

A Communication Multiplexity Approach to Social Capital: On- and Offline Communication and Self-Esteem

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Abstract

This study explores the mechanisms by which online social information seeking (i.e., monitoring Facebook friends) relates to social capital. Based on the extant literature, we propose a theoretical framework that includes communication activities across different channels operationalized as off-line participation, network structure on social network site operationalized as the number of actual online friends and network diversity, and self-esteem. Results from an online survey ($N = 223$) found a moderated mediation model in which participation in offline social activities mediated the relationship between social information seeking and self-reported bonding social capital, and self-esteem moderated this mediation. In addition, participation in offline social activities provided an additional channel to accessing bridging social capital. These results provide a theoretical framework for and suggest an approach of communication multiplexity to future research.

Keywords

social capital, offline social activities, self-esteem, moderated mediation

Social network sites (SNSs) are widely used communication platforms in the United States and around the world, and have emerged as an influential part of the contemporary media landscape. A national Pew survey showed that among all U.S. Internet users, 67% use at least one SNS, with 83% of those users comprising of 18- to 29-year-olds (Duggan & Brenner, 2013). Among these SNSs, Facebook has 1.4 billion users around the world, with 618 million users logging in every day (Social Networking Statistics, 2014).

The effectiveness of Facebook for nurturing and accessing social capital embedded in college students' social networks has been identified in a wide spectrum of research (e.g., Ellison, Steinfield, &

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Lampe, 2007, 2011; Valenzuela, Park, & Kee, 2009). In this study, we define social capital as resources accrued from human relations. Facebook—like other computer-mediated communication (CMC) tools—provides low-cost means to develop and maintain relationships by facilitating social exchanges between users (Resnick, 2002). The spectrum of communicative behavior on SNSs can be conceptualized along two dimensions: users can provide *self-generated* content in textual, visual, or audiovisual form, and Facebook allows *other-generated* content from users' online friends including comments and images. These information exchange behaviors facilitate relationship development and maintenance. As social capital is embedded in relationships, Facebook users can cultivate and access social capital from this website (Stefanone, Kwon, & Lackaff, 2012).

Recent evidence emerged that the impact of Facebook on social capital depends on how individuals use this site (Burke, Kraut, & Marlow, 2011; Ellison et al., 2011). Specifically, Ellison et al. (2011) found users employed three distinct connection strategies. Only social information seeking, defined as searching information about acquaintances with whom users are newly connected via Facebook, had a positive relationship with individuals' perceived access to social capital. Although Ellison et al. (2011) provided post hoc reasoning for this result, subsequent studies have yet to investigate *the mechanism* by which social information seeking facilitates access to social capital. As a coherent theory about what affects SNS users' access to social capital is lacking in the extant scholarship, we propose a theoretical framework based on prior empirical research which leverages three key components: communication activities across different channels, structural features of personal networks, and self-esteem.

First, prior research focused exclusively on how Facebook affects social capital (e.g., Ellison et al., 2007, 2011). This approach does not take the close connection between on- and offline communication via Facebook into account. Individuals use the site to reinforce their offline social networks (Ellison et al., 2007) and gain information from the site to facilitate offline interactions (Ellison et al., 2011). Thus, previous research may exaggerate the impact Facebook has on social capital and ignore the relative contribution of other communication channels. Communication multiplexity addresses how contemporary human relationships are developed and maintained through multiple channels (Haythornthwaite, 2005). The close connection between on- and offline communication via Facebook suggests that in order to fully understand the impact of Facebook on social capital, it is necessary to investigate how *offline* social interactions translate into individual access to social capital. Although some studies have addressed this connection (e.g., Wellman, Haase, Witt, & Hampton, 2001), no research has provided empirical evidence on the relationship between Facebook use, offline social interaction, and social capital. Thus, the first goal of this study is to investigate how offline communication influences the relationship between social information seeking and social capital.

Second, structural characteristics of personal networks influence levels of accessible social capital (Burt, 1992; Lin, 1982). Prior research focused on testing the impact of Facebook network size on social capital and showed that the number of actual friends on one's Facebook network demonstrated a curvilinear relationship with social capital (Ellison et al., 2011). Perhaps other structural characteristics also contribute to social capital. SNSs enable users to reach individuals from different backgrounds, which results in increasingly diverse personal networks. Typically online networks include relationships of all kinds like family, friends, work and school acquaintances, and strangers (Hampton, Goulet, Purcell, & Rainie, 2011). However, empirical evidence about how these increasingly diverse SNS networks affect users' access to social capital is lacking. We speculate that network diversity may function as a control variable in the process by which social information seeking affects individuals' access to bridging social capital.

Finally, supporting our third perspective, previous research provides consistent evidence which shows that self-esteem has a positive relationship with social capital (Ellison et al., 2007, 2011; Steinfield, Ellison, & Lampe, 2008). Individuals exhibiting high levels of self-esteem reported more access to social capital, and this relationship held independently of Facebook use. Therefore, we speculate that self-esteem may function as a *moderator* in the process of accessing social capital.

Leveraging scholarship on communication multiplexity (Haythornthwaite, 2005), network analysis (Coleman, 1988), and self-esteem (Steinfeld et al., 2008) on social capital, we conducted a systematic investigation on the mechanism by which social information seeking contributed to the development of social capital in a sample of college students. The literature review is structured as follows: We begin by conceptualizing social capital and reviewing the relationship between social information seeking and social capital via Facebook. Next, we explain how social information seeking and engagement in offline social activities relate to social capital. We then proceed to discuss the relationship between network size/diversity and social capital. Finally, we discuss the moderating role of self-esteem in this process.

Social Capital on Facebook

Defining social capital. Following the previous research (e.g., Bourdieu & Wacquant, 1992), we conceptualize social capital as resources accrued from human relationships. Specifically, we do not distinguish between on- or offline social capital because on- and offline communication are closely connected via Facebook (Ellison et al., 2007, 2011). Therefore, communication via one channel can be easily translated into another. Thus, the level of social capital individuals can access is a product of communication across channels.

Additionally, research distinguishes between two types of social capital—bonding and bridging—based on the networks from which they arise (Putnam, 2000). Bonding social capital is embedded in strongly connected individuals such as family or close friends. These ties involve strong emotional attachment. Therefore, they exchange support that requires more instrumental or relational efforts such as emotional and financial support (Wellman & Wortley, 1990).

