

Social Capital on Facebook: Differentiating Uses and Users

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ABSTRACT

Though social network site use is often treated as a monolithic activity, in which all time is equally “social” and its impact the same for all users, we examine how Facebook affects social capital depending upon: (1) types of site activities, contrasting one-on-one communication, broadcasts to wider audiences, and passive consumption of social news, and (2) individual differences among users, including social communication skill and self-esteem. Longitudinal surveys matched to server logs from 415 Facebook users reveal that receiving messages from friends is associated with increases in bridging social capital, but that other uses are not. However, using the site to passively consume news assists those with lower social fluency draw value from their connections. The results inform site designers seeking to increase social connectedness and the value of those connections.

Author Keywords

Social network sites, social capital, self-esteem, social skills, computer-mediated communication

ACM Classification Keywords

H.5.3 [Information Interfaces]: Group and Organization Interfaces - Collaborative computing, Web-based interaction, Computer-supported cooperative work

General Terms

Experimentation

INTRODUCTION

In its earliest days, when the Internet offered a small range of file transfer and communication services that were used by a relatively homogeneous population of early adopters, HCI researchers tended to treat both services and users monolithically. They implicitly assumed that all Internet use had similar effects on most users. For example, early studies of the Internet examined the association between overall time online, social capital, and loneliness [20,24]. However, as Internet services became richer and users more

heterogeneous, researchers began to ask whether different types of Internet use, (e.g., communication with family and friends, meeting new people, and finding information) had different effects on those varying in demographics and social resources [5,27].

Social network sites (SNS) and research on their impact have reached a similar inflection point. Social network sites are designed to connect people with friends, family, and other strong ties, as well as to efficiently keep in touch with a larger set of acquaintances and new ties. Therefore, they have strong potential to influence users’ social capital and the psychological well-being that often flows from social capital. While in their early days, sites like Facebook appealed to a homogeneous base of college students and supported only a small set of activities, today successful SNS are themselves rich platforms, allowing an enormous and diverse user base to join groups, play games, share photos, broadcast news, and exchange private messages. Therefore, just as researchers began to call for differentiated analyses of Internet use (e.g., [40]), researchers are recognizing that not all SNS use is equally “social” [8,12].

The goal of the present study is to examine how different uses of a large social network site influence different types of users’ social capital. Combining longitudinal self-report surveys and Facebook server logs, we examine how direct communication with friends, broadcasting status updates to a wide audience, and reading of others’ news predict changes in users’ social capital. We examine how people varying in self-esteem and social communication skill engage in these activities and how their use differentially affects their social capital. By using behavioral logs of SNS usage, we overcome the self-report biases common in much of the existing literature. By using an eight-month longitudinal panel design, we go beyond the cross-sectional research common in this area and can make stronger causal claims about how SNS use changes social capital.

ONLINE COMMUNICATION AND SOCIAL CAPITAL

Social capital is “the actual or potential resources which are linked to a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” [6]. It is the benefit derived from one’s position in a social network, the number and character of the ties one maintains, and the resources those ties themselves possess [38]. Although sociologists and political scientists tend to use the term

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'social capital,' psychologists refer to a related concept using the term 'social support.' Regardless of the discipline, a large literature shows that people derive benefits from their interpersonal relationships and the groups they belong to, ranging from improved health, access to expertise, and financial resources [9].

Social capital is often described as two constructs: bonding and bridging [20,32]. Emotionally close relationships such as family members and good friends provide bonding social capital, which enables specific reciprocity, emotional support, and companionship [38]. On the other hand, a large number of diverse, weaker ties who travel in different circles generates bridging social capital. Bridging social capital provides access to novel information (e.g., job opportunities), because one's closest and strongest ties are likely to have redundant information [15]. Acquaintances expose us to diverse perspectives and external groups, but do not necessarily provide emotional support. Bridging and bonding are not mutually exclusive, but rather different dimensions of the resources in a social network.

Online communication in general and the use of social network sites in particular have the potential to change the costs of communication, the number and character of people with whom one keeps in touch, and the nature of the communication one has with them. As a result, many researchers have proposed that online communication and participation in social networking will influence one's social capital and the downstream psychological consequences. Wellman and colleagues crystallized the debate with a paper titled "Does the Internet increase, decrease, or supplement social capital?" [37]. Cross-sectional research shows that compared to light users, people who use the Internet heavily have better social integration. For example, heavier users participate more in organizations and are in more frequent contact with friends and relatives [37]. Bloggers and photo sharers are more likely to confide in someone of a different race or discuss important matters with someone from a different political party [16]. College students who use Facebook heavily report higher levels of social capital [11]. However, much like early studies of the Internet (e.g., [24]), these studies generally treat social media as a relatively monolithic activity.

More recent studies have examined different types of use, often differentiating social activities from others [23,40]. When researchers do differentiate uses they tend to find a positive link between social motives for use and positive psychological outcomes [5]. Adolescents use instant messenger with existing friends and so tend to disclose more, which improves the quality of their relationships [35]. On the other hand, uses for entertainment (e.g., games and online movies) and communication with strangers are negatively associated with social capital [5,37]. For example, adults with typical or high levels of offline social support who used the Internet to meet new people felt more depressed six months later [5].

DIFFERENTIATING SOCIAL NETWORK SITE ACTIVITIES

A few studies have begun to differentiate uses of SNS. College students motivated by "social information-seeking," using SNS to learn about people they have met offline, and "expressive information sharing," feel greater bridging social capital [12,31]. However, these studies generally differentiate social media use based on motivations, rather than actual behavior. This focus on motivation occurs in part because fine-grained behavioral data are not available, while survey measures of users' attitudes are easy to collect. In the current study, we focus on behavior—as recorded in server logs—and its impact on social capital, largely because motivations and actual behavior are rarely so cleanly connected. Undergraduates use Facebook out of "habit" and "time-passing" [31], which tells us how pervasive Facebook is in their lives, but does not clarify how users actually pass that time. They could be chatting with distant cousins or playing solitaire, and these different behaviors may have dramatically different outcomes.

