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# Developmental Psychology

## **Me and My 400 Friends: The Anatomy of College Students' Facebook Networks, Their Communication Patterns, and Well-Being**

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# Me and My 400 Friends: The Anatomy of College Students' Facebook Networks, Their Communication Patterns, and Well-Being

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Is there a trade-off between having large networks of social connections on social networking sites such as Facebook and the development of intimacy and social support among today's generation of emerging adults? To understand the socialization context of Facebook during the transition to adulthood, an online survey was distributed to college students at a large urban university; participants answered questions about their relationships by systematically sampling their Facebook contacts while viewing their Facebook profiles online. Results confirmed that Facebook facilitates expansive social networks that grow disproportionately through distant kinds of relationship (acquaintances and activity connections), while also expanding the number of close relationships and stranger relationships, albeit at slower rates. Those with larger networks estimated that larger numbers of contacts in their networks were observing their status updates, a form of public communication to one's entire contact list. The major function of status updates was emotional disclosure, the key feature of intimacy. This finding indicates the transformation of the nature of intimacy in the environment of a social network site. In addition, larger networks and larger estimated audiences predicted higher levels of life satisfaction and perceived social support on Facebook. These findings emphasize the psychological importance of audience in the Facebook environment. Findings also suggest that social networking sites help youth to satisfy enduring human psychosocial needs for permanent relations in a geographically mobile world—college students with higher proportions of maintained contacts from the past (primarily high school friends) perceived Facebook as a more useful tool for procuring social support.

*Keywords:* social network site, peer relationships, emerging adulthood, intimacy development, well-being

Psychological development during the transition from childhood to adulthood happens within the context of an expanding network of social relations, the details of which depend on cultural and historical context, socialization environments, and material affordances (Schlegel & Barry, 1991). One of the most striking aspects of the socialization environment in Western cultures in the early part of the 21st century is that adolescents and emerging adults have a variety of communication technologies at their disposal to manage quickly and efficiently very large webs of social connections. Nowhere is this expanse of social connections more clearly articulated than on social networking sites such as Facebook, the most popular social network in the United States and the fourth most visited website on the Internet (Comscore, 2010).

From a sociocultural and historical perspective on human development (Côté & Levine, 2002), it is not hard to imagine that the prominence of Facebook as a cultural phenomenon in the lives of college students in the United States would frame and shape developmental issues salient to them. Certainly, the current generation of college students has experienced an adolescence permeated by online peer interactions (Gross, 2004). Estimates are that 90% of undergraduates on the majority of college campuses and 90% of high school students use social media sites, creating online profiles of themselves and adding other users to their lists of "friends" on the network (College Board and Art & Science Group, 2009; Lampe, Ellison, & Steinfield, 2006). As they build these social networks, college students collect large numbers of Facebook friends; a recent study finds the median to be 300 (Ellison, Steinfield, & Lampe, 2011), and numbers sometimes reach into the thousands.

The trend for large networks raises questions about the changing nature of friendship for the new generation of "digital natives" (Prensky, 2001). Namely, does Facebook engender an orientation toward popularity and large numbers of friends at the expense of reliable social support from close friends and the development of skills for intimate relations? In order to begin to understand the nature of Facebook friendship and its implications for social development during the transition to adulthood, we examine the anatomy, or friend composition, of college students' Facebook networks, and its implications for social interactions, life satisfaction, and perceived social support.

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### Close Relationships and Intimacy Development in Emerging Adulthood

Learning how to maintain close, intimate relationships has long been considered a central developmental task during emerging adulthood (Erikson, 1968). Defined broadly by Sullivan (1953) as “closeness,” intimacy has been operationalized as disclosure of private information requiring high levels of trust and confidentiality between partners (Hartup, 1992). Intimacy begins to appear in friendships during early to mid-adolescence but does not advance to more mature levels until late adolescence and emerging adulthood (Berndt & Savin-Williams, 1993), the period that is the focus of the present study.

Intimacy in relationships is just one of the social resources that quality close relationships can provide. During the developmental period spanning from adolescence to adulthood, friendships grow as a source of companionship and support for self-esteem and as a source of instrumental support (tangible aid) in complement to familial social support (Collins & Laursen, 2004). Research with emerging adults shows that those who report an increase in social support over the course of emerging adulthood show increases in psychological well-being (Galambos, Barker, & Krahn, 2006), whereas low perceived social support among college students is related to depression and loneliness (Jackson, Soderlind, & Weiss, 2000).

To what extent and in what way is intimate self-disclosure transferred to an online social networking site? How does the nature of the online social network and the nature of online communication relate to a sense of social support? These are some of the questions addressed in the present study.

### Developmental Tasks Projected Online

As the Internet becomes increasingly integrated into the socialization contexts of youth, salient developmental tasks such as identity and sexual development are projected, literally and metaphorically, onto computer screens (Manago, Graham, Greenfield, & Salimkhan, 2008; Subrahmanyam, Greenfield, & Tynes, 2004; Subrahmanyam, Smahel, & Greenfield, 2006). For example, in the area of identity development, MySpace facilitated a heightened focus on self-construction for college students when it was a popular social networking site (Manago, Graham, Greenfield, & Salimkhan, 2008). Other studies have supported these findings (e.g., Ibrahim, 2009; Pempek, Yevdokiya, & Calvert, 2009; Salimkhan, Manago, & Greenfield, 2010; Valkenburg, Peter, & Schouten, 2006).

Another developmental task salient during emerging adulthood, intimacy development, seems to be refracted in two different directions as it is transferred onto the screens of social network sites: depth and breadth. Both appear to be important to healthy development during emerging adulthood. Intimate close relations are widely regarded as conducive to psychosocial well-being (Prager, 1995), and breadth in social relationships is integral to the process of expanding social circles as young people experience broader horizons in their development toward adulthood (Collins & Laursen, 2004).

