

Original article

Depressive symptomatology, youth Internet use, and online interactions: a national survey

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Abstract

Purpose: To investigate the online communications and self-disclosure practices of youth reporting depressive symptomatology.

Method: The Youth Internet Safety Survey was a nationally representative telephone survey of 1501 Internet-using youth between the ages of 10 and 17 years, and one caregiver in their household. Fifty-three percent of youth participants were male and 73% were white race. The purpose of the survey was to obtain prevalence rates for unwanted sexual solicitation, harassment, and unwanted exposure to sexual material among young people online. Questions about current depressive symptomatology were also queried; this variable was defined based upon the DSM-IV definition of a major depressive episode: major depressive-like symptomatology (5+ symptoms of depression and functional impairment in at least one area); minor depressive-like symptomatology (3+ symptoms of depression); mild or no depressive symptomatology (<3 symptoms of depression). Data were cross-sectional and collected between the fall of 1999 and spring 2000. Multinomial logistic regression was used to estimate the conditional odds of reporting DSM-IV-like major or minor depressive symptomatology vs. mild/no symptomatology given the indication of self-disclosure practices and interactions with others online. Males and females were assessed separately.

Results: Talking with strangers online, using the Internet most frequently for e-mailing others, and intensity of Internet use differentiated youth reporting depressive symptoms from asymptomatic peers. Report of depressive symptomatology was not related to most measures of general Internet use nor gender differences. Personal disclosure was significantly more likely to be reported by both young men and young women who reported major depressive symptomatology vs. mild or no symptomatology. Differences were observed for how adolescents choose to self-disclose; females posted pictures of themselves, whereas males were more likely to provide personally identifiable information. Finally, most gender-related variation reflected differences in the *magnitude* of Internet associations with depressive symptoms rather than the *types* of Internet use, access, or online communications.

Conclusions: Youth-reported depressive symptomatology is associated with differences in online interactions and self-disclosure practices. © 2005 Society for Adolescent Medicine. All rights reserved.

Keywords:

Youth; Internet; Depression; Friendships; Self-disclosure; Gender differences

The number of youth accessing the Internet continues to increase [1]. As a result, research attention has begun to

focus on youth experiences and reactions to the Internet. Given the significant personal and public health burden that major depression represents [2], the possible relationship between Internet use and depressive symptomatology has been one such subject to be examined [3–6].

Depression in childhood and adolescence affects between

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4% and 7% of youth under the age of 18 years [7]. Beginning around 14 years of age, the prevalence rate of depressive symptomatology is twice as high among females than males [8–10]. This gender gap persists into adulthood, with the prevalence of depressive disorder twice as great among women than men [11]. Adolescence, therefore, is a critical time to focus on depression and factors associated with gender differences in the expression of depressive symptomatology.

Several studies have examined whether youth with depressive symptomatology use the Internet more frequently [3–6]. Most studies have reported that both cross-sectionally [3, 4] and longitudinally [5], the average number of days per week a youth is online does not significantly differ by the report of depressive symptomatology. Notably, however, each of these studies is based upon an ungeneralizable, relatively small, convenience sample. More importantly, general duration may not be the most informative variable to assess. It is unlikely that exposure to the Internet per se has any direct effect [12]. It is instead understanding the *experiences* and *interpersonal communications* that youth with depressive symptoms have while online that will help inform our understanding of this relationship, as well as future intervention and prevention programs.

Depressive symptomatology and online interactions

Many parents (57%) surveyed in a national study voiced concern that their children would be contacted by strangers online [13]. Most youth, however, report positive experiences with others they engage with on the Internet, including persons they know in person and those that they have met only online [13–17]. Youth with depressive symptomatology may be an at-risk population given their consistent reporting of strained and distant relationships with peers [18]. Depressed youth are also more likely to report lower levels of social support, fewer friends, deficiencies in social functioning, and lower interpersonal problem-solving skills compared with nondepressed youth [2,7,19–21]. How these deficiencies translate to online interactions is relatively unknown. For example, youth with depressive symptomatology may be less likely to interact with others online just as they are in person; alternatively, the Internet may be a technology that offers a safe and less demanding environment in which youth with symptoms of depression may engage with others and receive the social contact they need.