Three kinds of social activities

We distinguish between three kinds of social behavior in social network sites. These behaviors are measurable through site logs on Facebook, but generalizable to other platforms. The first activity, **(1) directed communication with individual friends** consists of personal, one-on-one exchanges. Much like email and IM, Facebook supports targeted communication through messages, wall posts, and synchronous chat. Unlike previous platforms, it provides lightweight mechanisms such as the "like" button, inline comments, and photo tagging. In each of these actions, one friend singles out another friend, signaling that their relationship is meaningful enough to merit an action.

Directed communication has the potential to improve both bonding and bridging social capital for two conceptually distinct, although empirically interrelated reasons: the content of the communication and the strength of the relationship with the communication partner. By virtue of being directed at particular others, one-on-one messages are likely to be rich in content that strengthens relationships, such as self-disclosure, supportiveness and positivity [30]. Both the offering and the receiving of the intimate information increases relationship strength [10]. Providing a partner with personal information expresses trust, encourages reciprocal self-disclosure, and engages the partner in at least some of the details of one's daily life. Directed communication evokes norms of reciprocity, so may obligate partner to reply. The mere presence of the communication, which is relatively effortful compared to broadcast messages, also signals the importance of the relationship. Thus, because of its content, directed communication is likely useful for maintaining relationships with existing ties and encouraging the growth of new ones.

In addition to its content, directed communication may be especially important because it tends to be exchanged with those with whom one already has strong relationships. Although people typically maintain a moderate number of

friends on social network sites (e.g., 150), they have reciprocal communication with a much smaller set (5-7) [26]. Ellison and colleagues [12] found that young adults only consider a small fraction of their Facebook friends “actual” friends (75 out of 300), and that only these “actual” friends correlate with social capital. Gilbert and Karahalios [13] demonstrated that features of directed communication—its recency, duration, intimacy, and amount—were strong predictors of Facebook tie strength. Because directed communication keeps one in touch with close ties, it should improve bonding social capital.

In contrast, the undirected messages that form the basis of **(2) passive consumption of social news**, when one reads others’ updates, and **(3) broadcasting**, when one writes them for others’ consumption, are not targeted at a particular other. Therefore, they are less likely to be rich in relationship-maintaining behaviors that characterize directed communication. These undirected messages are one of the novel features of SNS: an aggregate stream of news (known as the News Feed on Facebook). The News Feed contains general broadcasts, such as status updates, links, and photos, as well as public interactions between the user’s friends and those friends’ friends. In addition, profile pages and photo albums archive shared content generally viewable by any friend (modulo variations in privacy settings). By its very nature, this broadly targeted content is not tailored to a single recipient, and thus less likely to include the same degree of support and openness.

While the content of undirected messages may be less intimate than that of directed communication, they may still be valuable for relationship growth and maintenance. Profile information and status updates provide content for conversational grounding and reveal users’ similarities. Hancock and colleagues found that college students who mined information from a stranger’s Facebook profile were able to make that stranger like them more, by casually referencing shared interests [17].

News Feed content may be more similar to the small talk—informal superficial communication—that comprises roughly half of the content of face-to-face conversations [14]. While most scholars assume that communication involving support and openness are stronger drivers of tie strength than small talk, small talk can be valuable. Regular contact itself is at the heart of the relationships with friends [1]. The information exchanged by initiating and consuming broadcast messages allows one to keep in regular contact through a stream of small updates. Knapp and Vangelisti [22] argue that small talk “is critical to developing relationships,” and “a proving ground for both new and established relationships.”

Broadcast messages are much cheaper to produce and consume. Because the author doesn’t know who has read it, it entails no obligation to reply, though it may elicit responses. Because of their relatively low cost, sending and consuming News Feed stories, profiles, and photos should

allow a user to keep track of a much larger circle of friends and acquaintances—especially those she doesn’t have the time to write to individually, or with whom some social barrier prevents her from directly engaging.

For these reasons, it is plausible that creating and consuming undirected messages, allowing users to keep in touch, will lead to increases in social capital. Compared to direct messages, undirected communication will have less intimate content and will be exchanged with a larger number of weaker ties. Therefore, its effects should be stronger on bridging social capital than bonding social capital.

In this paper, we do not focus on purely asocial Facebook activities, such as solitary game-playing, as we would not expect them to add to social capital. However, we do control for overall time spent on the site, and where games are social (e.g., by fostering game play with friends), we expect the results to hold.

INDIVIDUAL DIFFERENCES AND SOCIAL MEDIA USE

Though few studies of social network sites take them into account, individual differences influence whether and how people use the Internet and the effects it has on them. Less socially skilled individuals may gravitate toward computer-mediated communication because it reduces social boundaries, and thus they might have more to gain from technology than their more socially connected peers [3]. Personality components such as extroversion and neuroticism have been shown to affect one’s choice of Internet activities and moderate the effect of those activities on affect, depression, and loneliness [5,23]. More introverted, less agreeable, and less conscientious college students spend more time online than their extroverted peers [25], which may be explained by extroverts spending their discretionary time in face-to-face social interactions, or introverts having fewer social obligations, freeing up additional time to spend online. Online channels allow greater control over self-presentation supporting the projection of an ideal self [36]. Caplan finds that some individuals with anxiety over self-presentation prefer interacting online because they feel “safer, more efficacious, more confident, and more comfortable” [9]. However, this preference for interacting online is linked to compulsive Internet use and negative consequences, such as missing work [9]. On the other hand, some introverts feel that they can better express themselves online and are thus more likely to form relationships that move offline [2, 28].