Evidence for depth in online interactions comes from surveys indicating that Facebook is used in the general population to maintain ongoing communication with close, rather than distant, relations (Hampton, Goulet, Rainie, & Purcell, 2011). Social net-

working sites create opportunities for young people to nurture friendship intimacy (Ellison, Steinfield, & Lampe, 2007). In one college sample, more intense Facebook use was associated with higher perceptions of emotional support (Ellison et al., 2007); in another, 20% asserted that MySpace brought them closer to their friends (Subrahmanyam, Reich, Waechter, & Espinoza, 2008). Perhaps having multiple modes of communication, “media multiplexity,” enables continual steady contact with close others (Haythornthwaite, 2005), which could increase intimacy.

College students also capitalize on social network sites to acquire breadth in social relationships. Ellison and colleagues (Ellison et al., 2007) found that the more intensely college students used Facebook, the more they perceived that they were integrated into their university community and the more confident they were in their ability to secure support from distant high school and hometown relationships. Recent studies showed that the strongest association with the intensity of Facebook use is the accumulation of informational forms of social support from distant kinds of contacts (Ellison, Steinfield, & Lampe, 2011). This finding suggests that Facebook is particularly conducive for maintaining large networks of “weak ties” because the technology allows for cheap, easy, and efficient maintenance of these relationships (Donath & Boyd, 2004).

A prevailing and unresolved question is whether these expansive social networks might present a socialization context that encourages superficial relationships more than close connections (Bessière, Kiesler, Kraut, & Boneva, 2008). As college students’ Facebook networks have grown larger over the past few years, the association between intensity of Facebook use and perceived emotional support seems to have disappeared (Vital, Ellison, & Steinfield, 2011). In the present study, we examine the relationship between network size and perceived social support to see whether the growth of social networks has led to dissociation between Facebook use and a sense of social support from close relationships. We also look at the “anatomy” of the friendship network to consider whether other kinds of online relationships are associated with a sense of social support.

Another possibility is that only reciprocal and direct exchanges with close others on Facebook are associated with feelings of social support (Vital et al., 2011), decreased loneliness, and higher life satisfaction (Burke, Marlow, Lento, 2010). This finding suggests that type of Facebook communication matters for a sense of social support and well-being. We explore this issue in the present study, particularly focusing on the distinction between private and public communication modalities. One important question is whether intimate self-disclosure is becoming more public, through status updates broadcasted to one’s entire network of contacts, and whether this kind of self-disclosure is associated with perceived social support among college students.

### Facebook in the Context of Sociocultural Change

In the current study, we consider the influence of Facebook on emerging adults’ social development through the lens of sociocultural and historical change. This point of view provides important perspectives on how humans adapt to culture change through socialization and psychological development. It also raises questions about what is enduring in humans’ social and emotional architecture, and what characteristics shift in response to new

social circumstances. Greenfield's (2009) theory of social change and human development suggests that societal change in the direction of increasing urbanization, structural complexity, wealth, commerce, or technology shifts socialization toward increasing individualism and social relations toward an increased number of relationships, many of which are both evanescent and with complete strangers. In small-scale, rural, low technology environments, strangers are rare or nonexistent and family cooperation is necessary for survival. In sharp contrast, lifestyles in complex, urban, high-tech environments require adaptations that feature independent values and behaviors, as well as instrumental relations with strangers. Indeed, manifold instrumental relations with strangers—for example, the clerk–customer relationship—is a documented effect of the shift from urban to rural residence (Greenfield, Maynard, & Marti, 2009). The theory predicts that technology, like urbanization, will enable manifold instrumental relations with relative strangers or superficial acquaintances.

Data suggest that not only are wealthier countries more individualistic than poorer countries (Hofstede, 2001) but also that individualism in the United States is increasing as a function of the growth of technology. For example, Uhls and Greenfield (2011) have observed a correspondence between the rapid growth in Internet penetration in the United States (156.9% between 2000 and 2011; Internet World Stats, 2011) and a sharp increase in narcissistic personality among college students after the year 2000 (Twenge, Konrath, Foster, Campbell, & Bushman, 2008), one facet of individualism. This correlation supports Greenfield's (2009) theoretical assertion that technology is currently the motor driving increasing individualism. Performing for an audience is one aspect of narcissistic personality, another component of which is inflated self-esteem; both are individualistic traits. Because the possibility of a large number of friends on Facebook facilitates performing for an audience, the theory would predict a correlation between network size and estimated audience size, as well as a correlation between estimated audience size and self-esteem; these predictions were tested in the present study.

If social networking sites are truly transforming the nature of social relations, we can go one step further and ask whether Facebook is a socialization context that drives college students toward deriving feelings of well-being and perceived social support from having large networks of connections and receiving attention from them. This question was explored in the present study.

The theory of social change and human development also predicts that technology will shift networks of social relationships away from a smaller number of relationships serving less differentiated functions toward a larger network of relationships serving more differentiated functions. The logic behind this prediction is that as technology affords more opportunities to connect easily and efficiently with expanded networks of social relations, human psychology adapts by increasing network size and creating specialized functions for different network members. Because of the limitation on the number of “genuinely social relationships” an individual can have (Dunbar, 1996), we predict that friendship networks on Facebook will grow predominantly by adding instrumental relations rather than emotionally close relationships. To examine these issues, we designed a survey study of college students that could address the following hypotheses and questions.

## Current Study and Analytic Plan

Research hypotheses (1–6) and questions (7–10) are broken down into three main topics, anatomy of the Facebook network, relationship between anatomy and communication behaviors, and psychological implications of Facebook use. The first set of analyses quantitatively describes the anatomy of college students' Facebook networks and how anatomy (proportions of different kinds of friend) changes with increasing network size. Next, using linear regression, we look at how proportions of particular types of friends and network size relate to Facebook communication behaviors. Finally, we use hierarchical linear regression to examine what kind of network composition and what Facebook communication behaviors predict life satisfaction and perceived social support through Facebook. Because we were interested in examining whether particular uses of Facebook would predict greater life satisfaction and higher perceived social support beyond the positive effects of self-esteem (Baumeister, Campbell, Krueger, & Vohs, 2003; Lakey, Tardiff, & Drew, 1994), we controlled for self-esteem in these regression analyses.

## Hypotheses

### Anatomy of the Facebook Network

1. In line with Greenfield's (2009) theory, we predict that friendship networks will be composed primarily of acquaintances, activity contacts, online-only contacts, and strangers—relatively superficial and instrumental relations. Close and maintained connections will be in the minority.
2. We predict that relative to close relations, networks will grow by adding a disproportionate number of superficial relations.

