

# Social Anxiety and Loneliness in Adults Who Solicit Minors Online

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## Abstract

This study examined the association of social anxiety, loneliness, and problematic Internet use (PIU) with the online solicitation of minors. Within a convenience sample of adult Internet users from Germany, Finland, and Sweden ( $N = 2,828$ ), we compared the responses of participants who had not interacted sexually with strangers online ( $n = 2,049$ ) with participants who sexually interacted with unknown adults online ( $n = 642$ ), and both groups with adults who sexually solicited unknown minors online ( $n = 137$ ). Online sexual interaction with adults was associated with higher levels of social anxiety, loneliness, and PIU compared with not sexually interacting with strangers online. Sexually soliciting minors online was associated with higher levels of social anxiety, loneliness, and PIU compared with sexually interacting with adults and not sexually interacting with strangers at all. Interestingly, compared with those with adult contacts, loneliness was specifically pronounced for participants who solicited children, whereas social anxiety and PIU were pronounced for participants soliciting adolescents. These findings suggest that social anxiety, loneliness, and PIU may be among the motivators for using the Internet to solicit individuals of different age groups for sexual purposes. These factors emerged as specifically relevant for adults who sexually solicited minors and who reported greater impairments compared with adults who sexually interacted with adults. These characteristics may thus be important to consider for assessment and treatment procedures for individuals soliciting minors online.

## Keywords

online sexual solicitation, social anxiety, loneliness, problematic Internet use

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Online sexual solicitation includes acts of encouraging another person to “engage in sexual activities or sexual talk or give personal sexual information” (Finkelhor, Mitchell, & Wolak, 2000, summary p. x). The characteristics of individuals who solicit minors online are largely unknown, as the Internet’s inherent anonymity impedes empirical research (Lanning, 2001; Ybarra, Espelage, & Mitchell, 2007). Specifically, factors associated with and motivating online sexual solicitation are still in need of investigation (Seto, Wood, Babchishin, & Flynn, 2012; Webster et al., 2012). Understanding these factors is of cardinal importance for mental health services treating offenders and for considerations regarding suitable assessment and prevention procedures (Babchishin, Hanson, & Hermann, 2011).

An initial step in identifying factors that may be associated with online sexual solicitation of minors is observing online sexual interaction in general. The Internet affects social interaction and interpersonal relationships (Cooper, Delmonico, & Burg, 2000; Griffiths, 2004) by providing a social context that is anonymous, accessible, affordable (Cooper, 1998), and disinhibiting (Joinson, 2001; Suler, 2004). Social cues salient in face-to-face interactions are arbitrarily manageable online (Brunet & Schmidt, 2007). The social cost of revealing personal aspects is reduced in online environments, which enables individuals to express themselves more freely and accelerates self-disclosure compared with offline interactions (Bardi & Brady, 2010; McKenna & Bargh, 1998; McKenna, Green, & Gleason, 2002; Walther, 1996). Concerning sexuality, which for many may be particularly difficult to express, the safety and social control afforded by the Internet may motivate individuals to seek sexual outlets and pursue encounters online (McKenna, Green, & Smith, 2001). This may be amplified for those who are inhibited in offline contexts, for example, by social anxiety or loneliness (Cooper, McLoughlin, & Campbell, 2000; Eichenberg & Malberg, 2012; Hill, 2011). Unsurprisingly, numerous studies link social anxiety and loneliness to the increased use of the Internet for social activities (Ando & Sakamoto, 2008; Bardi & Brady, 2010; Morahan-Martin & Schumacher, 2003), for the instigation of romantic relationships (Bargh, McKenna, & Fitzsimons, 2002; Odacı & Kalkan, 2010; Whitty, 2008a, 2008b), and for seeking sexual partners (Kubicek, Carpineto, McDavitt, Weiss, & Kipke, 2011; Ross, Rosser, McCurdy, & Feldman, 2007). Thus, many researchers stress the benefit of sexual interaction online in supporting the inclusion of marginalized individuals (Hill, 2011; Innala, 2007; McKenna et al., 2001).

Yet, using the Internet for sexual purposes has also been linked to negative effects (Döring, 2009). Seeking sexual interaction online has been associated with increased odds of sexual risk behaviors offline, such as unsafe sex or “bug catching” (i.e., intentionally infecting oneself with sexual transmitted infections; Adam, Murphy, & deWit, 2011). Another frequently discussed negative correlate of online sexual interaction is “getting tangled in the net” (Cooper, Putnam, Planchon, & Boies, 1999) in terms of problematic Internet use (PIU). PIU has been described as an inability to regulate one’s Internet use, causing distress and functional impairment (Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000), and has been used synonymously with Internet addiction and pathological Internet use (Douglas et al., 2008). Empirically, PIU has been associated with severe psychological, social, and professional repercussions

(Cooper et al., 1999; Griffiths, 2004; Young, 2008). PIU has also been linked to social anxiety and loneliness (Baker & Oswald, 2010; Caplan, 2003, 2007; Ceyhan & Ceyhan, 2008). Moreover, it has been discussed that using the Internet to escape anxiety and loneliness may trigger a vicious cycle that exacerbates these conditions (Erwin, Turk, Heimberg, Fresco, & Hantula, 2004; Pierce, 2009). Considering the relevance of social anxiety, loneliness, and PIU in general online sexual interaction, it seems plausible that these factors may also be relevant in online sexual solicitation of minors (Quayle & Taylor, 2003).

