

Social Networking Site Use Predicts Changes in Young Adults' Psychological Adjustment

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This study examined youths' friendships and posted pictures on social networking sites as predictors of changes in their adjustment over time. Observational, self-report, and peer-report data were obtained from a community sample of 89 young adults interviewed at age 21 and again at age 22. Findings were consistent with a leveling effect for online friendships, predicting decreases in internalizing symptoms for youth with lower initial levels of social acceptance, but increases in symptoms for youth with higher initial levels over the following year. Across the entire sample, deviant behavior in posted photos predicted increases in young adults' problematic alcohol use over time. The importance of considering the interplay between online and offline social factors for predicting adjustment is discussed.

The online domain has long been theorized to be a transformative context for youths' social development (McKenna & Bargh, 2000). Several features of communication on the Internet, such as enhanced opportunities for social connection and greater control over aspects of self-presentation, have been hypothesized to facilitate youths' friendship formation and impression management online (Bargh & McKenna, 2004; McKenna, & Bargh, 2000). Although research has begun to examine the transformative nature of online behavior, the ways in which online socializing behavior may be linked to youths' future adjustment remain unclear. It is uncertain to what extent online social connections and aspects of online self-presentation may confer psychological benefits or have negative consequences for youth, and whether such effects may occur uniformly for youth or be influenced by particular youth characteristics. The goal of the present study was to examine how young adults' social networking friendships, and the behaviors they choose to display in photos on social networking websites, are linked to residualized changes in their psychological well-being over time, and whether such

associations may be moderated by their initial levels of social functioning.

Early research considering the effects of Internet use on social connectedness and well-being posited that, instead of expanding social networks, using the Internet would divert attention away from existing relationships and decrease users' well-being (Nie, 2001). This hypothesis at first appeared largely confirmed, as increased Internet use was found to be associated with decreased family communication and a reduced social circle (Kraut et al., 1998; Nie, 2001; Nie & Erbring, 2000; Sanders, Field, Diego & Kaplan, 2000), as well as increased depressive symptoms and loneliness (Kraut et al., 1998; Ybarra, Alexander, & Mitchell, 2005). These data, however, were collected when online social communication, and even Internet use, were far less prevalent than they are today. For example, at the time of the first iterations of social networking sites in 2002, only 59% of U.S. adults had access to the Internet (Spooner, 2003). Thus, at the time these initial studies were conducted, Internet use may have indeed displaced social relationships, at least in part because maintaining friendships had not yet become a primary function of the Internet. Moreover, previous studies focused primarily on the amount of time that individuals spent online—rather than examining the quantity and quality of

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their online relationships—as predictors of their future adjustment (Valkenburg & Peter, 2009a).

Since then, both Internet access and use of online social communication have increased exponentially. A recent U.S. national survey found that 87% of individuals between the ages of 18 and 32 currently go online regularly, and that 60% of individuals in this age group have created a personal profile on a social networking website (Jones & Fox, 2009), suggesting that use of this technology has become a more regular part of young adults' lives. More recent studies utilizing self-reports of youths' online communication have suggested that, instead of displacing social relationships, the Internet may provide a context for youth to enhance relationships by facilitating positive communication between existing friends, which may in turn be positively related to individuals' psychological functioning (Bessière, Kiesler, Kraut, & Boneva, 2008; Kraut et al., 2002; Peter, Valkenburg, & Schouten, 2005; Valkenburg & Peter, 2007a, 2009b; Valkenburg, Peter, & Schouten, 2006).

However, recent studies have also suggested that associations between online communication and adjustment may differ substantially depending on the initial social functioning of the individual. More specifically, links between online communication and adjustment may depend in part on whether youth use online social communication to expand small or unsatisfying social networks, or instead use it at the expense of maintaining satisfying in-person friendships. For youth who may experience limited social success offline, opportunities to make friends online may be an attractive way to make connections with others. Social networking websites provide individuals with immediate access to a larger number of potential friends than are typically immediately available offline, vastly increasing options for social connection. Moreover, communication via these websites offers individuals who may be less socially skilled more time to think about and compose messages to others due to options for asynchronous communication on these sites. Increased control over what is communicated to others may reduce apprehension felt about being able to successfully respond to others in the moment. The importance of physical social cues is also decreased online, which may be advantageous for youth less capable of interpreting and responding to such cues appropriately. Thus, each of these aspects of online social communication may make it easier for less socially adept youth to make friends online as compared to offline, and it is possible that the presence of such

online connections may predict decreases in psychological difficulties for such youth who might otherwise have few satisfying offline social relationships.

Recent studies have provided some support for these ideas. For example, there has been some evidence for the "social reconnection hypothesis," which posits that social exclusion may motivate humans to seek social attachments in alternative ways from others (Baumeister, Brewer, Tice, & Twenge, 2007; Maner, DeWall, Baumeister, & Schaller, 2007). Socially excluded individuals tend to view others as friendlier, express more interest in meeting others, and act more positively toward others (Maner et al., 2007). Online communication through social networking websites may provide individuals who do not feel socially accepted by their peers with such an alternative way to reconnect with others. Indeed, introverted youth who report using the Internet because it makes them feel less shy are able to make new friends online (Peter et al., 2005). Similarly, social anxiety has been linked to a preference for online versus face-to-face communication, and socially anxious youth who received positive online communication from friends self-reported increased closeness within their friendships (Caplan, 2007; Valkenburg & Peter, 2007b). Perhaps more significantly, however, the results of one study found that for youth who perceived themselves as less physically attractive, having a large online friend network predicted decreases in feelings of social anxiety and loneliness (Ando & Sakamoto, 2008). This finding suggests it is likely that difficulties related to physical cues might be ameliorated online and allow youth to expand their social connections in this domain. Moreover, it suggests that making such connections may help improve individuals' feelings of psychological well-being.