### Communication Behaviors and Network Composition

3A. We predict that emotional self-disclosure, an important feature of intimacy, will predominate in status updates, thus transforming from private forms of expression to more public forms of expression.

3B. Based on Greenfield's (2009) theory, we predict that having larger networks of social connections on Facebook translates to perceptions of larger audiences for status updates. If this is the case, and if status updates are used primarily for emotional self-disclosure, then it follows that Facebook is transforming the nature of intimacy in the individualistic direction of public performance.

3C. We hypothesize that higher estimates of the audience size observing one's status updates will occur in networks including a greater number of distant social connections (superficial connections, online-only connections, strangers).

4. In line with the traditional nature of intimacy, we hypothesize that private messages will be used more when friendship networks comprise a higher proportion of close and maintained connections.

5. Conversely, we hypothesize that the more public modalities of communication (wall and photo posts) will be used more when friendship networks comprise a higher proportion of more distant relations (superficial connections, online-only connections, and strangers).

### Psychological Implications of Facebook Use

6. Based on Greenfield's (2009) theory, we predict a positive correlation between self-esteem and audience size: Deriving self-

esteem from attention to the self is a psychological adaptation in a highly individualistic socialization context.

7. Do higher proportions of close connections on the network or larger networks filled with more distant kinds of relations predict college students' life satisfaction? The former is in line with traditional notions of the importance of a few trusted friends for young people (Hartup, 1992). The latter, in line with Greenfield's (2009) theory, would suggest that sources of psychological satisfaction are changing to adapt to the potential for using Facebook to collect large networks of connections comprised primarily of more superficial relations.

8. Does having more private communication exchanges, public communication exchanges, larger audiences for one's status updates, or larger proportions of face-to-face contacts on the Facebook network predict life satisfaction? In other words, does Facebook help emerging adults meet enduring needs for close intimate relations or does it help emerging adults meet individualistic psychosocial needs? Will using Facebook for close intimate exchanges be most associated with life satisfaction? Or, alternatively, as Greenfield's (2009) theory would predict, does Facebook emphasize individualistic experiences of friendship, such that college students derive more life satisfaction from Facebook when the tool is used to gain garner attention from one's Facebook public?

9. Do higher proportions of close friends on the network or larger networks filled with more distant kinds of relations predict perceptions that one has available social resources through Facebook? In other words, do emerging adults seem to find social support through depth or breadth on Facebook?

10. Which activities and network structures are associated with perceptions of Facebook as a tool useful for acquiring social support: private communication exchanges and larger proportions of face-to-face contacts, the more traditional source of social support? Alternatively, in line with Greenfield's (2009) theory, is it public communication exchanges and larger audiences for one's status updates that better predict higher perceptions that Facebook is a useful tool for social support?

## Method

### Participants

Eighty-eight undergraduate students from University of California, Los Angeles (UCLA) participated in this study. The ages of the 67 female and 21 male students who participated ranged from 18 years to 28 years ( $M = 20.64$ ). There were 39 juniors, 23 seniors, 16 sophomores, and eight freshmen (two did not report year in school) Ethnic make-up was 36% Asian/Southeast Asian American, 27% European American, 19% Latino American, 8% Middle Eastern American, 2% Pacific Islander American, and 8% mixed ethnicities combining Asian, European, and African ancestries. Current access to a social network account was required to participate in this study. Because 95% of participants actively used Facebook, the study's label was switched from being a general social networking site study to a Facebook study.

### Procedure

Participants, upon online sign up, received a link to Survey Monkey. Participants were given a series of questions including

demographic data (age, gender, ethnicity, etc.) and general Facebook routines while having their Facebook profile open. They were also asked about their general Facebook activity (how many hours they use Facebook per day, how often they log on, how many people they believe view their status updates, what they use their status update for, and the number of friends in their network). Most central to the study, they were asked a series of questions for 20 friends in their network, including how they would classify the friend (e.g., acquaintance, family member, etc.), how often they communicate with this friend via various Facebook applications, and whether they see this person in their offline worlds. The next section describes the method used for unbiased selection of the 20 friends. Lastly, participants filled out psychological measures.

### Sampling the Friendship Networks

While our original intention was to ask questions about participants' entire social network, the large size of most social networks made that procedure too long and tedious. Hence, we asked participants to sample 20 friends from each network, a number that was doable by participants and convenient for calculating percentages. Participants were instructed to make this selection with their Facebook (or other favorite social network site) open to their profile and to use the friend list that displayed their entire network.

In order for participants to select 20 friends without bias, a systematic selection method was devised and included in the instructions. When the data were collected in 2009, there was only one option on Facebook for viewing a list of friends on the network: all of the user's friends were listed alphabetically by first name (at that time there was no application for listing only friends with whom one has recently interacted, recently added, etc.). We did not ask participants to take the first 20 friends on their friends list because consistently sampling friends from the beginning of the alphabet could have introduced bias into the selection process. Therefore, participants were asked to take their total number of friends (a number that is provided on the Facebook profile itself), divide that number by 20, take the answer and round it down to the lowest whole number (e.g., an answer of 8.85 would be rounded down to 8). Lastly, participants were asked to count by that whole number down their friends list, providing information for each friend at whom they stopped, until information for 20 friends had been filled out. For example, if network size was 160 and they divided by 20, their final number would be eight; they would then provide information for every eighth friend, which should bring them to the end of their friends list. We piloted this procedure with 10 participants, who were able to follow the directions quite easily.

As a consequence of this procedure we sampled a different proportion of friends for participants with different sized networks: For smaller networks, the sample of 20 friends was a higher proportion of the total network; for larger networks, the sample of 20 friends was a lower proportion of the total network. However, if we had instructed each participant to use the same percentage of his or her network, we would not have been able to equate the absolute sizes of the samples of friends across participants. It is intuitively clear that equating percentages would have yielded samples that were too small for those with small networks or samples that were too large and unwieldy for those with large networks. In contrast, a sample of 20 seemed large enough to include various categories of friends but small enough to be

manageable by the participants, given that there were multiple questions asked about each friend selected.

