

# Adolescent Peer Relationships and Behavior Problems Predict Young Adults' Communication on Social Networking Websites

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This study examined online communication on social networking web pages in a longitudinal sample of 92 youths (39 male, 53 female). Participants' social and behavioral adjustment was assessed when they were ages 13–14 years and again at ages 20–22 years. At ages 20–22 years, participants' social networking website use and indicators of friendship quality on their web pages were coded by observers. Results suggested that youths who had been better adjusted at ages 13–14 years were more likely to be using social networking web pages at ages 20–22 years, after statistically controlling for age, gender, ethnicity, and parental income. Overall, youths' patterns of peer relationships, friendship quality, and behavioral adjustment at ages 13–14 years and at ages 20–22 years predicted similar qualities of interaction and problem behavior on their social networking websites at ages 20–22 years. Findings are consistent with developmental theory asserting that youths display cross-situational continuity in their social behaviors and suggest that the conceptualization of continuity may be extended into the online domain.

*Keywords:* online, social networking, adolescents, friendship, peer relationships

Explosive growth has occurred in online social communication (Madden, 2006), with youths disproportionately affected by this new technology (Pew Internet and American Life Project, 2009). As online use increases, so too do debates about how internet-based interaction may compare with historical face-to-face ways of communicating (Bargh & McKenna, 2004; Tyler, 2002). One argument posits that internet interaction is often of lower quality than is face-to-face interaction, because constraints inherent in the online medium hinder relationships. Furthermore, use of online communication may be positively correlated with adjustment problems because (a) socially inept youths are drawn to online interaction and (b) the almost inevitably poor quality of online communication increases maladjustment. An alternative argument postulates that the internet is merely a new medium for youths to display the same long-standing patterns as they do using modes other than online forms of communication, such that there is correspondence between face-to-face and online interaction styles and friendship quality. In contrast to the first argument, use of online communication may be negatively correlated with adjustment problems, because socially competent youths treat the online environment as yet another place in which to interact with existing friends and broaden their social circle.

## Developmental Context of Social Communication

Characterizations of youths' social relationships in the internet medium, as well as the investigation of continuity between face-to-face and online social behaviors, carry high relevance for developmental psychology. It is during the adolescent period that peer interactions arguably hold the greatest importance for individuals' social and behavioral functioning (Berscheid, 2003; Collins, 1997; Gifford-Smith & Brownell, 2003). The quantity of peer interactions and the intimacy in friendships rise dramatically during this time (Berndt, 1999; Furman & Buhrmester, 1992); this increase in emotional closeness may be especially relevant for the friendships of girls (Maccoby, 1998). The correlation between friendship quality and adjustment (Buhrmester, 1990), as well as the influence of peers' behavior on youths' own behavior through contagion effects (Dishion & Owen, 2002; Harris, 1995), is also suggested to peak during adolescence. Increasingly, a significant proportion of these important peer interactions occurs online for many adolescents (Bargh & McKenna, 2004), making them relevant for researchers to characterize.

The templates that peer relationships establish in early adolescence may further become critical in early adulthood as peers become primary sources of support. Existing research suggests continuity in patterns of interpersonal communication and relationship quality over time and across social contexts. Several long-term, longitudinal studies find that characteristics of peer interactions in childhood and early adolescence are repeated in young adult relationships with romantic partners (Sroufe, Egeland, Carlson, & Collins, 2005; Stocker & Richmond, 2007) and friends (Bagwell, Newcomb, & Bukowski, 1998; Eisenberg et al., 2002). Similarly, externalizing and internalizing behavior problems displayed in social relationships at one time point have been shown to repeat themselves in relationships several years later (e.g., Pedersen, Vitaro, Barker, & Borge, 2007; Stocker & Richmond, 2007). Given this evidence for continuity in social interaction,

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early adolescents' patterns of face-to-face communication with peers may be replicated in an online medium as young adults.

### Quality of Internet-Based Relative to Face-to-Face Interaction

Existing research about online social communication remains limited. To our knowledge, all published, empirical studies to date have correlated individuals' self-reports of their online relationships and adjustment at a single time point, with the exception of Kraut et al. (1998, 2002), who used objective measures of internet use and self-report measures of adjustment in a 3-year longitudinal design, and Willoughby (2008), who used self-report measures in a 21-month design. Whether earlier patterns of peer interactions show continuity with behavior in the online medium remains largely unknown. Further, observational data about friendship quality online is completely lacking. Herein, we review support for the first argument, that internet-based interaction is of poorer quality than face-to-face interaction, and then review support for the second argument, that the internet represents a new medium for youths to enact their long-standing patterns of social communication displayed face-to-face.

Theoretical reasons have been proposed stating that because nonverbal cues and personalizing information are limited online, internet-based interactions result in lower quality relationships than do face-to-face interactions (Keisler, Seigel, & McGuire, 1984). Two studies that compared participants' self-report of their internet and face-to-face relationships found that youths rarely become as close to online friends as they do to in-person friends (Mesch & Talmud, 2007; Parks & Roberts, 1998). Further arguments have been proposed that internet use contributes to poor adjustment because youths' online social interactions do not substitute for (or potentially take time away from) intimate face-to-face relationships. Some research has found youths' self-report of internet use to be cross-sectionally correlated with self-report of adjustment problems (Modayil, Thompson, & Varnhagen, 2003; Morahan-Martin & Schumacher, 2003; Ybarra, Alexander, & Mitchell, 2005) and poor face-to-face relationships (Papacharissi & Rubin, 2000; Sanders, Field, Diego, & Kaplan, 2000). However, the direction of effects in these studies is unknown. It may be that poorly adjusted youths are drawn to internet communication because of their failure in face-to-face relationships (Wolak, Mitchell, & Finkelhor, 2003) and that such youths would have difficulty establishing positive social ties in any venue. However, consistent with the hypothesized causal pathway, Kraut et al. (1998, 2002) found that adolescents' objectively assessed internet use predicted self-reports of decreased social support and increased psychopathology over a 1- to 2-year period, although these effects disappeared at a subsequent follow-up.

