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Identifying Teens at Risk: Developmental Pathways of Online and Offline Sexual Risk Behavior

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KEY WORDS

sexting, Internet, risk behavior, development, sexuality

ABBREVIATIONS

APP—average posterior probabilities

BIC—Bayesian Information Criterion

OffSRB—offline sexual risk behavior

OnSRB—Online sexual risk behavior

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WHAT'S KNOWN ON THIS SUBJECT: Today's adolescents increasingly use the Internet to explore their sexual identity. There is public concern that the Internet, because of its accessibility, affordability, and anonymity, stimulates adolescents to engage in online sexual risk behavior (eg, sending sexual images to strangers).



WHAT THIS STUDY ADDS: This 4-wave panel study is the first to delineate the typical development of online sexual risk behavior, its relationship with offline sexual risk behavior, and the factors (eg, sensation seeking, family cohesion, life satisfaction, education, online communication) that predict both behaviors.

abstract

OBJECTIVES: The aims of this study were (1) to investigate the prevalence and development of both online (OnSRB) and offline sexual risk behavior (OffSRB) in adolescence, (2) to establish whether OnSRBs and OffSRBs are related, and (3) to identify risk factors that determine problematic pathways of OnSRB and OffSRB.

METHODS: A 4-wave longitudinal study with 1762 Dutch adolescents aged 12 to 18 was conducted (mean age, T1 = 14.52, 49% girls). By using group-based modeling, developmental pathways for OnSRB and OffSRB were identified and the relationship between both behaviors over time was examined.

RESULTS: Substantial intraindividual differences in the development of OnSRB and OffSRB were found. The analysis revealed 3 developmental pathways of OnSRB: no risk (70.2%), moderate risk (23.7%), and high risk (6.1%). For OffSRB, we identified a no risk (90.6%) and an increasing pathway (9.4%). OnSRBs and OffSRBs were related and had common predictors (ie, sensation seeking, low educational level, gender).

CONCLUSIONS: Only a minority of adolescents shows sustained high OnSRB. This group is likely to consist of low-educated, high-sensation-seeking adolescents who spend more time communicating on the Internet and come from less cohesive families. These same adolescents are also more likely to engage in OffSRB. Preventions should focus on these adolescents. *Pediatrics* 2012;130:e1489–e1496

The Internet has become an important venue for sexual exploration and sexual information among youth.^{1–3} Although the Internet may provide useful sexual information, there have been public concerns that some adolescents may engage in risky sexual behaviors online, such as sending intimate information to strangers or searching for sexual partners online.^{4–7} Engagement in online sexual risk behavior (OnSRB) may be problematic because it may lead to unwanted online sexual solicitations, online harassment, or the misuse of personal information.^{8,9}

OnSRB may be especially problematic if adolescents engage in it cumulatively and do so continuously, as this increases the risk for negative consequences.⁸ Longitudinal studies that investigate OnSRB over time are lacking, however. Investigating adolescents' OnSRB longitudinally may help to identify risk groups of adolescents that engage in cumulative OnSRB during adolescence. Investigating the development of OnSRB may also help to understand the onset and peak of this behavior during adolescence. This may be important for the prevention of this behavior.

Because of the novelty of OnSRB, we also lack an understanding of whether and how OnSRB is related to offline sexual risk behavior (OffSRB). OffSRB, such as engaging in casual sex, is a major health concern. Casual sexual intercourse is an increasingly occurring phenomenon among youth.^{10–12} Engaging in casual sex has been related to negative health consequences, such as contracting sexually transmitted infections, but also to negative emotional consequences, especially for girls.¹⁰ Although we do not know whether OnSRB and OffSRB are related, previous research comparing online and offline behaviors has shown that online and offline behaviors are related. These studies show that the Internet can be used as a venue to rehearse behaviors that are afterward

executed in real life¹³; however, it is yet unknown whether this also holds for sexual risk behavior.