## Measures

**Network size.** Participants reported the size of their network by looking at the number of friends listed on their profile page. Nineteen participants did not report network size and therefore were removed from analyses that used network size.

**Categories of friends.** Participants were asked to check only the most “accurate and intimate” option describing their relationship with each of the 20 friends that were sampled from their networks according to the following categories: family member, current boy- or girl-friend, best friend, very good friend, good friend, roommate, teammate, classmate, fraternity brother or sister, fellow club member, coworker, high school friend, past romantic partner, friend of a friend, acquaintance, floormate, casually dated, met in a different country, met only once, online friend only, band or musical artist, do not know this person, and other. Participants were given the instruction that “Participant B’s best friend can also be considered as a high school friend. However, she clicks the option for best friend since this is the most accurate and intimate choice to describe the nature of her relationship with this friend.”

To simplify the distribution of types of friends, we categorized the reported types of relationship in the following way: *close* = best friend, very good friend, good friend, current boy- or girl-friend, family member, or roommate; *acquaintance* = friend of a friend, acquaintance, floormate, casually dated, met in a different country, or met only once; *activity* = teammate, classmate, fraternity brother or sister, fellow club member, or coworker; *maintenance* = high school friend or past romantic partner; *online only* = online friend only or band or musical artist; *stranger* = do not know this person; and *other* = other, decline to answer. To obtain a percentage of these friend categories, we divided total number of friends in each category by 20. To estimate absolute numbers in each category, we multiplied percentage of friends in each category by participants’ reported number of friends in their network. To simplify analyses, we then combined acquaintance and activity friends into one category: superficial.

**Communication with Facebook friends.** Participants were asked to estimate how often they communicate with each of their 20 selected friends *publicly* (“How often do you post on your friend’s wall? How often do you receive comments from this friend on your wall? How often do you post a comment on this friend’s photos? How often do you receive a comment from this friend on your photos?”). They were also asked how often they communicate with that friend *privately* (“How often do you send a private message through Facebook to this friend? How often do you receive a private message through Facebook from this friend?”). Participants characterized exchange frequency on a 0–7 scale (0 = *never*, 1 = *once a year*, 7 = *every day*). The overall average of *public communication* with this random selection of 20 friends was created by averaging the frequency of exchanges of wall and photo posts across 20 friends. (Wall posts are messages that are accessible to one’s entire Facebook network; photo posts are also accessible to one’s entire Facebook network.) The overall average of *private communication* with these 20 friends was created by averaging the frequency of private messages sent and received through Facebook across 20 friends.

In addition, participants indicated whether they had face-to-face interactions with each of the 20 friends. We divided total number of people with whom participants reported face-to-face interaction by 20 to estimate proportion of people in the network with whom participants had offline relationships.

**Status updates.** The status update is a Facebook feature that allows users to post messages that automatically go to the news feed portion of every profile in one’s entire network of Facebook friends. Participants were asked to indicate how they typically use their status update by selecting all that applied from the following categories, listed here in the order they were presented: keep people updated on where you are/what you are doing, voice your opinion on a current event, convey your current emotional state, vent frustration, satire, or other. Then, they were asked how many people they estimate are looking at their status updates by selecting one of these categories: 1 = 0–10, 2 = 11–30, 3 = 31–50, 4 = 51–80, 5 = 81–100, and 6 = *more than 100*.

**Life satisfaction.** The Student’s Life Satisfaction Scale (Huebner, 1991) was adapted to assess global life satisfaction. Participants rated agreement on a 5-point Likert scale for nine statements (e.g., “I have a good life”; “I like the ways things are going for me”).

**Self-esteem.** The Rosenberg Self-Esteem Scale (Rosenberg, 1965) is a 10-item self-report measure of global self-esteem. Each item is scored on a 4-point Likert scale. Half the items are positive (e.g., “On the whole, I am satisfied with myself”); half are negative (e.g., “I certainly feel useless at times”) and are reverse coded.

**Perceived online social support.** A measure of perceived online social support was adapted from the interpersonal support evaluation list (Cohen & Hoberman, 1983), a multidimensional inventory used to evaluate perceived availability of social support. A subset of questions was adapted from the subscales of Companionship Support (three items), Emotional Support (three items), and Instrumental Support (two items). For example, “There are several people I trust to help me solve my problems” was adapted as “There are several people I trust on my friend list to help me solve my problems,” and “When I feel lonely there are several people I can talk to” was adapted as “When I feel lonely, there are several people online that I can talk to using a social networking site on the Internet.” Participants indicated the extent to which they agreed with the statements on a 5-point Likert scale.

## Results

### Anatomy of the Facebook Network

**Network composition.** Size of network reported by participants ranged from 29 friends to 1,200 friends. The most common network size, as indicated by 20% of participants, fell in the range between 200 friends and 299 friends. The mean was 440, and the median was 370. Analyses with network size include only participants reporting network size ( $n = 69$ ).

Figure 1 shows, on average, reports of the specific friend categories comprising the networks. Out of each participant’s 20 friends, on average, 27% were acquaintances (friend of a friend, acquaintance, floormate, casually dated, met in a different country, met only once), 24% were activity connections (teammate, classmate, fraternity brother or sister, fellow club member, coworker), 21% were close connections (best friend, very good friend, good

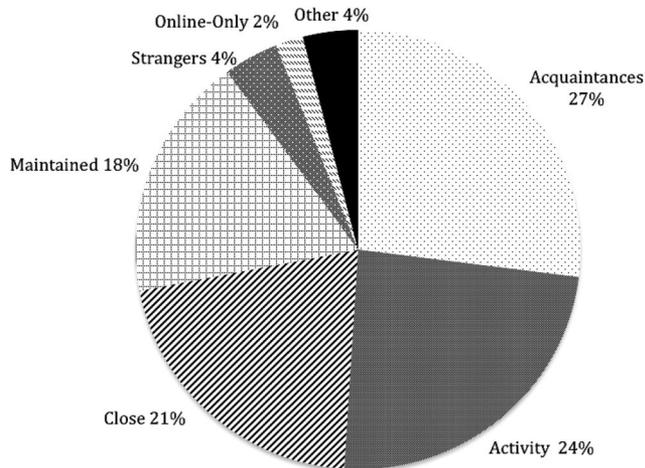


Figure 1. Anatomy of college students' Facebook networks. This figure illustrates the percentage of each type of friend in college students' Facebook networks.

friend, current boy- or girlfriend, family member, roommate), 18% were maintained connections (high school friends and past romantic partners), 4% were strangers (do not know this person), 2% were online connections (online friend only, band or musical artist), and 4% were classified as other (other, decline to answer). The distribution of friend types confirms Hypothesis 1 that close contacts and maintained contacts are in the minority among Facebook friends, together constituting just 39% of the network.