In contrast, bridging social capital originates from weak tie relationships (Putnam, 2000). Although weak ties involve limited relational investment and emotional attachment, they can broaden social horizons and provide access to new and nonredundant information or resources (Granovetter, 1973; Williams, 2006). These ties are typically comprised of dissimilar contacts and are sometimes connected to groups one does not usually have access to (Granovetter, 1983), so they are more likely to provide novel resources.

Social information seeking and social capital. Earlier research demonstrates positive relationships between the intensity of Facebook use and the amount of social capital that can be accessed (Ellison et al., 2007; Valenzuela et al., 2009). These studies suggest that simply using Facebook results in social capital. However, recent scholarship contends that the impact of Facebook on social capital is moderated by users' communication behavior on these sites (e.g., Burke, Kraut, & Marlow, 2010; Burke et al., 2011).

Specifically, Ellison et al. (2011) factor analyzed connection strategies that Facebook users employed into three types: initiating, maintaining, and social information seeking. These connection strategies are directed toward different individuals. Initiating strategies allow for building connections with strangers that have never been met offline. Maintaining strategies are used to maintain existing relationships with close friends. Finally, social information seeking is used to find out information with newly connected acquaintances. Ellison et al. (2011) found that only social information seeking exhibited a positive relationship with accessing bonding and bridging social capital. Their post hoc reasoning attributes this effect to the abundance of personal information that Facebook profile pages contain about the profile owners, such as basic demographic information, personal interests, political views, and mutual friends. Therefore, social information seeking can reduce one's uncertainty about Facebook contacts. They further speculated that individuals can use this information to facilitate interactions *outside* Facebook and develop stronger relationships. As social capital

is embedded in human relationships, individuals who use social information seeking more are more likely to accrue greater amounts of social capital.

Although this post hoc explanation is plausible, no subsequent research has examined the mechanism by which social information seeking affects social capital development. Given that a coherent theory is lacking which explains this mechanism, we proposed three components from the extant literature: communication activities across different channels, structural features of SNS network, and self-esteem, which are reviewed subsequently.

Communication Multiplexity and Social Capital

Communication multiplexity provides the theoretical framework for the present study. According to communication multiplexity, human relationships are developed and maintained through different channels (Haythornthwaite, 2001). While traditionally individuals rely heavily on face-to-face communication and mail to keep in touch, new technology provides additional channels for relationship development and maintenance (Baym & Ledbetter, 2009; Boase, 2008; Haythornthwaite, 2005; Ledbetter, 2009; Mesch & Talmud, 2006). In fact, multimodality characterizes contemporary human relationships (Walther, 2011).

Furthermore, communication multiplexity also argues a positive relationship between the number of channels used for communication in one relationship and the strength of that relationship (Haythornthwaite, 2002). This is because strong ties involve more emotional attachment, which demands more communication activities to achieve and sustain. It is possible that strongly connected individuals use only one channel for social interactions. However, their greater need for interaction motivates them to seek out and configure new ways to communicate (Haythornthwaite, 2002). Therefore, strong ties employ multiple channels for their interactions. Empirical research supports this argument. For example, in a series of research on communication between members in an organization, researchers (Haythornthwaite, 2001; Haythornthwaite & Wellman, 1998) found that all participants would use one or two channels to keep in touch, but strongly tied individuals would use additional channels. Similar findings were also found in a longitudinal study (Igarashi, Takai, & Yoshida, 2005).

Specifically in the context of Facebook, prior studies focus exclusively on the effect of online communication. However, Facebook networks are based on offline networks (Ellison et al., 2007) and communication switches on- and offline (Ellison et al., 2011). Thus, it is essential to investigate the relationship between offline communication and social capital.

In this study, we operationalize offline communication as participation in offline social activities. Engaging in offline social activities is identified as an important technique of relationship development and maintenance (Aron, Norman, Aron, & McKenna, 2000; Canary, Stafford, Hause, & Wallace, 1993; Dindia & Baxter, 1987). When individuals engage in these activities, for instance, having dinner or going to a pub, they also communicate with each other. Therefore through participation in these social activities, individuals engage in communication with each other, thus initiating new relationships, maintaining existing ones and developing weak ones into strong.

Social capital is embedded in personal relationships. Thus, participating in offline social activities fosters one's access to social capital (Coleman, 1988; La Due Lake & Huckfeldt, 1998; Putnam, 2000) due to its effectiveness in relationship development and maintenance. Furthermore, recall that social information seeking can provide common ground for subsequent interactions and so reduce uncertainty about acquaintances on Facebook. Hence, social information seeking may facilitate offline social activities. This close connection between social information seeking and participation in offline social activities suggests that offline social activities may mediate the relationship between social information seeking and social capital. However, this mediation relationship may only apply to bonding social capital.

Based on communication multiplexity, the number of channels involved in a relationship should be positively related to the strength of that relationship (Haythornthwaite, 2001, 2002; Igarashi et al., 2005). Recall that bonding social capital originates from strong ties, which involve more emotional attachment and thus require more communication. As a result, individuals may need to employ multiple channels to achieve the level of closeness that is required to access bonding social capital. Therefore, it may be necessary to both use social information seeking and engage in offline social activities to access bonding social capital. Given the close connection between social information seeking and participation in offline social activities, we argue that offline activities may account for part of the relationship between social information seeking and bonding social capital.

On the contrary, bridging social capital mainly originates from weak ties. Therefore, employing multiple communication channels is not necessary for accessing bridging social capital. It does not mean that weak ties use only one channel to communicate. However, the low level of emotional attachment involved in weak ties does not require multiple channels for accessing bridging social capital. Thus, we argue that participation in offline social activities does not mediate the relationship between social information seeking and bridging social capital. Instead, it may function as an extra channel and make additional contributions to bridging social capital.

Hypothesis 1a: The relationship between social information seeking and perceived bonding social capital is mediated by participation in offline social activities.

Hypothesis 1b: Participation in offline social activities explains additional variance in perceived bridging social capital.

Note that as Ellison et al. (2011) specified, social information seeking is only targeted at newly connected acquaintances. Therefore, offline activities are not prerequisite for social information seeking because individuals do not need offline communication to initiate connections on Facebook and then search information about their contacts. Instead, social information seeking happens after online connections are initiated on Facebook and provides information that can facilitate offline communication. In other words, social information seeking happens prior to offline communication.

