

# Online Risk Behavior and Depression in Adolescence

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**Abstract**

The current two-wave study focused on the bidirectional longitudinal associations between feelings of depression and online risk behaviors in adolescents. The sample consisted of 460 Dutch adolescents (mean age = 13.5 years at wave 1, 46.1% girls). Adolescents' self-reported on feelings of depression and the online risk behaviors: disclosing personal information online to a stranger, searching for someone to talk about sex with online and face-to-face meetings with a stranger met online. Results indicate that engaging in disclosing personal information online to a stranger was a predictor for increased feelings of depression for boys, but not for girls. In addition, a significant association was found with feelings of depression as a predictor of searching for someone to talk about sex with online, with a stronger association for boys. No significant associations were found for girls. In conclusion, associations between feelings of depression and online risk behaviors were found, the associations were stronger for boys.

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### Online Risk Behavior and Depression in Adolescence

A large majority of adolescents have access to the Internet and are oftentimes alone while using it. There are several beneficial ways in which adolescents can use it, such as for educational purposes, for communication and as an information source (Bezinovic, Darko, Roncevic, & Bilajac, 2015). Using online technologies has been linked to increases in self-esteem and social capital, safe identity experimentation and an increased opportunity for self-disclosure (Best, Manktelow, & Taylor, 2014). During adolescence the need to relate to others increases and the Internet may offer new opportunities for adolescents to engage in potentially risky behaviors, such as interacting with strangers online. Interactions on the Internet lower inhibitions and accelerate the growth of intimacy between people (O'Sullivan, 2014). Almost 80% of parents report being highly concerned that their child will meet a stranger online (George & Odgers, 2015). This concern should not be taken lightly. In a study in several European countries, almost a third of the sample of European youth had talked to a stranger online (Livingstone & Smith, 2014). A minority of adolescents report talking exclusively with strangers online (Peter, Valkenburg, & Schouten, 2006). In several studies conducted in countries around the world, the percentages of adolescents meeting a person face-to-face who they had initially met online ranged from 7% to 35% (Baumgartner, Valkenburg, & Peter, 2010a; Liau, Khoo, & Ang, 2005; Quayle, Jonsson, & Lööf, 2012). Moreover, more than 20% of adolescents attended the meeting alone and a small minority met up with someone who portrayed themselves as a child on the Internet but turned out to be an adult in real life (Liau et al., 2005). Meeting a stranger in person initially met online may be life threatening and can result in a host of negative consequences (Quayle et al., 2012).

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Little is known about the mental health of adolescents who engage in online risk behaviors and what makes adolescents susceptible to engaging in these potentially fatal risk behaviors (Livingstone & Haddon, 2008). Research does suggest that heightened feelings of depression could play a role (Ybarra, Alexander, & Mitchell, 2005).

Depression is common among adolescents and regularly has its onset in adolescence (Muris, Schmidt, Lambrichs, & Meesters, 2001). The prevalence among girls is twice as high as among boys (Ybarra et al., 2005). The purpose of the current research is to study the relationship between online risk behaviors and heightened feelings of depression in adolescence, more specifically whether heightened feelings of depression are a correlate, a risk factor or a consequence of engaging in online risk behaviors. Due to the differences in prevalence rates in depression among boys and girls, gender differences in these associations are also examined.

### **Social compensation hypothesis**

A possible explanation for why adolescents communicate online with others is offered by the social compensation hypothesis. According to the social compensation hypothesis socially anxious and introverted adolescents are especially likely to use the Internet. This is because these adolescents experience difficulty developing friendships and communicating in real-life settings (Valkenburg, Schouten, & Peter, 2005). The Internet provides reduced audiovisual cues, offers anonymity and may be a less demanding and more safe environment which may help adolescents in overcoming inhibition and shyness (Quayle et al., 2012; Selfhout, Branje, Delsing, Ter Bogt, & Meeus, 2009; Ybarra et al., 2005). In addition, contact online may help adolescents to ‘bounce back’ emotionally after experiencing social rejection or isolation (George & Odgers, 2015). Adolescents who are shy or feel isolated may seek online interactions to

decrease their loneliness or to increase social skills. Depressed adolescents are more likely to have fewer friends, to experience lower levels of social support and to have difficulty with social functioning (Ybarra et al., 2005). Adolescents who are significantly more likely to talk with strangers online report their motives to be a mix between boredom, a curiosity to meet new people and inhibitions in face-to-face communication (Peter et al., 2006). Therefore, in line with the social compensation hypothesis adolescents with heightened feelings of depression may seek out contacts online to decrease their loneliness and find support.

### **Forming relationships online and depression**

Several studies have been conducted regarding forming online relationships and its relation to feelings of depression in adolescence. Literature has examined the relationship both cross-sectionally and longitudinally. With respect to the cross-sectional studies, youth with heightened feelings of depression are more likely to form close online relationships, in comparison to their less troubled counterparts (Wolak, Mitchell, & Finkelhor, 2003). In an American study close to 80% of adolescents with major depressive symptomatology had talked with a stranger online in comparison to less than 55% for adolescents with no depressive symptomatology (Ybarra et al., 2005). The amount of times these adolescents had talked to strangers was twice as high for boys than for girls (Ybarra et al., 2005). Younger adolescents were more likely to talk with strangers online, no difference was found for the likelihood of talking with strangers between boys and girls. In another study, adolescents with heightened feelings of depression who felt that they had no one to talk to were more likely to express feelings and thoughts online, and to make friends online (Hwang, Cheong, & Feeley, 2009).