Gross et al investigated the association between depressive symptomatology and instant message (IM) partners among 7th graders [4]. Instant messaging is a form of online communication that occurs in real time. Like e-mail, one needs to know the ‘address’ of the person he or she wishes to IM with in order to contact them. Unlike e-mail, users see the message instantly, that is, as soon as the sender hits the ‘return’ key. About 74% of teenagers use instant messaging as a form of communication [13]. Youth who reported feelings of loneliness or anxiety at school were more likely to report their longest instant message

session during the previous day was with a stranger rather than a friend or best friend. There were no differences in partner intimacy based upon depressive symptomatology or global well-being. The authors conclude that the closeness of online relationships is based upon social adjustment, specifically adjustment at school, as opposed to being related to a youth’s individual mental well-being. In contrast, results from the Youth Internet Safety Survey, a nationally representative survey of youth between the ages of 10 and 17 years, indicate that “troubled youth,” a composite of characteristics that includes depressive symptoms, are more likely to form close online friendships compared with less troubled youth [16]. It is possible that youth with depressive symptomatology engage in instant messaging differently than other Internet activities, thereby explaining the potentially contradictory findings in the two studies. Additionally, beyond intense, specific exchanges, the types of people that youth with depressive symptomatology are generally engaging with online are unreported.

Self-disclosure online

There is some concern about the personal information youth may be sharing with others online, especially those they do not know in person. There is evidence that self-disclosure, specifically posting personal information online, is associated with reporting an unwanted sexual solicitation within the previous year [22]. Despite the advice not to share personal information [23,24] and indications that parents are worried about their children giving out personal information [25], a recent study reports that one-quarter of private-schooled 7th–12th graders have shared information about themselves, including their name, school, address, or phone online [26].

Gap in current literature

The present study extends the literature in three important ways. First, we use nationally representative, cross-sectional data to examine the types of activities in which, and persons with whom, youth with symptoms of depression compared with other youth, engage. Second, we examine self-disclosure activities (i.e., posting personally identifiable information on the Internet, sending a picture of oneself to another person online, and posting a picture of oneself online) to identify whether youth with depressive symptomatology are also more likely to report these potentially risky behaviors. Third, because depressive symptomatology manifests differently in males and females, we will investigate possible gender-related differences in online experiences.

Methods

The Youth Internet Safety Survey (YISS) was a nationally representative, cross-sectional, telephone survey of young (i.e., between the ages of 10 and 17 years), regular (i.e., logged onto the Internet at least monthly for the pre-

vious 6 months) Internet users. Data were collected between Fall of 1999 and Spring of 2000. The survey was approved and supervised by the University of New Hampshire's Human Subjects Committee, commissioned by the National Center for Missing and Exploited Children, supported by the Office of Juvenile Justice and Delinquency Prevention, and conformed to rules for research projects funded by the Department of Justice.

Sampling method

Respondents of the YISS were identified using a two-stage national probability design. First, household phone numbers were randomly generated by GENESYS, a commercial database and retrieval system. These numbers were contacted for a more general telephone survey of youth, the Second National Incidence Study of Missing, Abducted, Runaway, and Thrownaway Children (NISMA-2) [27]. The phone numbers of households that were identified as having a youth between the ages of 9 and 17 years were then forwarded to YISS for contact. A detailed explanation of the YISS sampling method can be found elsewhere [28].

A sample size of 1500 was predetermined for the YISS to achieve an expected sampling error of $\pm 2.5\%$ at the 95% confidence level for the three outcomes of interest: Internet harassment, unwanted sexual solicitation, and unwanted exposure to sexual material. All phone numbers received were contacted. At the time the desired sample size was achieved, 82% of eligible households contacted agreed to participate. Of the 18% of eligible households that did not participate, 11% were adults who had completed the interview and then refused to allow their child to participate, 5% were caregivers who had refused to complete the adult questionnaire, 2% were youth who had refused to participate after the adult had granted permission, and 1% were eligible households who were in 'call-back' status when the survey period ended.

Eligibility requirements for youth participants in the YISS included: being between the ages of 10 and 17 years, Internet use at least once a month for the previous 6 months, having lived in the household at least 2 weeks in the previous year, English speaking, and parent and youth informed consent. Youth were allowed to have used the Internet at any location (e.g., home, school, library) to capture users that did not necessarily have home access. Eligibility for caregiver participants included: being the one most knowledgeable (self-identified) about the youth's Internet activity, and informed consent.

Study population

Table 1 presents the demographic characteristics of YISS participants (N = 1501). The average youth was 14 years old (range: 10–17 years), and gender representation was roughly equal (52% male). Most youth self-identified as non-Hispanic white (75%), although 10% were non-Hispanic black, and 7% indicated Hispanic ethnicity. When this

Table 1
Demographic characteristics of the Youth Internet Safety Survey (n = 1501)

Youth characteristic	% (N)
Male	52.7 (790)
Age (Years mean: SD)	14.1 (1.96)
Household income	
< \$20,000	8.6 (119)
\$20,000–50,000	41.3 (575)
\$51,000–75,000	25.2 (350)
> \$75,000	25.0 (347)
Missing	7.3 (110)
Highest level of household education	
Not a high school graduate	2.5 (37)
High school graduate	21.4 (320)
Has some college education	22.4 (336)
College graduate	31.7 (474)
Post college degree	22.0 (330)
Race/ethnicity	
Non-Hispanic white	73.0 (1,095)
Non-Hispanic black	10.2 (153)
Hispanic	7.3 (110)
Other	9.5 (143)
Depressive symptomatology	
DSM IV-like major symptoms	66.6 (1000)
DSM IV-like minor symptoms	14.3 (214)
No depressive symptoms	5.1 (77)

sample was compared with the average household in the United States [29], we found income and highest adult education to be higher. Our sample characteristics however, were similar to other households with Internet connections at the time of data collection [17].