Social Capital and Network Characteristics

Structural features of social networks can influence access to social capital as well (e.g., Coleman, 1988; Lin, 1982). Earlier evidence demonstrates that online social network size has a positive relationship with the level of bonding social capital individuals perceive they have access to (Vergeer & Pelzer, 2009). Recent research found that the number of *actual* friends on Facebook was a better predictor than the number of friends (Ellison et al., 2011). This is because the meaning of *friend* on Facebook is different from that in everyday life. While “friend” in everyday life refers to individuals with strong mutual emotional attachment, this term on Facebook simply refers to any individuals who are connected (boyd, 2006). Thus, only a portion of Facebook friends count as actual friends (Ellison et al., 2011), who can provide bonding social capital.

However, one can only manage a certain number of close relationships. For instance, Dunbar (1996) argues that one can only maintain 150 stable relationships. Once beyond a certain limit, extra friends may not provide bonding social capital. Therefore, as Ellison et al. (2011) suggests, there should be a *curvilinear* relationship between the number of actual friends on Facebook and bonding social capital.

Hypothesis 2: The number of actual friends on Facebook has a curvilinear relationship with bonding social capital.

On the other hand, network diversity likely affects *bridging* social capital. Recall that bridging social capital refers to new, nonredundant information or resources, which are usually obtained from dissimilar social contacts. Thus, individuals with diverse networks are more likely to reach contacts from different backgrounds and exposed to novel resources, effectively increasing their access to bridging capital. In addition, we do not expect a curvilinear relationship between Facebook network diversity and bridging social capital because no evidence suggests that one can only manage certain levels of diversity in his or her network, or too much diversity may hinder one's access to bridging social capital. Thus,

Hypothesis 3: Facebook network diversity has a positive relationship with bridging social capital.

Social Capital and Self-Esteem

Research generated mixed results about the relationship between Internet use and psychological/social well-being. These results lead to different perspectives regarding the outcome of Internet use. The first perspective, known as the displacement hypothesis, argues that Internet use predicts more loneliness because the Internet deprives individuals of their time which could have been spent on offline communication (Putnam, 2000). One example is the study by Kraut et al. (1998). They found that Internet use was positively associated with loneliness and reduced levels of social support. However, their follow-up study revealed the opposite pattern over an extended period of time (Kraut et al., 2002). This discrepancy shows the weakness of the displacement hypothesis. In fact, this hypothesis is closely related to the technological characteristics of early CMC tools which separate on- and offline communication. As on- and offline communication are increasingly integrated into each other via more recent technology, this hypothesis will be less supported.

Subsequent research focuses on explaining how the impact of Internet use on psychological/social well-being is moderated by a third variable. Examples of moderator variables include extroversion/introversion, social anxiety, and self-esteem. Although these studies include different moderators, self-esteem—the fundamental evaluation of self—can influence social anxiety and personality (Bouvard et al., 1999; McCrae & Costa, 1988). Therefore, self-esteem may play a fundamental role in the process by which technology use influences psychological/social well-being.

Two major competing hypotheses are evident from previous research. The social compensation hypothesis contends that introverted, socially anxious, or low self-esteem individuals are more likely to benefit from Internet use because the Internet lowers the risk of communication (Campbell, Cumming, & Hughes, 2006; Desjarlais & Willoughby, 2010; Ellison et al., 2007; Forest & Wood, 2012; Steinfield et al., 2008). The anonymity and asynchronous communication enable individuals to polish their messages and construct optimal online personas (Walther, 1996). Besides, even if senders make inappropriate self-disclosure, they may not see receivers' disapproving reactions because receivers may carefully censor their responses to avoid any embarrassment in their conversations (Forest & Wood, 2012). Therefore, these CMC tools provide a sheltering place for those individuals who find offline communication difficult (Forest & Wood, 2012; McKenna, Green, & Gleason, 2002). This encourages them to engage in more social interactions and garner potential psychological, relational, and instrumental benefits from these interactions.

In contrast, the social enhancement hypothesis contends that extraverted, socially competent, or high self-esteem individuals gain disproportionately more benefits from Internet use (Burke et al., 2010; Kraut et al., 2002; Lee, 2009; Poley & Luo, 2012; Tian, 2011; Valkenburg & Peter, 2007). Their outgoing personality, high social skills, or positive self-evaluations make them more willing to engage in online interactions and better to communicate with others online. In fact, these

individuals are socially active both online and offline (Zywica & Danowski, 2008) and can garner more psychological, relational, and instrumental benefits from Internet use.

Based on these studies, we argue that self-esteem moderates the impact of Facebook on social capital, which empirical research supports. Ellison et al. (2007, 2011) found self-esteem was positively related to bonding and bridging social capital. Furthermore, the positive relationship between Facebook use and bridging social capital was greater among low self-esteem individuals, showing support for the social compensation hypothesis (Steinfeld et al., 2008). However, these studies focused exclusively on Facebook use and did not test how self-esteem interacts with *offline* communication to affect one's access to social capital.

When it comes to offline communication, high self-esteem individuals likely have an advantage. Research shows that self-esteem is positively related to extraversion (Kwan, Bond, & Singelis, 1997; McCrae & Costa, 1988) and involvement in social interactions (Barker, 2009). Therefore, high self-esteem individuals likely engage in more offline social activities, which should translate into more social capital. Thus, the effect of offline activities on bridging social capital should depend on self-esteem. In addition, although participation in offline social activities mediates the relationship between social information seeking and bonding social capital, this mediation should be *moderated* by self-esteem.

Hypothesis 4a: Self-esteem moderates the mediated relationship of participation in offline social activities between social information seeking and bonding social capital.

Hypothesis 4b: Self-esteem moderates the relationship between participation in offline social activities and bridging social capital.

Note that we do *not* expect self-esteem to moderate the relationship between social information seeking and participation in offline social activities because using information about Facebook contacts for offline interactions does not require special social skills or personality traits. Thus, individuals with high and low self-esteem should demonstrate no difference in this process. Figure 1 represents our moderated mediation model predicting bonding social capital.

Method

Sample

An online survey was conducted at a large northeastern university with participants recruited from introductory communication classes in spring 2013. An announcement of the survey was made on the class website, where students could find the link to the survey.