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With regards to the longitudinal research, only two studies have been done. The first study found that heightened feelings of depression in adolescents predicts an increase in preference for online social interactions, however an increased preference for online social interactions did not predict heightened feelings of depression. No gender differences were found for these associations (Gámex-Guadix, 2014). In the second longitudinal study, which studied both adolescents and adults, heightened feelings of depression at Time 1 was not associated with using the Internet to meet new people online at Time 2. In comparison, people who used the Internet to meet new people online at Time 1 reported significantly more feelings of depression at Time 2 (Bessiere, Kiesler, Kraut, & Boneva, 2008). However, this was only the case for individuals reporting high levels of social support. No association was found for the individuals with the lowest levels of social support and no gender differences were examined. To summarize, the cross-sectional research shows that adolescents with heightened feelings of depression are more likely to talk and form relationships online with strangers. With studies finding that boys engage in talking with strangers twice as much as girls do (Ybarra et al., 2005) and other studies findings no differences between boys and girls (Hwang et al., 2009; Wolak et al., 2003). The longitudinal research offers inconsistent findings with regards to the direction of the relationship between feelings of depression and forming or having a preference for online relationships. One study found that heightened feelings of depression predicts an increase in preference for online social interactions (Gámex-Guadix, 2014), while another study found that communicating with strangers online predicts an increase in feelings of depression (Bessiere et al., 2008). In one longitudinal studies no gender differences were found, in the other gender differences were not examined (Bessiere et al., 2008; Gámex-Guadix,

2014). To conclude, there is a large number of adolescents who communicate with strangers online. Adolescents who have heightened feelings of depression are especially prone to engage in online risk behaviors as they are significantly more likely to communicate with strangers online (Gámex-Guadix, 2014; Hwang et al., 2009; Wolak et al., 2003; Ybarra et al., 2005).

### **Risky online behavior and depression**

Although online relationships can benefit an adolescent by increases in self-esteem, the development of personal identity and an increase in social support (Bezinovic et al., 2015), there are certain risks. In the current research the focus is on examining feelings of depression as a possible outcome and as an antecedent for engaging in online risk behaviors, specifically these three online risk behaviors: disclosing personal information online, searching for someone to talk about sex with online and having a face-to-face meeting with a stranger met online. Each risk behavior and its association with feelings of depression and gender differences is examined. In addition, for each risk behavior the social compensation hypothesis is considered.

With respect to the first risk behavior, research shows that rates of disclosing personal information online, including pictures, ranges from 8.3% to 66% in adolescents (Baumgartner, Valkenburg, & Peter, 2010b; Livingstone & Helsper, 2007; White, Gummerum, & Hanoch, 2015). Disclosing personal information was more common among boys when not taking feelings of depression into account (White et al., 2015). The only two studies that looked at the relationship between this risk behavior and feelings of depression are cross-sectional American studies. In both studies, youth with mild and major depressive symptomatology were significantly more likely to disclose personal information (Wolak et al., 2008; Ybarra et al., 2005). This personal

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information consisted of an adolescents' real name, address and school or a picture of themselves, including sexual pictures. In the Ybarra study, girls were more likely to post pictures of themselves whereas boys were more likely to disclose personal information online, no gender differences were found in the Wolak study. An explanation for why adolescents with heightened feelings of depression are more likely to disclose personal information online is that these adolescents are trying to reach out to others and establish intimacy, which is in line with the social compensation hypothesis. To conclude, adolescents with heightened feelings of depression are more likely to disclose personal information, the research with regards to gender differences and feelings of depression shows either different forms of disclosure for boys and girls (Ybarra et al., 2005) or no differences (Wolak et al., 2003).

With regards to the second risk behavior, searching for someone to talk about sex with online, only cross-sectional studies could be found. Searching for someone to talk about sex with online ranged from the lowest percentage of 2.8% in young adolescent boys to the highest percentage of 10.7% in adolescent boys aged 14-15, with boys reporting engaging significantly more in the risk behavior than girls (Baumgartner et al., 2010b). In a Canadian sample almost half of adolescents had talked about sex online with someone, of which more than 10% had talked about sex online with a stranger (O'Sullivan, 2014). In an American study almost 5% of adolescents had searched for someone to talk about sex with online (Rice, Winetrobe, Holloway, Montoya, Plant, & Kordic, 2015). The depth and breadth with which Taiwanese boys engaged in sexual self-disclosure online was significantly greater than for girls (Chiou & Wan, 2006). No studies were found that examined the relationship between searching for someone to talk about sex with online and depression. Sexting, creating or sending



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nude or nearly nude pictures online, is closely associated with talking about sex online. A review that studied the literature of the relationship between sexting and depression did not find that sexting was significantly associated with symptoms of depression (Van Ouytsel, Walrave, Ponnet, & Heirman, 2015). However, only cross-sectional studies were included in this review. To conclude, research on sexting and depression shows no association and no research was found that investigates the relationship between searching for someone to talk about sex with online and feelings of depression. Current studies offer no support for the social compensation hypothesis as an explanation for this online risk behavior at this point in time. Research shows that a minority of adolescents search for someone to talk about sex with online, with boys being more likely to sexually disclose more and more often (Baumgartner et al., 2010b; Chiou & Wan, 2006; O'Sullivan, 2014; Rice et al., 2015). Therefore, the current study is one of the first to investigate the association between feelings of depression and this online risk behavior.