A second source to advise the search for psychopathological characteristics associated with online sexual solicitation of minors is studies sampling the offenders themselves. Empirical evidence suggests that solicitors are heterogeneous in demography, motivation, and strategies (Briggs, Simon, & Simonsen, 2011; Choo, 2009; Mitchell, Wolak, & Finkelhor, 2005; Webster et al., 2012). To date, social anxiety, loneliness, and PIU have not been investigated explicitly in association with online sexual solicitation of minors. Nonetheless, there are studies indicating social deficits among solicitation offenders. A quarter of Briggs et al.'s (2011) perpetrator sample met the criteria of an avoidant personality disorder, which has been discussed as the most severe form of social anxiety (Hofmann, Newman, Becker, Taylor, & Roth, 1995). Wanting to establish intimacy with victims, as displayed by some solicitation offenders (Grosskopf, 2010; Webster et al., 2012), alludes to pre-existing deficits in the perpetrators' social relationships. Correspondingly, Seto et al. (2012) found less capacity for relationship stability among online solicitation offenders compared with contact offenders. The online environment may afford these individuals, similar to nonoffender samples, social and sexual vents to compensate for offline social isolation and lacking social confidence (Briggs et al., 2011; Webster et al., 2012). Solicitation offenders report using the Internet to manage negative emotions and that being anonymous online provides a safe context for them to be themselves (Quayle, Allegro, Hutton, Sheath, & Lööf, 2012, 2014). Moreover, interacting with teenagers in the online context may be even less threatening than adult interaction (Briggs et al., 2011; Quayle et al., 2012).

Finally, evidence from other offender groups against children, though not the focus of this study, may allude to factors associated with online sexual solicitation. Intimacy deficits are theorized as an antecedent of child sexual abuse (Marshall, 1989). Child sexual abusers report higher levels of loneliness and fear of intimacy (Bumby & Hansen, 1997), social anxiety (Hoyer, Kunst, & Schmidt, 2001; Nunes, McPhail, & Babchishin, 2012), inept social functioning (Egan, Kavanagh, & Blair, 2005), and fear of negative evaluation (Overholser & Beck, 1986) compared with other sex offender groups and nonoffender controls. Studies on child pornography offenders identify social deficits as a key pathway to offending (Middleton, Elliott, Mandeville-Norden, & Beech, 2006). Child pornography offenders indicate more social avoidance and distress than nonoffender controls (Armstrong & Mellor, 2013) and also report emotional avoidance (Quayle, Vaughan, & Taylor, 2006). Concerning PIU, there has not been a systematic empirical investigation in the context of sexual offending against children. However, its prominence in models on the maintenance of child pornography use (Elliott & Beech, 2009; Quayle & Taylor, 2003) suggests that PIU may also be

relevant in online sexual solicitation of minors. Notably, the extant literature on recidivism risk does not support social deficits or loneliness as risk factors for sexual offense recidivism (Hanson & Bussière, 1998; Hanson & Morton-Bourgon, 2005; Mann, Hanson, & Thornton, 2010). However, there are only a few recidivism studies on online sex offenders, and most include samples of child pornography offenders rather than solicitation offenders, with a focus on criminal history and case characteristics rather than social impairments (Eke, Seto, & Williams, 2011; Seto & Eke, 2005; Seto, Hanson, & Babchishin, 2011).

Reviewing the literature on online sexual interaction in general, online solicitation offenders, and other sexual offender against children, it appears that social anxiety, loneliness, and PIU may be candidates for psychological and behavioral characteristics associated with solicitation of minors online. The present study aimed to investigate this assumption. Using an online survey, we sampled adults who had not interacted sexually with strangers online, adults who interacted sexually with unknown adults, and adults who sexually solicited unknown minors. Including a group without sexual online contacts and a group with adult-only contacts served to differentiate characteristics which may be specific for solicitation offenders against minors from characteristics associated with using the Internet for sexual interactions in general. This is important as Bergen and colleagues found little difference between adults sexually interacting with adults and adults soliciting minors with regards to tactics (Bergen, Davidson, et al., 2014) and situational factors (Bergen, Ahto, et al., 2014) of the sexual interaction.

We hypothesized that, compared with participants who do not interact sexually online with strangers, participants who sexually interact with adults would display more social anxiety (Hypothesis 1a), more social loneliness (Hypothesis 1b), and more PIU (Hypothesis 1c). We also hypothesized that, compared with participants not interacting sexually online with strangers and participants interacting sexually with adults, adults who solicited minors would display more social anxiety (Hypothesis 2a), more social loneliness (Hypothesis 2b), and more PIU (Hypothesis 2c).

We then investigated whether social anxiety, loneliness, and PIU differed between participants soliciting children (13 years or younger) and participants soliciting adolescents (14-17 years of age) in comparison with those who solicited adults. We explored this question without stating directional hypotheses, as prior findings based on offline offenders have been inconsistent regarding the increase of psychosocial impairments with decreasing victim age (Carlstedt et al., 2009; Firestone, Dixon, Nunes, & Bradford, 2005; Kalichman, 1991).

## **Method**

### *Sampling Procedure*

We identified websites that allowed individuals to socialize with others via common search engines (e.g., Google, Yahoo!, Bing, Ask) following a comprehensive sampling procedure used by Ridings, Gefen, and Arinze (2002). This constitutes a nonprobability sampling procedure, as the population of interactive websites is unknown (D'Ovidio,

Mitman, El-Burki, & Shumar, 2011). Inclusion in the study was independent of the websites' thematic focus. Websites were excluded if the administrators or terms and conditions prohibited promoting the study, or if the website had no activity within 1 month prior. The resulting convenience sample consisted of 97 German, 15 Swedish, and 16 Finnish websites including social networks (e.g., Facebook, Twitter, Snapscouts) and online communities (e.g., general, news, politics, health, lifestyle, sex, computer, dating, gaming). The survey was also spread via the email server of Abo Akademi University, Finland.

The study was promoted on the selected websites between July and December 2012. Text posts relaying the introduction of the survey were embedded in existing conversation threads and posted as new threads. Bimonthly checks were conducted to ensure continued conspicuity of the promotional posts and to allow responses to feedback. Posts on different websites contained distinct links to the survey. This allowed for monitoring of participation rates and the possibility of adapting recruitment strategies if the return rate was inadequate.