A total of 232 responses were collected. Nine were removed because those participants did not finish the survey or reported not to have a Facebook account, yielding a final sample of 223. Among the 222 participants that reported their gender, 110 were male. There were 53 freshmen, 66 sophomores, 86 juniors, and 17 seniors. Nearly two third of the sample identified as Caucasian (141), followed by Asian (44), African American (23), Hispanic (9), and other (6).

Measures

Bridging social capital ($M = 3.32$, $SD = 0.92$, Cronbach's $\alpha = .90$) and *bonding social capital* ($M = 3.14$, $SD = .90$, Cronbach's $\alpha = .76$) were measured with Ellison et al.'s (2011) scale assessing the amount of perceived bridging and bonding social capital participants reported.

Social information seeking was measured with Ellison et al. (2011)'s 4-item Likert-type scale that assesses connection strategies on Facebook. The original scale involves three dimensions, but only the 4 items that measure social information seeking were used ($M = 2.93$, $SD = .95$, Cronbach's $\alpha = .81$).

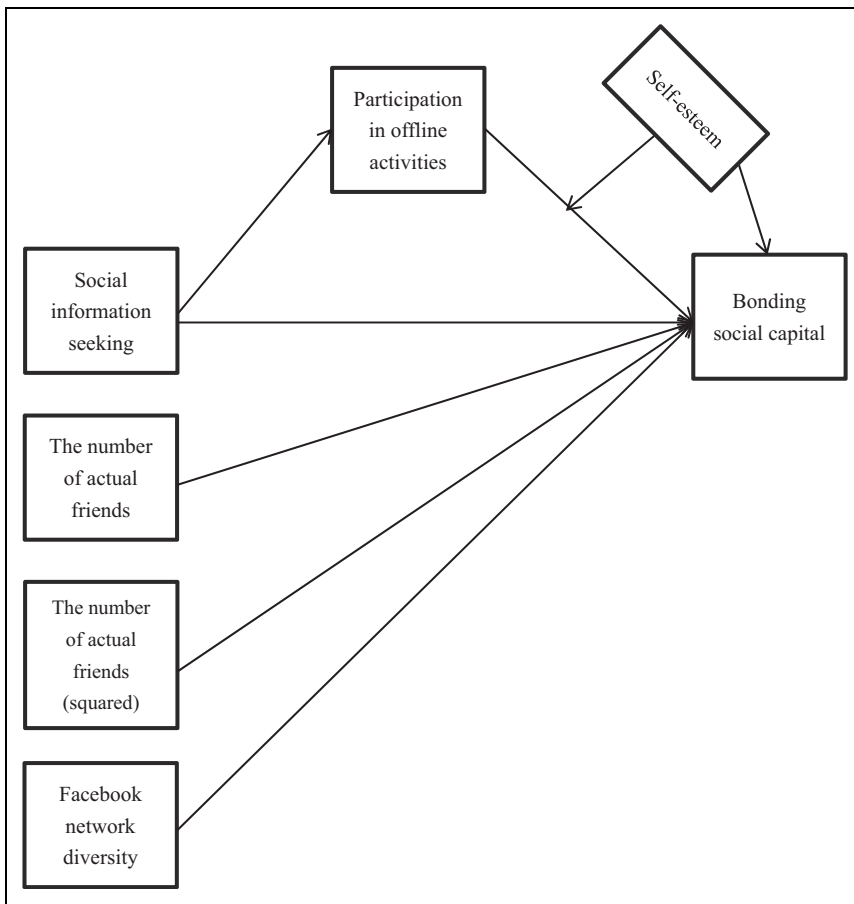


Figure 1. Theoretical model predicting bonding social capital.

Participation in offline social activities was measured with an 11-item scale ($M = 2.70$, $SD = .81$, Cronbach's $\alpha = .87$), developed from Li, Fang, Stanton, Feigelman, and Dong (1996) assessing adolescents' participation in a range of offline social activities. Respondents were asked to indicate their frequency of participation in listed social activities on a 5-point scale (1 = *never*, 2 = *several times in a year*, 3 = *once or twice per month*, 4 = *at least once a week*, 5 = *almost every day*). Table 1 shows all items and descriptive statistics for each.

Self-esteem was measured by Rosenberg's (1965) self-esteem scale, which involves 7 items on a 7-point Likert-type scale ($M = 3.93$, $SD = .83$, Cronbach's $\alpha = .89$).

The number of actual friends was measured by asking participants "approximately how many of your TOTAL Facebook friends do you consider actual friends?" Following Ellison et al. (2011), we did not provide specific definition of actual friends. Although this variable was skewed ($M = 122.77$, $SD = 195.15$), we did not transform it because residuals in our regression model were normally distributed, thus meeting the assumption of ordinal least squares regression (Cohen, Cohen, West, & Aiken, 2002).

Following Rui and Stefanone (2013), *network diversity* was measured with an additive index of a 14-item scale assessing a range of social categories participants reported to have on their Facebook network ($M = 8.95$, $SD = 3.15$). Examples of these social categories include immediate family, best friends/confidantes, people known through hobbies/recreation, coworkers, and neighbors.

Table 1. Items and Descriptive Statistics for Participation in Offline Social Activities.

Items	M	SD
Going to a pub for a drink	2.47	1.33
Going to a party	3.00	1.18
Going to movies with friends	2.74	1.08
Playing sports/working out with friends	3.32	1.30
Going to lunch/dinner with friends	3.71	1.18
Attending fraternity/sorority/other clubs	2.43	1.47
Cruising around/doing field trips/travelling with friends	2.66	1.13
Going to concerts with friends	2.42	1.12
Playing video games with friends	2.79	1.43
Playing cards or board games with friends	2.45	1.22
Going to the museum with friends	1.74	1.08

Note. $M = 2.70$, $SD = .81$. M = mean; SD = standard deviation. 1 = never, 2 = several times in a year, 3 = once or twice per month, 4 = at least once a week, 5 = almost every day.

Statistical Analysis

We employed Hayes (2013) to test our moderated mediation model. The model used bonding social capital as the dependent variable, social information seeking as the independent variable, participation in offline social activities as the mediator, self-esteem as the moderator, controlling for the number of actual friends, the squared term of the number of actual friends, and network diversity. We did not control any demographic information because these variables were not significantly correlated with bonding/bridging social capital. Although we did not propose a hypothesis about network diversity and bonding social capital, we still controlled for network diversity because it is possible that large Facebook networks are also diverse. The model was estimated for 1,000 bootstrapped samples.

