Communication Research

Attitudes Toward Online Social Connection and Self-Disclosure as Predictors of Facebook Communication and Relational Closeness

Andrew M. Ledbetter, Joseph P. Mazer, Jocelyn M. DeGroot, Kevin R. Meyer, Yuping Mao and Brian Swafford

The online version of this article can be found at:

Published by:

⑤SAGE

Additional services and information for *Communication Research* can be found at:

Email Alerts: http://crx.sagepub.com/cgi/alerts

Subscriptions: http://crx.sagepub.com/subscriptions

Reprints: http://www.sagepub.com/journalsReprints.nav

Permissions: http://www.sagepub.com/journalsPermissions.nav

Citations: http://crx.sagepub.com/content/38/1/27.refs.html

Attitudes Toward Online Social Connection and Self-Disclosure as Predictors of Facebook Communication and Relational Closeness

Andrew M. Ledbetter[1], Joseph P. Mazer[2], Jocelyn M. DeGroot[3], Kevin R. Meyer[4], Yuping Mao[5], and Brian Swafford[6]

Abstract

This investigation tested a theoretical model of communication behavior with specific Facebook friends, such that attitudes toward (a) online self-disclosure, and (b) online social connection, predict Facebook communication frequency and, in turn, relational closeness. Participants included both undergraduates and older adults. Results generally supported the model, with the interaction effect between self-disclosure and social connection directly predicting Facebook communication and indirectly predicting relational closeness. For both dependent variables, online social connection was a positive predictor at low and moderate levels of online self-disclosure, but high levels reduced the association to nonsignificance. One implication of these results was that high-warrant information may discourage those with social anxiety from social network site communication.

Keywords

social network sites, online communication, Facebook, attitude, closeness

[1]Texas Christian University
[2]Clemson University
[3]Southern Illinois University-Edwardsville
[4]Illinois State University
[5]University of Alberta
[6]Ohio University

Corresponding Author:
Andrew M. Ledbetter, Department of Communication Studies, Texas Christian University, TCU Box 298045, Fort Worth, TX 76129
Email: a.ledbetter@tcu.edu

The recent widespread adoption of social network sites (SNS; boyd & Ellison, 2007) influences communication behavior in a variety of contexts, including political participation (Smith & Rainie, 2008), identity construction (Liu, 2007), collegiate teacher–student relationships (Mazer, Murphy, & Simonds, 2007), and adolescent friendships (Lenhart & Madden, 2007). Though users appropriate these sites for varied purposes, the maintenance of networked interpersonal relationships is their central attraction and function (Donath, 2007; Ellison, Steinfeld, & Lampe, 2007; Tufekci, 2008). Accordingly, such sites are now receiving attention from interpersonal communication researchers, though a theoretical understanding of how SNS may contribute to relational closeness remains in infancy (Baym & Ledbetter, 2009). Of the hundreds of SNS available on the Internet, Facebook is one of the most popular across a variety of demographic categories (Boyd & Ellison, 2007).

This article explores motivations toward self-disclosure and social connection as distinct yet related predictors of Facebook use within specific relationships. Though any number of specific interpersonal communication motivations might merit research attention, Facebook itself explicitly calls attention to these motivations in the site's slogan, prominently featured on the opening page: "Facebook helps you *connect* and *share* with the people in your life" (Facebook.com, 2009, emphasis added). Facebook creator Zuckerberg (2008) acknowledged that the site's features are designed with these two motivations in mind. Separately, Ledbetter (2009b) identifies self-disclosure and social connection as fundamental motivations that foster online interpersonal communication more generally. Given decades of debate regarding interpersonal outcomes associated with online communication (for a review, see Walther & Parks, 2002) and that interpersonal communication scholars identify relational closeness as an outcome of practical and theoretical interest (Vangelisti & Caughlin, 1997), the chief goal of this study is to test a theoretical model that elaborates how these two motivations might contribute to Facebook communication behavior (within specific interpersonal relationships) and, in turn, how such communication is associated with relational closeness.