With respect to the last risk behavior, cross-country research shows that the percentage of adolescents that have had a face-to-face meeting with a stranger met online ranges from 7% to 35% (Baumgartner et al., 2010a; Liao et al., 2005; Livingstone & Helsper, 2007; Livingstone & Smith, 2014; Van den Heuvel, Van den Eijnden, Van Rooij, & Van de Mheen, 2012; Quayle et al., 2012). An American cross-sectional study found that socially anxious and/or lonely adolescents were more likely to communicate with people online that they did not have a close affiliation with (Gross, Juvonen, & Gable, 2002). The adolescents who reported that they had few close friends in school were significantly more likely to communicate online to avoid being lonely. However, this was not the case for depressed adolescents. In a Dutch longitudinal study,

low self-esteem and depression were significantly associated with engaging in this risk behavior (Van den Heuvel et al., 2012). Boys reported having had significantly more meetings than girls. However, depression was only significant in the cross-sectional analyses, no significant association was found in the longitudinal analyses. This could suggest that depression is only a correlate to this type of risk behavior and these findings challenge the social compensation hypothesis as a sufficient explanation for this type of risk behavior. To conclude, the scarce research shows inconsistent findings with regards to the relation between having a face-to-face meeting with a stranger initially met online and depression (Gross et al., 2002; Van den Heuvel et al., 2012).

### **The present study**

The present study examines the longitudinal associations between heightened feelings of depression and three different online risk behaviors, namely disclosing personal information online, searching for someone to talk about sex with online, and having a face-to-face meeting with a stranger met online. Both feelings of depression and the online risk behaviors are examined as a predictor of the other. In addition, gender differences are examined for each association. The first aim of the study is to examine whether engaging in online risk behaviors cause a change in feelings of depression over time. The first set of hypotheses predicts that engaging in each online risk behavior at wave 1 cause changes in feelings of depression from wave 1 to wave 2, with no difference in these associations between boys and girls. The second aim of the study is to examine whether the current study offers support for the social compensation hypothesis. Based on the social compensation hypothesis, one would expect that heightened feelings of depression will lead to an increase in online risk behaviors (Valkenburg et al., 2005). Hypothesized is that heightened feelings of depression at

wave 1 predict an increase in disclosure of personal information at wave 2, especially for boys (Wolak et al., 2008; Ybarra et al., 2005). The next hypothesis is an exploratory hypothesis because of a lack of empirical data, the hypothesis is that searching for someone to talk about sex with online at wave 2 is not associated with heightened feelings of depression at wave 1, but is more common for boys than for girls (Baumgartner et al., 2010b; Chiou & Wan, 2006; O'Sullivan, 2014; Rice et al., 2015). The last hypothesis is that heightened feelings of depression at wave 1 predicts engaging in having face-to-face meetings with someone met online at wave 2, with boys engaging in these meetings more often than girls (Gross et al., 2002; Van den Heuvel et al., 2012).

### **Method**

#### **Participants**

Participants for this study were drawn from a prospective three-wave longitudinal study in the Netherlands that began in 2012. Questionnaire data was gathered annually (in the years 2012, 2013, 2014). In total 460 adolescents who were either in their 7<sup>th</sup> or 9<sup>th</sup> grade in secondary school participated during the first and second wave. These adolescents were asked to fill out questionnaires during school hours on computers at their schools. At wave 1 the ages of the participants ranged between 12 and 17 ( $M = 13.5$ ,  $SD = 1.214$ ), with 46.1% of the adolescents being girls and 53.9% being boys. A majority of adolescents indicated being born in the Netherlands (93%), 63% of the adolescents identified themselves as Dutch. The rest reported identifying as various other ethnicities, such as Turkish/Turkish-Dutch (9.1%), Moroccan/Moroccan-Dutch (6.1%) and Hindu-Surinamese (4.1%). The majority of

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adolescents lived with both biological parents (70.7%) or their biological mother (21.7%).

### **Procedure**

Participants were recruited from various secondary schools. Secondary schools were recruited through phone calls and emails. In total 8 schools in six different regions within the Netherlands participated. After the schools gave permission for participation, parents could refuse to let their child participate via a passive consent form. The participants received written and verbal instructions from trained research assistants during data collection. The participants were informed that they could drop out at any time. Because schools varied in how much time was allowed to be used for data collection and because there was a time limit during the filling out of the questionnaires, not all students were able to finish in time. Participants were offered a chocolate candy worth 2 euros as a prize for participating, or they could have their name entered in a raffle to win a 50 euro gift voucher. Bias checks were conducted to check whether participants that were missing during one wave of measurement caused bias in results. Results revealed no bias was found.

### **Measures**

#### **Depressive symptoms.**

Depressive symptoms were reported during each wave with use of the Depressive Mood Inventory (DMI; Kandel & Davies, 1982), which was translated to Dutch by Deković (1996). Adolescents were asked to indicate how often within the last six months they experienced depressive symptoms. The questionnaire contained 6 items; example items are “*Feeling nervous or tense*” and “*Worrying too much about things*”. The answer categories were: 0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4

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= always. Mean scores were computed, with higher means denoting higher levels of depressive symptoms. Cronbach alpha's were .78 at wave 1 and .84 at wave 2.

### **Online risk behavior.**

Three items were used based on previous research (Baumgartner et al., 2010a). Participants were asked how many times in the last six months they had engaged in: 1) searching for someone to talk about sex with online, 2) disclosing their home address or phone number to someone recently met on the Internet, and 3) having ever had a face-to-face meeting with someone initially met on the Internet. Answer categories ranged from: 0 = never; 1 = once (seldom); 2 = twice (sometimes); 3 = 3-5 times (often); 4 = 6 or more times (very often). Because alpha intercorrelation reliability was low, .16 at wave 1 and .49 at wave 2, each item was analyzed separately.