Of the numerous individual differences, we focus on two: social communication skill and self-esteem. Social communication skill gauges comfort with social “chitchat” and ability to recognize nonverbal signals (such as when a partner is getting bored). We focus on this trait because SNS offers many ways to connect socially (including the three forms presented here), any one of which may be better suited for those who are uncomfortable face-to-face [7].

Self-esteem has previously been demonstrated to moderate the relationship between overall SNS use and bridging social

capital, and so we include it in the present study, to validate previous findings with a more diverse sample and investigate interaction effects with specific site activities. Ellison and colleagues [11] found that intensity of Facebook use (e.g., time spent on the site, number of friends, and agreement with attitudinal questions about the integration of Facebook in their daily lives) predicted higher levels of bridging social capital, even when controlling for self-esteem. Furthermore, they found that the effect was strongest for students with lower self-esteem. Therefore, we include self-esteem in the present study to validate those findings with an international, more diverse sample and investigate interaction effects with specific site activities.

Social communication skill and self-esteem are related but distinct concepts. In the present study, they correlate at 0.4, indicating a relationship, but 84% of the variance in either construct remains unexplained. Individuals with low self-esteem may be less comfortable communicating socially because they feel that they have few accomplishments to tout, or poor communication skills may reduce one's feeling of self-worth, indicating that it is quite possible that these constructs would affect an individual's choice of SNS activities differently, and so we examine both self-esteem and social communication skill separately.

IMPORTANCE OF LONGITUDINAL RESEARCH

In a cross-sectional study of approximately 1200 Facebook users, differentiating site activity revealed surprising differences in well-being outcomes. Communication one-on-one with friends was linked to positive outcomes, including higher levels of bonding social capital and lower loneliness but users who spent a lot of time passively consuming news reported lower bridging social capital and greater loneliness [8]. The cross-sectional analysis cannot determine causal direction: did the consumption cause the loneliness or the loneliness cause the consumption?

The problems making causal claims with observational data are well known. It is impossible to rule out the possibility that some third factor, such as self-esteem, accounts for the association between online activities and social capital. For example, Mikami et al. [29] show that adolescents' social disposition at age 13 predicted their SNS behavior nine years later. Those who were liked more by friends in adolescence had more friends online, communicated with them more and received more supportive messages from them. Rather than Internet use influencing their social capital, this research clearly shows that stable social dispositions can account for the association between Internet use and social capital.

Even the same dataset can lead to contradictory conclusions depending upon whether the researchers use cross-sectional or longitudinal data. For example, Shklovski and colleagues demonstrate that cross-sectional analyses show that people who use the Internet more have greater social capital [33]. They are more likely to dine out with friends or phone them. However, when using longitudinal data to examine changes in social capital, they showed that those who used the

Internet for a wider variety of purposes decreased the amount that they visited friends in person.

To overcome these problems, the research reported here will use longitudinal panel data to determine the impact of SNS uses on changes in social capital over eight months.

METHOD

To analyze the relationship between SNS activity, individual differences, and social capital, we surveyed Facebook users in July 2009 and again in March 2010. The survey contained standard scales for social capital, social communication skill, and self-esteem. Survey responses were matched to server logs of the participants' activity on Facebook for the two months prior to the second wave.

Participants

Participants (N=1193) were recruited via an ad on Facebook targeted at English-speaking adults around the world, and 415 of the original 1193 completed the second wave. There were no differences between drop-outs and returnees in demographics, self-esteem, communication skill, social capital, number of friends, time spent on site, or amount of content produced or consumed ($p > .80$ for all comparisons). Therefore only users who responded at both time points are analyzed. Compared to a random sample of active Facebook users, survey takers were slightly older ($M=33.7$ vs. 33.0 years, $p < .05$), spent more time on the site¹ ($M=1.7$ hours per day vs. 0.5 , $p < .001$), had more friends ($M=185.6$ vs. 170.0 , $p < .001$), were more likely to be women ($X^2=27.3$, $p < .001$), and less likely to be from the U.S. ($X^2=270.2$, $p < .001$). Figure 1 presents demographics.

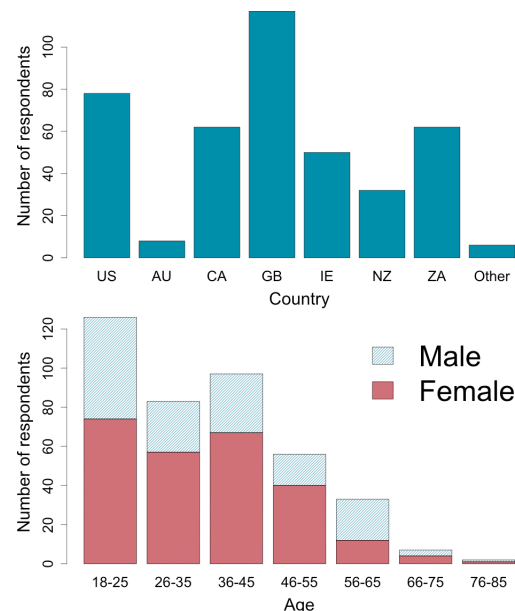


Figure 1. Participants by age, gender, and country.

¹ Log-transformed data were used for t-tests, but non-transformed means are reported for interpretability. Comparisons from July 2009.