However, it is also possible that the same qualities of online communication that may increase the availability of social interactions for less socially accepted youth might also detract from the richness of interactions for youth who are more socially successful. It is possible that individuals who typically feel connected with others offline may appreciate interacting face-to-face with their friends in a wide variety of social settings, and also become accustomed to and appreciative of the nuances of physical social cues present during such communication. To the extent that youth who would otherwise fare well in in-person social interactions come to rely heavily upon online social communication, they may effectively degrade their

overall quality of social interaction. Such youth may be less likely to experience the buffering effects of social interaction upon symptoms such as anxiety and depression, and thus may instead experience an increase, at least in residualized terms, in these and related psychological difficulties over time. Some recent evidence also supports this idea. Youth with higher levels of self-perceived social support reported *increases* in depressive symptoms when using the Internet to make new friends as compared to less supported youth, who did not experience changes in depressive symptoms (Bessière et al., 2008). This suggests the possibility that even as online social communication has become more normative, some youth may neglect in-person friendships for the purpose of forming new connections online. As suggested above, such neglect may be particularly troublesome for youth if these online associations prove to be less satisfying than the face-to-face relationships to which they are accustomed (Cummings, Butler, & Kraut, 2002), and may provide one explanation for why some youth may develop increased levels of depressive symptoms when communicating online.

Similarly, for youth who see themselves as physically attractive, and who presumably would feel relatively comfortable with in-person social interactions, having a self-reported greater number of friendships formed on the Internet has been associated with greater social anxiety and loneliness (Ando & Sakamoto, 2008). It is possible that physically attractive youth, who are often more interpersonally competent and socially successful (Langlois et al., 2000), may become dissatisfied with online relationships when they seek to maintain very large online friend networks, because they find these online relationships to be less fulfilling than face-to-face relationships they previously enjoyed with friends. Moreover, research investigating youths' motives for acquiring online friends suggests that individuals who have very large online friend networks (>900 friends) may do so in a calculated attempt to appear more popular to others (Donath & Boyd, 2004; Tong, Van Der Heide, & Langwell, 2008). Such individuals, who may already be well established socially, may thus end up devoting significant social resources to online communication at the expense of time spent developing or maintaining offline relationships, contributing to future psychological and social difficulties. Together, these studies provide initial evidence suggesting that spending large amounts of time in online relationships may leave otherwise well-adjusted youth relatively less satisfied, as these

relationships lack the intensity of in-person relationships.

Although these studies relied heavily upon youth reports, they provide initial evidence for a leveling effect of online social communication in which it acts as a sort of "social interaction-lite." Less well-adjusted youth may benefit from the reduced stress and intensity of online social communication whereas more well-adjusted youth may actually be at risk for adverse psychological effects from the relative lack of depth of such communication. Importantly, these findings also support the idea that youths' perceptions of their face-to-face social relationships with peers may be central to explaining associations between youths' online social communication and their future psychological well-being.

In addition to the amount of online communication an individual has, the content of what he or she communicates may also have important implications for future adjustment. Users of social networking websites have the ability to post pictures for others to view, and recent studies have begun to consider how the content of pictures presented on these websites may be related to individuals' personality and social experiences. For example, qualities of self-promotion and attractiveness in individuals' primary photo on their Facebook profile predicted accurate observer ratings of users' narcissism (Buffardi & Campbell, 2008). Early negative mother-teen interactions have also been shown to predict youth posting pictures on their Facebook and MySpace pages featuring smaller groups of same-age peers, suggesting that continuities in relationship difficulties may also be displayed in photos online (Szwedo, Mikami, & Allen, 2011). Youth reporting greater depressive symptoms in early adolescence have also been shown to be more likely than youth with lower depressive symptoms to post photos on their Facebook and MySpace pages featuring inappropriate behavior in early adulthood (Mikami, Szwedo, Allen, Evans & Hare, 2010).

Still, it remains unclear how the content of pictures posted to social networking websites may in turn predict changes in individuals' future adjustment, particularly when the content of such photos features deviant behavior. On social networking websites, youths' posted pictures are typically accessible to both their peers and to themselves. Such photos, when featuring deviant behavior, may communicate to others that deviant behavior is an important aspect of one's life and invite feedback from peers that positively reinforces the behavior

displayed. However, it is also possible that the mere act of posting pictures with deviant behavior may be reinforcing to that person. By making a public declaration to others that one engages in deviant behavior, an individual may also come to view him or herself as the kind of person who engages in such behavior, which may predict continuities or increases in deviancy over time.

The goal of the present study was to determine the extent to which young adults' social connections and self-presentation on social networking websites predict residualized changes in their levels of anxiety and depression, social withdrawal, and problematic alcohol use over the course of the following year. We sought to advance previous research in this domain—which has heavily relied on self-reports of youths' online behavior—by observing young adults' communication on social networking websites, which provides a unique opportunity to assess individuals' unscripted and unfiltered social behavior with peers online. We hypothesized the existence of a leveling effect of online friendships for predicting young adults' future adjustment. Specifically, we predicted that having a larger online friendship network, and receiving posts from a larger number of friends, would both be associated with decreases in internalizing symptoms for initially less socially accepted youth, but increases in internalizing symptoms for initially more highly accepted youth. Furthermore, we hypothesized that the presence of photos featuring deviant behavior on youths' social networking website profiles would be associated with an increase in problematic alcohol use over the following year.