### **Strategy of analyses**

All analyses were conducted in 'IBM SPSS Statistics 20'. A series of 2 (time) x 2 (gender) repeated measures analysis of variance was used to assess whether boys and girls differed on each of the online risk behaviors and depression across the two waves of measurement. To examine the degree to which each of the online risk behaviors at wave 1 predicted changes in feelings of depression from wave 1 to wave 2 linear multiple regression analyses were conducted. Gender, age and feelings of depression at wave 1 were entered at the first step of the analysis. At the second step each online risk behavior at wave 1 was entered. At the third step of the analysis an interaction term for each online risk behavior and gender was entered. To examine the degree to which depression at wave 1 could predict changes in engaging in each of the online risk behaviors from wave 1 to wave 2 three linear multiple regression analyses were conducted. Gender, age and the online risk behavior at wave 1 were entered at the first

step of the analysis. At the second step depression at wave 1 was entered and at the third step the interaction term for gender and depression at wave 1 was entered. If a significant interaction effect was found then regression analyses were run separately by gender. All variables were centered.

### **Results**

#### **Descriptive results**

The means, standard deviations and prevalence of each online risk behavior and depression for both wave 1 and 2 can be seen in Table 1. There were no significant differences between boys and girls in disclosing personal information online. In both wave 1 and wave 2 there were significant differences between boys and girls with regards to searching for someone to talk about sex with online. Boys engaged in this behavior significantly more than girls did at both wave 1,  $t(1, 423) = 2.18, p < .05$  and at wave 2  $t(1, 332) = 3.66, p < .001$ . In wave 2 boys engaged in having face-to-face meetings with a stranger initially met online significantly more frequently than girls did  $t(1,407) = 2.15, p < .05$ . In both wave 1,  $t(1, 396) = -6.75, p < .001$ , and wave 2,  $t(1, 417) = -6.75, p < .001$ , girls reported more feelings of depression than boys did. The correlations between variables of interest can be seen in Table 2.

#### **Online risk behaviors at wave 1 as a predictor of changes in feelings of depression from wave 1 to wave 2**

Each online risk behavior at wave 1 was examined for significance as a predictor of changes in feelings of depression from wave 1 to wave 2. Results of linear regression analyses revealed gender as a significant predictor for depression at wave 2. In addition, a significant gender by personal disclosure interaction effect was found, with disclosure

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Table 1

*Percentages, means and standard deviations of the online risk behaviors and means and standard deviations of feelings of depression*

	Wave 1				Wave 2									
	Sex talk		Personal disclosure		Meeting stranger		Dep	Sex talk		Personal disclosure		Meeting stranger		Dep
	%	<i>M</i> (SD)	%	<i>M</i> (SD)	%	<i>M</i> (SD)	<i>M</i> (SD)	%	<i>M</i> (SD)	%	<i>M</i> (SD)	%	<i>M</i> (SD)	<i>M</i> (SD)
Boys	13%	0.19 (0.59)	8.5%	0.17 (0.62)	13.8%	0.25 (0.72)	1.22 (0.59)	17.1%	0.36 (0.94)	15.4%	0.32 (0.88)	22.8%	0.44 (1.00)	1.27 (0.75)
Girls	7.1%	0.09 (0.38)	12.3%	0.17 (0.50)	11.3%	0.15 (0.48)	1.65 (0.74)	10.0%	0.12 (0.38)	19.0%	0.35 (0.82)	21.8%	0.28 (0.60)	1.78 (0.80)
Total	10.2%	0.15 (0.51)	10.2%	0.17 (0.57)	12.6%	0.20 (0.62)	1.42 (0.69)	13.8%	0.25 (0.75)	17.1%	0.33 (0.85)	22.3%	0.37 (0.84)	1.50 (0.81)

*Note.* Sex talk = searching for someone to talk about sex with online; Personal disclosure = disclosing personal information online to a stranger; Meet stranger = having a face-to-face meeting with a stranger met online; Dep = feelings of depression; % = of participants who report engaging in the behavior at least once.

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Table 2

*Correlations between variables of interest*

	1	2	3	4	5	6	7	8
1 Sex talk W1	-							
2 Personal disclosure W1	.22**	-						
3 Meet stranger W1	.15**	.37**	-					
4 Depression W1	.10*	.19**	.08	-				
5 Sex talk W2	.39**	.10*	.05	.07	-			
6 Personal disclosure W2	.12**	.24**	.20**	.13**	.39**	-		
7 Meet stranger W2	.10*	.20**	.36**	.03	.31**	.43**	-	
8 Depression W2	.10*	.15**	.05	.55**	.20**	.27**	.19**	-

*Note.* \* $p < .05$ ; \*\* $p < .01$ ; Sex talk = searching for someone to talk about sex with online; Personal disclosure = disclosing personal information online to a stranger; Meet stranger = having a face-to-face meeting with a stranger met online; W1 = wave 1; W2 = wave 2



of personal information being a significant predictor of depression for boys ( $B = .18$ ,  $p < .01$ ) but not for girls, as can be seen in Table 3. Analyses revealed that the other two online risk behaviors were not significant predictors.