Finally, we do not know whether the same or different psychological and social factors predict pathways of OnSRB and OffSRB. Knowing how these 2 types of behavior are related and by which factors they are influenced may make interventions more effective. If the predictors for OnSRB and OffSRB differ, interventions for OnSRB should be different from those for OffSRB. In this study, we examined the influence of psychological (sensation seeking and life satisfaction), social (family cohesion), and demographic variables (gender and education) on OnSRB and OffSRB. All these predictors have been shown to be related to OffSRB in past studies but have rarely been investigated for OnSRB.^{14–17} In addition, we investigated the effect of the frequency of online communication for OnSRB.

By using a 4-wave longitudinal study with a representative sample of 1762 Dutch adolescents, the goals of this study were (1) to investigate the prevalence and development of both OnSRB and OffSRB, (2) to establish whether OnSRB and OffSRB are related, and (3) to identify risk factors that determine problematic developmental pathways of OnSRB and OffSRB.

METHODS

This study involved a 4-wave panel study with 6-month time intervals. Fieldwork was done by a Dutch research agency. This agency has a large representative online access panel ($N = 10\,990$ Dutch adolescents), which was recruited with traditional telephone, face-to-face, or mail surveys. From these adolescents, 2092 were selected randomly and 1765 agreed to participate in the study (response rate: 84.4%). Institutional approval from the ethics board of the university, and parental and informed consent were obtained before

participation. The participants received 5 € (~\$7) for each completed questionnaire.

Of the 1765 adolescents who completed the first questionnaire, 1445, 1206, and 1016 also participated in Waves 2, 3, and 4, respectively (attrition rates = 16% to 18%). Participants who dropped out did not differ significantly from participants who completed all 4 surveys in gender, education, or levels of OnSRB or OffSRB, but were slightly older (mean = 14.62 vs 14.44 years). Because our data analytical approach can handle missing data, we included data from all participants, even if they did not participate in all 4 waves. Three participants were excluded from the analyses because of inconsistent age information. Thus, the final sample consisted of 1762 adolescents (49% females, aged 12 to 18, mean age = 14.52). Most of these adolescents (80.8%) lived with 2 parents (in line with official Dutch statistics). Participants came from urban as well as rural regions.

Measures

OnSRB

We assessed OnSRB with 4 items used in previous research.^{4,5,8} These items were inspired by academic and public discussions¹⁸ and have been linked to negative consequences, such as receiving unwanted sexual solicitation on the Internet.¹⁹ Participants indicated whether, in the past 6 months, they had (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 knew only online, (4) sent an address or telephone number online to someone they knew only online. The 4 binary OnSRB variables were added into a count variable that could take values from 0 to 4. For the 4 waves, the means (SD) were 0.25 (0.65), 0.22 (0.60), 0.19 (0.58), and 0.17 (0.51), respectively.

OffSRB

OffSRB is a multidimensional construct, reflecting a number of different behaviors.²⁰ In this study, we focused on one specific type of OffSRB, casual sex. Adolescents were asked whether in the past 6 months they had (1) sexual intercourse with someone they had just met and (2) sexual intercourse without condom with someone they had just met. These 2 dichotomous variables were combined into a single count variable that could take values from 0 to 2. Means (SD) for the 4 waves were 0.07 (0.33), 0.06 (0.31), 0.04 (0.26), and 0.05 (0.27), respectively.

Predictors

Psychological (sensation seeking, life satisfaction), social (family cohesion), and demographic variables (gender, education), as well as online communication were included as predictors. Because we assumed that these variables predict risk behavior, we only included these variables as measured at Wave 1 in the analyses.

Sensation seeking was measured with 5 items of the Brief Sensation Seeking Scale that had the highest factor loadings in previous studies.^{21,22} Response categories ranged from 1 (does not apply at all) to 5 (applies completely), mean = 2.09, SD = 0.88, $\alpha = 0.87$. Life satisfaction was operationalized with the 5-item Satisfaction-with-Life Scale.²³ Response categories ranged from 1 to 5 with higher scores indicating more life satisfaction, mean = 3.45, SD = 0.74, $\alpha = 0.87$.