METHOD

Participants and Procedure

Participants were 89 young adults and their peers drawn from a larger longitudinal investigation of adolescent social development including 184 target adolescents, their families, and their peers. The sample of 89 young adults was followed over a 1-year period. Participants' self-perceived social acceptance, participation in online social networking websites, and psychological adjustment were each assessed at Time 1 (Mean Age = 20.57, $SD = .99$); participants' psychological adjustment was reassessed 1 year later at Time 2 (Mean Age = 21.48, $SD = 1.00$).

The sample of 184 adolescents was originally recruited for participation from the seventh and

eighth grades of a public middle school drawing from suburban and urban populations in the southeastern United States. Students were recruited via an initial mailing to all parents of students in the school along with follow-up contact efforts at school lunches. Families of adolescents who indicated they were interested in the study were contacted by telephone. Of all students eligible for participation, 63% agreed to participate either as target participants or as peers providing collateral information. Individuals were unable to participate as close peers if they were already participating as targets in the larger study. To account for the fluid nature of friendships during adolescence, target participants re-nominated a close peer during each year of the study. Thus, the same close peers were sometimes re-nominated, but participants also had the opportunity to nominate a new friend for inclusion in the study. Peers reported knowing teens for an average of 7.66 years at Time 1 of the present study. Throughout the study, extensive tracking information was obtained for all participants. Participants were contacted each year by phone or mail and invited to continue to take part in the study. Individuals who moved out of the area but indicated that they would like to continue to participate were either compensated for their travel to the laboratory, or research assistants traveled to the participants to complete interviews. All participants provided informed consent before each interview session. Interviews took place in private offices within a university academic building, or, when research assistants traveled to interview participants, in privately rented office space.

Because the assessment of online social networking behavior was added to the larger study during the middle of an annual wave of data collection, 138 of the 184 target participants returned questionnaires regarding their participation in social networking websites before the close of the wave ($M = 5.32$ months after participants initial self-report; $SD = 3.88$ months). Of these 138 participants, 89 indicated that they had a social networking webpage on MySpace or Facebook (a figure slightly higher than national estimates suggesting 60% of youths have such sites; Jones & Fox, 2009). The sample of 89 participants who reported having an online social networking webpage was diverse: 35 male participants and 54 female participants; 64% Caucasian, 25% African American, and 11% other or mixed ethnicity; median family income in the \$40,000–59,999 range; 75% current students. Initial attrition analyses examining differences between participants who did ($n = 89$) versus did not

($n = 49$) report having a profile on Facebook or MySpace at Time 1 indicated significant differences on demographic and other variables of interest. Participants who reported having a profile on Facebook or MySpace at Time 1 ($n = 89$), relative to those who did not report having a page on these specific sites ($n = 49$), were more likely to have higher reported family income ($t(123) = 2.99, p < .01$) and have more problematic alcohol use ($t(116) = 3.59, p < .001$) at Time 1.

Of the 89 young adults who reported having a social networking webpage on MySpace or Facebook, 59 granted us permission to directly access it. Such permission is non-trivial, even for adolescents participating in an extended study, because it presents one of the few opportunities in research to examine completely spontaneous, unfiltered, and potentially embarrassing or incriminating interactions between young adults and their peers. There were no significant differences on any of the demographic variables, measures of psychological adjustment, or measure of social acceptance between participants who had their Facebook or MySpace page coded ($n = 59$) and those who reported having a page on Facebook or MySpace but did not grant permission for coding ($n = 30$). Participants whose pages were coded ($n = 59$) relative to those in the larger study who did not have a page coded ($n = 125$) were more likely to have a higher reported family income ($t(178) = 2.48, p < .05$) at Time 1.

Questionnaire Measures

Social acceptance (Time 1). Young adults' perception of their own level of social acceptance was assessed at Time 1 using a slightly modified version of a subscale from the Adolescent Self-Perception Profile (Harter, 1988). The format of this measure requires participants to choose between two contrasting descriptors and then rate the extent to which their choice is really true or sort of true about themselves. Responses to each item are scored on a 4-point scale and then summed, with higher scores reflecting higher levels of perceived social acceptance. Due to time constraints, the subscale assessing social acceptance was shortened from five items to four items relating to social adjustment within the larger peer group. Sample items included "Some teens find it hard to make friends/Some teens find it's pretty easy to make friends" and "Some people are well liked by other people/Some people are not well liked by other people". The shortened version of this scale showed

good internal consistency (Cronbach's alpha = .80) and was highly correlated with the full scale in other data collected on a similar population ($r = .97$).

Anxious-depressive symptoms (Time 1 and 2). Anxious-depressive symptoms were assessed using the 18-item self-report anxious-depressive subscale from the Adult Self Report (Achenbach & Rescorla, 2003). Items are scored on a 3-point scale with higher scores indicating greater anxious-depressive symptoms. Sample items include "I am unhappy, sad, or depressed" and "I am too fearful or anxious." Cronbach's alpha in this sample was .93 at Time 1 and .91 at Time 2. The correlation between anxious-depressive symptoms at Times 1 and 2 was $r = .79$.

Social withdrawal (Time 1 and 2). Participants' level of social withdrawal was assessed by a close peer using the 9-item social withdrawal subscale of the Adult Behavior Checklist (Achenbach & Rescorla, 2003). Items are scored on a 3-point scale with higher scores indicating greater social withdrawal. Sample items include "Would rather be alone than with others" and "Withdrawn, doesn't get involved with others". Cronbach's alpha in this sample was .67 at Time 1 and .60 at Time 2. The correlation between social withdrawal symptoms at Times 1 and 2 was $r = .33$.