In support of the alternative viewpoint, some research indicates that the characteristics of individuals' face-to-face relationships play out again in the online medium. Adolescents who described themselves as having internalizing symptoms (Gross, Juvonen, & Gable, 2002; Ybarra et al., 2005) were more likely to communicate over the internet with people they knew less well, and to talk about superficial topics, than were adolescents without internalizing symptoms. In retrospective self-report designs, individuals' problematic internet interactions have appeared to be extensions of difficulties that predated their internet use (Mitchell, Finkelhor, &

Becker-Blease, 2007; Modayil et al., 2003). Similarly, youths with strong, positive face-to-face relationships may be those most frequently using internet social communication as an additional venue in which to interact. In support of this argument, work has found youths' self-report of internet use to be cross-sectionally correlated with self-reports of extraversion (Peter, Valkenburg, & Schouten, 2005), low social anxiety (Valkenburg & Peter, 2007), and sociability in face-to-face interactions (Birmie & Horvath, 2002). Willoughby (2008) found trends that adolescents' self-reports of better relationships with peers, though not with parents, predicted increases in internet use over a 21-month period.

Social networking websites, the most popular of which are Facebook and MySpace, exemplify online social communication. Because of their recency, few studies have specifically investigated these explicitly socially oriented websites as opposed to the research reviewed studying other types of internet use. Notably, unlike other forms of internet communication, these sites encourage nonanonymous interactions and the recognition of connections between friends. Ellison, Steinfield, and Lampe (2007) found that the amount of time college students reported using Facebook was positively correlated with their self-reported face-to-face involvement in the college community; this relationship held after statistical control of total internet use, suggesting a unique function of Facebook to enhance social communication. In a study of a Dutch social networking website, Valkenburg, Peter, and Schouten (2006) found that adolescents who self-reported receiving positive comments from friends posted on their page also self-reported good adjustment. Walther, Van Der Heide, Kim, Westerman, and Tong (2008) found that participants judged Facebook page owners on the basis of characteristics of the friends on the owners' pages, suggesting that youths view Facebook interactions as reflecting the quality of owners' face-to-face relationships.

### Demographic Moderators of Online Social Communication

Although historically adolescent boys have adopted internet technology faster than girls, current research suggests gender equivalence in most types of internet use (Gross, 2004; Joiner et al., 2005; Subrahmanyam, Greenfield, Kraut, & Gross, 2001; Willoughby, 2008) and potentially female predominance in the social communication functions of the internet (Jackson, Ervin, Gardner, & Schmitt, 2001a). Females may make more emotionally supportive comments online than do males (Baron, 2004; Hartsell, 2005), which has been postulated to reflect gender differences also displayed in face-to-face relationships. White and high-income individuals may be more likely to use the internet than their low-income or minority peers (Jackson, Ervin, Gardner, & Schmitt, 2001b; Pew Internet and American Life Project, 2008), but it is unknown how income or ethnicity might affect communication or relationship quality online.

### Study Aims

The current study utilized observational measures and multiple informants in a longitudinal design to examine predictors of young adults' communication on the social networking websites Facebook and MySpace. We first hypothesized that youths with social networking websites at ages 20–22 years relative to youths with-

out such websites would be those who were best adjusted (a) at ages 13–14 years and (b) concurrently at ages 20–22 years. Among youths with web pages, we next hypothesized that youths' adjustment, both at ages 13–14 years and at ages 20–22 years, would predict similar patterns of communication on their web pages. Specifically, popularity and friendship quality at 13–14 and 20–22 years of age were expected to predict social competence on web pages, whereas problem behaviors at ages 13–14 and 20–22 years would also be displayed online. We made this prediction on the basis of developmental theory showing consistency in social behaviors across medium and time. On the basis of established gender differences in communication (Baron, 2004; Hartsell, 2005), we further hypothesized that girls would show more emotionally supportive interactions on web pages than would boys. In sum, we expected that data would support the theory that the internet represents a new medium to display the same patterns of social interaction as have been displayed in other venues.

### Method

Participants were 92 (39 male, 53 female) youths taking part in an ongoing longitudinal study of adolescent and young adult development. The youths entered the study in 1998–1999 when they were in the seventh and eighth grades (mean age = 13.30 years,  $SD = 0.62$ ) and were reassessed in 2006–2008 as young adults (mean age = 20.92 years;  $SD = 1.11$ ). These youths are the individuals for whom their social networking web pages could be coded, and they represent a subset of the full sample of 184 participants assessed at baseline and 172 participants assessed at follow-up.

At baseline, adolescents were recruited from a single public middle school; the students had attended the same school as an intact group since the fifth grade. Racial/ethnic diversity was as follows: 58% White, 29% African American, and 13% other or mixed. Annual family income was distributed as follows: 18% reported incomes under \$19,999; 28% had incomes of \$20,000–\$39,999; 22% reported incomes of \$40,000–\$59,000; and 33% had an income of \$60,000 or more. Active, written informed consent was obtained from participants at every assessment point; if participants were minors, they provided assent, and their parents provided consent. Study procedures were approved by a university review board. For further details about the sample, please see Allen, Porter, McFarland, Marsh, and McElhaney (2005).

### Baseline Measures (Ages 13–14 Years)

Using a multimethod procedure, we assessed adolescents' peer status, friendship quality, and problem behaviors. These particular peer relationship measures were selected because sociometric status and friendship quality are believed to be distinct, yet important ways of characterizing youths' social competence (Parker & Asher, 1993). Similarly, the adjustment measures chosen were thought to reflect the central areas of problem behavior—both internalizing and externalizing domains—known to relate to social functioning (Asarnow, 1988). We note that baseline data collection predated the advent of social networking websites, and therefore social networking information was not available at this time point.