Family cohesion was measured with 4 items from a Dutch adaptation of FACES^{24,25} (eg, "If you want something in our family, you have to take care of it yourself"). Response categories ranged from 1 to 5 with higher scores indicating more family cohesion, mean = 3.53, SD = 0.81, $\alpha = 0.84$.

To measure educational level, participants were asked to indicate the

educational level they were attending at the moment or, if they no longer followed an education, the highest level they had completed. The youngest participants (12-year-olds), who were not yet assigned to a specific educational level, were asked to which educational level they 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), mean = 1.72, SD = 0.81.

The frequency of online communication was measured by asking participants how often they use instant messaging, Internet chats, and social networking sites. Response categories ranged from 0 (never) to 10 (every day). The 3 variables were collapsed into a mean index (mean = 4.53; SD = 2.20).

Data Analytical Approach

To investigate the developmental pathways of OnSRB and OffSRB during adolescence, we arranged the data according to the logic of an accelerated cohort-sequential design with age as the time variable. More specifically, each participant provided data for up to 4 waves. For example, a participant who was 12 years old when she or he received the first questionnaire, contributed data for ages 12.0, 12.5, 13.0, and 13.5. Because participants were aged 12 to 18 in the first wave, we could cover an age range between 12.0 and 19.5 with overlapping cohorts. (To check whether cohort effects may have influenced our results, we ran a series of ANOVAs to investigate whether means of OnSRB and OffSRB at the same age differed for specific cohorts. There were no substantial or systematic deviations between the means of different cohorts. We, therefore, assume that there were no cohort effects that influenced the results).²⁶

The analyses were conducted in 3 steps. First, we separately identified the different developmental pathways of OnSRB and OffSRB by using group-based modeling.^{27–29} To select the number of groups that best represent the heterogeneity in developmental trajectories, the Bayesian Information Criterion (BIC) was used. Models with up to 4 groups were estimated. The model with the largest BIC was selected as the optimal model. To test model adequacy, the average posterior probabilities (APP) of group membership were estimated. Groups should exceed a minimum APP of 0.70. The trajectories were modeled by using the zero-inflated Poisson model. The zero-inflated Poisson model is particularly useful for count variables when the data provide more 0s than expected under the Poisson assumption.²⁸

In the second step, the relationship between group memberships in OnSRB and OffSRB was investigated. In the third step, risk factors were investigated that determine adolescents' membership in the high-risk groups. To identify these factors, we conducted (multinomial) logistic regressions with the predictor variables at Wave 1 as independent variables and group membership in the OnSRB and OffSRB groups as dependent variables.

RESULTS

Trajectories of Online Sexual Risk Behavior

For OnSRB, a 3-group model was estimated as fitting the data best (BIC values: -3259.11 , -2898.58 , -2823.02 , and -2837.00 for the 1-, 2-, 3-, and 4-group solutions, respectively). This model included 1 group that was specified to have 0 probability of risk engagement throughout the time period to account for adolescents who did not engage in OnSRB at all,³⁰ and 2 quadratic curves (BIC = -2811.85) (see Fig 1). The first group, "no-online-risk," consisted of

70.2% of the sample and represents those who did not engage in OnSRB 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 OnSRB, the shape shows a slight increase in middle 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 middle adolescence and a decline of risk engagement from middle to late adolescence. The APP of group membership were all above 0.73, indicating that individuals were well matched to their assigned group.

Trajectories of OffSRB

For OffSRB, 2 groups fit the data best (see Fig 2). One group was specified to have 0 probability of risk engagement. For the second group, a quadratic shape fit the data best (final BIC = -1058.10). APP for the 2 offline groups indicated that the individuals were well matched to their assigned groups (0.94 and 1.0). One large group of adolescents did not engage in OffSRB (90.6%). Adolescents in the second group, “high-offline-risk”, showed increasing levels of OffSRB until age 18, after which it slightly leveled off (9.4%).

