarheid, en het ingeschatte aantal vrienden dat online seksuele risico's neemt, voorspelden de mate van online seksueel risicogedrag zes maanden later. Hierbij bleek dat het ingeschatte aantal vrienden dat risico's neemt verreweg de meest consistente en sterkste voorspeller was van online seksueel risicogedrag. Deze bevindingen onderstrepen de invloed van leeftijdsgenoten op het online seksueel risicogedrag van adolescenten.

Hoofdstuk 4. In hoofdstuk 4 wordt de rol van de normen van vrienden (groepsnormen) verder toegelicht. De sociale-norm-theorie stelt dat de invloed van

leeftijdsgenoten gebaseerd is op het beeld dat adolescenten hebben over de normen van hun vrienden. In hoofdstuk 4 wordt op vier meetmomenten onderzocht wat de invloed van zowel descriptieve als injunctieve groepsnormen met betrekking tot online seksueel risicogedrag is. Twee *cross-lagged* structurele vergelijkingsmodellen ondersteunen de bevindingen van het vorige hoofdstuk: adolescenten waarvan de vrienden online seksueel risicogedrag vertonen, vertonen dit gedrag zelf ook meer op een later moment. Descriptieve groepsnormen voorspelden online seksueel risicogedrag op alle vier de meetmomenten. Injunctieve groepsnormen voorspelden ook online risicogedrag, hoewel in mindere mate en op een minder consistente manier dan descriptieve groepsnormen. Deze resultaten impliceren dat online risicogedrag, net als offline risicogedrag, vooral wordt beïnvloed door wat vrienden doen en wat hun normen zijn.

Hoofdstuk 5. In het vijfde hoofdstuk worden twee cruciale aspecten van online seksueel risicogedrag besproken: de ontwikkeling van online seksueel risicogedrag van vroege tot late adolescentie en de relatie tussen online en offline seksueel risicogedrag. Op basis van *groepsgebaseerde modellering* vonden we substantiële verschillen in de ontwikkeling van online en offline seksueel risicogedrag over de tijd. Voor online seksueel risicogedrag konden drie groepen met verschillende ontwikkelingstrajecten worden geïdentificeerd. Eén grote groep adolescenten vertoonde geen seksueel risicogedrag gedurende de adolescentie (70%). Een tweede groep vertoonde een matig niveau van seksueel risicogedrag (24%) en een derde groep vertoonde een verhoogd niveau van seksueel risicogedrag (6%). De matige en verhoogde risicogroepen volgden het typische ontwikkelingstraject van risicogedrag dat bestaat uit een stijging tussen vroege en mid-adolescentie, een piek in de midden adolescentie en daarna een daling. Verder liet een *dual trajectory* analyse zien dat online en offline seksueel risicogedrag sterk aan elkaar gerelateerd zijn. Ten slotte liet deze studie zien dat adolescenten die een verhoogd niveau van online seksueel risicogedrag vertoonden minder tevreden waren met hun leven, een hoger niveau van sensatiezucht hadden, uit minder hechte families kwamen en lager opgeleid waren.

Hoofdstuk 6. Hoofdstuk 5 liet duidelijk zien dat adolescenten specifieke ontwikkelingstrajecten van risicogedrag volgen. Verwacht kan worden dat het frequent en consequent vertonen van online seksueel risicogedrag gepaard gaat met negatieve online ervaringen. Het doel van hoofdstuk 6 was te onderzoeken of het volgen van meer 'problematische' ontwikkelingstrajecten van online seksueel gedrag gerelateerd is aan drie vormen van negatieve online ervaringen: ontvangen van ongewilde online seksuele verzoeken, online lastiggevallen worden en piekeren over online ervaringen. Zoals verwacht, rapporteerden de adolescenten in het verhoogd ontwikkelingstraject van online seksueel risicogedrag (6%) meer negatieve online ervaringen op alle meetmomenten.

Adolescenten in dit ontwikkelingstraject hebben dus meer kans op verschillende negatieve ervaringen op het internet.

Hoofdstuk 7. Het doel van het laatste hoofdstuk van dit proefschrift was om het onderzoek naar online seksueel risicogedrag onder Nederlandse adolescenten te verbreden naar adolescenten in heel Europa. Door analyse van een cross-nationale dataset met adolescenten uit 20 Europese landen, worden in dit hoofdstuk de individuele en culture voorspellers van *sexting* onderzocht. Verder werd in deze studie onderzocht of de individuele voorspellers van *sexting* per land verschillen. Multilevel analyses lieten zien dat leeftijd, sensatiezucht en de frequentie van internetgebruik in alle landen *sexting* voorspelden. De invloed van sekse verschilde per land. Hoewel culturele kenmerken (traditionele waarden, BNP, toegang tot breedband) *sexting* niet direct voorspelden, voorspelde traditionalisme van een land wel sekseverschillen in *sexting*. In meer traditionele landen bleken jongens vaker te *sexten* dan meisjes. In minder traditionele landen waren deze sekseverschillen minder prominent of zelfs omgekeerd. De resultaten geven aan dat in onderzoek naar *sexting* of online seksueel risicogedrag in het algemeen rekening moet worden gehouden met de culturele context om een volledig beeld te krijgen van dit gedrag.

Conclusie

De studies gepresenteerd in dit proefschrift vormen tezamen een belangrijke bijdrage aan ons begrip van online seksueel risicogedrag van adolescenten. Een van de belangrijkste bevindingen van dit proefschrift is dat online seksueel risicogedrag zich beperkt tot een kleine groep adolescenten. Het merendeel van de adolescenten vertoont dit gedrag niet en is zich bewust van de risico's die hieraan verbonden zijn. Deze bevindingen nuanceren eerdere zorgen over de mate van dit gedrag onder de jeugd. In tegenstelling tot de angst van ouders en het publiek (Turow, 1999; Wartella, 2001; Ybarra, Mitchell, Finkelhor, & Wolak, 2007) komt online seksueel risicogedrag niet massaal voor onder tieners, maar blijft het beperkt tot slechts een kleine groep adolescenten. Echter, deze kleine groep adolescenten verdient wel extra aandacht. Dit proefschrift laat zien dat jongeren met een verhoogd online seksueel risicogedrag ook meer offline seksueel risicogedrag vertonen en vaker worden lastig gevallen op het internet en vaker ongewilde seksuele verzoeken krijgen. Door demografische (leeftijd, geslacht, opleidingsniveau), cognitieve (risicoperceptie), psychologische (sensatie zoeken, levenstevredenheid), sociale (hechtheid van het gezin, groepsnormen) en culturele predictoren (traditionalisme) van online seksueel risicogedrag te identificeren, geeft dit proefschrift een genuanceerd beeld van welke adolescenten online seksueel risicogedrag vertonen.

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