The analysis procedure consists of two steps. First, participation in offline social activities is regressed on social information seeking and all control variables. Control variables are held constant to test their effects on the dependent variable. Second, the moderated mediation model is tested by including all variables and the product term between self-esteem and participation in offline social activities.

The moderated mediation relationship is determined by the extent to which the interaction effect is different from zero (Preacher, Rucker, & Hayes, 2007) and indicated by the 95% confidence interval (CI) of its effect size. If zero is included in the CI, a moderated mediation model cannot be established. Besides, we added the effect sizes of the moderated mediation and the direct relationship between social information seeking and bonding social capital, yielding the total effect. We then computed the ratio of the effect sizes between the moderated mediation and the total. This ratio indicates how much effect the moderated mediation relationship accounted for.

In addition, employing hierarchical multiple regression, we tested the moderation model predicting bridging social capital. In Block 1, the number of actual friends, the squared term of the number of actual friends, and network diversity were entered. Social information seeking and self-esteem were entered in Block 2, participation in offline social activities in Block 3, and the interaction term between participation in offline social activities and self-esteem in Block 4.

Results

Table 2 summarizes correlations between variables used in the analyses. On average, they spent 2.52 hr ($SD = 3.51$) on Facebook every day, and reported to have 535.03 friends on Facebook ($SD = 522.63$).

Table 2. Descriptive Statistics and Zero-Order Correlations for Variables; Means (Standard Deviations) Presented Along the Diagonal.

	Actual Friends	Diversity	SIS	Off-line	Bonding SC	Bridging SC	Self-Esteem
Actual friends	122.77 (195.19)	.16*	.06	.14*	-.01	.11	-.03
Diversity		8.95 (3.15)	.08	.07	.01	.13	.16*
SIS			2.93 (.95)	.32**	.33**	.33**	-.01
Off-line				2.70 (.81)	.43**	.36**	-.18
Bonding SC					3.14 (.90)	.63**	.33**
Bridging SC						3.32 (.92)	.38**
Self-esteem							3.93 (.83)

Note. SD = standard deviation; SIS = social information seeking; off-line = participation in off-line social activities; Bonding SC = bonding social capital; Bridging SC = bridging social capital.

* $p < .05$, ** $p < .01$.

The Moderated Mediation Model

Figure 2 shows the result of the moderated mediation model. First, a positive relationship was found between social information seeking and participation in offline social activities ($B = .25, p < .001$), $R^2 = .15, F(4, 217) = 9.27, p < .001$. Second, the direct effect between social information seeking and bonding social capital was significant ($B = .21, p < .001$), $R^2 = .42, F(7, 214) = 21.94, p < .001$. More important, the effect size of moderated mediation was estimated to be .08, with a 95% CI between .03 and .13. Because zero was not included in this CI, the moderated mediation was significant. In addition, adding up the effect sizes of the moderated mediation (.08) and the direct relationship (.21) makes the total effect size .29. Comparing the moderated mediation (.08) with the total effect shows that 27.58% of the total effect was attributed to the moderated mediation relationship.

Furthermore, the interaction between participation in offline activities and self-esteem was significant ($B = .31, p < .001$). Results of the simple effect test show that the relationship between participation in offline social activities and bonding social capital was only significant among high self-esteem individuals, $B = .15, 95\% \text{ CI}: [.08, .25]$ (see Figure 3).

In addition, the curvilinear relationship between the number of actual friends and bonding social capital was not supported ($B = .00, p < .052$). An interesting finding was that participation in offline social activities ($B = -.86, p < .001$) and self-esteem ($B = -.44, p < .03$) both demonstrated negative relationships with bonding social capital. In summary, Hypothesis 1a and Hypothesis 4a were supported, but Hypothesis 2 was rejected.

The Moderation Model

The regression model was not significant in Block 1, adjusted $R^2 = .03, F(3, 218) = 2.17, p < .094$. When social information seeking ($\beta = .32, p < .001$) and self-esteem ($\beta = .39, p < .001$) were entered in Block 2, the model improved significantly, adjusted $R^2 = .25, F(5, 216) = 16.06, p < .001$.

In Block 3, participation in offline social activities explained additional 7% of the variance in bridging social capital. In the final model (Block 4), social information seeking ($\beta = .25, p < .001$), self-esteem ($\beta = .40, p < .001$), participation in offline social activities ($\beta = .27, p < .001$), and the interaction between participation in offline social activities and self-esteem ($\beta = .12, p < .032$) exhibited positive relationships with bridging social capital, adjusted $R^2 = .33, F(7, 214) = 16.86, p < .001$ (see Table 3).

Following Aiken and West (1991), we examined the simple effects of participation in offline social activities on bridging social capital among participants who reported high level of self-esteem (one standard deviation [SD] above the mean) and who reported low level of self-esteem (one