Relationship Between OnSRB and OffSRB

Table 1 displays the relationship between the 3 OnSRB groups and the 2 OffSRB groups. Most adolescents belonged to both the no-online-risk group and the no-offline-risk group (67.6%), indicating that these adolescents did not engage in either OnSRB or OffSRB. One group of adolescents (23.1%) engaged only in

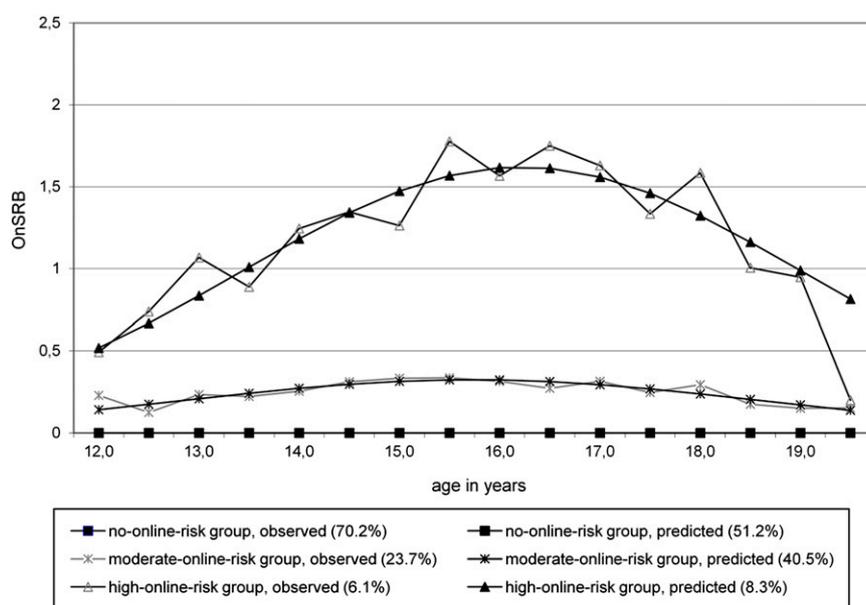


FIGURE 1 Trajectories of OnSRB. The estimated and predicted curves for the 3 OnSRB groups are displayed. The first group shows no OnSRB over time, the second group shows low risk levels, and the third group shows higher levels of OnSRB over the course of adolescence.

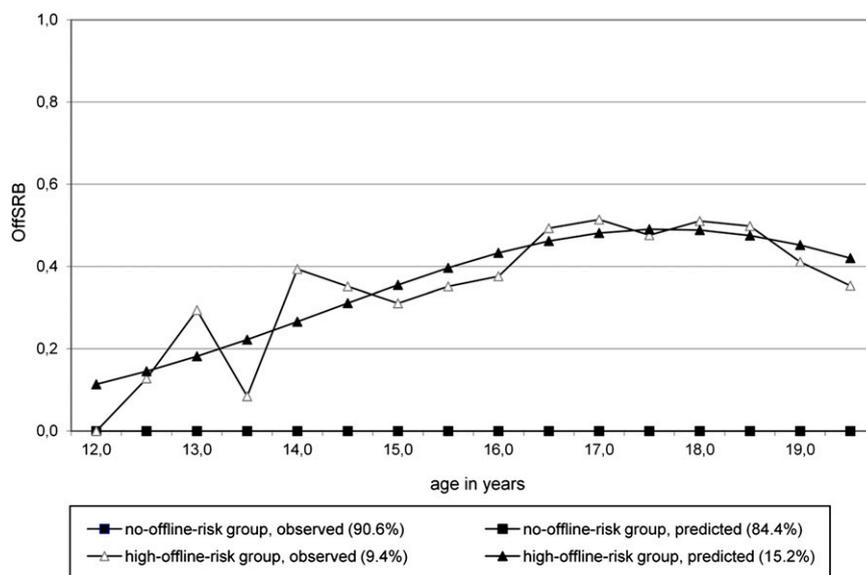


FIGURE 2 Trajectories of OffSRB. The estimated and predicted curves for both OffSRB groups are displayed. The first group shows no OffSRB over time. The second group shows an increasing pathway of OffSRB over the course of adolescence.