### **Depression at wave 1 as a predictor of changes in engaging in online risk behaviors from wave 1 to wave 2**

#### **Disclosing personal information online.**

Regarding the association between depression at wave 1 as a predictor of changes in disclosing personal information online from wave 1 to wave 2 linear regression analyses did show a significant effect for age but did not show a significant effect for depression as a predictor and neither was this the case for the gender by disclosing personal information online interaction effect, as can be seen in Table 4.

#### **Searching for someone to talk about sex with online.**

Regarding the association between depression at wave 1 as a predictor of changes in searching for someone to talk about sex with online from wave 1 to wave 2 linear regression analyses showed a significant effect for feelings of depression as a predictor as well as for age, as can be seen in Table 5. In addition, the interaction effect gender by searching for someone to talk about sex with online was significant. When analyses were run separately, the effect for boys just missed significance ( $B = .19$ ,  $p = .05$ ), whereas the effect for girls was not significant at all.

#### **Having a face-to-face meeting with a stranger initially met online.**

Regarding the association between depression at wave 1 as a predictor of changes in having a face-to-face meeting with a stranger initially met online from wave 1 to wave 2

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Table 3

*Regression analysis with the three online risk behaviors and their three interaction terms with gender as a predictor of depression in wave 2*

	Adjusted R <sup>2</sup>	Depression W2			β	Boys			Girls			
		B	SE	Total sample		Adjusted R <sup>2</sup>	B	SE	β	Adjusted R <sup>2</sup>	B	SE
Model 1	.33				.21				.31			
Gender		0.25	0.07	0.15**								
Age		0.04	0.03	0.06		0.07	0.03	0.11		-0.003	0.04	-0.005
Depression W1		0.58	0.05	0.50**		0.56	0.07	0.44**		0.61	0.07	0.57**
Model 2	.33				.24				.31			
Gender		0.26	0.07	0.16**								
Age		0.04	0.03	0.06		0.07	0.03	0.12*		-0.004	0.04	-0.005
Depression W1		0.56	0.05	0.48**		0.50	0.07	0.39**		0.63	0.07	0.58**
Sex talk W1		0.09	0.06	0.06		0.13	0.07	0.10		0.003	0.13	0.002
Personal disclosure W1		0.07	0.06	0.05		0.22	0.08	0.18**		-0.14	0.10	-0.09
Meet stranger W1		-0.01	0.06	-0.01		-0.08	0.07	-0.08		0.02	0.10	0.01
Model 3	.34											
Gender		0.26	0.07	0.16**								
Age		0.04	0.03	0.06								
Depression W1		0.57	0.05	0.48**								
Sex talk W1		0.12	0.07	0.07								
Personal disclosure W1		0.21	0.08	0.15*								
Meet stranger W1		-0.07	0.07	-0.06								
GenderxSex talk W1		-0.11	0.15	-0.04								
GenderxPersonal disclosure W1		-0.34	0.13	-0.14**								
GenderxMeet stranger W1		0.09	0.12	0.04								

*Note.* \* $p < .05$ ; \*\* $p < .01$ ; Sex talk = searching for someone to talk about sex with online; Personal disclosure = disclosing personal information online to a stranger; Meet stranger = having a face-to-face meeting with a stranger met online; W1 = wave 1; W2 = wave 2;

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GenderxSextalk = interaction term for gender and sex talk variable; GenderxPersonaldisclosure = interaction term for gender and personal disclosure variable; GenderxMeetstrangerW1 = interaction term for gender and meet stranger variable

Table 4

*Regression analysis with depression at wave 1 as a predictor of changes in engaging in disclosing personal information online to a stranger from wave 1 to wave 2*

	Adjusted R <sup>2</sup>	Personal disclosure W2		β
		B	SE	
Model 1	.06			
Gender		0.02	0.08	0.01
Age		0.07	0.03	0.10*
Personal disclosure W1		0.36	0.07	0.24**
Model 2	.07			
Gender		-0.02	0.08	-0.01
Age		0.07	0.03	0.09*
Personal disclosure W1		0.34	0.07	0.22**
Depression W1		0.09	0.06	0.08
Model 3	.07			
Gender		-0.02	0.08	-0.01
Age		0.07	0.03	0.10*
Personal disclosure W1		0.33	0.07	0.22**
Depression W1		0.15	0.09	0.12
Genderxdep W1		-0.09	0.12	-0.06

*Note.* \* $p < .05$ ; \*\* $p < .01$ ; Personal disclosure = disclosing personal information online to a stranger; Genderxdep = interaction term for gender and depression variable; W1 = wave 1; W2 = wave 2

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Table 5

*Regression analysis with depression at wave 1 as a predictor of changes in engaging in searching for someone to talk about sex with online from wave 1 to wave 2*

	Adjusted R <sup>2</sup>	Sex talk	Total sample	β	Boys			Girls				
		W2	SE		Adjusted R <sup>2</sup>	B	SE	β	Adjusted R <sup>2</sup>	B	SE	β
Model 1	.16				.15				.17			
Gender		-0.19	0.07	-0.13**		0.07	0.05	0.09				
Age		0.02	0.03	0.03		0.62	0.09	0.39**		-0.05	0.02	-0.16*
Sex talk W1		0.55	0.06	0.38**						0.40	0.06	0.41**
Model 2	.17				.16				.17			
Gender		-0.23	0.07	-0.15**								
Age		0.01	0.03	0.02		0.07	0.05	0.09		-0.06	0.02	-0.17*
Sex talk W1		0.54	0.06	0.37**		0.59	0.10	0.37**		0.40	0.06	0.40**
Depression W1		0.08	0.05	0.08		0.19	0.10	0.12+		0.02	0.03	0.05
Model 3	.17											
Gender		-0.24	0.07	-0.16**								
Age		0.01	0.03	0.02								
Sex talk W1		0.53	0.06	0.36**								
Depression W1		0.20	0.08	0.19**								
Genderxdep W1		-0.21	0.10	-0.15*								