Theoretical Background

Online communication's integration with offline social networks is seen clearly in the recent emergence of *social network sites* (SNSs), or "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system" (boyd & Ellison, 2007, p. 211). Though Facebook originated in 2004 as an SNS exclusively for college student use, the site soon opened to corporate networks in early 2006 and then to the general public by the end of that year (boyd & Ellison, 2007). As of this writing, Facebook remains one of the most popular SNSs across a variety of demographic categories (Hargittai, 2007). Yet before further considering the nature of interpersonal relationships on Facebook, we must address the ambiguous nature of the term *friend* when discussing SNS communication (boyd & Ellison, 2007). Though colloquial and

academic discourse generally applies the term only to nonfamilial platonic ties, several SNSs (including Facebook) use the term *friend* to describe any type of relational connection on the site. The potential for definitional confusion is obvious. To ameliorate this problem, we follow Boyd and Ellison's practice of capitalizing the word *Friend* when referring to SNS connections (which, truly, may be any type of relationship) versus the traditional understanding of friendship in interpersonal communication research (Rawlins, 1992).

During the past 20 years, scholars across a variety of disciplines have debated how online communication influences the quality of interpersonal relationships (Walther & Parks, 2002). Generally, early online communication research claims that the very nature of mediated communication (i.e., as a medium impoverished in nonverbal cues) serves to weaken online interpersonal ties (Short, Williams, & Christie, 1976; Sproull & Kiesler, 1986). However, subsequent theoretical development (e.g., Walther & Burgoon, 1992) challenges this conclusion, arguing that the human capacity for creativity fosters use of online communication that can equal, or even exceed, the quality of face-to-face communication (Walther, 1996).

This history suggests that the adoption of a new communication technology often raises concerns about deleterious effects on the quality of interpersonal relationships (Fischer, 2002; Kraut et al., 1998; Nie, Hillygus, & Erbring, 2002), and the emergence of Facebook is no exception to this trend (Henry, 2007; Tilsner, 2008). Despite this concern, recent empirical evidence suggests beneficial relational outcomes are associated with Facebook communication. Ellison and her colleagues (2007) noted that Facebook serves to build social capital, concluding that "online interactions do not necessarily remove people from their offline world but may indeed be used to support relationships and keep people in contact, even when life changes move them away from each other" (p. 1165). Other recent studies corroborate the conclusion that Facebook connects individuals to local and long-distance social ties (Hargittai, 2007; Quan-Haase, 2007), as do other SNSs (Baym & Ledbetter, 2009). Nevertheless, though much evidence suggests that Facebook use can produce positive relational outcomes, it is unlikely that it does so for every Facebook user. As Caplan's (2003, 2007) program of research notes, certain motivations to use online communication, such as social anxiety in offline settings, foster patterns of online interpersonal communication that produce deleterious psychosocial and relational outcomes. We argue that a balanced approach to Facebook communication must acknowledge the existence of relational outcomes that are both positive and negative and healthy and unhealthy. Understanding individual motivations to communicate via Facebook may explain such outcomes.

Online Communication Attitude

Following recent empirical evidence and theoretical development (Kelly & Keaten, 2007; Scott & Timmerman, 2005; Spitzberg, 2006), we argue that trait-like attitudes toward online communication influence the valence of relational outcomes from Facebook use. Ledbetter (2009b) builds from Rokeach's (1968) definition of attitude as "a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner" (p. 112), with these beliefs possessing both cognitive and

affective components. These affective/cognitive orientations, in turn, influence behavior toward the attitude object. Given the diverse manifestations of online communication, some may question whether research can speak meaningfully about an attitude toward online communication as a whole. Without denying the value of examining attitudes toward specific technologies, a robust research tradition examines trait-like orientations toward technology at a more abstract level, identifying constructs such as online communication apprehension (Scott & Timmerman, 2005), generalized problematic Internet use (Caplan, 2003), and information reception apprehension from technology sources (Wheeless, Eddleman-Spears, Magness, & Preiss, 2005) that significantly predict technology use and related outcomes. This investigation follows this tradition, with the hope that such knowledge will help build theory that explains both current and future communication technologies (Sawhney, 2007).