OnSRB (moderate- or high-online-risk groups). A very small group of adolescents (2.6%) engaged only in OffSRB. Some adolescents engaged in both OnSRB (moderate-online-risk or high-online-risk group) and OffSRB (6.7%). Of the 165 adolescents who belonged to

the high-offline-risk group, many also engaged in either moderate (41.8%) or high levels of OnSRB (30.3%). In sum, Table 1 shows that although quite a few adolescents engaged only in OnSRB, most adolescents who engaged in OffSRB also engaged in OnSRB.

To further investigate the relationship between OnSRB and OffSRB, we studied the typical patterns of risk engagement for the 119 adolescents who engaged in both types of risks within the 4 waves of data collection. Within this group, 4 different patterns of risk engagement could be identified: both behaviors concurrently, online to offline, offline to online, and inconsistent patterns. More than half of the adolescents (64%) first engaged in both behaviors concurrently. This means that they reported to have engaged in OnSRB and OffSRB concurrently in the past 6 months. They subsequently engaged in either OnSRB, OffSRB, in both behaviors, or neither behavior. Twenty-one percent first engaged in OnSRB and subsequently in OffSRB or in both behaviors concurrently. A much smaller group of adolescents showed the opposite pattern: only 7% moved from OffSRB to OnSRB. The remaining 8% followed an inconsistent pattern. These results show that, for most adolescents, engagement in OnSRB and OffSRB occurred simultaneously in the same 6-month period. There was also a stronger trend from OnSRB to OffSRB than vice versa.

Risk Factors

Table 2 displays the distribution of gender and education for each trajectory group. Table 3 reports the mean differences for all predictor variables for the different risk groups. To predict the three OnSRB 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 4). Higher levels of sensation seeking and lower life satisfaction significantly predicted being in the moderate-online-risk or high-online-risk group in comparison with the no-online-risk group. Moreover, adolescents from less coherent families were more likely

TABLE 1 Relationship Between OnSRB and OffSRB

	No Offline Risk Group <i>n</i> (% total)	High Offline Risk Group <i>n</i> (% total)	Total
No online risk group	1191 (67.6)	46 (2.6)	1237
Within online groups, %	96.3	3.7	
Within offline groups, %	74.6	27.9	
Moderate online risk group	348 (19.8)	69 (3.9)	417
Within online groups, %	83.5	16.5	
Within offline groups, %	21.8	41.8	
High online risk group	58 (3.3)	50 (2.8)	108
Within online groups, %	53.7	46.3	
Within offline groups, %	3.6	30.3	
Total	1597	165	1762

TABLE 2 Distribution of Gender and Education for OnSRB and OffSRB Groups

	Gender		Education		
	Boys	Girls	Low Level	Middle Level	High Level
No online risk (<i>n</i> = 1237), %	49.4	50.6	48.0	27.2	24.8
Moderate online risk (<i>n</i> = 417), %	52.8	47.2	55.9	23.1	21.1
High online risk (<i>n</i> = 108), %	62.0	38.0	62.4	25.7	11.9
No offline risk (<i>n</i> = 1597), %	50.2	49.8	49.3	26.8	23.9
High offline risk (<i>n</i> = 165), %	58.2	41.8	64.9	19.5	15.6

Gender differences: for OnSRB $\chi^2 = 7.06$, Cramer's $V = 0.06$; $P < .05$. For OffSRB $\chi^2 = 3.79$, Cramer's $V = 0.05$; $P = .05$. Differences in education: for OnSRB $\chi^2 = 16.21$, Cramer's $V = 0.07$; $P = .01$. For OffSRB $\chi^2 = 13.77$, Cramer's $V = 0.09$; $P < .01$.