*Note.* + $p < .10$ , \* $p < .05$ , \*\* $p < .01$ ; Sex talk = searching for someone to talk about sex with online; Genderxdep = interaction term for gender and depression variable; W1 = wave 1; W2 = wave 2

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Table 6

*Regression analysis with depression at wave 1 as a predictor of changes in engaging in having a face-to-face meeting with a stranger met online from wave 1 to wave 2*

	Adjusted R <sup>2</sup>	Meet stranger W2		β
		B	SE	
Model 1	.15			
Gender		-0.15	0.07	-0.09*
Age		0.11	0.03	0.15**
Meet stranger W1		0.45	0.06	0.33**
Model 2	.15			
Gender		-0.15	0.08	-0.09
Age		0.11	0.03	0.15**
Meet stranger W1		0.45	0.06	0.33**
Depression W1		0.02	0.06	0.01
Model 3	.15			
Gender		-0.16	0.08	-0.09*
Age		0.11	0.03	0.15**
Meet stranger W1		0.45	0.06	0.33**
Depression W1		0.06	0.09	0.05
Genderxdep W1		-0.08	0.11	-0.05

*Note.* \* $p < .05$ ; \*\* $p < .01$ ; Meet stranger = having a face-to-face meeting with a stranger met online; Genderxdep = interaction term for gender and depression variable; W1 = wave 1; W2 = wave 2

linear regression analyses did show a significant effect for age. However, no significant effect was found for depression as a predictor and neither was this the case for the gender by having a face-to-face meeting with a stranger initially met online interaction effect, as can be seen in Table 6.

### **Discussion**

The present study is one of the first to focus on the longitudinal associations between online risk behaviors and feelings of depression. Both directions of the association were examined: whether online risk behaviors cause a change in feelings of depression a year later and whether feelings of depression cause a change in engaging in online risk behaviors a year later. In addition, whether these associations differ for boys and girls was also examined.

Regarding the association between online risk behaviors at wave 1 and changes in feelings of depression from wave 1 to wave 2, the current study revealed that boys but not girls were more likely to develop feelings of depression after engaging in disclosing personal information online to a stranger. This is partly consistent with the literature, one study revealed that boys who reported feelings of depression were more likely to disclose personal information (Ybarra et al., 2005), whereas another study found no gender differences (Wolak et al., 2003). This finding is not in line with the social compensation hypothesis, one would expect that feelings of depression would decrease after engaging in this behavior because the goal of this behavior is possibly to reach out to others and establish intimacy. Regarding the online risk behavior searching for someone to talk about sex with online no significant associations were found with feelings of depression, with boys being more likely to engage in the behavior than girls.

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There is no available empirical data on the link between feelings of depression and this online risk behavior, therefore no comparison could be made with existing literature.

The gender difference that was found is in line with the literature, previous studies found that boys are more likely to engage in this behavior (Baumgartner et al., 2010b; Chiou & Wan, 2006; O'Sullivan, 2014; Rice et al., 2015). Regarding having a face-to-face meeting with a stranger met online no significant association with feelings of depression was found. In addition, boys are more likely to engage in meetings more frequently. Both findings are in line with previous literature (Gross et al., 2002; Van den Heuvel et al., 2012).

Regarding the association between whether feelings of depression at wave 1 predict changes in engaging in online risk behaviors from wave 1 to wave 2, for the risk behaviors disclosing personal information online and having a face-to-face meeting with a stranger met online, no significant associations were found. This is not in line with several studies that found that adolescents with heightened feelings of depression are more likely to engage in these behaviors (Gross et al., 2002; Van den Heuvel et al., 2012; Wolak et al., 2003; Ybarra et al., 2005). The association between searching for someone to talk about sex with online and feelings of depression was significant with the association stronger for boys than for girls with the association for boys just missing significance. Because no empirical data on the link between this risk behavior and feelings of depression was found, no comparison could be made.

The social compensation hypothesis suggests that adolescents with heightened feelings of depression may seek out contacts online to decrease their loneliness and find support (Peter et al., 2006; Quayle et al., 2012; Selfhout et al., 2009; Valkenburg et al.,

2005; Ybarra et al., 2005). The social compensation hypothesis is not a sufficient explanation for the results found in this study. Only for the online risk behavior searching for someone to talk about sex with, and then only for boys, a significant association was found. Adolescents with heightened feelings of depression were not more likely to engage in the other two online risk behaviors than their non-depressed peers. In addition, adolescents who had engaging in these online risk behaviors did not show significant decreases in feelings of depression. A possible reason for why the social compensation hypothesis is not a sufficient explanation for these findings is that the hypothesis focuses mainly on anxious and introverted adolescents and adolescents who have heightened feelings of depression are not necessarily anxious and/or introverted (Valkenburg et al., 2005).

### **Strengths, limitations and suggestions for further research**

There are several strengths to the current study. The present study consists of a large representative sample of Dutch adolescents. Furthermore, the study has a longitudinal design and studies a relatively new and upcoming subject. The current study adds to the still scarce literature on the topic.