Problematic alcohol use (Time 1 and 2). Self-reported problematic alcohol use was assessed using a 6-item subscale from the Alcohol and Drug Questionnaire. The Alcohol and Drug Questionnaire was created based on the "Monitoring the Future" surveys (Johnston, O'Malley, Bachman, & Schulenberg, 2006). Sample items include "During the past 30 days, how many times did you drink so much alcohol that you were really drunk?" and "During the past 30 days, how many times did you have a hangover, feel sick, get into trouble with your family or friends, miss school or work, or get into fights as a result of drinking behavior?" Higher scores indicate more problematic alcohol use. Cronbach's alpha in this sample was .89 at both Time 1 and Time 2. The correlation between problematic alcohol use at Times 1 and 2 was $r = .80$.

Coded Social Networking Website Measures

To assess the quality of participants' online social communication on social networking websites at

Time 1, an observational coding system was devised to capture constructs of interest to this study described in detail below. To view participants' profiles, trained research assistants logged on to a Facebook or MySpace profile created for the purpose of the study and requested to be added to the participants' friendship network, unless participants' profiles were already part of the public domain. If participants indicated they had a profile on both Facebook and MySpace, coders viewed the profile on the site participants reported using most frequently. Research assistants recorded information about various aspects of friendship quality present on the participants' pages. For all observationally coded measures of online social communication assessing comments received from peers, coders examined the 20 most recent posted messages from friends displayed on the participant's web page. The 20 most recent posts were examined regardless of the number of different individuals who made the comments, and regardless of the time period over which the comments occurred. Thirty pages (out of 59) selected at random were double coded to provide an estimate of consistency between raters. Discrepancies between coders were handled by taking the average of coders' scores. Data for the present study were collected and coded between February, 2007 and October, 2007.

Friend network size (Time 1). The total number of individuals in participants' friendship network was recorded from their Facebook or MySpace page as a marker of online friendship quantity at Time 1. Inter-rater reliability was assessed using the intraclass correlation coefficient and was .99.

Number of friends posting on page (Time 1). The total number of different online friends posting messages on participants' pages (within the 20 most recent posts) at Time 1 was recorded as a marker of the number of online friends with whom participants' have direct communication. Inter-rater reliability was assessed using the intraclass correlation coefficient and was .98.

Photos of deviant behavior (Time 1). Coders examined all the photos posted on participants' MySpace or Facebook pages at Time 1, including those posted by participants and those which were posted to participants' pages by others because they featured the participant. Deviant behavior in photos was originally rated on a scale of 1–3, with higher scores indicating more severe deviant behavior. On

this scale, a score of 1 reflected either the absence of deviant behavior in photos or suggested alcohol use in an appropriate context (i.e., drinking a beer at a bar or holding a glass of wine at a party). Scores of 2 or 3 were reserved for more blatant displays of alcohol use or sexually provocative behavior, such as explicit alcohol use (taking shots, doing kegstands, etc.), provocative dress or gestures, or vandalism. For the purpose of the present study, this variable was dichotomized to reflect the absence (scores of 1 on the original rating scale) or the presence (any scores >1 on the original rating scale) of deviant behavior. The absence of deviant behavior was re-coded as 0 and the presence of deviant behavior as 1. Inter-rater reliability was computed using the Kappa coefficient and was .59.

RESULTS

Preliminary and Correlational Analyses

Means and standard deviations of study variables are presented in Table 1. Observations more than three *SDs* from the mean of a variable's distribution were trimmed to a value equal to three *SDs* from the mean. Two extreme outliers were trimmed for anxious-depressive symptoms and four extreme outliers were trimmed for social withdrawal at Time 1. Three extreme outliers were trimmed for both anxious-depressive symptoms and for social withdrawal at Time 2. After truncating these variables, their distributions approximated normality. It should be noted that univariate examination of the variable "Friend Network Size" indicated an approximately normal distribution with values ranging from 21 to 1035. This variable had no observations >3 *SDs* from the mean. We decided against transforming to aid in ease of interpretation of our results, although parallel analyses using a square-root transformed variable yielded substantively identical results. Table 1 also presents simple correlations between all independent and dependent variables. Correlational analyses revealed several significant associations between variables measuring online social communication and self-presentation and adjustment outcome measures. Adjustment outcome measures displayed zero to small correlations with one another, suggesting that findings reported with these variables are relatively independent of one another.

Analytic strategy. Hierarchical regression analyses were designed to assess the extent to which young adults' future levels of psychological adjustment

TABLE 1
Univariate Statistics and Intercorrelations Between Primary Constructs

	Mean	SD	1	2	3	4	5	6	7	8	9
1. T1 anxious-depressive symptoms (S)	6.14	6.01	–								
2. T2 anxious-depressive symptoms (S)	4.25	4.57	.79***	–							
3. T1 social withdrawal (P)	1.44	1.88	–.09	.04	–						
4. T2 social withdrawal (P)	1.05	1.34	.29*	.36**	.33*	–					
5. T1 problematic alcohol use (S)	11.26	5.83	.27*	.22	–.04	–.02	–				
6. T2 problematic alcohol use (S)	11.16	5.83	.17	.20	–.12	–.03	.80***	–			
7. Social acceptance (S)	13.52	2.16	–.35**	–.34**	–.26	–.31*	.17	.26*	–		
8. Friend network size (O)	305.87	242.40	.00	–.01	–.11	.17	.24	.17	.23	–	
9. Number of friends posting messages (O)	12.27	4.02	–.15	–.18	–.25	–.01	.18	.18	.29*	.51***	–
10. Deviant behavior in photos (O)	26%	–	–.11	.03	.23	.45***	.13	.32*	.00	.04	.09

Note. (S) = Self-report; (P) = Peer-report; (O) = Observed on Facebook/MySpace. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

(at Time 2) could be predicted from their demographic characteristics, self-perceived social acceptance, and online social networking behavior at Time 1, after controlling for Time 1 levels of their adjustment. This approach of predicting the future level of a variable while accounting for predictions from initial levels (e.g., stability), yields one marker of change in that variable: increases or decreases in its final state relative to predictions based upon initial levels (Cohen & Cohen, 1983). Thus, in the present approach, the outcome measure is a function not just of the predictor but also of the base score for that measure times a β weight that reflects the strength of the association between the base and the outcome score. This baseline score was entered into all models so that the residualized outcome score (a measure of relative change) and predictions to it would not be affected by regression to the mean issues.