TABLE 3 Group Means (SDs) of Sensation Seeking, Life Satisfaction, Family Cohesion, and Online Communication for OnSRB and OffSRB Groups

	Sensation Seeking Mean (SD)	Life Satisfaction Mean (SD)	Family Cohesion Mean (SD)	Online Communication Mean (SD)
No online risk	2.79 (0.84) ^a	3.51 (0.73) ^a	3.61 (0.78) ^a	4.29 (2.14) ^a
Moderate online risk	3.13 (0.89) ^b	3.33 (0.75) ^b	3.39 (0.86) ^b	4.86 (2.16) ^b
High online risk	3.30 (0.98) ^b	3.27 (0.76) ^b	3.20 (0.81) ^b	5.74 (2.38) ^c
No offline risk	2.84 (0.85) ^a	3.46 (0.74) ^a	3.56 (0.81) ^a	
High offline risk	3.50 (0.93) ^b	3.36 (0.75) ^a	3.28 (0.83) ^b	

Means with different superscripts differ significantly per column (within the 3 online risk groups and the 2 offline risk groups).

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 with 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 group in comparison with the no-online-risk group. Online communication and gender also significantly differentiated between adolescents in the moderate- and high-

online-risk groups with more boys and adolescents who spend more time communicating online belonging to the high-online-risk group.

A logistic regression analysis with the 2 OffSRB groups as the dependent variable showed that sensation seeking and educational level were significant predictors of OffSRB.

DISCUSSION

This study examined the developmental pathways of OnSRB and OffSRB from

TABLE 4 Results of the (Multinomial) Logistic Regressions for the OnSRB and OffSRB Groups

	B (SE)		95% Confidence Interval for Odds Ratio		
			Lower	Odds Ratio	Upper
No online risk versus moderate online risk					
Intercept	-0.37	(0.58)			
Sensation seeking	0.38	(0.08) ^d	1.25	1.47	1.71
Life satisfaction	-0.26	(0.09) ^c	0.65	0.77	0.92
Family cohesion	-0.26	(0.08) ^c	0.66	0.77	0.91
Gender	-0.16	(0.14)	0.65	0.85	1.12
Education	-0.14	(0.07) ^a	0.74	0.87	1.02
Online communication	0.12	(0.03) ^d	1.05	1.12	1.20
No online risk versus high online risk					
Intercept	-0.73	(1.02)			
Sensation seeking	0.39	(0.14) ^c	1.13	1.47	1.93
Life satisfaction	-0.30	(0.16) ^a	0.55	0.74	1.01
Family cohesion	-0.50	(0.15) ^c	0.45	0.61	0.81
Gender	-0.78	(0.25) ^c	0.28	0.46	0.74
Education	-0.33	(0.16) ^b	0.53	0.72	0.98
Online communication	0.32	(0.06) ^d	1.23	1.38	1.55
Moderate online risk versus high online risk					
Intercept	-0.36	(1.06)			
Sensation seeking	0.01	(0.14)	0.76	1.01	1.33
Life satisfaction	-0.04	(0.16)	0.70	0.96	1.32
Family cohesion	-0.25	(0.15)	0.58	0.78	1.05
Gender	-0.63	(0.26) ^b	0.32	0.54	0.88
Education	-0.18	(0.16)	0.61	0.83	1.15
Online communication	0.21	(0.06) ^c	1.09	1.23	1.39
No offline risk versus high offline risk					
Constant	-3.37	(0.78) ^d			
Sensation seeking	0.88	(0.11) ^d	1.94	2.41	3.00
Life satisfaction	-0.13	(0.12)	0.70	0.88	1.10
Family cohesion	-0.16	(0.11)	0.69	0.85	1.05
Gender	-0.04	(0.18)	0.68	0.96	1.37
Education	-0.40	(0.12) ^c	0.53	0.03	0.85

For OnSRB, $R^2 = 0.10$ (Cox & Snell), 0.13 (Nagelkerke). Model $\chi^2(12) = 146.32$, $P < .001$. For OffSRB, $R^2 = 0.06$ (Cox & Snell), 0.13 (Nagelkerke). Model $\chi^2(5) = 98.33$, $P < .001$.