**Peer sociometric status.** We assessed peer sociometric status using a limited nomination sociometric procedure adapted from

Coie, Dodge, and Coppotelli (1982) and modified for adolescents (Franzoi, Davis, & Vasquez-Suson, 1994). Each participant nominated up to 10 peers in their grade with whom they would most like to spend free time outside of school and 10 peers with whom they would least like to spend such free time. Because the entire sample attended the same school, each adolescent's nominations came from 72 to 146 peers, depending on the adolescent's grade cohort. Sociometric status was calculated for each participant by taking the number of "most liked" nominations received minus the number of "least liked" nominations received, divided by the number of peers making nominations. This procedure has yielded stability over a 1-year period ( $r = .78$  for positive and  $r = .66$  for negative nominations), strong links to friendship and attachment security, and longitudinal links to decreasing levels of hostility over time (Allen et al., 2005; Allen, Porter, McFarland, McElhaney, & Marsh, 2007).

**Observed positivity and negativity in peer interaction.** Each adolescent and his or her best friend (nominated by the adolescent) participated in a dyadic interaction in which the pair decided together who, out of a hypothetical cast of characters, should be selected to be rescued from a desert island. The task was intended to produce discussion and conflict. Coders, unaware of other data about the participants, rated the positivity (smiling genuinely toward one another, validating the other person's ideas, making truly friendly jokes, and listening to the other person) and negativity (interrupting the other person, criticizing the other person's ideas, and appearing uninterested in what the other person was saying) in the dyadic interaction. Positive and negative indicators were considered separately as has been recommended by other researchers (Hartup, 1995). This standardized coding system has demonstrated validity (Allen, Porter, & McFarland, 2006; Allen et al., 2007). Interrater reliability between raters was acceptable (intraclass correlation coefficients [ $ICCs$ ]: .65–.86).

**Depressive symptoms.** Adolescents completed the Child Depression Inventory (CDI; Kovacs & Beck, 1977), a widely used self-report measure of depressive symptoms (Twenge & Nolen-Hoeksema, 2002). We chose a self-report measure because of consensus that adolescents are the most valid reporters of their own internalizing problems (Bird, Gould, & Staghezza, 1992). The CDI has been documented to relate to clinical depression among adolescents (Craighead, Curry, & Ilardi, 1995; Timbremont & Braet, 2004). The scale contains 27 items (sample item: "I am sad once in a while"), each rated on a metric from 0 to 2 to indicate the youth's feelings within the past 2 weeks. Alpha level in our sample was .86.

**Delinquent behavior.** Primary caregivers (98% of whom were mothers) completed the short form of the Delinquency scale of the Child Behavior Checklist (Achenbach, 1991), which assesses the adolescent's delinquent and acting out behavior (sample items: "She destroys things belonging to her family or others"; "She is disobedient at school"). Each item is rated on a metric from 0 to 2 and summed to produce a composite score. Reliability and validity of this form in relation to the full scale has been documented (Lizotte, Chard-Wierschem, Loeber, & Stern, 1992). All adolescents were living with the primary caregiver who completed the report. We relied on parental report to assess these behaviors because of evidence that adults are the most valid informants of disruptive behavior (Loeber, Green, Lahey, & Stouthamer-Loeber, 1991). Alpha in our sample for the six-item scale was .69.

### Online Social Communication Follow-up Measures

When participants were young adults, we assessed online social networking web page use and friendship quality on these web pages, as well as indicators of adjustment. Of the 172 participants reached at the follow-up assessment point, 147 reported that they had a social networking web page; of these, 118 gave consent to code their page, and we successfully coded 92 of these pages. The pages we could not code (a) were on a social networking website, such as Friendster, with a scheme that was too different from Facebook or MySpace for us to apply the coding; (b) could not be located; or (c) were not accessible because the participant consented during the visit but failed to accept our "friend request" on the website (which is needed to view the page). There were no significant differences between youths who gave consent for us to code their web pages versus youths with web pages who did not give consent on any baseline measure: age,  $t(145) = -0.10$ ; family income,  $t(145) = -0.75$ ; gender,  $\chi^2(1, N = 147) = 0.07$ ; ethnic minority status,  $\chi^2(1, N = 147) = 1.21$ ; peer sociometric status,  $t(145) = -0.85$ ; observed positivity,  $t(145) = 0.47$ , or negativity,  $t(145) = -0.81$ , in peer interaction; delinquent behavior,  $t(145) = 0.36$ ; or depressive symptoms,  $t(145) = -1.57$ , all  $ps > .05$ . Additionally, there were no differences between the youths whose pages we successfully coded and the youths with web pages that we did not code.

Facebook and MySpace are by far the most popular social networking websites (TechCrunch, 2008), which is why we chose them for coding. Of the pages coded in our sample, 66% were on Facebook and 34% were on MySpace. On these websites, users create their own page where they typically include their name, photos, and information about themselves. Individuals are linked to friends in a social network, and friends post comments on each others' pages that may be viewed by all network members. For coding, we selected indicators reflecting the most prominent features of these web pages: the description of the page owner (hostility in "About Me" sections, inappropriateness in photos posted by the owner) and the characteristics of the friends (number of friends and connection and support in friends' posts on the page). Seventy pages were selected at random to be double coded to provide an estimate of consistency among raters.

**Number of friends on web page.** Coders recorded the total number of friends in the participant's social network, which is listed on the web page ( $ICC = .97$ ).