### *Participants*

An online convenience sample of international adult Internet users of both sexes was analyzed. Of the 7,733 accesses to the survey, 4,905 (63.4%) cases were removed after being identified as incomplete or displaying invalid responses, that is, responding faster than two standard deviations below mean response times, indicating that they had not read the items. As a result, 2,828 participants (36.6%) who completed all questions regarding online communication were included in the study. This sample consisted of 1,383 men (49.1%) and 1,431 women (50.9%) with ages ranging from 18 to 72 ( $M = 28.43$ ,  $SD = 9.73$ ). Participants were predominantly sampled in Germany ( $n = 1,712$ ; 60.8%), followed by Finland ( $n = 990$ ; 35.2%), and Sweden ( $n = 112$ ; 4.0%). Within the sample, 44.7% were single, 78.9% had graduated with a certificate equating to 12 years of formal education, and 10.0% were unemployed at the time of the study.

### *Procedure*

The promotional posts contained links that directed participants to a secure server ([www.soscisurvey.de](http://www.soscisurvey.de)). An introduction informed participants that the study assessed social and sexual online behaviors and factors motivating such behaviors. The introduction also contained information on anonymity of participation, the required minimum age of 18 years for participation, and the incentive (a lottery for 1 of 10 Amazon.com vouchers per country, worth an equivalent of 20€ each). The online survey was set to disable recording of identifiable information (e.g., IP address, referring browser) and moving backward between survey pages.

Participants had to indicate their consent to proceed to the survey. Upon finishing the survey, a link forwarded participants interested in the lottery to another website to record email addresses separately from survey data. The study was approved by the ethics committees of Deutsche Gesellschaft für Psychologie and Abo Akademi University, Finland.

## Measures

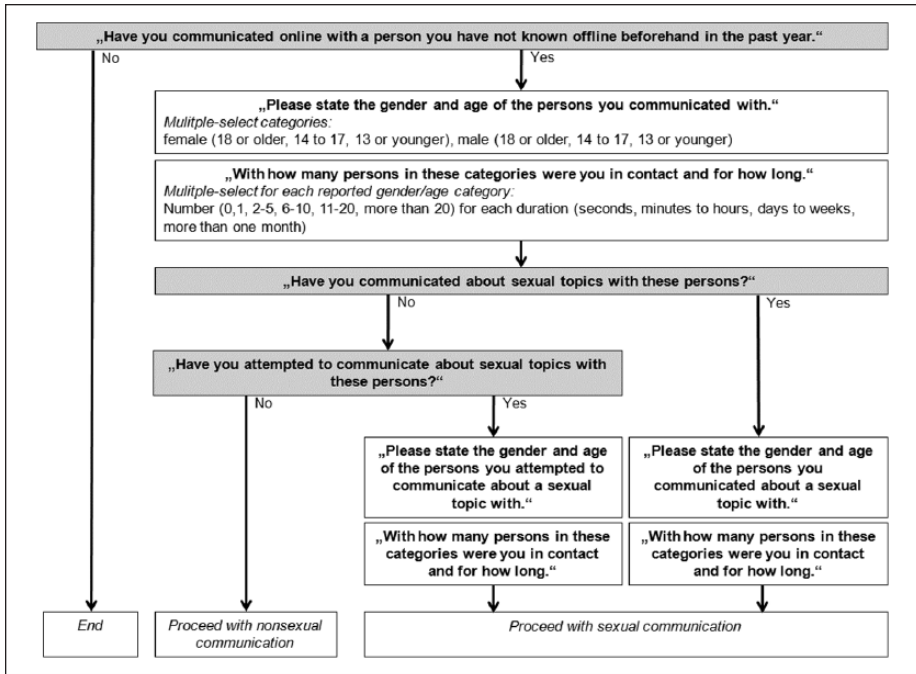
The survey was constructed in English and translated into German, Finnish, and Swedish in a translation–backtranslation procedure.

**Demography.** Single-item questions assessed sex, age, relationship, education, and employment status. Distinct survey links supplied the country wherefrom a participant accessed the survey.

**Social anxiety.** The Mini-Social Phobia Inventory (Mini-SPIN; Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001) is a three-item self-rating instrument for generalized social anxiety disorder. The Mini-SPIN has been found to discriminate social anxiety patients from nonanxious controls (Connor et al., 2001; Osório, Crippa, & Loureiro, 2010) and has been shown to have convergent and divergent validity with other social anxiety and depression measures (Osório et al., 2010). All items are rated on a 5-point Likert-type scale ranging from 0 (*not at all*) to 4 (*extremely*). Higher sum scores indicate greater generalized social anxiety within a range 0 to 12. Osório et al. (2010) have found the Mini-SPIN to have adequate internal consistency (Cronbach's  $\alpha = .73$ ). In the present study, the internal consistency was  $\alpha = .79$ .

**Loneliness.** The three-item Social Loneliness subscale of the De Jong Gierveld Loneliness Scale (De Jong Gierveld & Van Tilburg, 2006) measures social loneliness, defined as the negative feeling arising from a lack of engagement in social networks. This scale has displayed convergent validity with longer versions of the De Jong Gierveld Loneliness Scale ( $r = .93$ ; De Jong Gierveld & Van Tilburg, 2006), as well as concurrent validity with established markers of loneliness, such as smaller social networks (De Jong Gierveld & Van Tilburg, 2010). The anchors of the 5-point Likert-type scale were adapted from the original (*yes!*, *yes*, *more or less*, *no*, and *no!*) to *completely agree*, *somewhat agree*, *neither nor*, *somewhat disagree*, and *completely disagree*. The items are coded inversely so that higher sum scores indicate greater social loneliness within a range of 3 to 15. A participant is categorized as extremely lonely when indicating *somewhat disagree* or *completely disagree* on two or more statements (De Jong Gierveld & Van Tilburg, 1999). The internal consistency has been found to range from  $\alpha = .70$  to  $\alpha = .73$  (De Jong Gierveld & Van Tilburg, 2006). In the present study, the adapted scale yielded an internal consistency of  $\alpha = .92$ .