Multiplying participants' percentages of friends for each category by their reports of total network size yielded an estimate of the absolute number of friends in each category. On average, participants reported having within their networks 123 acquaintances, 120 activity connections, 80 close connections, 77 maintained connections, 17 strangers, 16 others, and 7 online connections. All of the types of friends except for close connections and maintained connections are superficial types of relationships or strangers. These data further

demonstrate that college students use Facebook primarily to collect large webs of superficial connections.

**The relationship between network size and network composition.** Absolute number of superficial connections correlated closely with network size,  $r(69) = .90, p = .0001$  (see Table 1). Absolute numbers of close connections also increased significantly with increasing network size,  $r(69) = .43, p = .0001$ . However, as suggested by the smaller correlation, this expansion occurred at a slower rate: As reported network size increased, the *proportion* of friends participants labeled as close connections decreased significantly,  $r(69) = -.33, p = .006$ , while the *proportion* classified as superficial connections (activity and acquaintance contacts) increased significantly,  $r(69) = .35, p = .003$ . These data confirm Hypothesis 2: Networks grow on Facebook primarily through relatively more distant kinds of relationships. Whereas close contacts also expand with increased network size, they do so to a lesser extent.

Absolute number of strangers was significantly correlated with network size, albeit relatively weakly,  $r(69) = .25, p = .040$ , while proportion was not,  $r(69) = .03, p = .815$ . Hence, while the number of strangers does increase as networks grow larger, it does so at a lower rate than superficial connections but at a higher rate than close connections. In summary, college students with large Facebook networks are expanding those networks primarily from their involvement in extracurricular activities and acquaintances, secondarily through adding strangers, and thirdly by adding close contacts.

### Communication Behaviors Associated With Facebook Use and Network Composition

Overall, participants reported spending on average a little over an hour a day on Facebook. They reported checking into their accounts quite frequently; 80% report logging on to Facebook multiple times a day, and on average, they reported updating their status a few times a week. Table 1 shows the correlations between communication variables, network size, and categories of friends.

**Status updates.** The most frequent use of the status feature reported by participants is to "convey one's current emotional state" (endorsed by 51% of participants). This confirms Hypothesis 3A, that emotional self-disclosure, a key feature of intimacy,

Table 1  
Correlations Between Categories of Friends, Network Size, and Communication Patterns

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Network size	—													
2. Proportion close	-.33**	—												
3. Proportion maintained	-.11	-.18	—											
4. Proportion superficial	.35**	-.39***	-.21*	—										
5. Proportion online	-.02	-.06	-.22*	.35**	—									
6. Proportion stranger	.03	-.19	-.17	-.19	.12	—								
7. Absolute close	.43***	.55***	-.28*	-.12	.04	-.08	—							
8. Absolute maintained	.54***	-.35**	.67***	.02	-.16	-.06	-.08	—						
9. Absolute superficial	.90***	-.46***	-.24	.66***	-.01	-.08	.20	.37**	—					
10. Absolute online	.23	-.06	-.16	.11	.82***	-.04	.15	-.06	.22	—				
11. Absolute strangers	.25*	-.20	-.07	-.09	-.09	.91***	.02	.13	.09	.01	—			
12. Private communication	-.14	.52***	-.23*	-.16	.05	-.08	.29*	-.23*	-.19	.17	-.07	—		
13. Public communication	-.12	.61***	-.22*	-.14	.01	-.15	.42***	-.25*	-.20	.17	-.12	.91***	—	
14. Estimated audience size	.41**	.06	-.11	-.08	.20	.04	.34**	.06	.30*	.15	.26*	.07	.15	—

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

has gone public. The second and third most frequent reported use of the status feature is to “keep people updated on where you are/what you are doing” (endorsed by 44% of participants), and “vent frustration” (endorsed by 43% of participants).

**Estimated audience for status updates.** We predicted that a larger network translates to perceptions of larger audiences for one’s status updates (Hypothesis 3B). The most common estimate of audience size was 10–50 people; 50% percent of participants estimated that between 10 and 50 people are looking at their status updates, 24% estimate over 50 people are looking at their status updates, 23% estimate that less than 10 people are doing so (3% did not answer). Indeed, the larger one’s network, the more people college students perceive are looking at their status updates,  $r(69) = .405, p = .001$ . This correlation between the size of the network and the size of the estimated audience for status updates supports Hypothesis 3B: Users with larger networks are aware of their friendship network as audience for the self.

To explore what network “anatomy” is associated with audience size for status updates, we conducted a regression analysis, entering absolute numbers of each kind of friend to see which kind of friend predicted larger estimated audiences for one’s status updates. (Because status-update audience is an estimate of absolute numbers, we used absolute numbers rather than proportions for this analysis.) We entered absolute numbers of close connections, maintained connections, superficial connections, online-only connections, and strangers as independent variables into the regression model. According to Hypothesis 3C, numbers of superficial connections, online-only connections, and strangers should be significant predictors. While the overall model was significant (see Table 2), only number of close connections and strangers emerged as significant predictors in the model. These results differ from the predicted pattern. They suggest two routes to perceiving that one is receiving attention and feedback for expressing oneself via public status updates: having many close friends on the network and having a relatively large collection of unknown others as potential onlookers or fans.