With this theoretical background in mind, Ledbetter (2009b) validates attitude toward online *self-disclosure* (OSD) and attitude toward online *social connection* (OSC) as two fundamental orientations influencing media-use patterns in interpersonal relationships, with similar concepts echoing in related lines of research (e.g., "disposition toward social grooming and privacy concerns," Tufekci, 2008, p. 561). Specifically, Ledbetter argues that these orientations address an individual's attitude toward the medium itself, which then influences both the formation and interpretation of online messages. That previous research recognizes both self-disclosure (Acquisti & Gross, 2006; Mazer et al., 2007) and social connection (Donath, 2007; Ellison et al., 2007) as core SNS behaviors further supports this line of argumentation; also, that Facebook's basic site structure aims to gratify both of these attitudinal orientations (Zuckerberg, 2008) further merits considering theoretical links between these motivations, communication behavior, and subsequent relational outcomes. We will review each of these orientations in turn.

OSD. Mazer and his colleagues (2007) provided perhaps the earliest peer-reviewed article on Facebook self-disclosure. Conceptualizing self-disclosure as "any message about the self that a person communicates to another" (Wheeless & Grotz, 1976, p. 47), Mazer and his colleagues identify several Facebook features that foster self-disclosure: "users post personal information such as pictures, hobbies, and messages to communicate with fellow students and instructors as well as friends and family" (p. 2). Building from Mazer and his colleagues' work and Petronio's (2002) treatment of self-disclosure as coordinating boundaries around private information, Walther and his colleagues (Walther, Van Der Heide, Kim, Westerman, & Tong, 2008) noted that self-disclosure occurs alongside information about the self provided by other users (e.g., through "wall" posts or comments on status messages). Wright and his colleagues (Wright, Craig, Cunningham, Igiel, & Ploeger, 2008) further validate the importance of self-disclosure behavior via Facebook, finding that breadth and depth of self-disclosure is associated with increased interdependence and predictability. Thus, as Facebook's own slogan claims, the site is indeed a location where users share information about the self with a proscribed set of others.

Communication researchers have long recognized the role of self-disclosure in healthy relational development (Petronio, 2002), and Mazer et al. (2007) likewise report that Facebook self-disclosure can enhance the quality of teacher–student relationships.

However, evidence from other studies of online communication suggests that generalized attraction to OSD may be associated with negative psychological and relational outcomes. Online communication scholars have long considered the antecedents and outcomes of identity formation and self presentation enacted via OSD (O'Sullivan, 2000; Turkle, 1995), with several studies reporting that communicators often self-disclose more online than they do when face to face (Ho & McLeod, 2008; Joinson, 2001; Postmes, Spears, & Lea, 1998). McKenna, Green, and Gleason (2002) focused on self-disclosure in online-only relationships, arguing that lack of social competence may account for heightened self-disclosure online because those with poor social skills may prefer the greater control over communication behavior that online contexts afford:

> Logically, those individuals . . . who have the social skills needed to communicate themselves well and effectively have little need to express their true selves or "Real Me" over the Internet. The rest of us should be glad that the Internet exists. . . . Thus we would expect people who are lonely or are socially anxious in traditional, face-to-face interaction settings to be likely to feel better able to express their true self over the Internet and so to develop close and meaningful relationships there. (p. 12)

Thus, they argue that motivation to self-disclose online may produce beneficial relational outcomes, as online communication may provide the socially anxious with opportunities to build social skills and meaningful relationships (see also Valkenburg & Peter, 2008).

Like McKenna et al. (2002), Caplan (2003) agreed that poor social skills are associated with a preference for online communication (and particularly online self disclosure). Caplan (2007) identified lack of communication competence as a theoretical motivator, arguing that those with high social anxiety prefer online communication's "greater control over self presentation" and "less perceived social risk, than in traditional FtF communication" (p. 235). Yet Caplan (2003) challenged the claim that such use generates positive outcomes, demonstrating that preference for online communication is associated with depression, loneliness, and other negative psychosocial outcomes. Though Caplan's (2002) research initially focused on online and offline social life as separate social spheres, his recent research identifies communication competence as a more general influence on online communication behavior; in other words, Caplan (2007) does not theorize or test whether relational medium of origin or degree of multimodality influences online communication frequency. Relatedly, Spitzberg's (2006) overview of communication competence in online contexts concludes that loneliness and depression are related to online communication use in complex ways. Following these lines of theoretical development, Ledbetter (2009b) directly tested the association between OSD and generalized communication competence, finding a significant moderate inverse association between the two constructs.