Measures

Depressive symptomatology. Following the *Diagnostic Statistical Manual IV (DSM-IV)* [30] definition of major depression, youth were asked about the presence ("yes"/"no") of each of the nine symptoms of depressive disorder. Each question referred to the previous month except for dysphoria, which referred to all day, nearly every day, within the previous 2 weeks. Further, in accordance with the DSM-IV's requirement for additional functional impairment, youth were asked if they had felt 'so down' that they had experienced challenge in (a) school work, (b) personal hygiene, or (c) self-efficacy (i.e., feeling like he or she could do anything 'right').

Youth were categorized into one of three groups of depressive symptomatology [30]: (a) DSM-IV-like major depressive symptomatology (i.e., 5+ symptoms, one of which is dysphoria or anhedonia, and functional impairment in at least one area, 5.1%, n = 77); (b) DSM-IV-like minor symptomatology (three or more symptoms of depression, 14.3%, n = 214); or (c) mild or no reported depressive symptomatology (fewer than 3 symptoms of depression, 80.6%, n = 1210).

General Internet use. General Internet use was measured by four items. First, youth were asked to estimate the average number of hours per day he or she used the Internet on a typical day of Internet use (range: 1–10+). Second, youth were asked to estimate the average number of days he or she went online in a typical week (range: <1–7). Because of indications of nonlinearity, each was dichotomized by comparing the responses one standard deviation above the mean vs. lower. Third, participants were asked to rate how important the Internet was in their lives on a 5-point scale, ranging from not at all important to extremely important. This was dichotomized to reflect youth for whom the Internet was very or extremely important vs. less so. Finally, youth were asked to rate their Internet expertise on a 5-point scale, ranging from “beginner” to “expert.” Youth who self-reported as “almost expert” or “expert” were compared with youth who reported a lower level of expertise.

Internet access and activity. Youth were asked from which location they most often accessed the Internet. Three categories were created: (a) those that access the Internet most often at home (reference group), (b) those that access the Internet most often at school, and (c) those that access the Internet most often from any other location (i.e., library, another person’s house, ‘some other location’).

Respondents were asked to indicate the activity for which they most used the Internet. This was categorized into four groups based upon the likelihood for interaction with others, the speed of the interaction (i.e., real-time vs. slower), and the likelihood of anonymity of persons with whom the youth was interacting: (a) instant messaging, (b) chat room, (c) e-mail, and (d) all else (e.g., schoolwork, game playing, maintain a web page) (reference group).

Online interactions. To understand the types of people youth were interacting with online, they were asked to indicate if they had *ever* spoken (“yes”/“no”) online with people they first met in person that were: (a) peers of the same age they saw frequently, (b) peers of the same age they did not see frequently, (c) frequently seen family members, (d) infrequently seen family members, and (e) other people that were not family members or same-aged peers. Youth were also asked about people they knew only online, including those they met (a) through a family member, (b) by getting information online, or (c) some other way.

Self-disclosure. Three online activities that involve self-disclosure within the previous year were asked of all youth (“yes”/“no”): (a) posting personally identifiable information (e.g., name, address, school) somewhere online, (b) sending a picture of oneself to someone else online, and (c) posting a picture of oneself somewhere online.

Demographic information. Youth reported their age, which was entered as a continuous variable, and race/ethnicity (i.e., non-Hispanic white, non-Hispanic black,

Hispanic, and other). Caregivers reported the youth’s gender and 1999 household income, which was categorized at “\$20,000 and less” vs. “higher.”

Statistical methods

All statistical analyses were completed using Stata 7 [31]. Cases were first examined for missing data. There were no instances where a variable of analytic interest had more than two responses missing within a subject category of analytic interest (i.e., general Internet use, interactive Internet activity, depressive symptomatology, and demographics), thus resulting in all respondents being included (N = 1501). Next, missing data were imputed based upon best-set regression [31] relying upon responses to the nine depression items, three functional impairment items, youth gender, age, race/ethnicity, and household income. In most cases, this affected less than 1% of the data, except for the estimated number of days of Internet use per week (1.1% missing) and household income (7.3%). Finally, ‘refused’ and ‘don’t know’ answers were replaced with the sample mean, which most often translated to ‘symptom absent’. Again, for most items, this affected less than 1% of cases, except for race (2.1%).