	Median	Mean	SD
Age	34.0	35.2	13.9
Gender	63% female		
Friend count	171.0	241.2	288.4
Time on site (hours/day)	1.3	1.8	1.9
Directed communication scale (in) ($\alpha = 0.90$)			
Distinct friends who initiated communication	41.0	53.1	47.3
Comments received	66.0	130.2	199.7
Messages received	30.0	70.8	147.8
Wall posts received	10.0	18.3	24.8
"Likes" received	29.0	61.5	116.7
Tags in photos	5.0	14.1	29.6
Directed communication scale (out) ($\alpha = 0.88$)			
Distinct friends user communicated with	56.0	72.8	62.4
Comments written	127.0	232.2	344.8
Messages sent	34.0	92.3	226.2
Wall posts written	13.0	24.4	33.0
"Likes" given	34.0	93.6	231.3
Times tagged friends in photos	1.0	25.4	77.1
Passive consumption scale ($\alpha = 0.93$)			
Times reloaded feed	773.0	1281.6	1577.2
Stories clicked in feed	179.0	341.1	498.3
Friends whose feed stories user clicked	65.0	101.2	109.9
Distinct photos viewed	4.0	11.5	20.5
Distinct profiles viewed	140.0	211.5	275.6
Broadcasting scale ($\alpha = 0.63$)			
Status updates	24.0	41.3	58.6
Notes written	0.0	0.2	0.6
Photos shared	3.0	7.0	15.5
Application stories posted to own wall	17.0	126.0	352.5
Other items posted to own wall	2.0	10.6	28.0

Table 1. Participant demographics and activities over two-month period and aggregate scales.

	Directed comm. out	Consumption	Broadcast
Directed comm. in	0.88	0.60	0.65
Directed comm. out		0.67	0.71
Consumption			0.53

Table 2. Correlation between activity scales.

Survey content

Scales used in the survey include bonding and bridging social capital [39], social communication skill (a subscale of [4]), and self-esteem [32]. Major life came from [19]: pregnancy or new family member, move to a new city, personal injury or illness, fired or lost job, marriage or relationship reconciliation, divorce or relationship breakup, and death of close friend or family. Each was measured with single binary value indicating whether the event occurred between survey waves.

Bonding (5 items, scale alpha=0.75) includes “There are several people I trust to help solve my problems” and “There is someone I can turn to for advice about making very important decisions.”

Bridging (10 items, alpha=0.86) includes “I come in contact with new people all the time,” “I interact with people from different racial or ethnic backgrounds,” and “Based on the

people I interact with it is easy for me to hear about new job opportunities.”

Social communication skill (10 items, alpha=0.63) includes “I enjoy social chitchat,” “I know how to tell if someone listening to me is getting bored,” and “I frequently find that I don’t know how to keep a conversation going.”

Self-esteem (7 items, alpha=0.87) includes “On the whole I am satisfied with myself,” and “I feel that I have a number of good qualities.”

Bridging, bonding and self-esteem were scored using the mean of 5-point agreement Likert scales. Communication skill was presented with the same scale for ease, but 1 point was given to “agree” or “strongly agree,” 0.5 to “neither agree nor disagree,” and 0 for “disagree” or “strongly disagree” (inverted for reverse-worded items). Scores were summed across the 10 items, so range from 0-10.

Site activity

Site activities for each survey participant for the 60 days before the second survey were counted. All variables were aggregated from server logs so that no individual’s actions, friend networks, or identifiable information were used.

All activity variables follow heavy-tailed distributions, and so are log-transformed (base 2, after adding a start-value of 1) to control for skew and then standardized by centering at the mean and dividing by the standard deviation. Scales representing each kind of Facebook activity (directed communication, consumption, and broadcasting) were created by taking the means of the z-scores of the representative variables. Tables 1 and 2 present descriptive statistics for the raw variables, scale alphas, and correlations.

Controls

Participant age and gender were included as controls, as was time spent on the site (logged and standardized). Country did not improve the models, and so was dropped.

RESULTS

To determine how site use affects social capital change, we use a lagged dependent variable model of the form:

$$Y_t = \alpha Y_{t-1} + \beta_0 X_t + \varepsilon_t$$

For example:

$$Bridging_t = \alpha Bridging_{t-1} + \beta_0 TimeOnSite_t + \varepsilon_t$$

This form of autoregressive distributed lag model is common in econometrics and appropriate when the dependent variable is stationary (the mean and variance do not change over time, as is the case with our social capital measures) and model residuals are not highly autocorrelated. Lagged independent variables (previous site activity) are not included because they are highly collinear, and thus would produce biased estimates (see [21]).

Base model: Time on site and bridging social capital

Table 3 presents a series of models for bridging social capital. The base model includes the lagged dependent variable (bridging social capital reported eight months

prior), demographic controls, and major life events in the intervening eight months. To determine which life events to include, we added each event separately to the base model and retained those that were at least marginally significant ($p < .10$): moving and losing a job. The base model shows that, controlling for demographics, major life changes, and previous level of bridging social capital, time spent on the site is a marginally significant predictor of increased bridging social capital ($p = .06$). This “monolithic” analysis of time on site suggests there is much room for improvement by differentiating site uses and users.

Model including Facebook activities

Next, holding time on site constant, we look at the impact of three kinds of SNS activities done during that time: directed communication with individual friends, consumption of social news, and broadcasting. Model 2 reveals that different activities on the site are not equally valuable. In particular, social capital increases with directed communication, but not with consumption or broadcasting.

Inbound and outbound directed communication are highly correlated ($r = 0.88$) and thus cannot be included in the same model. When included separately, inbound directed communication is a strong predictor of bridging social capital ($p < .01$), while outbound is not ($p = .20$). A combined measure is qualitatively similar to the inbound measure but slightly smaller ($\beta = .13$, $p = .02$). Since the research goal is to determine the impact of Facebook on the individual and identify levers available to site designers—such as nudging friends to contact another user—we include inbound directed communication in the model.