To summarize, self-disclosure is an important Facebook communication behavior, and thus we would expect those with high OSD to use it more. Moreover, Caplan's (2003, 2007) research also suggests that high OSD may be associated with avoidance of face-to-face communication, even in relationships where dyads have previously communicated face to face. Thus, we hypothesize:

Hypothesis 1: OSD positively predicts frequency of Facebook communication (with specific Facebook Friends).

Hypothesis 2: OSD inversely predicts frequency of offline communication (with specific Facebook Friends).

OSC. In contrast to OSD, we argue that maintaining existing social connections (i.e., OSC) is a relationally healthier motivation for using online communication. Ledbetter (2009b) reports that both OSC and OSD exhibit similar patterns of association with online communication behavior, yet differ in their association with generalized communication competence: Though OSD is inversely associated with communication competence, OSC yields a positive association of nearly equivalent magnitude. This may suggest that communicatively competent people do not seek online communication because they wish to avoid discomfort attendant with face-to-face communication, but rather because they perceive online communication as a useful method for sustaining preexisting weak and strong social ties (Haythornthwaite, 2005).

Other research supports our assertion that OSC is associated with positive relational outcomes. When countering claims that online communication (i.e., more generally than just SNS use) produces negative relational outcomes (Kraut et al., 1998; Nie et al., 2002), scholars frequently provide empirical evidence demonstrating beneficial outcomes for the strength of both local and long distance social ties (Baym, Zhang, & Lin, 2004; Quan-Haase, Wellman, Witte, & Hampton, 2002). That SNSs likewise maintain social networks may sound tautological; nevertheless, recent research elaborates mechanisms via which SNSs foster such connections. For example, Ellison and her colleagues (2007) reported that Facebook social connections develop several types of social capital, Stern and Taylor (2007) reported that college students use Facebook to maintain social connections developed on campus and with old friends, and Baym and Ledbetter (2009) suggested that shared interests may motivate the formation of some SNS relationships.

In addition to Ledbetter (2009b), other empirical evidence suggests that internal attitudinal factors influence attraction to online communication as a space for building social connections. Both Donath (2007) and Tufekci (2008) conceptualized SNS use as analogous to social grooming among primates (Dunbar, 1998), advancing the claim that resources devoted to regular, brief contacts facilitate relational ties with other individuals in a social network. Tufekci noted that this desire for social grooming varies in magnitude across individuals, with some people valuing such behaviors and others considering them unnecessary; in Tufekci's study, those who generally desire social grooming were also more likely to use an SNS. Donath claims that this motivation arises from the nature of SNSs as "more temporally efficient and cognitively effective" for the purpose of "maintaining ties" (p. 231). Donath noted that this increased efficiency may facilitate formation of *social supernets* or social networks that are larger than those sustainable through other communication media. This line of theoretical development resonates with Parks' (2006) recent argument that all dyadic relationships are intimately constituted in webs of network ties, with individuals sustaining ties using several communication media (Sawhney, 2007; Walther & Parks, 2002).

Taken as a whole, then, this research indicates that many people use SNSs because they wish to maintain existing social ties and that this motivation, in contrast to OSD, is associated with positive relational and psychosocial outcomes. What remains less clear, however, is the extent to which OSC is associated with offline communication between Facebook Friends. Some research suggests that those who engage in social networking behavior when online are also likely to do so when communicating offline (Quan-Haase et al., 2002; Tufekci, 2008). Thus, we argue that OSC may positively predict not just frequency of Facebook communication but also that of offline communication. We hypothesize:

Hypothesis 3: OSC positively predicts frequency of Facebook communication (with specific Facebook Friends).
Hypothesis 4: OSC positively predicts frequency of offline communication (with specific Facebook Friends).

We also expect a significantly positive association between Facebook communication frequency and offline communication frequency. Though media multiplexity theory (Haythornthwaite, 2005) suggests that tie strength is a moderator (i.e., such that strong ties communicate across many media whereas weak ties use fewer media), most studies find a significantly positive association between offline and online frequency with a specific relational partner (Baym et al., 2004; Ramirez & Broneck, 2009). Thus,

Hypothesis 5: Facebook communication is positively associated with offline communication (with specific Facebook Friends).