The data were analyzed in a two-step process. First, descriptive analyses compared the distribution of youth with “mild or no,” “minor,” and “major depressive” symptoms on a variety of variables (e.g., general Internet use, etc.) using Chi-square tests. Second, the sample was stratified by gender and multinomial logistic regression was used to quantify the conditional odds of reporting experiences online for: (a) youth reporting minor depressive symptoms, or (b) youth reporting major depressive symptoms vs. (c) youth reporting mild or no symptoms of depression (reference group). This type of analysis is appropriate for the current investigation as it allows for multiple outcome categories (i.e., three categories of depressive symptomatology), and provides estimates related to one outcome category while taking into account the probabilities and associated standard errors of the alternative outcome category. Resulting conditional odds ratios were adjusted for differences in race/ethnicity, age, and household income.

Results

Descriptive results

As reported previously [32], 5% (n = 77) of YISS youth respondents reported DSM-IV-like major depressive symptomatology, with an additional 14% (n = 214) indicating minor depressive-like symptomatology. As the age of these young, regular Internet users increased, so too did the conditional odds of reporting DSM-IV-like major depressive symptomatology vs. mild/no symptomatology (COR: 1.19, CI: 1.05, 1.35). Females were more likely to report major depressive-like symptomatology compared with males (COR: 1.59, CI: 1.00, 2.54).

Most youth reported using the Internet for less than 2

hours a day (M: 1.64, SD: 1.1), and for an average of 3 days per week (M: 3.3, SD: 2.2) (data not shown). About two in five youth (43%) accessed the Internet 2 days or less per week, although 15% reported using the Internet daily. E-mail was the most often cited activity for which the Internet was used (26%, $n = 383$). Almost the same proportion of youth reported using the Internet most frequently to play games online (24%, $n = 363$). Around 9% ($n = 137$) of youth used the Internet most for chat rooms, and 10% ($n = 155$) used it most to instant message with others. The majority of regular Internet users in the current sample (65%, $n = 968$) reported accessing the Internet most often from home vs. all other locations. Two-thirds of youth (67%, $n = 1007$) reported talking online with peers they first met in person, whereas slightly more than half of the youth (56%, $n = 839$) had ever talked with a “stranger,” someone online they had not previously met in person.

Internet use and the report of depressive symptomatology

Most indications of Internet usage were similar across the varying levels of depressive symptomatology (Table 2). Notably however, almost 30% of youth who reported depressive symptomatology indicated using the Internet for 3 or more hours a day vs. 14% of youth reporting minor symptomatology and 12% of youth reporting mild or no symptoms of depression ($p < .001$).

Internet access. Significant differences in Internet access and use were observed for respondents ($p < .01$). For example, almost one in three youth reporting major depressive-like symptomatology used the Internet most frequently at school compared with one in four youth reporting minor depressive symptoms and less than one in two youth indicating mild or no symptoms. In contrast, two-thirds of youth indicating mild or no symptoms of depression used the Internet most frequently at home vs. one-half of youth reporting either minor or major depressive symptoms.

Internet activities. The activity one reported using the Internet for most frequently significantly differed by the report of depressive symptoms ($p = .01$). For example, twice as many youth reporting major depressive-like symptoms indicated using the Internet for chat room use (17%) compared with youth reporting mild or no symptoms (8%), whereas three times as many youth reporting no or mild symptoms indicated using the Internet most often for instant messaging (11%) compared with youth reporting major depressive-like symptoms (4%). One in three youth reporting major depressive-like symptoms (34%) indicated using the Internet most frequently for e-mail, compared with one in four youth with mild or no symptoms (26%) and one in five youth indicating minor depressive symptoms (21%).

Online interactions. We found multiple differences in online interactions with regard to the report of depressive symptomatology. Sixty percent of youth indicating major

depressive-like symptoms reported using the Internet to interact with peers he or she infrequently saw in person compared with 46% of youth indicating mild or no symptoms of depression ($p < .05$). An even higher percentage of youth with major depressive symptoms (78%) indicated using the Internet to keep in contact with frequently seen peers, compared with 61% of youth reporting minor depressive symptoms, and 67% of youth reporting mild or no symptoms ($p < .05$).

The indication of depressive symptomatology was generally associated with a higher percentage of youth interacting with people known only online. Thus, 80% of youth indicating major depressive symptoms talked with a stranger online as did 62% of youth indicating minor depressive symptoms; in comparison, 53% of youth with mild or no depressive symptoms reported talking with a stranger ever online ($p < .001$). More specifically, 35% of youth indicating major depressive-like symptoms met a stranger online while seeking information, compared with 24% of youth with minor depressive-like symptoms, and 19% of youth indicating mild or no symptoms ($p < .001$). One in two youth reporting major depressive-like symptoms met a stranger online through a family member compared with one in three youth with mild or no depressive symptoms ($p < .05$); similar differences were noted for youth who met an online stranger another way than through family or information ($p < .001$).