**PIU.** The Generalized Problematic Internet Use Scale 2 (GPIUS2; Caplan, 2010) assesses self-reported cognitions, behaviors, and outcomes related to deficient self-regulation of Internet use. Previous research indicates that the GPIUS2 is associated with other measures of excessive Internet use, increased loneliness, depression, and social anxiety, supporting its convergent and concurrent validity (Barke, Nyenhuis, & Kröner-Herwig, 2014; Fioravanti, Primi, & Casale, 2013; Yong Kim-fong, 2013). The five factors of PIU (Mood Alteration, Compulsive Use, Cognitive Preoccupation, Negative Outcomes, and Preference for Online Social Interaction) are measured via



**Figure 1.** Flowchart of online sexual solicitation items.

Note. Communication about sexual topics was defined as “making sexually insinuating or suggestive comments, sexual innuendo or flirting, conversing about sexual preferences, activities, pornography, or the like.”

three items each on an 8-point Likert-type scale ranging from 1 (*definitely disagree*) to 8 (*definitely agree*). Caplan (2010) found the internal consistency to be excellent ( $\alpha = .91$ ). For the present study, the authors chose one item for each factor based on the highest factor loading reported in the original publication (Caplan, 2010). After omitting items, mean values were analyzed, with higher mean values signifying greater PIU. The adapted scale yielded an internal consistency of  $\alpha = .79$ .

**Online sexual solicitation.** Items measuring online sexual solicitation referred to sexual contacts in the last 12 months between the participant and an individual that he or she had never met before (Figure 1). We chose contact with strangers, as previous studies suggest that the vast majority of online solicitation offenders have been previously unknown to the victims (86%-92%; Ferreira, Martins, & Goncalves, et al., 2011; Finkelhor et al., 2000; Wolak, Mitchell, & Finkelhor, et al., 2006).

Participants were then asked whether they had engaged in the following sexual behaviors with their online contacts: sending sexual pictures to the contact, receiving sexual pictures portraying the contact, engaging in cybersex, or engaging in sexual activities during offline meetings. These items focused on a single contact (target) to reduce memory bias and complexity of the survey. The target was defined as the longest

**Table 1.** Composition of Participants Who Sexually Interacted With Strangers According to Age of Youngest Online Contact ( $n = 779$ ).

Reported contact ages	Composite groups: Youngest online contact					
	Adult only ( $n = 642$ )		Adolescent ( $n = 108$ )		Child ( $n = 29$ )	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Adult only	642	(100)	0	(0)	0	(0)
Adolescent only	0	(0)	23	(21.3)	0	(0)
Child only	0	(0)	0	(0)	4	(13.8)
Adult and adolescent	0	(0)	85	(78.7)	0	(0)
Adult and child	0	(0)	0	(0)	5	(17.2)
Adolescent and child	0	(0)	0	(0)	3	(10.3)
All age groups	0	(0)	0	(0)	17	(58.6)

Note. Participants were categorized into composite groups based on the age of the youngest contact with who they reported communicating online in the past year. Percentages refer to the columns.

contact from the youngest age category a participant had reported (e.g., *someone between 14 to 17 years of age*). All participants received the same questions concerning sexual behaviors independent of the age category of the target contact. Consequently, the online sexual solicitation group included participants who reported sexual communication or any of the sexual behaviors online with adults or minors.

## Data Analysis

We analyzed the data using IBM© SPSS© Statistics 20 (International Business Machines Corp, 2011). Bivariate Pearson product-moment correlations were used to assess associations among the psychological variables. For between-group comparisons on categorical variables, chi-square tests were conducted, and odds ratios (ORs) were analyzed as the preferred effect size for categorical data (Fleiss, 1994; Sánchez-Meca, Marín-Martínez, & Chacón-Moscoso, 2003). Accounting for intercorrelations, between-group comparisons on metric variables were conducted using multivariate analyses of variance (MANOVAs) and Cohen's *d* with pooled standard deviation as the effect size (Cohen, 1988). Confidence intervals (CIs) are reported at a 95% level.

## Results

### Frequency of Online Sexual Interaction

In the entire sample, 72.5% ( $n = 2,049$ ) reported no online sexual interaction with a stranger, whereas 27.5% ( $n = 779$ ) had interacted sexually with unknown contacts online. Subsequently, participants who confirmed online sexual interaction with strangers reported the presumed age (i.e., adult, adolescent, or child) of these sexual contacts (Table 1).



**Table 2.** Demographic Characteristics as a Function of Sexual Online Interaction With Strangers ( $N = 2,828$ ).

Demographic characteristic	Sexual online interaction			$\chi^2(df = 2)$
	None	Adult contact	Minor contact	
	$n = 2,035$	$n = 642$	$n = 137$	
	% (n)	% (n)	% (n)	
Age (M, SD)	28.37 (9.67) <sub>a</sub>	29.28 (10.15) <sub>a</sub>	25.36 (7.83) <sub>b</sub>	9.36*** <sup>1</sup>
Sex (% male)	45.7 (931) <sub>a</sub>	55.0 (353) <sub>b</sub>	72.3 (99) <sub>c</sub>	47.44***
Relationship (% single)	41.3 (841) <sub>a</sub>	52.6 (338) <sub>b</sub>	56.9 (78) <sub>b</sub>	34.07***
Education (% >12 years)	80.3 (1,390) <sub>a</sub>	75.8 (391) <sub>b</sub>	69.8 (74) <sub>b</sub>	10.45**
Employment (% unemployed) <sup>2</sup>	8.6 (149) <sub>a</sub>	13.9 (72) <sub>a</sub>	14.2 (15) <sub>a</sub>	14.58**

Note. Different subscripts indicate significant differences in post hoc pairwise comparison (Games Howell-correction for the metric variable age, and pairwise chi-square comparisons for the categorical variables with adjusted significance level  $\alpha = .01$ ).