Facebook Communication and Relational Closeness

Thus far, we have considered relational outcomes associated with Facebook communication but have not specified these in testable hypotheses. In this investigation, *relational closeness* is our chief outcome of interest, as Vangelisti and Caughlin (1997) noted that relational closeness is a variable of interest in a wide variety of relationship types (including friendship, family, and romantic relationships). Though we acknowledge that closeness is not the only possible relational outcome worthy of investigation, it is also worth acknowledging that close relationships are important sources of social support (Burleson & MacGeorge, 2002) and that ongoing closeness promotes relational longevity (Ledbetter, Griffin, & Sparks, 2007). Closeness has also received attention as an outcome variable associated with several forms of online communication behavior across diverse samples, including online relational maintenance (among U.S. college students; Ledbetter, 2009a), duration of Internet use (among Israeli adolescents; Mesch & Talmud, 2006), and both frequency of online communication and depth of online self-disclosure (among Dutch adolescents; Valkenburg & Peter, 2007). Though scholars have not devoted as much attention to closeness across SNSs, Baym and Ledbetter (2009) reported that though relational quality (a variable conceptually similar to closeness) with SNS Friends tends to be low, frequency of SNS contact between Friends is positively associated with relational quality (even after controlling for contact across other media). In this study, we conceptualize

closeness as a subjective experience of intimacy, emotional affinity, and psychological bonding with another person (see Aron, Mashek, & Aron, 2004); given the foregoing literature, we predict that frequency of Facebook communication will uniquely and positively predict Friend closeness.

Our conceptualization of closeness bears strong resemblance to Haythornthwaite's approach to *strong* and *weak* social ties in her theory of media multiplexity. Strong social ties include relationships such as those with friends, romantic partners, and family members; such relationships exhibit behavior that reflects emotionality, interdependence, and intimacy (i.e., a high level of closeness). By contrast, weak ties are "casual contacts" that are more loosely connected to an individual's social network and are not characterized by intimacy (Haythornthwaite, 2005, p. 128). According to media multiplexity theory, the number of different communication media that dyad members use is strongly associated with whether a tie is weak or strong. Specifically, strong ties employ several media types, but weak ties use only one or two media. As Baym and Ledbetter (2009) report that SNS communication explains variance in relational development beyond that explained by other communication media, we expect that Facebook communication will function similarly:

> *Hypothesis 6:* Offline communication positively predicts relational closeness (with specific Facebook Friends).
> *Hypothesis 7:* Facebook communication positively predicts relational closeness (with specific Facebook Friends).

As we argued earlier, previous research and theory (e.g., Caplan, 2007) suggests that online communication motivated by OSD is associated with negative outcomes. Nevertheless, some interpersonal communication theory (Altman & Taylor, 1973) and empirical research (Laurenceau, Barrett, & Pietromonaco, 1998) suggests that self-disclosure is positively associated with relational closeness. Thus, the computer-mediated communication and traditional interpersonal communication literatures offer divergent predictions regarding this association. Thus, we advance a research question:

> *Research Question 1:* Does OSD indirectly (i.e., mediated via Facebook and offline communication constructs) predict relational closeness (with specific Facebook Friends)?

Though earlier online research characterizes online communication as reducing a sense of social connection, work countering this claim demonstrates that those who build social connections offline also tend to do so online and, consequently, experience positive relational outcomes (e.g., Quan-Haase et al., 2002). This resonates with Ellison and her colleagues' (2007) work demonstrating increased social capital associated with Facebook use. Thus, to the extent that high OSC fosters Facebook use, we predict that OSC will indirectly predict relational closeness:

Hypothesis 8: OSC positively and indirectly (i.e., mediated via Facebook and offline communication constructs) predicts relational closeness (with specific Facebook Friends).