**Private communication.** To explore what type of friendship network is associated with use of private communication modalities on Facebook, a regression analysis was conducted to explore which categories of friends would predict more frequent private communication exchanges. This analysis was based on participants’ reports of private communication via messages on Facebook with the 20 selected friends. We entered proportion of close connections, maintained connections, superficial connections, online-only connections, and strangers as independent variables into the regression model. Variables in the model are summarized in Table 3. The overall model

Table 2  
*Close Connections and Strangers Predict Higher Audience Size Estimates*

Variable	<i>b</i>	<i>SE b</i>	$\beta$
Absolute number of close connections	0.005	0.002	.292*
Absolute number of maintained connections	0	0.002	-.003
Absolute number of superficial connections	0.001	0.001	.209
Absolute number of online-only connections	0.004	0.009	.046
Absolute number of strangers	0.008	0.003	.259*

Note.  $F(5, 61) = 3.92, p = .004$ , adjusted  $R^2 = .181$ .  
\*  $p < .05$ .

Table 3  
*Close Connections Predict Frequency of Private Communication*

Variable	<i>b</i>	<i>SE b</i>	$\beta$
Proportion of close connections	4.00	0.935	.528**
Proportion of maintained connections	-0.896	1.00	-.105
Proportion of superficial connections	0.338	0.817	.056
Proportion of online connections	0.925	1.28	.082
Proportion of strangers	0.106	1.36	.008

Note.  $F(5, 82) = 6.79, p = .0001$ , adjusted  $R^2 = .25$ .  
\*\*  $p < .01$ .

is significant, and proportion of close connections drives the model; it is the only category of friend significantly predicting reports of frequency of private communication. Hypothesis 4 is partially confirmed: The more intimate modality of private messaging on Facebook is more frequent when friendship networks comprise a higher proportion of close but not maintained connections.

**Public communication.** To explore what type of friendship network is associated with the use of public Facebook modalities, a regression analysis was conducted to identify which categories of friends would predict more frequent reports of public communication (wall and photo posts) with the 20 selected friends. Again we entered proportion of close connections, maintained connections, superficial connections, online-only connections, and strangers as independent variables into the regression model. Variables in the model are summarized in Table 4. Once again, the model is significant, and only the proportion of close connections predicts public communication exchanges. This finding that college students are more likely to be communicating via public modalities on Facebook with close connections suggests that contrary to Hypothesis 5, the central feature of Facebook communication, public posting, is generally not utilized to communicate with distant others. Rather, Facebook facilitates interactions between close relations to take place in the virtual public.

## Psychological Implications of Facebook Use

Table 5 shows the correlations between the measures of well-being, communication patterns, and categories of friends.

**Relationship between audience size and self-esteem.** As predicted in Hypothesis 6, there was a significant positive correlation between estimates of audience size and self-esteem,  $r(69) = .24, p = .018$ . Larger audiences are associated with higher self-esteem.

Table 4  
*Close Connections Predict Frequency of Public Communication*

Variable	<i>b</i>	<i>SE b</i>	$\beta$
Proportion of close connections	4.31	0.748	.655**
Proportion of maintained connections	-0.467	0.799	-.063
Proportion of superficial connections	0.666	0.653	.127
Proportion of online-only connections	0.789	1.02	.081
Proportion of strangers	-0.200	1.09	-.018

Note.  $F(5, 82) = 11.03, p = .0001$ , adjusted  $R^2 = .37$ .  
\*\*  $p < .01$ .

Table 5  
Correlations Among Categories of Friends, Communication Patterns, and Well-Being

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Network size	—										
2. Proportion close	-.33**	—									
3. Proportion maintained	-.11	-.18	—								
4. Proportion superficial	.35**	-.39***	-.21*	—							
5. Private communication	-.14	.52***	-.23*	-.16	—						
6. Public communication	-.12	.62***	-.22*	-.14	.91***	—					
7. Estimated audience size	.41**	.06	-.11	-.08	.07	.15	—				
8. Proportion face-to-face	.01	.35**	.01	.16	.12	.21	.22*	—			
9. Self-esteem	.13	.14	.01	-.16	-.08	-.07	.24*	.12	—		
10. Life satisfaction	.29*	-.04	.11	-.01	-.12	-.13	.26*	.04	.47***	—	
11. Social support	.26*	-.09	.28**	-.09	-.19	-.19	.25*	.08	.30**	.30**	—

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Life-satisfaction and network composition.** Are college students deriving happiness from intimate friendships on Facebook or from expanded networks and popularity on the site? To explore the kinds of Facebook networks that are associated with college students' life satisfaction, we conducted a regression analysis entering proportions of close connections, maintained connections, superficial connections, and network size as independent variables into the regression model, with self-esteem as the covariate. The variables in the regression are summarized in Table 6, which shows that the model is significant after controlling for self-esteem, and only size of the network predicts college students' life satisfaction. Proportions of close connections and maintained connections show larger standardized coefficients than proportion of superficial connections; however, they were not statistically significant. In response to Question 7, these data suggest that emerging adults who take advantage of Facebook as an efficient tool for collecting large networks of friends rather than using it to maintain a network more dense with close and enduring friendships are happier with their lives.

**Life-satisfaction and Facebook use.** Next, we explored what particular uses of Facebook are associated with higher life satisfaction: exchanges of public communication, exchanges of private communication, having larger audiences for one's status updates, or having larger proportions of contacts in the network with whom one has a face-to-face relationship. We again entered self-esteem

as a covariate. Variables in the regression models are summarized in Table 7. The models were significant, but it was only higher estimates of numbers of people observing one's status updates that emerged as a marginally significant predictor of life satisfaction above and beyond self-esteem. Answering Question 8, this finding suggests that emerging adults who use Facebook derive more life satisfaction from their friendships in the virtual world when they perceive they function as an audience rather than when they have more mutually reciprocal private or public exchanges or more offline relationships within their online networks.

**Social support and network composition.** What kind of friendship network is associated with viewing Facebook as useful for procuring social support (Question 9)? To answer this question, a regression analysis was conducted entering proportions of close connections, maintained connections, superficial connections, and network size, with self-esteem as a covariate, predicting our measure of social support. Table 8 summarizes the variables in the two models, both of which were significant. Controlling for self-esteem, higher proportions of friends labeled as maintained connections in the network and larger network size significantly predicted positive attitudes toward Facebook as a tool that is useful for garnering social support. Those with more friends from the past on their network, primarily high school friends, and those with larger networks are more likely to feel social support on Facebook.