**Connection with friends on web page.** Coders examined the most recent 20 posts from friends displayed on the participant's web page. This number was chosen because most participants had many more than 20 posts, and the most recent 20 are automatically displayed on a participant's web page when someone clicks on the link to view posts. Coders counted the number of different friends who had posted comments among these 20 that indicated that the friend and the participant shared an actual relationship. This construct captured whether the participant was primarily communicating online with existing friends or communicating with strangers or distant acquaintances, as has been found in previous research to characterize youths with psychopathology (Wolak et al., 2003). Posts in which the friend said "see you at dinner" or "wasn't that lecture today hilarious?" suggested a connected relationship between individuals who communicate with one another outside of the online realm. Posts that appeared to be chain letters or posts,

such as "what's up?" were not counted as connection, as they were not considered to demonstrate a close relationship between the friend and the participant ( $ICC = .84$ ). Friends' connection posts were positively correlated with participants' self-report on the Online Friendships Questionnaire that they "talk with people online often seen in person" ( $r = .29$ ;  $p = .03$ ) and were negatively correlated with self-report that they "have a close friendship with someone they met online" ( $r = -.35$ ;  $p < .01$ ), questions used and validated in previous research (Morahan-Martin & Schumacher, 2003).

**Support of friends on web page.** Again in the most recent 20 posts from friends on the web page, coders recorded the number of different friends making posts characterized by strong words of encouragement, compliments, understanding, caring, or validation. This construct indicated supportive relationship quality on the website, similar to ways in which emotionally supportive comments are coded in face-to-face interaction tasks. Posts in which the friend said "I miss you so much," "I love you," or "you're truly my inspiration" would exemplify support. Posts that were mildly positive in tone, such as "take care" or "have a good weekend," were not considered support because these comments seem plausible in a casual relationship. Comments without a validation, such as "I'm so happy to be going home this weekend" or "did you do the lab homework?" were not considered support, although the question about homework would be considered connection ( $ICC = .83$ ).

**Hostility in "About Me" section.** Participants' descriptions of themselves on the website were coded for the presence of aggression, hostility, or negativity on a dichotomous metric. Coders assigned a 1 if there was no indication of these themes. A 2 was coded if there was any mention of anger or hostility toward the world, criticism or annoyance expressed, or explicit mention of any threat of violence. For example, the statement "I live in the worst town you could ever imagine, not only is it boring here, but it is consumed by pricks" would be counted for the presence of hostility ( $\kappa = .63$ ).

**Inappropriate photos posted.** After looking at all photos on the website posted by the participant, coders assigned a rating of 1–3 to indicate the degree to which any picture showed behavior that might be considered inappropriate if viewed by an authority figure. To establish this construct, we researched what type of photos posted on social networking websites lead employers to not hire applicants (Finder, 2006). All participants had at least one photo on their web page. Coders assigned a 1 if there were no inappropriate photos displayed. Coders assigned a 2 for the presence of minor inappropriate behavior and a 3 for the presence of significant inappropriate behavior in any photo. Benign photos of the participant, including most photos of the participant drinking beer, would be scored 1. A score of 2 was given for any picture of downing shots of alcohol or the participant in provocative clothing. If there was any photo of the participant naked, making obscene gestures, or engaging in vandalism, the construct was scored 3 ( $ICC = .76$ ).

### Social and Behavioral Adjustment Follow-up Measures

We selected measures of social and behavioral adjustment in face-to-face relationships at follow-up that were conceptually the most similar to those included at baseline.

**Friendship quality.** The age of the participants at the follow-up assessment point precluded assessment of peer sociometric status, and observational measures of friendship quality were not available. However, participants and their best friends (nominated by the participant) each independently reported on the quality of their friendship using the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985), a 45-item scale commonly used in this age group. We considered positive features (e.g., companionship, intimacy, nurturance, affection) and negative features (e.g., conflict, antagonism, criticism, punishment) of friendship quality separately. Reliability and validity have been documented (Furman, 1996).

**Depressive symptoms.** Participants self-reported their depressive symptoms on the Beck Depression Inventory–II (Beck, Steer, & Brown, 1996), a widely used, 21-item scale with good psychometric properties (Steer, Ball, Ranieri, & Beck, 1999) in which participants endorse depressive symptoms experienced in the past 2 weeks. Alpha in our sample was .85.

**Rule-breaking behavior.** Parental report was no longer appropriate for this age group. We collected best friend reports of the youths' behavior on the Young Adult Behavior Checklist (Achenbach, 1997) Rule-Breaking subscale. This subscale contains 14 items. Alpha in our sample was .86.

### Data Analytic Plan

We used binary logistic regression to test our first hypothesis that positive adjustment (a) in early adolescence and (b) concurrently in young adulthood would predict having a social networking web page in young adulthood. The presence versus absence of a social networking web page was the criterion variable, and the measures of friendship quality and adjustment at each age period were the predictors. We included the covariates of participant gender, age, and ethnic minority status as well as baseline family income. Gender and minority status were dichotomous, dummy-coded variables (1 = male, 2 = female; 1 = White, 2 = minority).

We next tested the hypotheses that among the group of youths with social networking web pages, adjustment at 13–14 and 20–22 years of age would be reflected in the youths' web pages at 20–22 years of age and that females would display more supportive relationships on their web pages than would males. First, regarding predictive relationships between early adolescent adjustment and young adult online relationships, we conducted ordinary least squares hierarchical multiple regressions for the continuous variables of (a) number of friends in the network, (b) friends posting connection comments, and (c) friends posting support comments; binary logistic regression for (d) hostility in the "About Me" section; and ordinal logistic regression for (e) inappropriate photos. At Step 1, we entered the demographic covariates of baseline family income, gender, age, and ethnic minority status. At Step 2, we entered the measures of baseline social adjustment together: (a) peer sociometric status, (b) observed positivity in peer interaction, (c) observed negativity in peer interaction, (d) depressive symptoms, and (e) delinquent behavior. If the baseline measures of sociometric status, positivity, and negativity in peer interaction predicted the number of friends in network, friends posting connection comments, and friends posting support comments, then the hypothesis regarding continuity of social status and friendship quality into the online domain would be confirmed. If the baseline

measures of depressive symptoms and delinquent behavior predicted hostility in the "About Me" section and inappropriate photos, then the hypothesis regarding continuity of behavior problems into the online domain would be confirmed.