We also considered whether or not participant social acceptance might interact with online social networking behavior to explain additional variance in youths' future anxious-depressive symptoms and social withdrawal. For regression equations predicting anxious-depressive symptoms and social withdrawal, interactions between social acceptance and friend network size and social acceptance and number of friends posting on participants' page were examined. Although we did not have any specific hypotheses for interactions between social acceptance and deviant behavior in photos for predicting problematic alcohol use, this interaction was examined for exploratory purposes. Significant interactions were probed in the manner recommended by Holmbeck (2002), in which we estimated the slope between the predictor and the criterion variable for a participant one *SD* above and one *SD* below the raw mean in the moderator variable.

We also explored interactions between participants' online social networking behavior and gender and family of origin income. We included these variables as covariates in all analyses because of previous research finding that older teenage girls may be more likely to use social networking webpages (Lenhart & Madden, 2007) and individuals from households with greater income may be more likely to go online (Madden, 2006). Gender differences have also been shown to emerge in several areas of psychological adjustment during adolescence (e.g., depression, aggression, and alcohol use; Card, Stucky, Sawalani, & Little, 2008; Hicks et al., 2007; Johnston et al., 2006; Nolen-Hoeksema & Girgus, 1994; Young et al., 2002). Finally, we controlled for the time between participants' initial Time 1 interview and the coding of their social networking page, and the time between the coding of their page and their Time 2 interview, by including these variables in our regression equations. We also examined interactions between these variables and the Time 1 online social behavior variables for predicting each of our adjustment outcomes. However, no significant main effects or interactions were found and these analyses have been excluded from the tables below for ease of interpretation.

To best address any potential biases due to missing data in analyses, full information maximum likelihood methods were utilized in Mplus version 6 to handle any missing data. These procedures have been found to yield the least biased parameter estimates when all available data are used for longitudinal analyses (vs. listwise deletion of missing data; Enders, 2001). Because teens who did versus did not permit their pages to be coded did not differ on any demographic or psychological adjustment variables and could be justified as missing at random, data from the full study sample of 89 young adults were used to provide the best

estimates of population variance for all predictor variables in the study.

Primary Analyses

Anxious-depressive symptoms. After controlling for participants' level of family income, gender, anxious-depressive symptoms at Time 1, and social acceptance at Time 1, analyses revealed two significant interaction effects upon entry to the model (Table 2). Probing of the first interaction revealed that, as hypothesized, for young adults who reported feeling less socially accepted by their peers at baseline, a larger network of online friends on Facebook or MySpace was associated with a residualized decrease in self-reported anxious-depressive symptoms over the 1-year period. For young adults who perceived themselves as more socially accepted at baseline, larger friend network size was associated with a slight residualized increase in symptoms, although the slope for this group was not significant. These findings are depicted in Figure 1, which displays participants' levels of anxious-depressive symptoms as predicted by online friend network size and moderated by self-perceived social acceptance. However, this interaction was nonsignificant in the final model.

Probing of the second interaction revealed that for young adults who reported lower social acceptance at baseline, receiving messages on their

Facebook or MySpace page from a greater number of friends was associated with a residualized decrease in self-reported anxious-depressive symptoms over time. However, young adults with higher reported social acceptance at baseline who received messages on their Facebook or MySpace page from a greater number of friends reported a residualized increase in anxious-depressive symptoms (see Figure 2).

Social withdrawal. After controlling for participants' level of family income, gender, peer-rated social withdrawal symptoms at Time 1, and self-perceived social acceptance at Time 1, analyses revealed that, upon entry to the model, young adults with a larger network of online friends reported a residualized increase in peer-reported social withdrawal symptoms at Time 2 (see Table 2). However, as hypothesized, there was also an interaction effect between self-perceived social acceptance and the number of friends posting messages on young adults' social networking page. Probing revealed that for young adults who reported lower self-perceived social acceptance at Time 1, receiving messages from a greater number of friends was predictive of a slight residualized decline in peer-reported social withdrawal 1 year later, although the simple slope for this group was not significantly different from zero. However, receiving messages from a greater number of friends was significantly predictive of a

TABLE 2
Predicting Residualized Change in Young Adults' Psychological Adjustment From Online Social Communication Interacting with Self-Perceived Social Acceptance

	Self-Report of Anxious-Depressive Symptoms				Peer-Report of Social Withdrawal			
	β entry	β final	Change R^2	Total R^2	β entry	β final	Change R^2	Total R^2
Step 1.								
Family income	.22*	.07			-.12	-.23		
Gender	.06	.08	.05*	.05	.04	-.06	.02	.02
Step 2.								
T1 level of criterion variable	.70***	.61***	.47***	.52***	.31**	.32**	.09**	.11
Step 3.								
Social acceptance	-.17*	-.07	.02	.54***	-.04	-.05	.00	.11
Step 4.								
Friend network size	-.05	-.09	.00	.54***	.32*	.29	.09*	.20*
Step 5.								
Number of friends posting messages	-.07	-.06	.00	.54***	.11	.09	.01	.21*
Step 6.								
Social acceptance \times Friend network size	.32***	.14	.09**	.63***	.02	-.20	.00	.21*
Step 7.								
Social acceptance \times Number of friends posting messages	.32**	.32**	.07**	.70***	.43**	.43**	.11**	.32**

Note. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. $N = 89$.