That extant literature suggests divergent outcomes from OSC and OSD implies that these motivations are inversely associated with each other. However, previous research reports a positive association between the two constructs (Ledbetter, 2009b); as such, it is theoretically unclear what outcomes arise from an individual who possesses high levels of both motivations. Following Caplan (2007), one might speculate that problematic Internet use driven by OSD would reduce beneficial outcomes from increased social connections. Alternatively, following theoretical arguments that online social ties may enhance the social skills of the lonely and socially anxious (McKenna et al., 2002; Valkenburg & Peter, 2008), it could stand to reason that OSC is associated with positive social outcomes regardless of an individual's level of OSD. In any case, the extant literature at least suggests the possibility of a meaningful interaction effect between these two constructs on online communication and relational closeness, though the available evidence does not permit a prediction of the nature of this association in advance. Thus,

Hypothesis 9: OSD is positively associated with OSC.
Research Question 2: Does the interaction effect between OSC and OSD predict Facebook communication (with specific Facebook Friends)?
Research Question 3: Does the interaction effect between OSC and OSD predict offline communication (with specific Facebook Friends)?
*Research Question 4:* Does the interaction effect between OSC and OSD indirectly predict relational closeness (with specific Facebook Friends)?

Figure 1 depicts all hypotheses and research questions together in a structural model. The overarching goal of this investigation is to evaluate this model's fit.

Method

Sampling and Participants

In order to capture a diverse sample of Facebook users, we recruited participants via three approaches. First, with the consent of the computing services department at a large Midwestern university, a random sample was drawn from the list of all students enrolled in undergraduate courses. Second, other participants were recruited through announcements on the Facebook pages of various members of the research team. Third, we posted a call for participants on the listserv of a professional organization interested in technology and communication. After discarding participants that indicated no Facebook usage ($n = 27$), these sampling techniques resulted in a group of 325 participants (75 men, 250 women) with 226 (69.5%) identifying themselves as undergraduate students. Participants' age ranged from 18 to 59 years ($M = 23.4$, $SD = 6.0$), and most participants (90.5%) reported their ethnic identity as White.
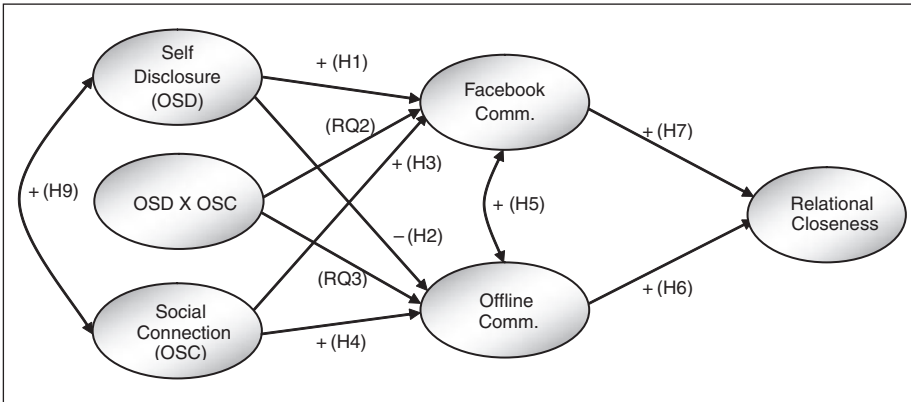
Figure 1. Hypothesized structural model predicting communication frequency and relational closeness

Note: Research Question 1, Hypothesis 8, and Research Question 4 are not depicted. These address indirect predictors of relational closeness, respectively: OSD (no direction predicted), OSC (positive predictor), and the interaction effect (no direction predicted).

Procedures

Recruitment procedures directed participants to a Web link containing an informed consent form, and upon acceptance, participants were taken to the secure online questionnaire. If the participants were Facebook users, the questionnaire instructed them to open their Facebook account in a separate window and load their profile. At the time of data collection (early 2008), Facebook profiles included a box at the left side of the screen that displayed Friends selected from a person's primary network. Although Facebook has not publicly discussed the algorithm behind Friend selection for this window, tests of the feature at the time seemed to indicate that Friend selection was at least pseudorandom (although it is worth noting that Facebook's recent site redesign seems to have altered this algorithm since data collection). This method of Friend selection was designed to move beyond the practice of participant friend selection common in friendship research (e.g., Johnson, Wittenberg, Villagran, Mazur, & Villagran, 2003; Ledbetter, 2009a). The survey directed participants to complete several measures based on the first Friend who appeared in this box. At the end of the survey, participants had the option of entering their e-mail addresses for a chance to win one of four US$20 gift certificates from Amazon.com. These e-mail addresses were removed from the data set before analysis.