Because participants who had social networking web pages did not randomly represent the full sample of youths, we used the Heckman two-stage procedure to correct for selection bias (Heckman, 1979). In the Heckman correction, in the first stage, we used probit regression to estimate the likelihood of having a web page and, in the second stage, incorporated parameter estimates from the selection equation to predict the relationship between early adolescent adjustment and online communication. This procedure reduced the likelihood of a bias in regression estimates resulting from unmeasured differences between youths who have web pages and youths who do not.

We entered all possible interactions between gender and baseline social adjustment at Step 3 in each regression. Out of 20 possible interactions, two were significant. Probing revealed opposite effects such that the relationship between one measure of adjustment and online communication was stronger for girls, but the relationship between the other measure and online communication was stronger for boys. Because the number of significant interactions was close to what would be expected by chance, and because the directions of the two effects were inconsistent, we do not report these findings in the current article.

Next, regarding correspondence between concurrent indicators of adjustment and patterns of online social communication at 20–22 years of age, we conducted correlations between these measures. If social adjustment measures were correlated with a greater number of friends, friends' connection, and friends' support online, and behavior problem measures were correlated with hostility and inappropriate photos online, then this hypothesis would be confirmed.

## Results

### Preliminary Analyses

All continuous study variables were roughly normally distributed, with the exception of number of friends on the web page, which was positively skewed. We calculated the square root of this variable, which yielded a normal distribution; we used the transformed variable in analyses. We next examined the *z*-score distributions of all variables. For no variable did any participant have a *z* score greater than  $\pm 3.0$ . Descriptive statistics and correlations among the baseline indicators of adjustment and follow-up social networking variables are presented in Table 1. Variables within each time period were modestly or moderately (and not highly) correlated with one another, justifying the inclusion of each of these separate indicators.

### Factors Differentiating Youths With and Without Social Networking Web Pages

Among the youths who completed follow-up measures ( $n = 172$ ), 147 (86%) reported that they had a personal social networking web page, and 25 (14%) reported that they did not. We used the full sample of participants with web pages for these analyses (as opposed to the proportion of individuals with web pages who

Table 1  
Correlations Between Adjustment at 13–14 Years of Age and Online Communication at 20–22 Years of Age

| Variable                 | Descriptive statistics                      | 1      | 2      | 3    | 4    | 5      | 6     | 7    | 8    | 9    | 10 |
|--------------------------|---|--------|--------|------|------|--------|-------|------|------|------|----|
| 1. Sociometric status    |   | —      |        |      |      |        |       |      |      |      |    |
| <i>M</i>                 | 0.35  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (1.65)                                      |        |        |      |      |        |       |      |      |      |    |
| 2. Observed positivity   |   | .12    | —      |      |      |        |       |      |      |      |    |
| <i>M</i>                 | 2.36  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (0.63)                                      |        |        |      |      |        |       |      |      |      |    |
| 3. Observed negativity   |   | -.06   | -.05   | —    |      |        |       |      |      |      |    |
| <i>M</i>                 | 0.78  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (0.52)                                      |        |        |      |      |        |       |      |      |      |    |
| 4. Depressive symptoms   |   | -.08   | -.07   | .04  | —    |        |       |      |      |      |    |
| <i>M</i>                 | 5.07  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (4.28)                                      |        |        |      |      |        |       |      |      |      |    |
| 5. Delinquent behavior   |   | -.27** | -.18*  | .09  | .18* | —      |       |      |      |      |    |
| <i>M</i>                 | 1.52  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (1.82)                                      |        |        |      |      |        |       |      |      |      |    |
| 6. Number of friends     |   | .25*   | .29**  | -.18 | -.11 | -.30** | —     |      |      |      |    |
| <i>M</i>                 | 298.60                                      |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (247.6)                                     |        |        |      |      |        |       |      |      |      |    |
| 7. Friends' connection   |   | .27**  | .41**  | .10  | -.14 | -.37** | .42** | —    |      |      |    |
| <i>M</i>                 | 5.74  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (2.64)                                      |        |        |      |      |        |       |      |      |      |    |
| 8. Friends' support      |   | .28**  | .10    | -.15 | -.14 | -.21*  | .29** | .24* | —    |      |    |
| <i>M</i>                 | 1.63  |        |        |      |      |        |       |      |      |      |    |
| ( <i>SD</i> )            | (1.35)                                      |        |        |      |      |        |       |      |      |      |    |
| 9. Hostility in about me | 1 = 79, 2 = 13<br>(86%) (14%)               | .00    | -.27** | .04  | -.16 | .21*   | .04   | -.04 | -.01 | —    |    |
| 10. Inappropriate photos | 1 = 66, 2 = 16, 3 = 10<br>(72%) (17%) (11%) | .04    | .08    | -.08 | .21* | .01    | .02   | .13  | .01  | -.12 | —  |

Note. Means (with standard deviations in parentheses) are presented for raw scores on continuous variables. Pearson product moment correlations are presented for continuous variables, point biserial correlations were presented for continuous with categorical variables, and phi coefficients were calculated for categorical variables. Constructs 1–5 were assessed at baseline (13–14 years of age); *N* = 172. Constructs 6–10 were assessed at follow-up (20–22 years of age); *N* = 92.

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

gave permission for us to code them) as a more conservative test of the hypothesis that better adjusted youths have web pages.