<sup>1</sup>F statistic ( $df = 2$ ) of univariate analysis of variance (ANOVA).

<sup>2</sup>The post hoc comparisons of employment status failed significance, whereas the comparison in all three groups reached statistical significance.

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

A considerable proportion of participants (14.9%) reported interacting with more than one age group. As shown in Table 1, for the following analyses, these participants were assigned to groups based on their youngest contact, that is, adult contact versus minor contact, which were later divided into adolescent or child contacts. Accordingly, 642 participants (82.4%) reported sexual online contact with adults and 137 participants (17.6%) with a minor. Of these, 108 participants (13.9%) reported soliciting at least one adolescent (14-17 years) but no child contact, and 29 (3.7%) reported soliciting at least one child (13 years or younger).

### Demographic Characteristics

We compared participants with no sexual online interactions, participants with adult sexual contacts, and participants soliciting minors on their demographic characteristics. The analyses yielded statistically significant differences between the groups concerning sex, age, relationship, education, and employment status (Table 2).

Post hoc analyses revealed that, compared with participants who did not interact sexually with strangers, participants with adult contacts were significantly more likely to be male (OR = 1.44, 95% CI = [1.21, 1.73]), single (OR = 1.58, 95% CI = [1.32, 1.89]), and less educated (OR = 0.77, 95% CI = [0.61, 0.97]). However, they did not differ significantly in age or employment status.

Participants soliciting minors were significantly more likely to identify as male than participants who did not interact sexually with strangers (OR = 3.09, 95%

**Table 3.** Product–Moment Correlation Coefficients and Descriptive Statistics of Social Anxiety, Loneliness, and PIU ( $N = 2,828$ ).

	Intercorrelations $r_p$			<i>M</i>	<i>SD</i>	% <sup>a</sup>
	1.	2.	3.			
1. Social Anxiety	—	.34***	.39***	3.95	2.92	29.2
2. Social Loneliness		—	.28***	6.68	3.33	7.3
3. PIU			—	2.89	1.47	—

Note. PIU = problematic Internet use;  $r_p$  = correlation coefficient of Pearson product–moment correlation.

<sup>a</sup>Percentage above cutoff refers to cutoff values reported in original publications for social anxiety (sum score > 6; Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001) and social loneliness (agreed to at least two items; De Jong Gierveld & Van Tilburg, 1999). There was no cutoff reported for PIU (Caplan, 2010).

\*\*\* $p = .001$ .

CI = [2.10, 4.54]), and participants with adult contacts (OR = 2.13, 95% CI = [1.42, 3.20]). They were also significantly younger than either group (no sexual interaction with stranger:  $d = -0.38$ , 95% CI = [-0.49, -0.14]; sexual interaction with adults:  $d = -0.40$ , 95% CI = [-0.58, -0.22]). Compared with those who did not interact sexually with strangers, participants soliciting minors were significantly more likely to be single (OR = 1.88, 95% CI = [1.32, 2.66]) and report lower education (OR = 0.55, 95% CI = [0.38, 0.77]) but did not significantly differ in employment status. Analyses regarding relationship, education, and employment status did not yield statistically significant differences between participants soliciting minors versus adults.

### Social Anxiety, Loneliness, and PIU in Online Sexual Interaction

Descriptive statistics and intercorrelations between social anxiety, loneliness, and PIU are presented in Table 3. All variables were positively correlated to a moderate effect. The percentages above cutoff imply that social anxiety and extreme loneliness were frequent in the present sample.

Participants with no sexual online interactions, participants with adult contacts, and participants soliciting minors were then compared regarding social anxiety, loneliness, and PIU. The MANOVA yielded a statistically significant difference,  $F(3, 2403) = 31.08$ ,  $p < .001$ ,  $\eta^2 = .04$ . As shown in Table 4, univariate analyses revealed that the participant groups differed significantly on all dependent variables.

Post hoc comparisons showed that participants with adult sexual contacts reported higher levels of social anxiety ( $d = 0.16$ , 95% CI = [0.06, 0.25]), loneliness ( $d = 0.34$ , 95% CI = [0.24, 0.43]), and PIU ( $d = 0.51$ , 95% CI = [0.41, 0.61]) compared with those who did not interact sexually with strangers online. This confirmed Hypotheses 1a, 1b, and 1c.

Participants soliciting minors reported higher levels of social anxiety compared with those who did not interact sexually with strangers ( $d = 0.43$ , 95% CI = [0.25, 0.63]) and those with adult contacts ( $d = 0.26$ , 95% CI = [0.06, 0.47]). Similarly,

**Table 4.** Summary of Univariate *F* Tests of Social Anxiety, Loneliness, and PIU as a Function of Sexual Online Interaction With Different Contacts (*N* = 2,828).

Psychological characteristic	Sexual online contact			<i>F</i> ( <i>df</i> = 2)	$\eta^2$
	None	Adult	Minor		
	<i>n</i> = 1,766	<i>n</i> = 530	<i>n</i> = 111		
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )		
Social Anxiety	3.79 (2.83) <sub>a</sub>	4.24 (3.05) <sub>b</sub>	5.05 (3.38) <sub>c</sub>	13.26***	.011
Social Loneliness	6.34 (3.20) <sub>a</sub>	7.44 (3.50) <sub>b</sub>	8.32 (3.50) <sub>c</sub>	37.51***	.030
PIU	2.67 (1.37) <sub>a</sub>	3.39 (1.52) <sub>b</sub>	3.82 (1.73) <sub>c</sub>	77.49***	.061

Note. Participants were allocated to groups according to the age of the youngest online contact: The "Adult" contact group includes participants communicating exclusively with adults; the "Minor" contact group includes participants communicating with at least one adolescent or child. Different subscripts indicate significant differences in post hoc pairwise comparison (Games Howell-correction).