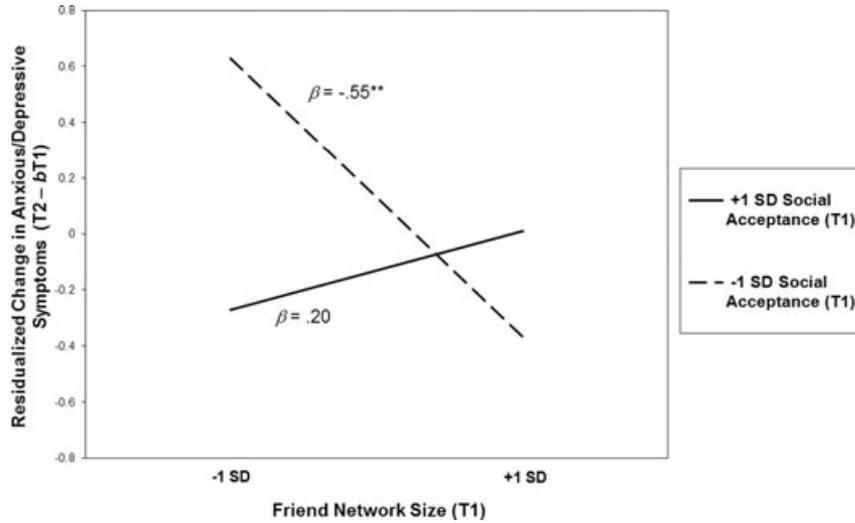


FIGURE 1 Interaction between self-perceived social acceptance and online friend network size predicting residualized change in young adults' anxious-depressive symptoms (all measures standardized). Lines on graphs represent 1 SD above and below the mean on social acceptance and online friend network size. Higher scores on anxious-depressive symptoms indicate a residualized increase in anxious-depressive symptoms from Time 1 to Time 2. Simple slopes were estimated between online friend network size and anxious-depressive symptoms for a participant 1 SD above and 1 SD below the raw mean on social acceptance as outlined by Holmbeck (2002). Note. $**p \leq .01$.

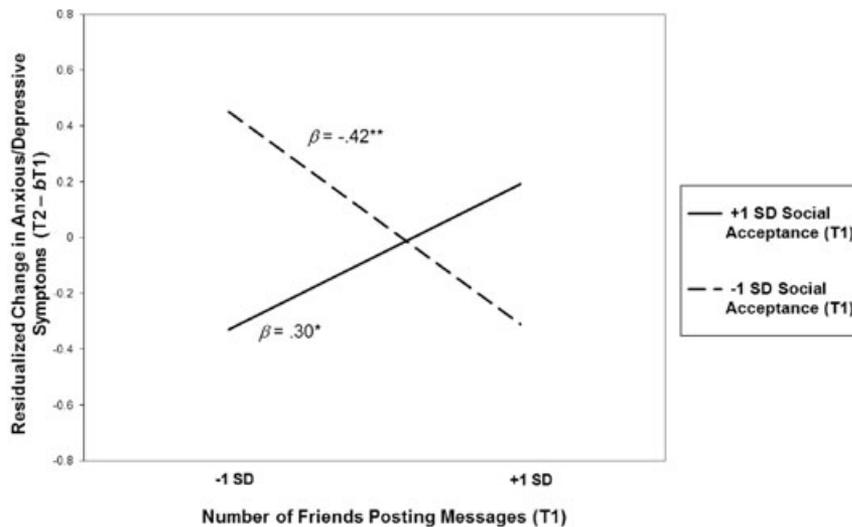


FIGURE 2 Interaction between self-perceived social acceptance and number of friends posting messages predicting residualized change in young adults' anxious-depressive symptoms (all measures standardized). Lines on graphs represent 1 SD above and below the mean on social acceptance and number of friends posting messages. Higher scores on anxious-depressive symptoms indicate a residualized increase in anxious-depressive symptoms from Time 1 to Time 2. Simple slopes were estimated between the number of friends posting messages and anxious-depressive symptoms for a participant 1 SD above and 1 SD below the raw mean on social acceptance as outlined by Holmbeck (2002). Note. $*p \leq .05$; $**p \leq .01$.

residualized increase in social withdrawal for young adults who reported higher social acceptance at Time 1. See Figure 3.

Problematic alcohol use. After controlling for participants' level of family income, gender, problematic alcohol use at Time 1, and self-perceived

social acceptance at Time 1, there was a significant main effect for the presence of deviant behavior in young adults' posted photos on Facebook or MySpace for predicting problematic alcohol use. Having at least one photo featuring deviant behavior posted on young adults' pages was associated with a residualized increase in