Having a social networking web page was not significantly associated with the demographic factors of participant age, odds ratio (*OR*) = 0.64, 95% confidence interval (*CI*) = 0.41–1.01, *p* = .06; ethnic minority status, *OR* = 0.72, *CI* = 0.25–2.11, *p* > .05; gender, *OR* = 1.26, *CI* = 0.51–3.14, *p* > .05; or baseline family income, *OR* = 1.51, *CI* = 0.93–2.45, *p* > .05. However, after statistical control of demographic factors, early adolescent youths who had displayed greater observed negativity in their face-to-face peer interactions and more depressive symptoms were significantly less likely to have a social networking webpage in young adulthood. With regard to concurrent adjustment, young adults who self-reported more positive features in their close friendships were also more likely to have a social networking webpage (see Table 2).

### Longitudinal Associations Between Early Adolescent Adjustment and Web Page Indicators

We conducted analyses limited to the subsample of youths with social networking web pages that we coded (*n* = 92).

**Number of friends on web page.** At Step 1, we found that having more friends was correlated with being a member of an

ethnic minority group. However there were no main effects for gender, age, or baseline parental income. At Step 2, we found significant effects for two of the baseline social adjustment measures in predicting the number of friends the participant listed on their web page at 20–22 years of age. Youths with higher early adolescent positivity in their peer dyadic interaction had more friends in their online network. Youths with more negativity in their peer dyadic interaction, however, had fewer friends in their online networks (see Table 3).

**Connection of friends on web page.** As displayed in Table 3, at Step 1 we controlled for demographic variables, none of which was associated with the criterion variable of number of friends posting comments on the web page indicating connection (out of the most recent 20 posts). At Step 2, observed positivity in peer interactions predicted a larger number of individuals posting connection comments. Parent-reported delinquency, however, predicted a smaller number of individuals posting connection comments.

**High support of friends on web page.** As displayed in Table 3, at Step 1 participant gender was significant, such that female participants, in comparison with male participants, had more friends posting highly supportive comments on their web page. However no other demographic variable predicted support. After

Table 2  
*Early Adolescent Adjustment of Youths With Social Networking Web Pages in Young Adulthood*

| Variable                  | Has web page ( <i>n</i> = 147)<br>at 20–22 years of age | No web page ( <i>n</i> = 25)<br>at 20–22 years of age | Odds ratio | 95% Confidence interval |
|---------------------------|---|---|------------|-------------------------|
|                           | <i>M</i> ( <i>SD</i> )                                  | <i>M</i> ( <i>SD</i> )                                |            |                         |
| Ages 13–14 years          |   |   |            |                         |
| 1. Sociometric status     | 0.47 (0.96)   | 0.07 (1.56)   | 1.31       | 0.78–2.20               |
| 2. Observed positivity    | 2.38 (0.63)   | 2.22 (0.51)   | 1.12       | 0.71–1.79               |
| 3. Observed negativity    | 0.74 (0.47)   | 0.99 (0.67)   | 0.68*      | 0.45–0.99               |
| 4. Depressive symptoms    | 4.68 (3.84)   | 7.44 (6.28)   | 0.63*      | 0.43–0.93               |
| 5. Delinquent behavior    | 1.35 (1.81)   | 2.38 (1.70)   | 0.72       | 0.47–1.10               |
| Ages 20–22 years          |   |   |            |                         |
| 1. Self-report positivity | 11.88 (2.05)  | 10.24 (2.41)  | 2.05**     | 1.26–3.35               |
| 2. Self-report negativity | 4.31 (1.64)   | 4.47 (2.03)   | 1.10       | 0.70–1.71               |
| 3. Peer-report positivity | 11.42 (1.91)  | 11.03 (2.40)  | 1.17       | 0.74–1.86               |
| 4. Peer-report negativity | 4.46 (1.71)   | 4.34 (1.32)   | 1.12       | 0.64–1.96               |
| 5. Depressive symptoms    | 5.32 (6.08)   | 6.13 (7.34)   | 0.90       | 0.57–1.43               |
| 6. Rule breaking          | 3.68 (4.26)   | 3.93 (4.04)   | 0.95       | 0.58–1.54               |

*Note.* Presented means are raw scores (unadjusted for covariates), with standard deviations in parentheses. Odds ratios, however, were calculated by logistic regression with statistical control of participant age at baseline, gender, ethnic minority status, and baseline family income.

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

statistical control of income, gender, age, and ethnic minority status, at Step 2 having higher sociometric status at 13–14 years of age predicted more friends posting supportive comments on the web page.

**Hostility in “About Me” section.** No demographic variable at Step 1 predicted the presence of hostility in the participant’s “About Me” section. At Step 2, participants who had higher parent-rated delinquent behavior at 13–14 years of age were more likely to display hostility in their “About Me” section (see Table 4).

**Inappropriate photos posted.** No demographic variable at Step 1 was associated with the presence of inappropriate photos on the web page. At Step 2, more self-reported depressive symptoms

at 13–14 years of age significantly predicted the presence of inappropriate photos on web pages (see Table 4).

### Concurrent Associations Between Young Adult Adjustment and Online Social Communication

Table 5 presents correlations between concurrent indicators of social adjustment and problem behavior, on the one hand, and measures of online communication in young adulthood, on the other. Youths’ self-report of positivity in their friendship was positively correlated with number of friends and support of friends on the web page. Youths’ self-report of negativity in their friend-