PIU = problematic Internet use.

\*\*\**p* < .001.

participants soliciting minors reported higher levels of loneliness than participants with no sexual online contact with strangers ( $d = 0.62$ , 95% CI = [0.42, 0.80]) and those with adult contacts ( $d = 0.25$ , 95% CI = [0.05, 0.46]). Finally, participants soliciting minors reported higher levels of PIU than those with no sexual online contact with strangers ( $d = 0.82$ , 95% CI = [0.63, 1.02]) and those with adult contacts ( $d = 0.28$ , 95% CI = [0.01, 0.42]). This confirmed Hypotheses 2a, 2b, and 2c.

### Social Anxiety, Loneliness, and PIU as Function of Age of the Minor

Subsequently, we explored whether the age of the minor contacts (i.e., adolescent vs. child contacts) made a difference in participants' reported levels of social anxiety, loneliness, and PIU. Thus, we compared participants who reported sexual interaction with adult contacts with those with adolescent contacts and those with child contacts.

First, we compared these groups concerning demographic characteristics (Table 5).

The analyses only reached statistical significance with respect to participant sex and participant age. Compared with participants with adult contacts (55.0%), the proportion of males was higher in the group soliciting adolescents (69.4%; OR = 1.86, 95% CI = [1.20, 2.88]) and in the group soliciting children (82.8%; OR = 3.93, 95% CI = [1.48, 10.43]). The group soliciting adolescents and the group soliciting children did not significantly differ in participant sex (OR = 2.11, 95% CI = [0.74, 6.01]). Compared with those with adult contacts, participants soliciting adolescents were younger ( $d = -0.49$ , 95% CI = [-0.69, -0.28]). There was no statistically significant difference between participants with adult contacts and those soliciting children ( $d = -0.08$ , 95% CI = [-0.85, 0.68]) and between the group soliciting adolescents and those soliciting children ( $d = 0.51$ , 95% CI = [-0.78, 1.80]). As shown in Table 5, the

**Table 5.** Sociodemographic Characteristics as a Function of Adult, Adolescent, or Child Online Contact ( $n = 779$ ).

Demographic characteristic	Age of youngest sexual online contact			$\chi^2(df = 2)$
	Adult ( $n = 642$ )	Adolescent ( $n = 108$ )	Child ( $n = 29$ )	
	% ( $n$ )	% ( $n$ )	% ( $n$ )	
Age ( $M, SD$ )	29.28 (10.15) <sub>a</sub>	24.53 (7.00) <sub>b</sub>	28.45 (9.91) <sub>a,b</sub>	10.93*** <sup>1</sup>
Gender (% male)	55.0 (353) <sub>a</sub>	68.6 (75) <sub>b</sub>	82.8 (24) <sub>a,b</sub>	15.50***
Relationship (% single)	52.6 (338)	53.7 (58)	69.0 (20)	2.97
Education (% > 12 years)	75.8 (391)	72.3 (60)	60.9 (14)	2.90
Employment (% unemployed)	13.9 (72)	10.8 (9)	26.1 (6)	3.49

Note. Participants were allocated to groups according to the age of the youngest online contact. Different subscripts indicate significant differences in post hoc pairwise comparison (Games Howell-correction).

<sup>1</sup>F statistic of univariate analysis of variance (ANOVA).

\*\*\* $p < .001$ .

comparisons between participants with differently aged contacts concerning relationship, education, and employment status failed statistical significance.

With regard to social anxiety, loneliness, and PIU, the MANOVA yielded a difference between the participant groups with adult, adolescent, or child contacts that reached statistical significance,  $F(6, 1210) = 3.46, p = .002, \eta^2 = .02$ . Univariate analyses revealed that the groups differed on all three dependent variables (Table 6).

Post hoc testing yielded a number of statistically significant differences for the dependent variables. Concerning social anxiety, participants soliciting adolescents reported significantly higher levels of anxiety than participants with adult contacts ( $d = 0.35, 95\% \text{ CI} = [0.12, 0.57]$ ). There was no significant difference in social anxiety between participants with adult contacts versus child contacts ( $d = -0.03, 95\% \text{ CI} = [-0.44, 0.37]$ ) and between participants soliciting adolescents versus those soliciting children ( $d = -0.35, 95\% \text{ CI} = [-0.81, 0.10]$ ). Notably, the latter comparison yielded a small effect, which may not have reached statistical significance due to lower subsample sizes in this comparison ( $n = 137$ ) compared with the other analyses (adult vs. adolescent contact:  $n = 750$ ; adult vs. child contact:  $n = 671$ ).

In contrast, loneliness did not significantly differ between participants with adolescent and participants with adult contacts ( $d = 0.17, 95\% \text{ CI} = [-0.06, 0.39]$ ). Yet, loneliness was significantly higher in the group soliciting children compared with those with adult contacts ( $d = 0.53, 95\% \text{ CI} = [0.12, 0.95]$ ). No significant difference in loneliness emerged between those soliciting adolescents and those soliciting children ( $d = 0.37, 95\% \text{ CI} = [-0.01, 0.82]$ ).

PIU was significantly higher in the group soliciting adolescents compared with those with adult contacts ( $d = 0.34, 95\% \text{ CI} = [0.11, 0.57]$ ). There was no significant difference between participants with adult contacts versus child contacts ( $d = 0.09, 95\% \text{ CI} = [-0.04, 0.22]$ ) or between those soliciting adolescents versus those soliciting children ( $d = -0.22, 95\% \text{ CI} = [-0.67, 0.23]$ ).

**Table 6.** Summary of Univariate *F* Tests of Social Anxiety, Loneliness, and PIU as a Function of Adult, Adolescent, or Child Sexual Online Contact (*n* = 779).