Even though the study has many strengths there are some limitations as well. A limitation of the study is the measure of depression that is used. The current measure of depressive symptomatology is statistically robust, with strong intercorrelations between symptoms, but it does not cover all of the DSM-5 symptoms of depression (American Psychiatric Association, 2013). Therefore, the measure does not necessarily extend to all adolescents with feelings of depression. A suggestion for further research is the use of a depression measure that encompasses all symptoms of depression.



A second limitation is that all results are based on self-reports of adolescents. All of the measures came from the same source, namely the adolescent. Using only self-report as a source may increase the risk of inconsistency in answers and in social desirability motives (Podsakoff & Organ, 1986). A suggestion for future research is to make use of multi-informant measures to minimize the risks that come with self-reports.

This study focuses mainly on young adolescents, with an average age of 13.5 at wave 1, which may have influenced the findings and can therefore be seen as a limitation. Depression typically has its onset in late adolescence (American Psychiatric Association, 2013) and research suggests that younger adolescents, especially boys, take fewer risks with online risk behavior which signifies that age is an important predictor in engaging in online risk behavior (Baumgartner et al., 2010a). This is verified by the current study, the age of the adolescent was a consistent significant predictor for engaging in two of the three online risk behaviors. The combination between the onset of depression and adolescents' age as a significant predictor may offer different results in a sample of older adolescents. Therefore, a suggestion for further research is a similar study among older adolescents.

### **Implications**

Despite limitations, this research extends previous, mostly cross-sectional, literature concerning the link between online risk behaviors and depression in adolescents, especially male adolescents. As adolescents are further integrating online and mobile technologies into their daily lives awareness should be raised among health-care practitioners, parents, policy makers and the adolescents themselves about possible consequences their online behavior may have. Results of the current study reveal that

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10-23% of adolescents have engaged in online risk behaviors at least once, which is no small number. More knowledge and insight into risk factors for engaging in online risk behavior, and its consequences, will make health-care practitioners, parents and policy makers better equipped to help at-risk adolescents. This is especially important for male adolescents. Male adolescents who report feelings of depression are more likely to report Internet harassment (Ybarra, 2004) and male adolescents are more likely to develop feelings of depression after engaging in online risk behavior. Parental rules on Internet use, qualitative good parent-child conversations and parental reactions to excessive Internet use have been found to prevent adolescents from engaging in online risk behavior (Van den Heuvel et al., 2012).

**References**

- American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition*. Washington: American Psychiatric Publishing.
- Baumgartner, S. E., Valkenburg, P. M., & Peter, J. (2010a). Assessing causality in the relationship between adolescents' risky sexual online behavior and their perceptions of this behavior. *Journal of Youth Adolescence*, *39*, 1226-1239. doi:10.1007/s10964-010-9512-y
- Baumgartner, S. E., Valkenburg, P. M., & Peter, J. (2010b). Unwanted online sexual solicitation and risky sexual online behavior across the lifespan. *Journal of Applied Developmental Psychology*, *31*, 439-447. doi:10.1016/j.appdev.2010.07.00
- Bessiere, K., Kiesler, S., Kraut, R., & Boneva, B. S. (2008). Effects of Internet use and social resources on changes in depression. *Information, Communication & Society*, *11*, 47-70. doi:10.1080/13691180701858851
- Best, P., Manktelow, R., & Taylor, B. (2014). Online communication, social media and adolescent wellbeing: A systematic narrative review. *Children and Youth Services Review*, *41*, 27-36. doi:10.1016/j.chilyouth.2014.03.001
- Bezinovic, P., Rovis, D., Roncevic, N., & Bilajac, L. (2015). Patterns of Internet use and mental health of high school students in Istria County Croatia: A cross-sectional study. *Croatian Medical Journal*, *56*, 297-305. doi:10.3325/cmj.2015.56.297
- Chiou, W. B., & Wan, C. S. (2006). Sexual self-disclosure in cyberspace among Taiwanese adolescents: Gender differences and the interplay of cyberspace. *Cyberpsychology & Behavior*, *9*, 46-53. doi:10.1089/cpb.2006.9.46

## ONLINE RISK BEHAVIOR AND DEPRESSION IN ADOLESCENCE

- Deković, M. (1996). *Vragenlijst Depressie bij Adolescenten (VDA)*. Unpublished manuscript, Department of Psychology, Utrecht University, Utrecht, The Netherlands.
- Gámex-Guadix, M. (2014). Depressive symptoms and problematic Internet use among adolescents: Analysis of the longitudinal relationships from the cognitive-behavioral model. *Cyberpsychology, Behavior, and Social Networking*, *17*, 714-719. doi:10.1089/cyber.2014.0226
- George, M. J. & Odgers, C. L. (2015). Seven fears and the science of how mobile technologies may be influencing adolescents in the digital age. *Perspectives on Psychological Science*, *10*, 832-851. doi:10.1177/1745691615596788
- Gross, E. F., Juvonen, J., & Gable, S. L. (2002). Internet use and well-being in adolescence. *Journal of Social Issues*, *58*, 75-90. doi:10.1111/1540-4560.00249
- Hwang, J. M., Cheong, P. H., & Feeley, T. H. (2009). Being young and feeling blue in Taiwan: Examining adolescent depressive mood and online and offline activities. *New Media & Society*, *11*, 1101-1121. doi:10.1177/1461444809341699
- Kandel, D. B., & Davies, M. (1982). Epidemiology of depressive mood in adolescents: An empirical study. *Archives of General Psychiatry*, *39*, 1205-1212. doi:10.1001/archpsyc.1982.042901000065011
- Liau, A. K., Khoo, A., & Ang, P. H. (2005). Factors influencing adolescents engagement in risky Internet behavior. *Cyberpsychology & Behavior*, *8*, 513-520. doi:10.1089/cpb.2005.8.513
- Livingstone, S., & Haddon, L. (2008). Risky experiences for children online: Charting European research on children and the Internet. *Children and Society*, *22*, 314-323. doi:10.1111/j.1099-0860.2008.00157.x