The intercept represents an average woman receiving the mean inbound directed communication (approximately 150 comments, “likes,” wall posts, messages, and photo tags per month). She would have a bridging social capital score of 3.86 out of 5. For every doubling of that inbound communication, her bridging social capital would increase by .14 points. This is comparable to the social capital increase felt by people who moved to a new city between survey waves ($\beta = .14$), and about half the loss by those who became unemployed ($\beta = -0.32$).

Planned comparisons reveal that directed communication has a significantly larger impact on bridging social capital than broadcasting ($p = .04$), and marginally larger than consumption ($p = .10$). Broadcasting and consumption do not differ from each other ($p = .39$). Personalized, one-on-one communication with friends has a measurably greater impact on social capital than undirected communication.

A model testing reverse causation (not shown), in which current directed communication is the dependent variable, and lagged directed communication and lagged bridging social capital are independent variables, did not show an effect ($p = .23$ on lagged bridging). We do not find evidence that bridging social capital predicts future site activity.

Models 1 and 2 were repeated using bonding social capital as the outcome, and revealed no significant effects. Controlling for lagged bonding social capital, the three kinds of site use had no additional impact on bonding social capital. Potential explanations for this lack of findings are in the Discussion section.

	1. Base model		2. FB activity		3. Communication skill		4. Self-esteem	
	β	(SE)	β	(SE)	β	(SE)	β	(SE)
Intercept	3.86 ***	(0.03)	3.86 ***	(0.03)	3.85 ***	(0.03)	3.86 ***	(0.03)
Bridging social capital (lagged)	0.47 ***	(0.04)	0.45 ***	(0.04)	0.41 ***	(0.04)	0.41 ***	(0.04)
Age	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)	0.00	(0.00)
Male	-0.17 ***	(0.05)	-0.17 **	(0.05)	-0.14 **	(0.05)	-0.16 **	(0.05)
Major life changes								
Moved	0.14	(0.09)	0.14	(0.09)	0.12	(0.08)	0.13	(0.09)
Lost job	-0.34 **	(0.11)	-0.32 **	(0.11)	-0.25 *	(0.11)	-0.30 **	(0.11)
Time on Facebook	0.05 .	(0.03)	-0.05	(0.04)	-0.04	(0.04)	-0.04	(0.04)
Facebook activities								
Directed communication (in)			0.14 **	(0.05)	0.12 **	(0.05)	0.13 **	(0.05)
Passive consumption			0.05	(0.04)	0.04	(0.04)	0.04	(0.04)
Broadcasting			-0.02	(0.06)	0.01	(0.06)	0.00	(0.06)
Individual differences								
Communication skill					0.08 **	(0.03)		
‡Communication skill X Directed communication					-0.07 *	(0.03)		
‡Communication skill X Consumption					-0.07 *	(0.03)		
‡Communication skill X Broadcasting					0.00	(0.04)		
Self-esteem							0.06 *	(0.03)
‡Self-esteem X Directed communication							-0.07 **	(0.03)
‡Self-esteem X Consumption							-0.04 .	(0.02)
‡Self-esteem X Broadcasting							-0.01	(0.03)
	Adj. $R^2 = 0.30$		$R^2 = 0.32$		$R^2 = 0.34$		$R^2 = 0.34$	

*** $p < .001$ ** $p < .01$ * $p < .05$. $p < .10$ N=415

Table 3. Models predicting bridging social capital, controlling for previous level of bridging social capital, major life changes, and time spent on Facebook. ‡Each interaction effect (e.g., between communication skill and directed communication in Model 3) was tested in a separate model due to multicollinearity but each set of three is presented in a single column for space. Coefficients and standard errors for interaction effects with directed communication are shown and are qualitatively the same in other models.

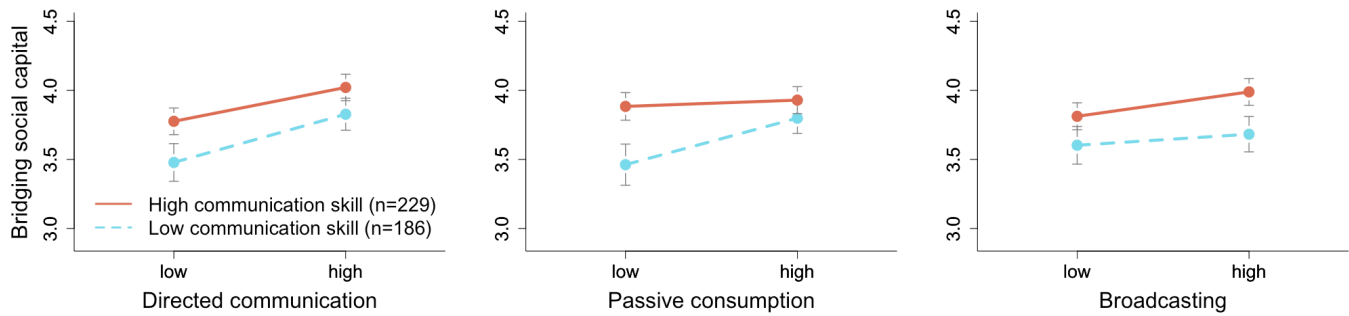


Figure 2. Interactions between social communication skill and site activity on bridging social capital (using median splits). There is a main effect for directed communication: users of all skill levels benefit from greater directed communication. There is an interaction effect for passive consumption; it benefits those with lower social communication skills, while has no effect on the bridging social capital of more socially skilled users. Broadcasting shows no effect for either group.

Models including self-esteem and communication skill

Next we examine individual differences. We first look to see if communication skill ($M=8.1$, $SD=1.6$) and self-esteem ($M=3.9$, $SD=0.7$) are related to differences in site use. Controlling for age and gender in an OLS regression (not shown), we see two differences in site use. Those with higher self-esteem and social communication skill have more friends: every standard deviation increase in self-esteem or communication skill is associated with 19 or 25 more friends, respectively ($p < .01$ for both). Additionally, those with lower communication skill initiate and receive less directed communication ($p < .05$). Every standard deviation decrease in communication skill is associated with approximately 150 fewer outbound and 90 fewer inbound directed communication actions. No other differences in site activity (including broadcasting, consumption, inbound directed communication, or time on site) are found based on self-esteem or social communication skill.