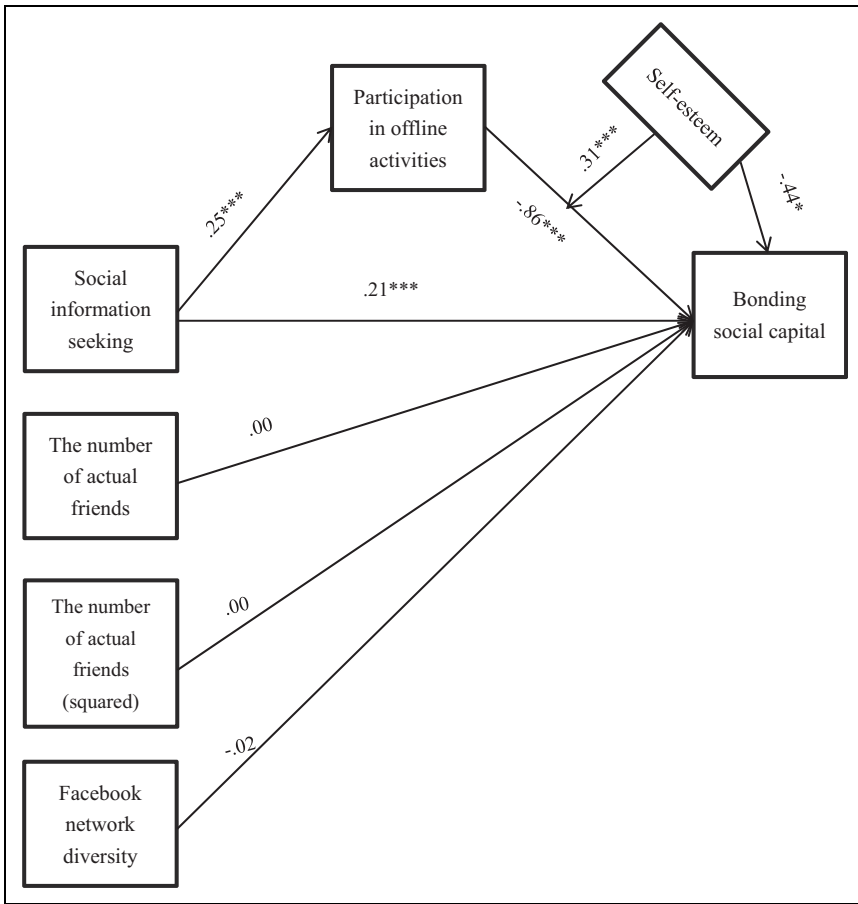


Figure 2. Moderated mediation regressing bonding social capital.

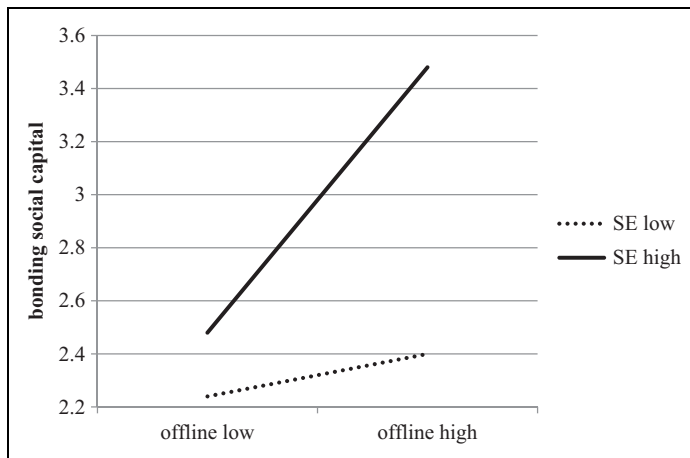


Figure 3. Self-esteem moderating the relationship between participation in off-line activities and bonding social capital.

Table 3. Hierarchical Multiple Regression Model Predicting Bridging Social Capital.

	Block 1		Block 2		Block 3		Block 4	
	β	SE	β	SE	β	SE	β	SE
Actual friends	.18	.00	.13	.00	.02	.00	.02	.00
Actual friends (squared)	-.11	.00	-.04	.00	.05	.00	.05	.00
Diversity	.12	.02	.04	.02	.03	.02	.02	.02
Incremental R^2	.03							
SIS			.32***	.06	.24***	.06	.25***	.06
Self-esteem			.39***	.05	.39***	.05	.40***	.05
Incremental R^2			.24***					
Off-line					.29***	.06	.27***	.06
Incremental R^2					.07***			
Interaction, off-line \times self-esteem							.12*	.05
Incremental R^2							.01*	
Adj. R^2 , F							.33***, $F(7, 214) = 16.86$	

Note. SIS = social information seeking, off-line = participation in off-line social activities.

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

SD below the mean). A significant relationship between participation in offline social activities and bridging social capital was only found among high self-esteem individuals ($\beta = .39, p < .001$) but not among low self-esteem individuals ($\beta = .14, p < .13$, see Figure 4). Therefore, Hypothesis 1b and Hypothesis 4b were supported, but Hypothesis 3 was rejected.

Discussion

The popularity of Facebook triggered a wide spectrum of research on the relationship between Facebook use and social capital. Built from Ellison et al. (2011), the present study seeks to better understand the mechanisms by which social information seeking facilitates individual access to bonding and bridging social capital within the framework of communication multiplexity. Three relevant components were identified in the extant literature: communication activities across different channels operationalized as participation in offline social activities, the structural features of SNS network operationalized as the number of actual friends and Facebook network diversity, and self-esteem. We found a moderated mediation model in which participation in offline social activities mediated the relationship between social information seeking and bonding social capital and self-esteem moderated this mediation relationship. Besides, we found participation in offline social activities explained additional variances in bridging social capital, and self-esteem moderated this relationship. Going beyond simply demonstrating the relationship between Facebook use and social capital, our results shed light on the mechanism by which social information seeking affects different types of social capital. Although prior research suggests some of our findings such as the close connection between on- and offline communication, we are the first to provide empirical evidence supporting these relationships. Our results extend the scholarship on communication multiplexity and produce implications for understanding of how new media and offline communication are intertwined to affect different types of social capital.

Major Findings

Perhaps the most interesting finding is our moderated mediation model predicting bonding social capital. Specifically, the relationship between social information seeking and bonding social capital

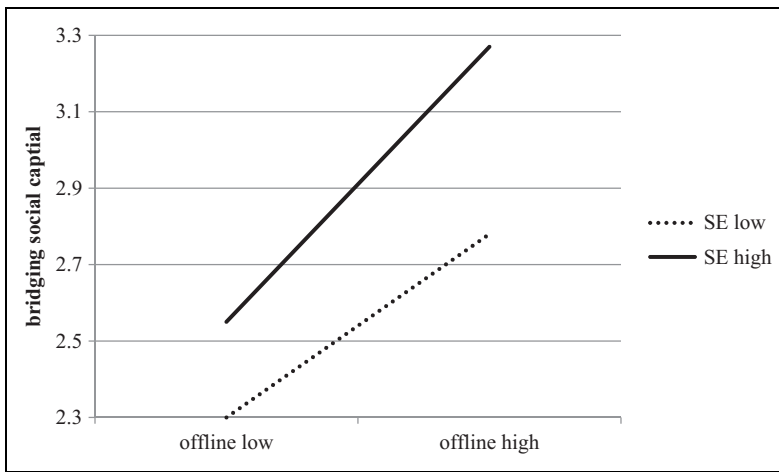


Figure 4. Self-esteem moderating the relationship between participation in off-line activities and bridging social capital.

was mediated by participation in offline social activities, and this relationship was moderated by self-esteem. The mediation relationship first provides empirical evidence supporting Ellison et al. (2011)'s post hoc explanation that social information seeking functions as a catalyst for offline social interactions. Facebook profiles contain large amounts of information that reduces users' uncertainty about their social contacts and provides common ground for their subsequent communication encounters. Therefore, social information seeking can facilitate future interactions. This result increases our knowledge about why Facebook is effective for accessing social capital. Prior research suggests that the reason is Facebook lowers the costs associated with maintaining large social networks and developing personal relationships. Our result provides an additional reason: Facebook facilitates offline social interaction. Taking a perspective of media ecology, this explanation suggests that the effectiveness of Facebook and possibly other SNSs may lie in their ability to facilitate offline communication.