## ONLINE RISK BEHAVIOR AND DEPRESSION IN ADOLESCENCE

- Livingstone, S., & Helsper, E. J. (2007). Taking risks when communicating on the Internet: the role of offline social-psychological factors in young people's vulnerability to online risks. *Information, Communication & Society, 10*, 619-644. doi:10.1080/13691180701657998
- Livingstone, S., & Smith, P. K. (2014). Annual research review: Harms experienced by child users of online and mobile technologies: The nature, prevalence and management of sexual and aggressive risks in the digital age. *The Journal of Child Psychology and Psychiatry, 55*, 635-654. doi:10.1111/jcpp.12197
- Moreno, M. A., VanderStoep, A., Parks, M. R., Zimmerman, F. J., Kurth, A., & Christakis, D. A. (2009). Reducing at-risk adolescents' display of risk behavior on a social networking web site. *Archives of Pediatrics & Adolescent Medicine, 163*, 35-41. doi:10.1001/archpediatrics.2008.502
- Muris, P., Schmidt, H., Lambrichs, R., & Meesters, C. (2001). Protective and vulnerability factors of depression in adolescents. *Behavior Research and Therapy, 39*, 555-565. doi:10.1016/S0005-7967(00)00026-7
- O'Sullivan, L. F. (2014). Linking online sexual activities to health outcomes among teens. In E. S. Lefkowitz & S. A. Vasilenko (Eds.), *New Directions for Child and Adolescent Development* (pp. 37–51). doi:10.1002/cad.20059
- Peter, J., Valkenburg, P. M., & Schouten, A. P. (2006). Characteristics and motives of adolescents talking with strangers on the Internet. *Cyberpsychology & Behavior, 9*, 526-530. doi:10.1089/cpb.2006.9.526
- Podsakoff, P. M., & Organ, D. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management, 12*, 531-544. doi:10.1177/014920638601200408

## ONLINE RISK BEHAVIOR AND DEPRESSION IN ADOLESCENCE

- Quayle, E., Jonsson, L., & Löf, L. (2012). *Online behavior related to child sexual abuse: Interviews with affected young people*. Stockholm: ROBERT project.
- Rice, E., Winetrobe, H., Holloway, I. W., Montoya, J., Plant, A., & Kordic, T. (2015). Cell phone Internet access, online sexual solicitation, partner seeking, and sexual risk behavior among adolescents. *Archives of Sexual Behavior, 44*, 755-763. doi:10.1007/s10508-014-0366-
- Schouten, A. P., Valkenburg, P. M., & Peter, J. (2007). Precursors and underlying processes of adolescents' online self-disclosure: Developing and testing an "Internet-Attribute-Perception" model. *Media Psychology, 10*, 292-315. doi:10.1080/15213260701375686
- Selfhout, M. H. W., Branje, S. J. T., Delsing, B. M., Ter Bogt, T. F. M., & Meeus, W. H. J. (2009). Different types of Internet use, depression, and social anxiety: The role of perceived friendship quality. *Journal of Adolescence, 32*, 819-833. doi:10.1016/j.adolescence.2008.10.011
- Valkenburg, P. M., Schouten, A. P., & Peter, J. (2005). Adolescents' identity experiments on the Internet. *New Media & Society, 7*, 383-402. doi:10.1177/1461444805052282
- Van den Heuvel, A., Van den Eijnden, R. J. J. M., Van Rooij, A. J., & Van de Mheen, D. (2012). Meeting online contacts in real life among adolescents: The predictive role of psychosocial wellbeing and Internet-specific parenting. *Computers in Human Behavior, 28*, 465-472. doi:10.1016/j.chb.2011.10.018
- Van Ouytsel, J., Walrave, M., Ponnet, K., & Heirman, W. (2015). The association between adolescent sexting, psychological difficulties, and risk behavior: An

## ONLINE RISK BEHAVIOR AND DEPRESSION IN ADOLESCENCE

integrative review. *The Journal of School Nursing*, 31, 54-69.

doi:10.1177/105984051454196

White, C. M., Gummerum, M., & Hanoch, Y. (2015). Adolescents' and young adults' online risk taking: The role of gist and verbatim responses. *Risk Analysis*, 35, 1407-1422. doi:10.1111/risa.12369

Wolak, J., Mitchell, K. J., & Finkelhor, D. (2003). Escaping or connecting? Characteristics of youth who form close online relationships. *Journal of Adolescence*, 26, 105-119. doi:10.1016/S0140-1971(02)00114-8

Ybarra, M. L. (2004). Linkages between depressive symptomatology and Internet harassment among young regular Internet users. *Cyberpsychology & Behavior*, 7, 247-257. doi:10.1089/109493104323024500

Ybarra, M. L., Alexander, C., & Mitchell, K. J. (2005). Depressive symptomatology, youth Internet use, and online interactions: a national survey. *Journal of Adolescent Health*, 36, 9-18. doi:10.1016/j.jadohealth.2003.10.012