Now, we examine main and interaction effects based on social communication skill and self-esteem. Model 3 shows the effects for communication skill, and Model 4 shows them for self-esteem. There are main effects for each, such that those with higher communication skill or higher self-esteem have higher levels of bridging social capital.

For interaction effects with communication skill, we see negative coefficients for both directed communication and passive consumption. This indicates that the effects are greater for those with low social skill. Figure 2 shows this interaction effect more clearly using median splits. Participants are divided into “high” and “low” communication skill groups along the median. Those with exactly the median value (8.5) are included in the “high” group. The solid red lines represent those with higher skills, and the dashed blue lines represent those with lower skills. Each plot shows the relationship between one type of Facebook activity and bridging social capital. Each activity is also divided into “high” and “low” levels at the median. For directed communication, both lines have an upward slope, such that those who receive more directed

communication feel higher levels of bridging social capital. But for consumption, there is a clearer difference in slopes, such that those with lower social communication skills who consume more social news experience higher social capital. Consumption has no effect on those with higher skills. For broadcasting, the lines are virtually horizontal, illustrating no significant effect for either group.

Results are qualitatively similar for self-esteem. Those with low self-esteem gain more through directed communication. The interaction effect with consumption is similar, though not statistically significant ($p = .11$).

DISCUSSION

Of the three types of social engagement provided by SNS, only directed, person-to-person exchanges were shown to be associated with increases in bridging social capital. Facebook users articulate a set of mutually agreed-upon relationships, but these ties do not directly equate to bridging social capital. For a tie to provide value, such as a job recommendation, an person must be aware that the tie has a resource (such as an “in” with the Human Resources department), and be able to ask the tie about it (“Hey, are you guys hiring?”). Through directed communication, friends keep a channel of interaction open, periodically maintaining the relationship. While undirected broadcasts and passive consumption may affect knowledge of friends’ resources, they do not directly develop relationships or allow acquaintances to call on each other for help.

It is curious to note that while we see this relationship for inbound directed communication, we do not see it for outbound. This might be explained by the inherent asymmetric nature of new interactions: by sending a message, I am signaling to my friend that it is ok to get in touch with me in the future. Unless she reciprocates, this says nothing about the relationship from my perspective. In this manner, reaching out to a friend is tantamount to expanding his or her bridging social capital.

At first glance, the lack of connection between Facebook use and bonding social capital is surprising. Previous cross-

sectional work has already demonstrated a connection exists [8,11], and so the power of the longitudinal analysis is the ability to tell that frequent Facebook users tend to be already rich in bonding social capital, and their use of the site does not directly increase the value of those relationships. Media multiplexity may help explain this finding: we tend to communicate with our closest friends over many channels, including face-to-face [18]. Therefore, the exchanges that maintain close relationships are less likely to appear in server logs. Facebook is one component in a diverse ecology of communication channels for strong relationships. Spouses and roommates know about each others' lives because they see each other every day, and so do not need Facebook to keep in touch as much as geographically distant friends do. Another explanation is that bonding social capital may be generated through one single good friend who can be relied upon in times of need, and so bonding is less sensitive to amount of communication. Facebook may not strengthen already-strong relationships, but it can increase the value of less strong and nascent relationships.

Similarly, the present results contrast with cross-sectional findings that passive consumption and bridging social capital are inversely correlated [8]. The previous analysis cannot determine whether passive consumption causes feelings of disconnectedness, or if that disconnectedness spurs consumption. With the benefit of time, we find that the latter explanation is more likely: those with lower initial bridging social capital may consume more, but the act of consumption does not make it worse. And, for those with lower social communication skills, consuming friends' status updates and photos makes it modestly better.

Another goal of this paper was to explore how individual differences in self-esteem and communication skill affect one's choice of activities and the benefits those activities bring them. Among the users we surveyed, we found very little difference in site use based on these individual qualities outside of users with higher self-esteem having more friends, and those with lower communication skill interacting one-on-one less. We see no difference in time on site, consumption, or broadcasting, suggesting the site, like many forms of computer-mediated communication, may help to "level the playing field" of self-expression and connection.

When we examine the interaction between communication skill and bridging social capital, we find that for users with lower communication skills, the effects of two kinds of Facebook uses are amplified. Receiving messages from friends, and consuming those friends' news increases their feelings of connectedness. There are a few possible explanations for why increased consumption may differentially help those with lower skills: those who are uncomfortable in social situations may have interacted less with their friends—especially weaker acquaintances—and as such will be less aware of the information and resources provided by those ties, or may be less comfortable asking them. These users may lack reasons to engage with their friends, and the added information provided by News Feed

and profiles can catalyze conversations and provide context for discussion, online and offline.

We also find that some major life changes are associated with changes in bridging social capital. Moving has a positive relationship, most likely as a result of adding new relationships with diverse information in the new place of residence. Losing a job, on the other hand, is associated with a decrease, as the social context necessary to interact with former co-workers is lost. Other life changes, such as marriage, divorce, death, new family members, new jobs and illness do not have a relationship to bridging social capital, suggesting that these do not have as substantial an effect on one's wider social circle. When compared to events, where we would expect a major disruption in social capital, the effect of Facebook is clear: every doubling of directed communication is associated with the same gain as moving to a new city, and about half the change incurred by job loss.

Limitations and next steps

Though the sample of English-speaking adults from around the world is more diverse than a convenience sample of undergraduates, the sample is still a self-selected population willing to click on an ad and take multiple waves of surveys. The participants are also heavier site users and have more friends than average. In future waves, we plan to complement the current sample with another stratified by demographics and site use.