Table 3  
*Social Adjustment at 13–14 Years of Age Predicts Friendship on Social Networking Web Pages at 20–22 Years of Age*

| Predictor<br>(ages 13–14 years) | Number of<br>friends $\beta$ | Friends’<br>connection $\beta$ | Friends’<br>support $\beta$ |
|---------------------------------|------------------------------|--------------------------------|-----------------------------|
| Step 1                          |                              |                                |                             |
| Family income                   | .23                          | .09                            | .14                         |
| Female gender                   | -.02                         | .09                            | .33**                       |
| Ethnic minority                 | .28*                         | -.14                           | -.07                        |
| Age at baseline                 | -.12                         | -.02                           | .02                         |
| Summary statistics              |                              |                                |                             |
| Total $R^2$                     | .20*                         | .20**                          | .24**                       |
| $\Delta R^2$                    | .20*                         | .20**                          | .24**                       |
| Step 2                          |                              |                                |                             |
| Sociometric status              | .18                          | .09                            | .24*                        |
| Observed positivity             | .32**                        | .29**                          | -.04                        |
| Observed negativity             | -.27*                        | .20                            | -.14                        |
| Delinquent behavior             | -.13                         | -.23*                          | -.03                        |
| Depressive symptoms             | -.23                         | -.02                           | -.03                        |
| Summary statistics              |                              |                                |                             |
| Total $R^2$                     | .32**                        | .35**                          | .29**                       |
| $\Delta R^2$                    | .12*                         | .16**                          | .05                         |

*Note.*  $\Delta R^2$  effect size conventions: .01 = small; .06 = medium; .14 = large.

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

Table 4  
*Behavioral Adjustment at 13–14 Years of Age Predicts Problem Behaviors on Social Networking Web Pages at 20–22 Years of Age*

| Predictor<br>(13–14 years of age) | Hostility  |                         | Inappropriate photos |                         |
|-----------------------------------|------------|-------------------------|----------------------|-------------------------|
|                                   | Odds ratio | 95% Confidence interval | Odds ratio           | 95% Confidence interval |
| Step 1                            |            |                         |                      |                         |
| Family income                     | 0.53       | 0.22–1.29               | 0.79                 | 0.51–1.23               |
| Female gender                     | 0.77       | 0.19–3.08               | 0.80                 | 0.25–2.56               |
| Ethnic minority                   | 0.56       | 0.29–1.10               | 0.80                 | 0.15–4.29               |
| Age at baseline                   | 0.60       | 0.27–1.36               | 0.80                 | 0.43–1.49               |
| Step 2                            |            |                         |                      |                         |
| Sociometric status                | 1.08       | 0.40–2.94               | 0.98                 | 0.65–1.49               |
| Observed positivity               | 0.48       | 0.21–1.10               | 1.05                 | 0.44–2.54               |
| Observed negativity               | 2.07       | 0.49–8.71               | 1.02                 | 0.20–5.10               |
| Delinquent behavior               | 2.73*      | 1.05–7.13               | 0.97                 | 0.65–1.44               |
| Depressive symptoms               | 1.16       | 0.24–5.66               | 1.27*                | 1.02–1.57               |

\*  $p < .05$ .

ship was negatively correlated with connection of friends on the web page. Best friend reports of positivity and negativity were associated, positively and negatively, respectively, with observed support on the web page. With regard to problem behaviors, concurrent rule-breaking behavior, but not depression, was correlated with inappropriate photos. Neither problem behavior was significantly correlated with hostility on the web pages.

### Discussion

Findings from this study suggest that youths may use social networking websites to enact their long-standing face-to-face patterns of interaction. After accounting for demographic factors, we found that youths who were better adjusted at 13–14 years of age, as indicated by having less observed negativity in face-to-face peer interactions and fewer self-reported depressive symptoms, were more likely to be using social networking websites at 20–22 years of age. In addition, youths at age 20–22 who self-reported more positivity in their closest friendship were more likely to be using social networking websites.

Among the group of youths with social networking web pages, the presence of higher positivity and lower negativity in a dyadic peer interaction in early adolescence each predicted a greater number of friends on the website. Higher observed positivity in the peer interaction and lower parent-reported delinquent behaviors predicted a greater number of friends posting comments indicating connection. Higher peer sociometric status at baseline predicted a greater number of friends posting comments indicating support. Early adolescent delinquent behaviors predicted the presence of hostility in the participant's "About Me" section, and depressive symptoms predicted the presence of photos on the website that might be considered inappropriate. Females were more likely to have friends posting supportive comments than were males, but the predictive relationships between early adolescent adjustment and young adult online communication did not differ by gender.

Analyses further suggested that concurrent social and behavioral adjustment was also associated with similar patterns of communication online. Self- and peer-reported positive friend-

ship quality was concurrently associated with more friends posting supportive comments online; self-reported positivity was also associated with a larger number of friends. Self-reported negativity in the friendship predicted fewer friends posting comments indicating connection; peer-reported negativity predicted fewer friends posting supportive comments. Concurrent peer reports of the participants' rule-breaking behavior was associated with more posted pictures of the participant engaging in inappropriate actions.

Taken together, these results are consistent with existing developmental theory that youths display cross-situational continuity in their interpersonal interactions and suggest that the conceptualization of continuity may be extended into the online domain. Findings also highlight the potential importance of establishing positive peer relationships in the developmental period between early adolescence and young adulthood, suggesting that sociometric status and friendship quality at 13–14 years of age may set the stage for youths' relationship quality at 20–22 years of age. Further, indicators of delinquent and depressive psychopathology in early adolescence may manifest themselves in young adult relationships, suggesting that adjustment patterns in early adolescence can carry long-lasting effects.

Our findings diverge from previous studies suggesting low correspondence between online and face-to-face relationships and that maladjusted youths are drawn to the internet. However, previous studies were conducted when far fewer households had access to online technology. Given the high degree to which social networking web pages are used by youths today, it is more likely that this represents a normative way of communicating. Social networking web pages also differ from previous internet communication tools (such as instant messaging and e-mail) in that they support communication with many friends and encourage users to recognize connections between individuals. The graphical interface of the web page allows users to share information with friends in a vivid, easily accessible manner. In short, the web has changed rapidly enough that studies based on usage from the year 2000 may not reflect the impact of sites explicitly designed to facilitate social networking on youths' interactions.