Gender differences in online interactions based upon the report of depressive symptomatology

Differences in online interactions were assessed for boys and girls separately. Findings are displayed in Table 3 and discussed below.

General Internet use. Intense Internet use (3 or more hours per day) was related to a 3.5-fold increase (CI: 1.20, 4.01) in the conditional odds of reporting DSM-IV-like major depressive symptomatology, and a twofold increase (1.70, 7.50) in the conditional odds of reporting DSM-IV-like minor depressive symptomatology compared with mild/no symptoms of depression among demographically similar females; a similar yet attenuated trend was suggested for males. This was a robust finding; subsequent analysis reveals that after holding the average number of days of Internet use per week constant, females who used the Internet intensely were still 3.8 times as likely (CI: 1.8, 7.8) to report DSM-IV-like major depressive symptomatology and 2.3 times as likely (CI: 1.2, 4.1) to report DSM-IV-like minor depressive symptomatology compared with reporting mild/no symptoms of depression. No other indicators of general use, including frequency (6 or more days per week), self-rated Internet expertise, and self-rated importance of the Internet, were associated with the report of depressive symptomatology for either males or females, after adjusting for race/ethnicity, age, and household income.

Table 2
Prevalence of youth Internet characteristics by report of depressive symptomatology (n = 1501)

	No depressive symptoms (n = 1210)	DSM IV-like minor depressive symptoms (n = 214)	DSM IV-like major depressive symptoms (n = 77)	Statistical Comparison	
Internet usage characteristics	% (n)	% (n)	% (n)	χ^2 (Degrees of Freedom)	p Value
General Internet use					
Intensity (3+ h/d)	12.5 (151)	14.5 (31)	27.3 (21)	13.7 (2)	< .001
Self-rated importance of Internet	19.0 (230)	24.8 (53)	26.0 (20)	5.4 (2)	.07
Self-rated Internet expert	32.1 (388)	35.5 (76)	35.1 (27)	1.2 (2)	.55
Frequency (6+ d/week)	20.1 (243)	16.4 (35)	22.1 (17)	1.9 (2)	.39
General Internet access and use					
Most frequent access point				15.4 (4)	< .01
Home	66.6 (806)	56.5 (121)	53.3 (41)		
School	18.1 (219)	25.2 (54)	31.2 (24)		
All other locations	15.3 (185)	18.2 (39)	15.6 (12)		
Activity Internet most frequently used for				16.7 (6)	.01
Chat room	8.4 (101)	10.3 (22)	16.9 (13)		
Email	25.8 (312)	21.0 (45)	33.8 (26)		
Instant messaging	11.0 (133)	8.4 (18)	3.9 (3)		
All other (reference group)	54.9 (664)	60.3 (129)	45.5 (35)		
Online interactions and disclosure					
Personal disclosure online					
Sent picture of self to someone	6.0 (73)	9.4 (20)	11.7 (9)	6.2 (2)	.05
Posted personal information	10.0 (121)	12.2 (26)	18.2 (14)	5.6 (2)	.06
Posted picture of self	4.0 (48)	6.1 (13)	10.4 (8)	8.1 (2)	.02
Communication with others online					
Known in person					
Infrequently seen peers	46.5 (562)	48.1 (103)	61.0 (47)	6.2 (2)	.04
Frequently seen peers	67.4 (816)	61.2 (131)	77.9 (60)	7.5 (2)	.02
Other people that aren't peers or family	27.7 (335)	20.1 (43)	32.5 (25)	6.6 (2)	.04
Infrequently seen family members	30.6 (370)	35.5 (76)	32.5 (25)	2.1 (2)	.35
Frequently seen family members	16.6 (201)	15.4 (33)	11.7 (9)	1.4 (2)	.50
Known only online					
Talked with any stranger	53.4 (646)	61.7 (132)	79.2 (61)	23.0 (2)	< .001
Stranger met some other way	31.2 (377)	36.9 (79)	53.3 (41)	17.6 (2)	< .001
Stranger met through family	36.8 (445)	43.9 (94)	50.7 (39)	9.0 (2)	.01
Stranger met by getting information	18.8 (228)	23.8 (51)	35.1 (27)	13.6 (2)	< .001
Demographic characteristics					
Age (Years Mean: SD)	14.1 (2.0)	14.1 (2.0)	14.7 (1.8)		
Race/ethnicity					
Non-Hispanic black	9.4 (114)	14.5 (31)	10.4 (8)	22.9 (6)	< .001
Hispanic	6.8 (82)	8.9 (19)	11.7 (9)		
Non-Hispanic other	8.8 (107)	9.4 (20)	20.8 (16)		
Non-Hispanic white	75.0 (907)	67.3 (144)	57.1 (44)		
Female	46.9 (567)	45.3 (97)	58.4 (45)	4.3 (2)	.12
Income (< \$20,000)	7.4 (90)	9.4 (20)	11.7 (9)	2.5 (2)	.29