^a $P < .10$.

^b $P < .05$.

^c $P < .01$.

^d $P < .001$.

early to late adolescence. By using a group-based modeling approach, we found substantial variation in the developmental course of OnSRB and OffSRB. For engagement in OnSRB, 3 distinct groups were identified. One large group of adolescents did not engage in OnSRB during adolescence (70.2%). A second group showed moderate levels of risk engagement (23.7%), and a third group showed higher levels of risk engagement (6.1%). The moderate and high online risk groups followed the typical developmental pathway of offline risk behavior, with an increase from early to middle adolescence, a peak in middle adolescence,

and a decline thereafter.^{31–33} This finding suggests that OnSRB follows pathways similar to many offline risk behaviors. Although OnSRB peaks in middle adolescence, the onset of this behavior occurs already in early adolescence. Preventions should, therefore, target early adolescents to interrupt problematic pathways before these adolescents engage in heightened levels of OnSRB. Identifying different trajectory groups of OnSRB and OffSRB advanced our understanding of the rather new phenomenon of OnSRB. In contrast to public concerns and fears,¹⁸ most adolescents behaved responsibly online. Engagement in OnSRB

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. However, this small group may demand special attention.

For OffSRB, we identified 2 distinctive trajectories. Similar to OnSRB, most adolescents in the sample did not engage in OffSRB at all; however, 1 small group showed increasing levels of risk engagement over the course of adolescence. These 2 trajectories are comparable to developmental trajectories found in previous studies on OffSRB.^{34,35}

Another important finding of this study is that OnSRB and OffSRB were related. Most importantly, our findings showed that most adolescents who engaged in OffSRB also engaged in OnSRB. This finding is in line with previous Internet research that has shown that there is a large overlap between all sorts of online and offline behaviors.^{13,36,37} For today's youth, the Internet has become an integral part of their social lives. Therefore, the boundaries between online and offline behaviors have become blurred.

There are at least 2 explanations for the strong overlap between OnSRB and OffSRB. The first explanation is that engagement in 1 behavior increases the likelihood of engaging in the other behavior.³⁸ 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 possibilities to engage in sexual behaviors offline. Our findings partly support this argument because some adolescents engaged in OnSRB before they engage in OffSRB. Moreover, the trajectory analysis showed that OnSRB peaked earlier during adolescence than OffSRB. It may thus be that OnSRB is a precursor of OffSRB.

The second explanation for the strong overlap between both behaviors is that they are determined by common factors.³⁸ 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.³⁹ 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 OnSRB and OffSRB allows us to identify adolescents in high-risk groups and potentially tailor preventions to these adolescents. Adolescents engaging in OnSRB 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.⁴⁰ There-

fore, parents, teachers, and practitioners may be well advised to pay particular attention to adolescents who are not satisfied with their lives to prevent potentially adverse OnSRB in this group. Concerning the prevention of OnSRB and OffSRB, the findings suggest that public campaigns may particularly center on adolescent sensation seekers and choose formats and techniques that these adolescents value.^{41,42} 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 OnSRB 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 4 behaviors we measured. Similarly, OffSRB was conceptualized as engaging in casual sexual intercourse. Although this behavior

is considered a particularly risky form of OffSRB,¹⁰ future studies may incorporate a broader measurement of offline sexual behavior to fully reflect adolescents' sexual development.

CONCLUSIONS

The current study provides a detailed picture of the developmental pathways of OnSRB and OffSRB, as well as the interrelations of these 2 behaviors. The findings suggest that adolescents' online and offline behaviors are closely related. Although OnSRBs and OffSRBs are behaviorally different, there is a strong overlap between adolescents engaging in OffSRB and OnSRB. In particular for adolescents who are prone to engage in OffSRB, the Internet may be a place to experiment with their sexuality before engaging in OffSRB. Thus, to fully comprehend the development of adolescents' sexual risk behavior, pediatricians can no longer ignore adolescents' sexual online behavior.

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