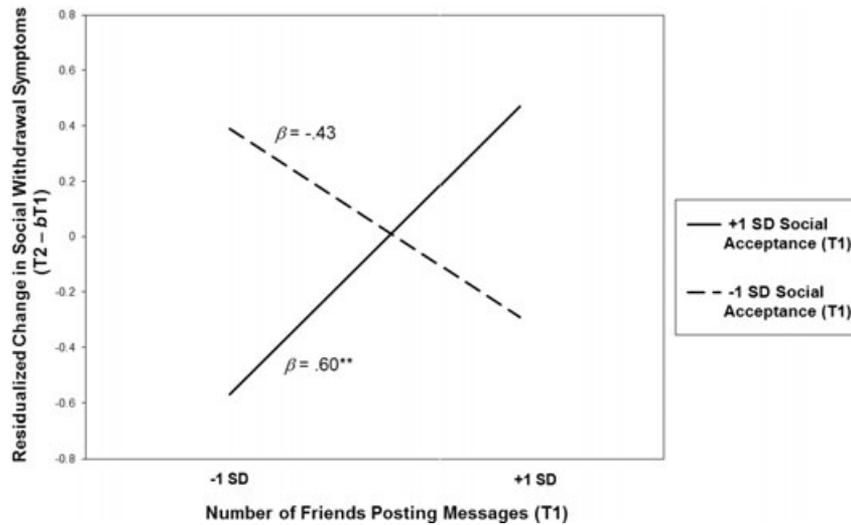


FIGURE 3 Interaction between self-perceived social acceptance and number of friends posting messages predicting residualized change in young adults' social withdrawal symptoms (all measures standardized). Lines on graphs represent 1 *SD* above and below the mean on social acceptance and number of friends posting messages. Higher scores on social withdrawal symptoms indicate a residualized increase in social withdrawal symptoms from Time 1 to Time 2. Simple slopes were estimated between the number of friends posting messages and social withdrawal symptoms for a participant 1 *SD* above and 1 *SD* below the raw mean on social acceptance as outlined by Holmbeck (2002). Note. ** $p \leq .01$.

problematic alcohol use at Time 2. The interaction between problematic alcohol use at Time 1 and social acceptance at Time 1 was not significant. See Table 3.

Post-hoc Analyses

Additional analyses were conducted to determine if participants' friend network size interacted with the number of friends posting on page to predict anxious-depressive symptoms or social withdrawal.

After conducting our hypothesized analyses for each of these outcome variables, these interactions were entered into regression equations as a block. No significant results were found. A second block of predictors was added to the regression equations predicting anxious-depressive symptoms and social withdrawal to test for quadratic and curvilinear effects in the data. These analyses were conducted to determine if there might be an "optimum" friend network size or messages received from an optimum number of friends that might maximize

TABLE 3
Predicting Residualized Change in Young Adults' Problematic Alcohol Use From Deviant Behavior in Online Photos

	Self-Report of Problematic Alcohol Use			
	β entry	β final	Change R^2	Total R^2
Step 1.				
Family income	.50***	.22**		
Gender	-.16	-.11	.28***	.28**
Step 2.				
T1 level of criterion variable	.64***	.62***	.33***	.61***
Step 3.				
Social acceptance	.13	.15*	.01	.62***
Step 4.				
Deviant behavior in photos	.20**	.20**	.05**	.67***
Step 5.				
Social acceptance \times deviant behavior in photos	-.10	-.10	.01	.68***

Note. * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. $N = 89$.

adaptive outcomes 1 year later. This block included the squared terms of friend network size, and number of friends posting on page. Again, no significant results were found. A final block of predictors including interactions between social acceptance and the squared term of friend network size and the squared term of number of friends posting on page were then entered into the model. No significant results were found.

DISCUSSION

These findings suggest that the social connections that young adults maintain on social networking websites, as well as certain aspects of their self-presentation on these sites, may predict residualized changes in their psychological well-being over time. One of the primary results of this study was that maintaining a greater number of relationships online appears to have something akin to a leveling effect on young adults' future levels of psychological adjustment, predicting elevated well-being for young adults who perceived themselves to be less socially accepted but decreased well-being among individuals who perceived themselves to be more socially accepted.

For example, less socially accepted young adults who maintained a larger network of online friends reported a residualized decline in anxious-depressive symptoms over the 1-year period. Thus, it appears that having a larger network of online friends may serve a buffering function against anxious-depressive symptoms for less socially accepted individuals. As suggested by the social reconnection hypothesis, individuals who feel excluded from offline relationships may turn to the Internet to make or maintain friendships. Such individuals may find creating a large network of friends online easier and less threatening than attempting to do so offline, possibly in part due to the increased number of social contacts available online and the reduced social cues of online communication. Although maintaining many online friends does not necessarily suggest that individuals regularly interact with all or even most of the friends in their online network (particularly given that the average friend network size in this study was about 306 friends), individuals who do not otherwise feel socially accepted may enjoy feeling connected to a large number of people and knowing that they have the opportunity to interact with them if they so choose. Through these websites, individuals may also view friends' profiles at any time to see what they have been doing, which may make them feel more connected to others'

lives and enhance feelings of well-being. Results of this study also suggest that not only a larger online network, but also a greater number of interactions on social networking websites, may be psychologically beneficial to less accepted individuals. When less socially accepted young adults received posts from a greater number of friends on their pages, they also experienced a residualized decline in anxious-depressive symptoms over time. This again suggests the possibility that social involvement online promotes a feeling of attachment to peers that may help less socially accepted individuals feel less anxious or depressed. Moreover, the present results suggest that the number of different individuals youth engage with on social networking site may even be a more robust predictor of their future adjustment than friend network size alone, given that the interaction between social acceptance and friend network size dropped below significance in the final model.