Like many large-scale observational social science studies, we cannot draw definitive causal conclusions, even with longitudinal data. By controlling for previous levels of social capital and observing the relationship between current site use and current social capital, we account for many exogenous factors, but other unmeasured variables may still affect both. We begin to address this by including major life changes, such as job loss, and demonstrating their correlation with changes in social capital. Furthermore, there are myriad individual differences that may affect Internet use and social benefits of that use, and social communication skill and self-esteem are just a first step in this large research space. Future studies will incorporate other potential variables, such as extroversion and social anxiety.

Social communication skill is a continuum, and everyone falls somewhere on the distribution. From an absolute perspective, most users surveyed were very highly skilled (with a median of 8.5 out of 10, and only 19 participants—4.6%—scoring below 5). Self-esteem is similarly top-heavy, with a median of 4 out of 5. Thus, we should be conservative in interpreting these results, as an especially unskilled population might have entirely different outcomes caused by varying degrees of use. However, among Facebook users, there is a range of social communication skill and self-esteem, and we don't see many behavioral differences in use across that range.

We employed an entirely content-free approach in order to maintain participant privacy. Though we found few quantitative differences in site use based on self-esteem and

social communication skill, users of varying skill may express themselves in a qualitatively different way. Sociolinguistic features, such as hedge words, positive or negative emotion, or even informal web-speak (e.g., “lol”) may differ and indicate ways in which communication content affects social capital.

Finally, the confound between communication channel and tie strength suggests the need for additional research to disentangle the two. Unlike traditional computer-mediated communication platforms, where channel and tie strength are more closely entwined (e.g., long phone calls are typically made to close friends and family, while online discussion forums revolve around exchanges with strangers who may share a common identity of interest, but have not met in person), social network sites foster many kinds of relationships over many kinds of channels. Users can passively consume the social news of weak or strong ties, send birthday wishes to best friends and work colleagues, and broadcast personal status updates to classmates and parents. To better understand how social capital is aggregated from dyadic relationships, we need to look at the interaction between communication channel and communication partner. In future waves, we intend to follow Gilbert and Karahalios’s [13] method of asking users to report “closeness” for a set of Facebook friends, and identify features that correlate with tie strength. While many features will be related to communication channel (e.g., messages sent), others will be independent (e.g., number of friends in common in a geographic region, co-appearance in photos). We can use these features to add tie strength to our models of communication channel.

As social network sites grow, understanding the interaction between site features and individual differences in users will only become more important. This current study suggests a number of design implications for social media practitioners who may be interested in creating and optimizing social capital flows on their services. As both inbound communication and consumption are tied to bridging social capital in some respect, features which stimulate these behaviors may lead to systemic increases in social capital.

First, features which lower the barrier for initiating conversation will have positive effects on social capital. Many of the lightweight interactions, such as liking and poking have already increased the volume of interactions, and features to this end will result in the generation of more bridging social capital. Similarly, since new broadcast communications are the starting point for many conversations, SNS should consider creating incentives for users to produce stories that create opportunities for more inbound communication.

Second, by adapting the display of content, users can be prompted to interact with individuals who may benefit from direct communication. For example, Facebook’s News Feed is an algorithmically controlled stream of information that displays the most relevant stories. This ranking could incorporate the potential value of a new communication. For

instance, individuals who had recently lost their job could be ranked higher to increase the probability they will be the target of communications, relieving their feeling of lost bridging social capital. Services may also induce new communication by directly helping people maintain relationships. Suggestions to reconnect with old friends or reordering lists of people to highlight acquaintances over regular contacts would increase the likelihood that bridging social capital would result. This approach to catalyzing new communication comes with the cost of de-emphasizing friends with whom the user often communicates, possibly decreasing the overall interaction in the system. A system which took this ordering approach would need to account for this trade-off.

Finally, since much of the content on social media services has an ephemeral nature, disappearing from view a few weeks after it was shared, a final means of stimulating communication could be the resurfacing of prior content. For relationships that have been inactive for some time, services could choose to highlight prior interactions, such as a status update or photos with comments. These stories could spur nostalgic memories and create a context to re-engage.

CONCLUSION

The study presents compelling evidence for the need to differentiate *uses* and *users* in social media studies. Not all time is equally social, even on inherently social platforms, and individual mileage may vary. We find that, receiving messages—but not sending them—is linked to increases in bridging social capital. Furthermore, some effects depend on the person: passive consumption of friends’ news has no effect on users with higher than average social skills, but does help those who are uncomfortable communicating in person, allowing them to benefit from the resources their relationships provide.

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REFERENCES

1. Allan, G. (1979). *A Sociology of Friendship and Kinship*. London: George Allen & Unwin.
2. Amichai-Hamburger, Y., Wainapel, G., & Fox, S. (2002). "On the Internet No One Knows I'm an Introvert": Extroversion, Neuroticism, and Internet Interaction. *CyberPsychology & Behavior*, 5(2), 125-128.
3. Bargh, J., McKenna, K., & Fitzsimons, G. (2002). Can you see the real me? Activation and expression of the "true self" on the Internet. *J. Social Issues*, 58(1), 33-48.
4. Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-Spectrum Quotient (AQ): Evidence from Asperger Syndrome/ High-Functioning Autism, Males and Females, Scientists and Mathematicians. *J. Autism and Developmental Disorders*, 31(1), 5-17.