Psychological characteristic	Age of youngest sexual online contact			<i>F</i> ( <i>df</i> = 2)	$\eta^2$
	Adult ( <i>n</i> = 530)	Adolescent ( <i>n</i> = 87)	Child ( <i>n</i> = 24)		
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )		
Social Anxiety	4.24 (3.05) <sub>a</sub>	5.31 (3.42) <sub>b</sub>	4.13 (3.14) <sub>a,b</sub>	4.88**	.017
Social Loneliness	7.45 (3.50) <sub>a</sub>	8.03 (3.42) <sub>a,b</sub>	9.33 (3.68) <sub>b</sub>	4.12*	.013
PIU	3.39 (1.52) <sub>a</sub>	3.91 (1.65) <sub>b</sub>	3.53 (1.98) <sub>a,b</sub>	4.14*	.014

Note. Participants were allocated to groups according to the age of the youngest online contact. Different subscripts indicate significant differences in post hoc pairwise comparison (Games Howell-correction).

PIU = problematic Internet use.

\**p* < .05. \*\**p* < .01.

## Discussion

The present study examined the extent to which online sexual solicitation of adults, adolescents, and children were associated with social anxiety, loneliness, and PIU. Social anxiety, loneliness, and PIU were positively correlated with each other. As hypothesized, participants who sexually interacted with unknown adults online reported more social anxiety, loneliness, and PIU compared with those who had not used the Internet to interact sexually with strangers. Moreover, participants who solicited minors reported more social anxiety, loneliness, and PIU than both participants interacting sexually with adults and those not interacting sexually with strangers. When comparing participants with adult contacts with those with adolescent and child contacts separately, a differential effect emerged: Social anxiety and PIU were elevated for those soliciting adolescents compared with participants with adult contacts, whereas loneliness was pronounced for those soliciting children. The difference between participants soliciting adolescents versus children was not statistically significant concerning social anxiety, loneliness, or PIU.

The intercorrelation of social anxiety, loneliness, and PIU in the present study corresponds with extensive prior evidence linking social anxiety and loneliness to PIU (Baker & Oswald, 2010; Caplan, 2007; Ceyhan & Ceyhan, 2008). Moreover, we found that participants who sexually solicited adults online had greater social anxiety, loneliness, and PIU than participants who did not sexually interact with strangers online. This, too, concurs with prior studies showing an association between these psychological conditions and instigating relationships among adults or seeking sex online (Ando & Sakamoto, 2008; Bardi & Brady, 2010; Cooper, Delmonico, & Burg, 2000; Cooper et al., 1999; Morahan-Martin & Schumacher, 2003; Odacı & Kalkan, 2010; Whitty & McLaughlin, 2007). It is important to note that the present findings and much of the prior evidence relies on cross-sectional data, which prohibits interpretation of causal relationships among the investigated psychological conditions, as well as between the psychological conditions and sexual online behavior. Yet, a vicious-cycle relationship between these characteristics and behaviors has been proposed

(Erwin et al., 2004; Pierce, 2009). Moreover, both social impairments and, for some individuals, using the Internet for sexual purposes have been related to severe psychological, social, and professional detriments (Eichenberg & Malberg, 2012; Hill, 2011; Putnam & Maheu, 2000; Wittchen, Fuetsch, Sonntag, Muller, & Liebowitz, 2000; see also below). Thus, the association between social impairments and using the Internet for sexual purposes emphasizes the need to consider these factors in clinical practice.

Considering the association of social anxiety, loneliness, and PIU with online sexual interaction, as shown in the present and previous studies, we assessed whether these variables would be particularly associated with online sexual solicitation of minors. Studies have shown that adult–adult interactions differ little from adult–minor interactions in tactics and situational factors (Bergen, Ahto, et al., 2014; Bergen, Davidson, et al., 2014). Thus, the present study included a comparison group of Internet users with adult sexual online contacts to distinguish whether detected variations in psychopathological conditions were specific for the group of solicitors or an artifact of using the Internet for sexual interaction in general. Interestingly, participants soliciting minors reported increased social anxiety, loneliness, and PIU compared with the group who did not pursue sexual interaction with strangers online, as well as the group who reported sexual online interaction with adults only. Thus, although social anxiety, loneliness, and PIU were associated with sexual online interactions in general, these conditions appear amplified for adults who sexually solicit minors.

In this regard, the present study is limited, as it is not possible to deduce from our cross-sectional survey whether these conditions serve as risk factors for solicitation of minors or for the persistence of that behavior. The extant research regarding (mostly offline) sex offenses does not support a direct association of loneliness or social deficits with recidivism (Hanson & Bussière, 1998; Hanson & Morton-Bourgon, 2005; Mann et al., 2010). Nevertheless, the present findings suggest that social anxiety, loneliness, and PIU are related to *online* sexual offense behavior. Plausibly, the Internet lowers the threshold for displaying otherwise inhibited or avoided behavior (Cooper, McLoughlin et al., 2000; Craft, 2012; McKenna et al., 2001). Pursuing online social and sexual contacts to compensate for offline impairments due to social anxiety and loneliness may contribute to the persistence of these symptoms by further limiting individuals to online contacts (Erwin et al., 2004; Pierce, 2009). Similar to the processes that have been observed in general sexual online interaction, our data suggest that social anxiety, loneliness, and PIU are associated also with online sexual solicitation of minors. Given that any of these conditions have been related to debilitating repercussions (Alden & Taylor, 2004; Erwin et al., 2004; Pierce, 2009; Wittchen et al., 2000), the present findings suggest that these characteristics may also be important to address in the treatment of individuals soliciting minors. However, indirect pathways are possible: Forms of severe social withdrawal associated with PIU have been related to an increased risk for psychopathology (e.g., depression or substance use disorders; Caplan, 2002, 2003; High & Caplan, 2009; Shapira et al., 2000), which might or might not, in turn, be related to increased online sexual solicitation. Further research, and longitudinal studies in particular, is needed to test possible pathways for the relationship of social anxiety, loneliness, and PIU with online sexual solicitation of minors.