Mean ages compared using Student's *t*-tests: minor depressive symptoms vs. no depressive symptoms: $p > .05$, $t = -0.05$; major depressive symptoms vs. no depressive symptoms: $p < .01$, $t = -2.76$.

Internet access and activities. Results suggested that youth with depressive symptomatology were less likely to access the Internet most often from home, but more likely to access it at school. This was especially true for males; those who reported DSM-IV-like major depressive symptomatology vs. mild/no symptoms of depression were 2.6 times as likely (CI: 1.1, 5.7) to also report using the Internet most frequently at school vs. home. Subsequent analysis reveals that, after additionally adjusting for home Internet access, the odds of reporting most frequent Internet access at school

is 3 times greater for boys who also report major depressive symptomatology (CI: 1.1, 8.5). A similar trend was observed for female Internet users. The report of using the Internet most often for e-mailing was also significantly related to reporting DSM-IV-like major symptoms for males, with a more than 2.5-fold increase in conditional odds (CI: 1.1, 6.5) after controlling for demographic differences.

Online interactions. Males and females who reported de-

pressive symptomatology were just as likely to report online engagement with people they knew in person compared with same-gender youth who reported mild/no symptoms of depression after adjusting for demographic differences. One exception was observed: males who indicated chatting with peers they infrequently saw in person were more than three times as likely as males who did not indicate chatting with infrequently seen peers (CI: 1.4, 7.1) to also report DSM-IV-like major depressive symptomatology.

Youth who reported talking with someone online that they *did not* know in person were significantly more likely to also report depressive symptomatology after adjusting for race/ethnicity, age, and household income. Males who indicated they had talked with any stranger online were more than 4.5 times as likely (CI: 1.7, 12.4) to also report DSM-IV-like major depressive symptomatology vs. mild/no symptoms of depression compared with males who reported not talking to strangers online. More specifically, differences in the conditional odds of reporting DSM-IV-like major depressive symptomatology vs. mild/no symptoms of depression among males were seen for meeting strangers some way other than by getting information or through family members (ACOR: 3.2, CI: 1.5, 6.8) compared with not meeting strangers through such venues. Similarly, females who reported talking with any stranger online were almost 2.5 times as likely (CI: 1.2, 4.9) to also report DSM-IV-like major symptoms of depression compared with females who indicated they had not talked with a stranger online. When asked how they had met strangers online, females who indicated they had met a stranger while getting information were almost 2.5 times as likely (CI: 1.3, 4.8) to also report DSM-IV-like major symptoms of depression.

Personal disclosure. Disclosing personal information was related to the report of depressive symptomatology. Compared with males who reported not posting personally identifiable information (e.g., phone number, address, school name) online, those who did were 2.4 times as likely (CI: 1.0, 5.8) to also report DSM-IV-like major symptoms of depression. On the other hand, females who indicated they had posted a picture of themselves online were 3.2 times as likely (CI: 1.2, 9.0) to also indicate DSM-IV-like major symptoms of depression vs. mild/no symptoms of depression compared with females who reported not having posted a picture.

Discussion

An interesting picture of Internet use emerges for youth who report DSM-IV-like major depressive symptomatology. Results suggest it may be the intensity, as opposed to the frequency, of use that discriminates the manner in which youth with depressive symptoms use the Internet. Intense Internet use is related to a twofold increase in conditional odds of reporting DSM-IV-like ma-

ior symptoms among demographically similar males. A twofold increase in conditional odds of reporting minor depressive-like symptoms as well as a 3.5-fold increase in conditional odds of indicating major depressive symptoms was observed among demographically similar females. As expected, however [3–5], the average number of days per week youth use the Internet is similar across levels of reported depressive symptomatology. Further, no differences are observed based upon the importance of the Internet to oneself, or by self-reported Internet expertise.

Access and activities

Results suggest that youth with DSM-IV-like major symptoms of depression, especially males, are 2.5 times as likely to use the Internet most often at school compared with use at home. It is possible that these youth are eschewing in-person interaction at school where the demand for and possibility of peer-to-peer interface is greatest, and are instead choosing to spend time on the computer. This does not necessarily mean that youth with symptoms of depression are ‘antisocial’, or not wanting of social interaction, for males are significantly more likely to report using the Internet most often for e-mailing vs. all other noninteractive activities compared with males who report mild or no symptoms of depression.