5. Bessière, K., Kiesler, S., Kraut, R., & Boneva, B. (2008). Effects of Internet Use and Social Resources on Changes in Depression. *Information, Communication & Society*, 11(1), 47 - 70.
6. Bourdieu, P. (1985). The forms of capital. In JC Richardson (Ed.), *Handbook of Theory and Research for the Sociology of Education* (pp. 241-258). New York: Greenwood.
7. Burke, M., Kraut, R., Williams, D. (2010). Social use of computer-mediated communication by adults on the autism spectrum. In *Proc. CSCW 2010*: 425-434.
8. Burke, M., Marlow, C., & Lento, T. (2010). Social network activity and social well-being. In *Proc. CHI 2010*: 1902-1912.
9. Caplan, S. (2005). A social skill account of problematic Internet use. *J. Communication*, 55(4), 721. Coleman, J. S. (1988). Social Capital in the Creation of Human Capital. *The American Journal of Sociology*, 94, 95-120.
10. Collins, N., & Miller, L. (1994). Self-disclosure and liking: A meta-analytic review. *Psychological Bulletin*, 116(3), 457-475.
11. Ellison, N., Steinfield, C., & Lampe, C. (2007). The Benefits of Facebook" Friends:" Social Capital and College Students' Use of Online Social Network Sites. *JCMC*, 12(4), 143-1168.
12. Ellison, N., Steinfield, C. & Lampe, C. (In press). Connection Strategies: Social capital implications of Facebook-enabled communication practices. *New Media & Society*.
13. Gilbert, E., & Karahalios, K. (2009). Predicting tie strength with social media. *Proc. CHI 2009*, 211-220.
14. Goldsmith, D., & Baxter, L. (1996). Constituting relationships in talk: A taxonomy of speech events in social and personal relationship. *Human Communication Research*, 23(1), 87-114.
15. Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology*, 78(6), 1360.
16. Hampton, K. N., Sessions, L. F., & Her, E. J. (2009). Social Isolation and New Technology. *Pew Internet and American Life Project*.
17. Hancock, J., Toma, C., and Fenner, K. 2008. I know something you don't: the use of asymmetric personal information for interpersonal advantage. In *Proc. CSCW'08*. ACM, New York: 413-416.
18. Haythornthwaite, C., & Wellman, B. (1998). Work, friendship, and media use for information exchange in a networked organization. *J. the American Society for Information Science*, 49(12), 1101-1114.
19. Holmes T., and Rahe R. (1967). The Social Readjustment Rating Scale. *J Psychosomatic Research* 11(2): 213-8.
20. Katz, J., & Aspden, P. (1997). A nation of strangers? *Communications of the ACM*, 40(12), 81-86.
21. Keele, L., & Kelly, N. (2006). Dynamic Models for Dynamic Theories: The Ins and Outs of Lagged Dependent Variables. *Political Analysis*, 14(2), 186-205.
22. Knapp, M. L., & Vangeslisti, A. L. (2003). *Interpersonal communication and human relationships* (Vol. 5). Boston: Allyn and Bacon.
23. Kraut, R., Kiesler, S., Boneva, B., Cummings, J. N., Helgeson, V., & Crawford, A. M. (2002). Internet paradox revisited. *J. Social Issues*, 58(1), 49-74.
24. Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukhopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist*, 53(9), 1017-1031.
25. Landers, R., & Lounsbury, J. (2006). An investigation of Big Five and narrow personality traits in relation to Internet usage. *Computers in Human Behavior*, 22(2), 283-293.
26. Marlow, Cameron (2009). Maintained Relationships on Facebook. Retrieved from <http://overstated.net/2009/03/09/maintained-relationships-on-facebook>
27. McKenna, K., & Bargh, J. (1998). Coming out in the age of the Internet: Identity "demarginalization" through virtual group participation. *J. Personality & Social Psychology*, 75(3), 681-694.
28. McKenna, K., Green, A. S., & Gleason, M. (2002). Relationship formation on the Internet: What's the big attraction? *J. Social Issues*, 58(1), 9-31.
29. Mikami, A., Szwedo, D., Allen, J., Evans, M., & Hare, A. (2010). Adolescent Peer Relationships and Behavior Problems Predict Young Adults' Communication on Social Networking Websites. *Developmental Psychology*, 46(1), 46.
30. Oswald, D. L., Clark, E. M., & Kelly, C. M. (2004). Friendship Maintenance: An Analysis of Individual and Dyad Behaviors. *J. Social and Clinical Psychology*, 23(3), 413-441.
31. Papacharissi, Z., & Mendelson, A. Toward a New (er) Sociability: Uses, Gratifications, and Social Capital on Facebook. Paper presented at the Internet Research conference, Copenhagen, Denmark, October 2008.
32. Rosenberg, M. (1989). Society and the adolescent self-image (Rev. ed.). *Middletown, CT: Wesleyan University*.
33. Shklovski, I., Kraut, R., & Rainie, L. (2004). The Internet and social participation: Contrasting cross-sectional and longitudinal Analyses. *JCMC*, 10(1).
34. Valenzuela, S., Park, N., & Kee, K. (2009). Is There Social Capital in a Social Network Site?: Facebook Use and College Students' Life Satisfaction, Trust, and Participation. *JCMC*, 14(4), 875-901.
35. Valkenburg, P., & Peter, J. (2007). Internet communication and its relation to well-being: Identifying some underlying mechanisms. *Media Psychology*, 9(1), 43-58.
36. Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication research*, 23(1), 3.
37. Wellman, B., Quan Haase, A., Witte, J., & Hampton, K. (2001). Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, 45(3), 436-455.
38. Wellman, B., & Wortley, S. (1990). Different strokes from different folks: Community ties and social support. *American Journal of Sociology*, 96(3), 558-588.
39. Williams, D. (2006). On and off the 'net: Scales for social capital in an online era. *JCMC*, 11(2).
40. Zhao, S. (2006). Do Internet users have more social ties? A call for differentiated analyses of Internet use. *JCMC*, 11(3), 844.