In contrast, for young adults who received posts from a greater number of friends, higher self-perceived social acceptance predicted a residualized *increase* in anxious-depressive symptoms and social withdrawal symptoms over time. These results are consistent with the displacement hypothesis posited by some online communication researchers, and suggest that online relationships may have different implications for individuals depending on their initial levels of social functioning. Although posts from friends are documentation of more direct communication between individuals, these results suggest the possibility that the depth of such communication via social networking websites may not be sufficient for more socially accepted individuals—who may be accustomed to richer interpersonal communication—to maintain strong attachment to friends. This may be because the wall-post function on social networking websites encourages individuals to leave short messages for one another rather than engage in more involved conversations. Thus, the pull of the online world in this respect may turn these successful individuals' relationships in a more shallow direction. Similarly, it may be that individuals who maintain a larger number of friendships online do so at the expense of devoting time to in-person relationships. This possibility is corroborated by the finding that youth with larger online friend networks also reported a residualized increase in social withdrawal symptoms, although this finding dropped below significance in the final model. Importantly, although these findings provide additional support for the notion that developmental factors may help explain

prior research results indicating social displacement for individuals.

Overall, the divergent findings for more versus less socially accepted young adults provide potentially important information about the nature of social networking sites, which have become a frequent avenue for youth social communication. Findings are consistent with a view of social networking sites as providing a type of lower intensity, easier entry to social interaction that is a likely step-down in quality from the in-person interactions of socially accepted individuals, but a step-up, and a manageable step-up, from the relative isolation of less accepted individuals. Online social communication of course provides less information relative to in-person communication, lacking such cues as eye-contact, tone of voice, posture, and facial expressions, not to mention physical contact. These may be precisely the kinds of cues that provide comfort and sustenance in successful relationships, but mastery of these cues may provide important barriers to relationships for less socially skilled individuals. Together, these facets of online communication might account for the apparent leveling effect of participation in such communication on individual outcomes.

In one respect, online behavior had consistent implications for outcomes across all groups of young adults studied. Individuals who had at least one photo posted to their page featuring deviant behavior reported increasing levels of problematic alcohol use over the following year. It is possible that displays of deviant behavior in pictures are indicative of risk-taking or novelty-seeking personality traits that may be associated with increased alcohol use. Or, sharing such photos with friends online may also allow opportunities for others to comment on, and possibly reinforce, the behavior seen in the photos, which may increase the likelihood of engaging in similar behaviors in the future.

This study has several limitations. First, although we have proposed several mechanisms through which online behavior may affect psychological adjustment, this study was not able to provide any direct tests of these mechanisms. Future research would benefit from more specific examinations of questions raised by this study. For example, future research could examine whether or not using social networking sites to interact with friends who are seen often offline might have different implications as compared to interacting with friends not typically seen in person. Moreover, future research will need to develop a better understanding of who individuals' online friends

really are, particularly if they do not spend time with them regularly offline. Online friends may be offline friends who have moved away, friends that the individual knows as acquaintances offline but has deeper relationships with online, or friends made online that the individual has never met. Even if individuals report using these sites to keep in touch with friends they primarily know in person, it will be important to determine how the amount of time they spend interacting with them online compares to the time they spend with these friends offline. Examining these differences would allow more specific conclusions about whether or not online interactions with these friends may replace versus complement their offline relationship. Similarly, it would be useful to determine whether individuals view communication on social networking sites as less satisfying than interacting with friends in person.

It should also be noted that we assessed social withdrawal from the perspective of a close peer. We assessed social withdrawal in this way to consider participants' withdrawal from a relationship that is likely maintained at least in part in person, suggesting that online behavior may have real effects on offline relationships. Although the test-retest correlation for social withdrawal was significant, it was smaller than the test-retest correlations for the self-reported measures of psychological adjustment. This was likely because teens had the opportunity to select different peers for each year of the study. Thus, different peers may have had different perceptions of social withdrawal in the relationship. Nevertheless, the significant correlation suggests that teens' social withdrawal behavior was observed relatively consistently across time and even potentially across different peer relationships. Future research would benefit from assessing socially withdrawn behavior from multiple reporters to assess withdrawal both within and across relationships. We also limited our investigation of participants' wall posts to the 20 most recent comments to be able to examine these posts for a variety of qualities as part of a larger study without overburdening our research assistants. We recognize that there are other ways of assessing these comments, such as by looking at all the wall posts that have occurred within a certain amount of time. In addition, we were unable to assess the frequency with which posts from friends occurred. The frequency of these posts may be an important predictor of social adjustment outcomes, or may interact with other qualities of online behavior to predict future adjustment.

These findings are also limited by the small sample from which they were derived, which in part reflects the rarity of youth being willing to open up completely uncensored peer communications to the eyes of strangers. Nevertheless, these findings would benefit from replication in other, larger samples. In addition, the sample studied represents a relatively narrow age range of participants, and it is uncertain whether the results would also generalize to younger or older age groups. Moreover, conclusions about the causality of effects cannot be drawn from naturalistic longitudinal studies such as this one. It is possible that online social communication and self-presentation may not be the causes of young adults' residualized changes in psychological adjustment, but are rather markers for other characteristics that affect adjustment.

Despite these limitations, these results have several implications. Overall, online social networks appear to have a leveling effect on young adults' social adjustment—improving outcomes for initially less accepted young adults but associated with less positive changes for young adults who are more socially accepted at baseline. One possibility is that youth who use these websites to facilitate *in-person* interactions with others enjoy the best psychological outcomes, although more research is clearly needed to determine if this is the case. With regard to the content of online communication, posting photos featuring deviant behavior predicted increasing levels of problematic alcohol use. These findings may even lend validity to the practice of employers making hiring decisions based in part on the content of applicants' social networking websites; deviant behavior in photos posted on applicants' pages may indeed be predictive of future problems. Moreover, although the deviant behaviors observed in this study may have been legal based on our participants' ages, it is important to consider that there could be potentially stronger social or legal implications for such behavior in younger age groups.

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