Table 6  
Network Size, Network Composition, and Life Satisfaction

Variable	Model 1			Model 2		
	<i>b</i>	<i>SE b</i>	$\beta$	<i>b</i>	<i>SE b</i>	$\beta$
Self-esteem	0.313	0.077	.444***	0.271	0.079	.384***
Proportion of close connections				0.378	0.341	.182
Proportion of maintained connections				0.294	0.325	.139
Proportion of superficial connections				0.083	0.310	.048
Network size				0.000	0.000	.296*

*Note.* Model 1 establishes that our control variable, self-esteem, is predictive of the outcome variable (life satisfaction). Model 2 tests whether other variables, over and above self-esteem, are also predictive of life satisfaction. Model 1:  $F(1, 67) = 16.47, p = .0001$ , adjusted  $R^2 = .185$ ; Model 2:  $F(1, 67) = 4.79, p = .001$ , adjusted  $R^2 = .218$ .

\*  $p < .05$ . \*\*\*  $p < .001$ .

Table 7  
Facebook Communication Behaviors and Life Satisfaction

Variable	Model 1			Model 2		
	<i>b</i>	<i>SE b</i>	$\beta$	<i>b</i>	<i>SE b</i>	$\beta$
Self-esteem	0.333	0.069	.469**	0.295	0.072	.416**
Private communication				0.044	0.064	.165
Public communication				−0.085	0.076	−.276
Proportion of face-to-face relations on network				−0.011	0.129	−.088
Estimated audience size for status updates				0.043	0.023	.195 <sup>†</sup>

*Note.* Model 1 establishes that our control variable, self-esteem, is predictive of the outcome variable (life satisfaction). Model 2 tests whether other variables, over and above self-esteem, are also predictive of life satisfaction. Model 1:  $F(1, 82) = 23.08, p = .0001$ , adjusted  $R^2 = .210$ . Model 2:  $F(1, 67) = 5.57, p = .0001$ , adjusted  $R^2 = .216$ .

<sup>†</sup> $p = .066$ . \*\* $p < .01$ .

**Social support and communication.** Finally, we explored what aspects of Facebook use—private communication exchanges, public communication exchanges, estimated audience size, and proportions of face-to-face relationships on the network—would predict perceptions that Facebook is a useful tool for acquiring social support (Question 10). Again we entered self-esteem as a covariate. As seen in the summary of variables in the model in Table 9, the models are significant overall, and higher estimates of an audience size for one’s status updates is marginally significant, predicting perceived social support above and beyond the effects of self-esteem. The more that college students feel that they are receiving attention for their self-expressions, the more likely they are to feel that Facebook is a useful tool for acquiring social resources. These data, together with the associations between estimated audience size and life satisfaction, demonstrate the importance of attention from one’s Facebook public as a pathway to feeling better about one’s life and one’s social resources.

## Discussion

### Network Composition

We confirmed our hypothesis that Facebook facilitates large, impersonal social networks. We can put this finding in historical perspective by relating it to past research that shows networks are

getting larger over time: From data collected by Children’s Digital Media Center @ Los Angeles in 2006, the average network size for college students was estimated at 137 (Subrahmanyam et al., 2008); data collected in 2007 led to an estimate of 185 (Manago et al., 2008), with the estimate rising to 225 for data collected in 2008 (Salimkhan et al., 2010). All three studies were carried out with college students in the same city, Los Angeles. The latter two estimates were from data collected at the same university, UCLA. Steinfield et al. (2008) reported that the average number of college students’ Facebook friends at Michigan State University increased from 223 in 2006 to 339 in 2007. The present data, collected in 2009, shows yet another increase, now to a median of 370 and mean of 440 friends. Differences between the studies notwithstanding, the trend toward ever larger social networks is unmistakable.

Also in support of our hypotheses, relatively superficial relations (acquaintances and activity-based friends) formed the majority of participants’ Facebook networks. In addition, networks grew by adding disproportionate numbers of these superficial relations. As networks grew larger, participants also added to their stranger contacts (at a slower rate) and close connections (at the slowest rate). Nonetheless, the significant positive correlation of network size with number of close connections also suggests the transformation of close relationships, as ever increasing numbers of close

Table 8  
Facebook Composition and Social Support

Variable	Model 1			Model 2		
	<i>b</i>	<i>SE b</i>	$\beta$	<i>b</i>	<i>SE b</i>	$\beta$
Self-esteem	0.359	0.182	.236*	0.276	0.177	.182
Proportion of close connections				0.504	0.766	.112
Proportion of maintained connections				1.86	0.730	.406*
Proportion of superficial connections				0.250	0.696	.067
Network size				0.001	0.0001	.294*

*Note.* Model 1 establishes that our control variable, self-esteem, is predictive of the outcome variable (social support). Model 2 tests whether other variables, over and above self-esteem, are also predictive of social support. Model 1:  $F(1, 66) = 3.89, p = .053$ , adjusted  $R^2 = .041$ . Model 2:  $F(5, 62) = 3.73, p = .005$ , adjusted  $R^2 = .169$ .

\* $p < .05$ .

Table 9  
*Facebook Communication Behaviors and Facebook Social Support*

Variable	Model 1			Model 2		
	<i>b</i>	<i>SE b</i>	$\beta$	<i>b</i>	<i>SE b</i>	$\beta$
Self-esteem	0.459	0.156	.312**	0.353	0.160	.239*
Private communication				0	0.143	0
Public communication				-0.132	0.169	-.206
Proportion of face-to-face				0.103	0.288	.039
Estimated audience size for status updates				0.097	0.051	.214 <sup>†</sup>

*Note.* Model 1 establishes that our control variable, self-esteem, is predictive of the outcome variable, social support. Model 2 tests whether other variables, over and above self-esteem, are also predictive of social support. Model 1:  $F(1, 81) = 8.71, p = .004$ , adjusted  $R^2 = .086$ . Model 2:  $F(5, 77) = 3.13, p = .013$ , adjusted  $R^2 = .115$ .

<sup>†</sup> $p = .06$ . \* $p < .05$ . \*\* $p < .01$ .

connections mean that intimacy must be attenuated for any given dyad. This conclusion is supported by the fact that the mean number of close connections in this sample of emerging adults was 80.