In addition, this result lends support to communication multiplexity. Contemporary social relationships are developed through a wide range of communication channels, which prior research shows (e.g., Baym, 2009). However, most research is descriptive in only showing the use of multiple channels to relationship development (Walther, 2011). We furthered the scholarship by demonstrating how different channels are intertwined to influence social capital. Furthermore, by comparing the different mechanisms of bonding and bridging social capital development, our result suggests the boundary of communication multiplexity. Bonding social capital originates from strong ties, which involve strong emotional attachment. Thus, multiple communication channels are necessary for developing strong ties and accessing bonding social capital. In contrast, bridging social capital mainly results from weak ties. The minimum requirement for relational closeness means that individuals do not have to rely on a number of channels to develop strong emotional attachment for accessing bridging social capital. Instead, one single channel may be enough.¹ Based on our results, we argue that communication multiplexity functions as a useful approach to explaining relationship development and maintenance in the contemporary media landscape, especially for strongly connected social contacts.

Unexpectedly, participation in offline social activities exhibited a *negative* main effect on bonding social capital (Figure 2). However, this result should not be interpreted as evidence that offline interactions hinder social capital development. In fact, recall the positive relationship between

participation in offline social activities and bonding social capital among high self-esteem individuals. Thus, there may be other interpretations for this unexpected finding, which we offer next.

Based on results of the post hoc analysis, when the link between social information seeking and participation in offline social activities was *excluded*, participation in offline social activities was *positively* associated with bonding social capital.² Hence, social information seeking may exhibit a greater relationship with bonding social capital than participation in offline social activities. One explanation is that social information seeking can facilitate accessing bonding social capital by providing common ground for subsequent communication. In other words, compared with participation in offline social activities, social information seeking has the potential to combine both on- and offline communication, thus more effective to accessing bonding social capital.

This does not mean that participation in offline social activities is unimportant to bonding social capital. Perhaps it is not one single communication channel that individually affects bonding social capital. Instead, the process by which social information seeking facilitates offline communication contributes to bonding social capital. This suggests an interdependent relationship between social information seeking and offline communication, at least in the context of accessing bonding social capital. Based on our observations, we argue that the traditional approach to researching individual impacts of communication channels can miss the nuanced, interdependent relationship between different channels and cause misunderstanding on the impact of communication channels on social capital.

Moreover, we examined a moderation model predicting bridging social capital. Besides social information seeking and self-esteem, we found participation in offline social activities was positively related to bridging social capital. Based on our results, we propose the relationship between social information seeking, offline communication, and bridging social capital as mentioned subsequently. First, due to low levels of emotional attachment for weak ties, multiple channels are not required for accessing bridging social capital. Thus, social information seeking alone can predict bridging social capital. However, offline communication functions as an additional channel to accessing bridging social capital. In other words, offline communication may not be required for accessing bridging social capital, but individuals can garner additional benefits from engaging in offline communication. This relationship shows the multimodal nature of human relations and thus supports communication multiplexity.

In addition, we found participation in offline social activities was positively related to bonding/bridging social capital only among *high self-esteem* individuals. High self-esteem is related to extraversion, less social anxiety, and more social interactions. Thus, high self-esteem individuals gain more social capital from participating in offline social activities. This result suggests the key role that self-esteem plays in the process of accessing social capital. Although on- and offline communication can contribute to social capital, low self-esteem individuals may not be able to garner these benefits because their relatively low self-evaluations can prevent them developing meaningful relationships that will be ultimately translated into beneficial resources.

Although self-esteem moderated the relationship between participation in offline social activities and both types of social capital, the moderation effect for bonding social capital ($B = .31, p < .001$) is stronger than that for bridging social capital ($B = .17, p < .031$). One explanation is the difference between bonding and bridging social capital. Because bonding social capital originates from strong ties, individuals need to invest more time and effort developing relational closeness, which requires more interactions. As high self-esteem is related to more social interactions, low self-esteem individuals may experience more challenges when accessing bonding social capital than bridging social capital.

Finally, we examined how Facebook network characteristics affected social capital. However, the expected curvilinear relationship between the number of actual friends and bonding social capital was not found. One reason is that participants have different understandings of the term *actual friend*. Some may consider actual friends as those they share strong emotional bonds with, but some

may expand the definition to anyone they have met in person. Yet only the former can provide bonding social capital. Thus, the reported number of actual friends in our study may be inflated. Although we followed Ellison et al. (2011) and avoided specifying a definition of actual friends, the difference between their results and ours suggests that future research would benefit by clearly defining actual friends as those sharing strong emotional connections with participants.

We did not find any relationship between Facebook network diversity and bridging social capital. It may be because college students' networks are homogeneous, mainly composed of friends, family, and classmates. Additionally, we operationalized network diversity as relational diversity, but other types of network diversity may be more effective for accessing bridging social capital. Recall that bridging social capital refers to novel information or resources, which can be obtained from individuals that have different experiences or backgrounds. Therefore, cultural or occupational diversity may be better predictors of bridging social capital.

Limitations

Although this moderated mediation model was supported and the positive relationship between social information seeking and bonding social capital replicates the findings from Ellison et al. (2011), closer inspection reveals several potential problems. First, while bonding social capital originates from *strong ties*, social information seeking is a connection strategy targeted at *acquaintances*, so how these two discrepant constructs are related remains a question. One possible explanation is that social information seeking (perhaps along with other communication channels) facilitates the development of acquaintanceships into strong ties, which then leads to bonding social capital.