Online interaction

Additional evidence that youth with depressive symptomatology may be replacing in-person engagement with online socializing is seen by the patterns of online interactions reported. In general, youth with and without symptoms of depression are just as likely to report using the Internet to interact with people they know in person. Given that youth with depressive symptomatology are likely experiencing in-person social challenge [2,7,19–21], these results suggest that the Internet may serve as a safe method for them to maintain their in-person relationships, but on a less intensely interactive (i.e., online vs. in person) level. Alternatively, both males and females who indicate DSM-IV symptoms of depression are significantly more likely to also report having talked online with strangers, although the magnitude is almost twice as high for males as for females. It appears that youth reporting depressive symptomatology may be seeking interaction with others online, but are doing so not only with people known in person, but also with those known exclusively online.

Previous studies provide evidence to support the inference that youth with depressive symptomatology may be ‘replacing’ in-person interaction with online engagements. Based upon a survey of adult Internet users, McKenna and Bargh [12] report that the Internet serves as a tool for creating and maintaining close relationships for people that report challenge in in-person social situations and relationships. Possibly, youth indicating

Table 3

Adjusted conditional odds of reporting depressive symptomatology versus mild/no symptoms of depression for male and female young, regular Internet users (n = 1501)

	Males (n = 792)				Females (n = 709)			
	DSM IV-like minor symptomatology (n = 117)		DSM IV-like major depressive symptomatology (n = 32)		DSM IV-like minor symptomatology (n = 97)		DSM IV-like major depressive symptomatology (n = 45)	
	ACOR ^a (95% CI)	p Value	ACOR (95% CI)	p Value	ACOR (95% CI)	p Value	ACOR (95% CI)	p Value
General Internet use								
Intensity (3+ h/d)	0.72 (0.39, 1.31)	.28	2.04 (0.90, 4.65)	.09	2.19 (1.20, 4.01)	.01	3.57 (1.70, 7.50)	< .001
Self-rated importance of Internet	1.50 (0.95, 2.38)	.08	1.60 (0.73, 3.53)	.24	1.21 (0.71, 2.06)	.49	1.16 (0.55, 2.46)	.70
Self-rated Internet expert	1.17 (0.77, 1.77)	.47	1.44 (0.69, 3.00)	.33	1.18 (0.74, 1.87)	.50	0.80 (0.40, 1.61)	.53
Frequency (6+ d/week)	0.74 (0.42, 1.29)	.29	1.09 (0.44, 2.66)	.86	0.87 (0.50, 1.54)	.64	0.94 (0.44, 2.01)	.88
General Internet access and use								
Most frequent access point								
School	1.59 (0.98, 2.59)	.06	2.55 (1.14, 5.72)	.02	1.47 (0.85, 2.56)	.17	1.70 (0.80, 3.62)	.17
All other locations	1.42 (0.81, 2.48)	.22	1.24 (0.40, 3.89)	.71	1.34 (0.73, 2.47)	.34	1.22 (0.49, 3.01)	.67
Home (reference group)	1.00 (Reference)		1.00 (Reference)		1.00 (Reference)		1.00 (Reference)	
Activity Internet most frequently used for								
Email	0.65 (0.33, 1.29)	.22	2.67 (1.10, 6.47)	.03	0.80 (0.48, 1.32)	.38	0.89 (0.44, 1.82)	.75
Chat rooms	1.07 (0.54, 2.12)	.85	1.39 (0.44, 4.43)	.58	1.08 (0.50, 2.33)	.84	1.98 (0.80, 4.89)	.14
Instant messaging	0.84 (0.41, 1.72)	.64	0.80 (0.18, 3.65)	.78	0.61 (0.27, 1.38)	.24	0.18 (0.02, 1.37)	.10
All other	1.00 (Reference)		1.00 (Reference)		1.00 (Reference)		1.00 (Reference)	
Online interactions and disclosure								
Communication with others online								
Known in person								
Infrequently seen peers	1.04 (0.68, 1.59)	.85	3.21 (1.44, 7.14)	< .001	1.27 (0.80, 2.01)	.31	0.95 (0.50, 1.80)	.87
Frequently seen peers	0.73 (0.48, 1.11)	.14	1.87 (0.78, 4.50)	.16	0.87 (0.53, 1.43)	.59	1.30 (0.60, 2.79)	.50
Other people that aren't peers or family	0.79 (0.48, 1.30)	.35	1.83 (0.84, 4.01)	.13	0.55 (0.32, 0.93)	.03	0.94 (0.48, 1.85)	.87
Infrequently seen family members	1.41 (0.93, 2.15)	.11	1.18 (0.55, 2.53)	.67	1.17 (0.74, 1.84)	.52	0.99 (0.51, 1.93)	.97
Frequently seen family members	0.68 (0.38, 1.21)	.20	0.51 (0.15, 1.72)	.28	1.23 (0.69, 2.20)	.48	0.98 (0.40, 2.42)	.97
Known only online								
Talked with any stranger	1.46 (0.96, 2.22)	.07	4.65 (1.74, 12.44)	< .001	1.45 (0.92, 2.28)	.11	2.38 (1.17, 4.87)	.02
Stranger met some other way	1.25 (0.81, 1.94)	.31	3.21 (1.53, 6.76)	< .001	1.37 (0.87, 2.16)	.17	1.67 (0.89, 3.14)	.11
Stranger met through family	1.28 (0.84, 1.94)	.25	1.81 (0.87, 3.76)	.11	1.45 (0.93, 2.26)	.10	1.30 (0.70, 2.42)	.41
Stranger met by getting information	1.19 (0.74, 1.91)	.46	1.83 (0.85, 3.96)	.12	1.57 (0.93, 2.65)	.09	2.46 (1.26, 4.80)	.01
Personal disclosure online								
Posted personally identifiable information	1.14 (0.62, 2.10)	.66	2.40 (0.99, 5.81)	.05	1.68 (0.83, 3.43)	.15	2.00 (0.78, 5.12)	.15
Posted picture of self	1.50 (0.62, 3.58)	.37	1.72 (0.37, 7.90)	.49	1.70 (0.66, 4.40)	.27	3.24 (1.17, 8.92)	.02
Sent picture of self to someone	1.42 (0.65, 3.10)	.37	1.47 (0.41, 5.20)	.55	1.95 (0.94, 4.03)	.07	2.01 (0.77, 5.20)	.15