Another interesting finding was the pattern of effects concerning the age of the solicited minor. Compared with participants with adult contacts, increased social anxiety and PIU were specific for participants soliciting adolescents. A potential explanation may be excessive compensatory behavior for offline inhibitions due to social anxiety. These individuals may not be sexually interested in adolescents, but they may find these contacts less anxiety-inducing and more approachable compared with peer contacts with other adults (Briggs et al., 2011; Quayle et al., 2012). PIU may result from preferring to communicate with others online (Caplan, 2003), and with adolescents in particular, and thus excessive reliance on the virtual environment for social purposes.

In contrast, loneliness was particularly pronounced in the group soliciting children compared with those with adult contacts. Loneliness may be a consequence of another factor, namely, sexual interest in children, for which individuals are stigmatized and ostracized offline (Holt, Blevins, & Burkert, 2010; Jahnke, Schmidt, Geradt, & Hoyer, 2015). Moreover, sexual interest in children may motivate participants to interact sexually with children online. Sexual interest was not the focus of the present study, but it would be interesting to investigate this as a mediator of the relationship between loneliness and online solicitation of children.

Notably, differences between participants soliciting adolescents and participants soliciting children did not reach statistical significance, despite having similar effect sizes as the differences with the adult-contact group. Larger sample sizes are requisite before reliable conclusions about the existence (or nonexistence) of differences between solicitors of adolescents versus solicitors of children can be drawn. Overall, our findings did not generally support an association of younger victim age with increased psychopathology found in previous studies (Firestone et al., 2005; Kalichman, 1991). Yet, other studies could not find this association either (e.g., Carlstedt et al., 2009). Conceivably, all studies examined different variables of which some may be more suitable than others to distinguish groups with differently aged victims.

It is critical to mention that the explained variance in the multivariate analyses was small. Also, it has to be taken into account that the present control group with adult-only contacts may have included sexual online interactions focusing on minors as well (D'Ovidio et al., 2011; Holt et al., 2010). In addition, our groups of child and adolescent solicitors included a high proportion of participants who also interacted sexually with adults or, in case of the child solicitors, with adults and adolescents. This heterogeneity within, and overlap between, groups may counteract the identification of larger effects. Investigating exclusive groups poses an opportunity for further investigation, but it was not feasible in the present study due to low case numbers. Moreover, it is unclear to what extent the present Internet sample relates to legally apprehended solicitation offenders (Briggs et al., 2011; Quayle et al., 2012; Webster et al., 2012). There is also a lack of comparative studies on how solicitation offenders differ from other offender groups in the psychological characteristics addressed in this study. Seto and colleagues (2012) found that solicitation offenders had less capacity for relationship stability than contact offenders but scored similar to child pornography offenders.

Lack of stable relationships has been related to psychopathology, but it is not equivalent to social anxiety (Alden & Taylor, 2004). In contrast, Wolak and Finkelhor (2013) found little behavioral differences to distinguish solicitation offenders who met their victim online from those using media (i.e., cell phones or Internet) to abuse a victim they know personally. However, their study did not focus on psychopathology. Clearly, these questions should be addressed in the future to determine whether risk assessment and treatment procedures developed for other offender groups are applicable to adults who solicit minors online (Babchishin et al., 2011; Elliott & Beech, 2009).

The present study had several further limitations. A major limitation pertains to participants' candor concerning sensitive or illegal activities. Social desirability is a crux of self-report measures, specifically in the context of crime (Saunders, 1991). We tried averting this issue by assuring participants of the survey's anonymity and allowing them to skip sensitive questions. The anonymity of the online instrument also may have motivated people to be more truthful (Cooper, Scherer, & Mathy, 2001). Moreover, empirical studies suggest that assessing offender populations using self-report scales yields accurate and valid data (Kroner, Mills, & Morgan, 2006; Mathie & Wakeling, 2011; Mills & Kroner, 2005, 2006), although these studies are limited to incarcerated offenders. Repeated participation in the survey is possible, although the high effort (i.e., the length of the survey) and the low reward (i.e., a chance in a lottery) make it less probable. Also, the sample was checked for invalid and duplicate cases, which were discarded. Inevitably, the voluntary respondents who chose to respond may differ systematically (i.e., be less involved in the targeted behaviors) from those who did not.

Another limitation is that participants could not be certain of the actual age of their contacts (unless a meeting had occurred), so they only reported what they thought the age of the contact was. Given that the contact may have lied about their age (Webster et al., 2012; Wolak, Finkelhor, & Mitchell, 2004), this poses a concern to the validity of the data. We assume, however, that the fact that participants thought they were talking to a child and continuing sexual interaction, though not illegal, may still be important as an indicator for underlying motivation. Using modified scales for measuring loneliness and PIU without testing their validity is another limitation, as they may not have measured the intended constructs. Yet, the present results were similar to prior studies concerning the associations between these concepts, which support the validity of our approach. Finally, the present Internet sample is a convenience sample that may differ indeterminably from the offline population and the population of those socializing online (D'Ovidio et al., 2011). We attempted to counteract this limitation by sampling online using the most encompassing procedure possible (Cooper et al., 2001; Ridings et al., 2002).

In conclusion, by demonstrating that social anxiety, loneliness, and PIU were associated with self-reported solicitation behaviors, the present study broadened the spectrum of factors empirically related to online sexual solicitation of minors. The cross-sectional nature of our study cannot confirm the extent to which social anxiety, loneliness, or PIU serve as criminogenic risk factors or maintaining factors in online sexual solicitation. Yet, these conditions have been related to severe detriments, social



isolation, and generally diminished psychological well-being. Their association with online sexual solicitation of minors, thus, suggests the consideration of these conditions when providing treatment or designing relapse prevention measures for online solicitation offenders.

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