Table 5  
Correlations Between Concurrent Adjustment and Online Communication at 20–22 Years of Age

| Variable                                 | Descriptive statistics                      | 1     | 2      | 3     | 4      | 5    | 6     | 7     | 8     | 9    | 10   | 11 |
|--|---|-------|--------|-------|--------|------|-------|-------|-------|------|------|----|
| 1. Youth self-report positivity          |   | —     |        |       |        |      |       |       |       |      |      |    |
| <i>M</i>                                 | 11.61                                       |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (2.28)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 2. Youth self-report negativity          |   | .06   | —      |       |        |      |       |       |       |      |      |    |
| <i>M</i>                                 | 4.36  |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (1.69)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 3. Peer report positivity                |   | .31** | -.02   | —     |        |      |       |       |       |      |      |    |
| <i>M</i>                                 | 11.39                                       |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (1.97)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 4. Peer report negativity                |   | .13   | .36**  | -.09  | —      |      |       |       |       |      |      |    |
| <i>M</i>                                 | 4.47  |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (1.69)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 5. Youth self-report depressive symptoms |   | -.04  | .12    | .00   | -.04   | —    |       |       |       |      |      |    |
| <i>M</i>                                 | 5.36  |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (6.22)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 6. Peer report rule breaking             |   | -.03  | .02    | -.14  | .46**  | .07  | —     |       |       |      |      |    |
| <i>M</i>                                 | 3.72  |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (4.21)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 7. Number of friends                     |   | .28** | -.07   | .06   | -.02   | -.12 | -.05  | —     |       |      |      |    |
| <i>M</i>                                 | 298.60                                      |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (247.6)                                     |       |        |       |        |      |       |       |       |      |      |    |
| 8. Friends' connection                   |   | .15   | -.28** | .04   | -.06   | -.03 | .02   | .34** | —     |      |      |    |
| <i>M</i>                                 | 5.74  |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (2.64)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 9. Friends' support                      |   | .27** | -.06   | .28** | -.27** | .12  | -.11  | .27** | .24** | —    |      |    |
| <i>M</i>                                 | 1.63  |       |        |       |        |      |       |       |       |      |      |    |
| ( <i>SD</i> )                            | (1.35)                                      |       |        |       |        |      |       |       |       |      |      |    |
| 10. Hostility in about me                | 1 = 79, 2 = 13<br>(86%) (14%)               | .16   | .17    | .00   | .14    | .08  | -.05  | .03   | -.04  | -.01 | —    |    |
| 11. Inappropriate photos                 | 1 = 66, 2 = 16, 3 = 10<br>(72%) (17%) (11%) | .02   | -.15   | .16   | .02    | -.11 | .33** | .01   | .14   | .01  | -.10 | —  |

Note. Means (with standard deviations in parentheses) are presented for raw scores on continuous variables. Pearson correlations are presented for continuous variables, point biserial correlations are presented for continuous with categorical variables, and phi coefficients are presented for categorical variables. All constructs were assessed at follow-up (20–22 years of age).  $N = 92$ .

\*\*  $p < .01$ .

Nonetheless, our finding that the best adjusted youths (both in early adolescence and in young adulthood) were those using online social communication as young adults may specifically pertain to social networking websites and not other online activities. Perhaps youths with psychopathology were spending large amounts of time online, but in other media not assessed as part of this study. We speculate that well-adjusted youths may use social networking websites in which visible communication is prominent, whereas inept youths may prefer online activities where they have greater anonymity. This hypothesis is supported by findings that people with large face-to-face social networks are more likely to use the internet to communicate with friends and family and less likely to use the internet to communicate with strangers (Bessiere, Kiesler, Kraut, & Boneva, 2008).

Strengths of this study include the longitudinal design and observational measures of friendship quality, both in face-to-face relationships and online. There is nearly complete independence of method variance in primary analyses. The use of peer nominations to assess sociometric status is rare, particularly in a study with adolescent participants. Further, social networking websites represent a novel, observational medium for assessing peer relationships that has high ecological validity.

A significant limitation of this study is the lack of online relationship measures at the early adolescent assessment point. Because social networking websites were started very recently (Facebook and MySpace, e.g., were both founded in 2004 but did not achieve widespread adoption until later), it was not possible to assess this type of online social communication when the participants entered the study in 1998–1999. In addition, in 1998–1999, it was uncommon for youths in early adolescence, the age of the participants in this study, to be using e-mail, instant messaging, or chat rooms; at that time, these types of online communication tools were predominantly used by college students. Nonetheless, our study was not able to control for online communication use at baseline, which limits the conclusions that may be drawn. In the future, we will be able to use indicators of online social communication in the important objectives of prospectively predicting changes in youths' social and behavioral adjustment. We speculate that online use in and of itself will not contribute to adjustment but rather that positive social communication and friendship quality online will further enhance social–emotional functioning, whereas negative online relationships will predict increasing adjustment problems.

Another limitation of the present study was the relatively small sample size for the analyses limited to the participants with coded

web pages. The high percentage of participants who did not give permission to code their page raises the concern that the sample may not reflect the population of social networking web page users, although we did not find any evidence that individuals who consented differed from those who did not consent on any of the nine baseline measures of demographics and adjustment. A further limitation is that the baseline sociometric measure, modified for use with an adolescent sample, may not fully capture the peer acceptance of youths in the way that such measures do for elementary school-aged children.

In sum, although earlier studies concluded that online social relationships were nearly always of poorer quality than face-to-face relationships, the results from the current study instead suggest continuity between youths' face-to-face and online communication patterns, friendship quality, and behavioral adjustment. In a well-known cartoon for *The New Yorker* (Steiner, 1993), a dog in front of a computer says to his canine companion, "on the Internet, nobody knows you're a dog" (p. 61). On the basis of the current findings, however, it is perhaps more accurate to say "on the internet, you behave like the dog that you are."

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