### Communication on Facebook

Expressing one's current emotional state dominated use of Facebook's status-update tool, a feature for broadcasting oneself to one's entire network, usually numbering in the hundreds. This finding indicates that self-disclosure, a hallmark of intimacy, has gone public, transforming the nature of intimacy development for emerging adults.

Participants with larger networks estimated larger audiences for their status updates. More specifically, larger numbers of both close relations and strangers predicted larger audience estimates. Thus, Facebook appears to be a tool for transforming both close connections and unknown others into audiences for individualistic self-displays.

We also found that participants with relatively more close contacts more frequently communicated both privately (messaging) and publicly (exchanging public photos and wall comments) on Facebook. The finding implies that public performance has been added to private communication, transforming the nature of close relations.

On the one hand, the persistence of private communication used with close relations suggests the enduring nature of intimacy in close relations within the socialization context of Facebook. On the other hand, the movement of interactions between close connections into the public eye suggests a mechanism by which interactions between close friends are transformed on Facebook from the exchange of emotional support to the showcasing of social skills. Like earlier research, this study suggests that college students increasingly construct their social identities through public performances on social network sites: College students' public interactions with friends on MySpace allowed them to demonstrate social skills and connections to large audiences and sometimes reinforced closeness between friends through the process of committing publicly to the relationship (Manago et al., 2008; Salimkhan et al., 2010). The potential to enact both self-displays and relationship displays on Facebook may further socialize emerging adults to focus on the construction of personal and social identities for a

public audience. In line with Greenfield's (2009) theory, performance for an audience is an individualistic turn in the development of emerging adults.

### Life Satisfaction and Social Support

Participants' reports of larger networks and larger estimated audiences for status updates predicted both life satisfaction and perceived social support. Proportion of close contacts did not. These findings constitute evidence that emerging adults are adapting psychologically to the affordances of social network site tools. Whereas other studies emphasize instrumental benefits of large networks of superficial relations (Ellison et al., 2011), our study points to another potential benefit of large networks for the current generation of emerging adults: more attention. From Dunbar's (1996) estimate that the maximum number of people with whom an individual can have a "genuinely social relationship" is 150, researchers have posited that the remaining contacts in college students' networks may serve as collections of "latent ties," relationships that are available but not yet activated or engaged (Haythornthwaite, 2005). Our findings indicate that college students may derive life satisfaction and social support from these latent ties as they comprise the audiences for their self-displays and relationship displays.

Indeed, as predicted, there was a positive relationship between self-esteem and estimated audience size. We do not know whether high self-esteem leads to higher estimates of audience size or larger perceived audiences are a source of self-esteem. If the latter is the case, then the new possibility of large audiences created by social networking sites would tend to inflate self-esteem, augmenting narcissistic personality traits. This interpretation is in line both with Twenge et al.'s (2008) finding of a jump in narcissistic personality in the present decade—during which Facebook and other communication technologies have evolved—and the prediction from Greenfield's (2009) theory of social change and human development that the expansion of technology produces increasing individualism.

Data concerning connections among larger networks, estimated audiences for the self, and measures of well-being suggest that one source of psychological adjustment for today's young people may be attention from an audience as they adapt to the affordances of social network sites. In this way, Facebook may be a feature of the

technological environment that is both expressing and contributing to the documented increase in (nonclinical) narcissistic personality of today's college students (Twenge et al., 2008).

Driven by the rise of new communication technologies, the sharp increase in narcissistic personality traits in the last decade (Twenge et al., 2008) parallels the rise of fame and fall of community feeling as values presented in popular family and preteen television shows in the United States in this same period (Uhls & Greenfield, 2011). The current study suggests that tools for public self-displays on social network sites may be one way young people today enact increasing values for fame and attention. In line with Greenfield's (2009) theory of social change and human development, new communication technologies augment an individualistic focus on the self.

Another important result of this study is that college student participants who were most highly convinced of the usefulness of Facebook for procuring social support were those with higher proportions of maintained connections. This finding is consistent with large surveys from the general population of adults showing that large proportions of Facebook social networks comprise friends from the past, primarily high school friends, and that Facebook users have higher levels of perceived social support than do non-Facebook users (Hampton et al., 2011). These contacts from the past have been termed by Ellison and colleagues (Ellison et al., 2007) as "maintained social capital."

In fact, social networking sites may be important new psychosocial adjustment tools for emerging adults, in particular, to adapt to the increased mobility of modern society (Adams, 1998). Pre-Facebook studies on friendship during the transition from high school to college found declines in pre-college friendship quality and satisfaction (Oswald & Clark, 2003) and associations between concerns over losing high school friends and higher levels of emotional distress and college maladjustment (Paul & Brier, 2001). On the other hand, college students who are able to maintain communication with high school friends report being less lonely and better adjusted to college life (Oswald & Clark, 2003). Electronic communication such as e-mail and instant messaging helps college students maintain distant high school friendships even more so than do face-to-face communication or phone calls (Cummings, Lee, & Kraut, 2006); in addition, the ability to stay in touch with high school friends through social networking sites buffers college students' emotional distress associated with "friendsickness" (Ellison et al., 2007).

### Limitations and Future Directions

The fact that we did not assess participants' entire networks is a limitation, although systematic sampling of the friend network while participants were online was a methodological advance. Other limitations in our study include a small sample, a high proportion of women, and the fact that participants voluntarily signed up for the study, which may have biased our sample to those who are active users and interested in Facebook. Others have found that women are more active communicators on Facebook, especially public communicators (Hampton et al., 2011), and thus, our results may have largely been driven by women's proclivities. In addition, there may be other modalities not assessed in this study (e.g., cell phone) by which college students may be developing skills for intimacy with close friends and family. The present

study has limited its focus to Facebook—a highly popular socialization context that promotes a particular orientation toward social relationships and drives social development in a particular direction.

In this study, we have attempted to study social change indirectly, by inferring emerging adults' psychological adaptation to Facebook at one point in time. For stronger inferences concerning social change, a future investigation could study these patterns over chronological time, assuming that communication technologies continue to expand and develop. The prediction would be that network size would keep growing, that proportion of superficial relations would increase, and that the importance of self-expression to an audience would continue to grow.

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