^a ACOR = Adjusted conditional odds ratio (refers to the conditional odds of reporting a specific level of depressive symptomatology versus mild/no symptoms of depression given the report of the Internet usage characteristic of interest, after adjusting for race/ethnicity, age, and household income).

symptoms of depression perceive interaction online as demanding less effort, or perhaps they find it easier to disclose to a stranger, much like study respondents disclose more personal information on the computer vs. in person [33,34]. The Internet may offer a safe place for these youth to get the social interaction they need without requiring the social knowledge, such as body language and vocal cues [35], that in-person interactions demand.

Online self-disclosure

Youth who report DSM-IV-like major depressive symptoms are more likely to engage in personal disclosure online compared with youth who indicate mild or no depressive symptomatology. It is possible that this is another avenue these youth are using to reach out to others online and establish intimacy. On the other hand, this may be an indi-

cation of risk-taking that youth with depressive symptomatology are more likely to engage in compared with asymptomatic youth. Clearly, this is an important issue necessitating future investigation.

Limitations

Although this is the first national study to examine the general Internet use and online interactions reported by youth with depressive symptomatology, it is not without limitation. First, it is a cross-sectional study, disallowing temporal inferences. It cannot be said then, that talking with strangers *caused* subsequent depressive symptomatology, nor that depressive symptomatology *caused* youth to interact with strangers online. Second, the measure of depressive symptomatology is not based upon a clinical examination; the measure is not therefore a diagnosis of major depression. It is however, based upon the DSM-IV [30] definition of major depression, and therefore has strong construct validity. Third, although the types of online interaction are assessed, the data do not measure the quality of these relationships. No conclusions can be made about which relationships, either with people known in person or only online, are positive and which are negative. Fourth, non-English speaking youth were excluded. It is possible, based upon the findings that the distribution of ethnicity/race differed significantly by the report of depressive symptomatology, which online interactions may also vary by racial and ethnic background. Finally, youth who use the Internet exclusively at nonhome environments, such as at school, the library, or other locations, may have been undercounted because persons without a home phone were excluded from the sampling frame.

Conclusion

Despite limitations, the current study adds to the emerging literature of youth Internet use by detailing interactions online for youth with symptoms of depression. Youth with major depressive symptomatology are much more likely to talk with strangers online compared with their asymptomatic peers. Personal disclosure is also significantly more likely for both young men and young women, with the only difference being how adolescents choose to self-disclose. Most gender-related variation in Internet use reflects differences in the *magnitude* of associations with depressive symptoms rather than the actual *types* of Internet use, access, or online interactions. Findings for youth indicating minor depressive symptomatology are similar, yet attenuated compared with youth reporting major depressive symptomatology.

Future studies should focus on understanding the nature of these online interactions (e.g., are they supportive and positive, or coercive and negative) and the underlying temporality (e.g., are youth with depressive symptomatology seeking out online

relationships or do these relationships in some way contribute to depressive symptomatology).

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