Alternatively, there may be measurement error with social information seeking. Perhaps what the scale really measured is not only a connection strategy targeted at acquaintances but a wider range of relationships including strong ties. After all, examining close friends' profiles is common. The conceptualization and operationalization of social information seeking need to be refined with additional research.

Second, we found that social information seeking predicted social capital, but the cross-sectional nature of our study prevents us from making causal arguments. It is possible that social information seeking and social capital covary and a nonrecursive relationship exists between them: Perhaps Facebook users with more social capital are motivated to find out more about their social contacts. Given the scarcity of theory and empirical evidence, we cannot provide a solid argument about the relationship between social information seeking and social capital. Longitudinal research can resolve this issue.

Another potential problem related to the cross-sectional design of this study is the relationship between social information seeking and participation in offline social activities. It is possible that individuals active in offline interactions tend to use social information seeking to learn more about those they know offline. However, Ellison et al.'s (2011) explanation provides a theoretical basis for our findings, and results from the post hoc analyses add to the strength of our findings.³ In addition, this relationship only applies to local ties. For distant ties, social information seeking may not lead to participation in offline social activities due to the geographic distance. Yet this does not mean that communication multiplexity does not apply to distant relationships. Mediated communication such as texting and phone calls may be intertwined with social information seeking to affect bonding social capital. Future research is needed on accessing social capital from distant ties.

Next, our study focuses on Facebook, where users' online social networks are similar to their off-line networks. As a result, interactions via Facebook can easily translate to offline. However,

SNSs that do not replicate offline personal network—such as Twitter—may have limited impact on off-line interactions and social capital.

Additionally, using a convenience sample of college students may limit the generalizability of our findings. College students are different from the general population because they are highly homogeneous and heavy SNS users. However, these characteristics should not change the relationship between social information seeking and participation in offline social activities and the moderating effect of self-esteem. Therefore, our results should be replicable in a different population.

Finally, we operationalized offline communication as participation in offline social activities. Although prior research shows close connections between these two concepts, they are not entirely the same. Therefore, we assume offline communication happens during these activities. Although it is very likely, caution is required to interpret our findings and better operationalization and measures are needed for future research.

Practical Implications

Our research provides the following practical implications on how to use Facebook to optimize one's pursuit of relational and instrumental goals. First, because accessing bridging social capital does not require multiple communication channels, Facebook alone can be an effective tool. However, different connection strategies can cause different outcomes, so individuals should use social information seeking more. Besides, our result shows that the effectiveness of Facebook to accessing bonding social capital may lie in its ability to trigger offline interactions. Therefore, individuals should use similar features that enable them to conduct offline interactions with their social connections such as organizing offline events with their friends. Designers should also develop more features that facilitate offline social interactions.

Theoretical Implications

In terms of theoretical implications, we tested and developed communication multiplexity. First, by showing both social information seeking and participation in offline social activities contributed to social capital, we provide evidence which supports communication multiplexity. Second, we found empirical evidence about the mediating role of offline communication between social information seeking and bonding social capital. This demonstrates that communication across different channels is deeply integrated into each other and together they influence social capital development. Furthermore, by showing the different roles that offline communication plays in the process by which social information seeking affects bonding/bridging social capital, our results suggest the boundary of communication multiplexity, which may depend on different types of social ties. Based on all these implications, we argue that communication multiplexity is a valuable approach to investigating the impact of new technology on human communication. Future research should go beyond studying individual impacts of different communication channels and take an ecological perspective to examine the interdependent relationship of communication across different channels.

In addition, although prior research has generated enough evidence on the effectiveness of SNSs to accessing social capital, we extended these studies by explicating the mechanism by which social information seeking affects social capital. Specifically, we provided a theoretical framework for future research. This framework covers three types of variables that contribute to social capital in the extant literature: communication activities across different channels, self-esteem, and network structure. Our results suggest the mediating role offline communication activities and the moderating effect of self-esteem for bonding social capital. Besides, multiple communication channels make additional contributions to accessing bridging social capital. Considering the absence of a coherent

theoretical framework in the extant literature about the impact of new technology on social capital, this may be the most important contribution of this study.

Future Research

We suggest the following directions for future research. First, longitudinal research is recommended to more comprehensively account for the dynamics of SNS use, offline social activities, and social capital accrument, and enable researchers to make causal arguments. Second, future research can investigate how *enacted* social capital, instead of perceived social capital, is affected in this process (see, e.g., Stefanone et al., 2012). Finally, as discussed previously, our findings may not be generalizable to other SNSs due to different technological affordances of these technologies. A systematic understanding of the impact of new media on communication should take into account technological characteristics of different new media. Hence, future research should test the boundary of our proposed model in different SNSs.

Conclusion

This study presents an exploratory attempt to understand the complex dynamics between online or offline communication, self-esteem, network characteristics, and social capital. A moderated mediation relationship was found, in which participation in offline social activities mediated the relationship between social information seeking and bonding social capital, and self-esteem moderated this relationship. In addition, participation in offline social activities makes additional contribution to accessing bridging social capital, and self-esteem moderated this relationship. Therefore, we demonstrate that social capital accrument in the contemporary media landscape is a complex process affected by communication both online and offline, with self-esteem being key in this process.

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Notes

1. We conducted post hoc analyses on a moderated mediation model predicting bridging social capital with the same variables. The 95% confidence interval (CI) of the moderated mediation relationship was [.001, .11] and its effect size was .04. Although zero was not included, the lower bound of this CI was on the border. Therefore, we decided to take a conservative approach in order not to inflate the probability of Type I error.
2. We conducted post hoc analyses on a model that was the same as our moderated mediation model, but excluded the direct relationship between social information seeking and participation in offline social activities. Social information seeking ($B = .21, p < .001$), participation in offline social activities ($B = .28, p < .001$), self-esteem ($B = .33, p < .001$), and the interaction between participation in offline social activities and self-esteem ($\beta = .21, p < .001$) exhibited positive relationships with bonding social capital, adjusted $R^2 = .40, F(7, 214) = 21.94, p < .001$.

3. We conducted post hoc analyses on a model in which participation in offline social activities was the *independent* variable, and social information seeking was the *mediator*, with all other variables same as the moderated mediation model. The 95% CI of the moderated mediation relationship was $[-.01, .10]$. Therefore, the moderated mediation was not supported. This shows the strength of our model.

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