Measurement

Online communication attitude. The self-disclosure and social connection subscales of Ledbetter's (2009b) generalized measure of online communication attitude assessed OSD and OSC, respectively. The self-disclosure subscale contains 7 items: "I feel less nervous

when sharing personal information online"; "I feel like I can be more open when I am communicating online"; "I feel like I can sometimes be more personal during Internet conversations"; "When online, I feel more comfortable disclosing personal information to a member of the opposite sex"; "I feel less shy when I am communicating online"; "I feel less embarrassed sharing personal information with another person online"; and "It is easier to disclose personal information online." The social connection subscale contains 6 items: "If I couldn't communicate online, I would feel 'out of the loop' with my friends"; "If I lost Internet access, I think I would probably lose contact with many of my friends"; "Without the Internet, my social life would be drastically different"; "I would communicate less with my friends if I couldn't talk with them online"; "Losing Internet access would not change my social life at all" (reverse coded); and "Online communication is not an important part of my social life" (reverse coded). For these questions, the questionnaire directed participants to consider online communication (i.e., "your opinion about communicating online [for example, e-mailing, instant messaging, etc.]") in interpersonal communication contexts (i.e., "how you communicate online in your family, friendship, and romantic relationships, not how you use online communication for school or work purposes.") Ledbetter (2009b) first establishes face validity by developing scale items from analysis of open-ended descriptions of online social life and then demonstrates evidence for the convergent and discriminant validity of these constructs via associations with usage experience and information reception apprehension from technology sources (Wheeless et al., 2005). Participants responded on a 7-point Likert-type scale with response options ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's alpha reliability was acceptable for both the OSD (.92) and OSC (.87) dimensions.

Friend demographic information. Participants reported basic demographic information about the randomly chosen Friend. Most reported that their Friend was a member of the participant's sex ($n = 193$, 59.4%), though others reported on cross-sex relationships ($n = 132$, 40.6%). Age of the Friend ranged from 17 to 60 ($M = 22.8$, $SD = 5.2$), with length of relationship ranging from 1 month to 43 years ($M = 4.3$ years, $SD = 5.2$). Most participants reported that their Facebook Friend was, indeed, a friend ($n = 204$, 62.8%) or an acquaintance ($n = 73$, 22.5%), though a small number reported on a romantic partner ($n = 11$, 3.4%), a family member ($n = 6$, 1.8%) or did not specify the type of relationship ($n = 31$, 9.5%). Though most participants reported on local relationships ($n = 221$, 68.0%), some reported on long-distance relationships ($n = 104$, 32.0%).

Facebook communication. Informed by Lenhart and Madden's (2007) description of the methods of communication possible within Facebook, a 6-point Likert-type scale assessed frequency of Facebook communication with the Friend. This measure contains 7 items: "I write on my friend's wall," "I send my friend a private message," "I communicate with the friend in a Facebook group," "I 'poke' my friend," "I comment on one of my friend's photographs," "I comment on one of my friend's notes," and "I communicate with the friend through an application on Facebook." Participants responded on a 6-point Likert-type scale with response options ranging from 0 (*never*) to 5 (*very frequently*). Following Baym and Ledbetter's (2009) evidence that communication frequency on another SNS (Last.fm) exhibits unidimensional structure, we submitted all items to an exploratory factor analysis

using the principal components extraction method with varimax (i.e., orthogonal) rotation. Using the criterion of eigenvalue >1.0 produced a unidimensional solution with all items loading above 0.60 (McCroskey & Young, 1979). The 7 items also demonstrated strong internal reliability (α = .87), and thus were averaged to form a single measure of Facebook communication frequency with the Friend.

Offline communication. Several theorists in the field of computer-mediated communication urge examination of online communication alongside offline communication media (Baym et al., 2004; Sawhney, 2007; Walther & Parks, 2002). Following this line of theoretical development, Ledbetter (2009b) factor-analyzed media use via a 6-point Likert-type scale structure (0 = *never* to 6 = *very frequently*) adopted from Scott and Timmerman (2005), finding that face-to-face and telephone communication load onto the same factor of offline media use. We used the same instrument in this study to measure frequency of offline communication with the Friend, with an additional item measuring cellular-phone text messaging. These 3 items demonstrated good internal reliability (α = .85), and thus were treated as separate manifest indicators of a single latent construct in the confirmatory and structural models.

Relational closeness. Vangelisti and Caughlin's (1997) 7-item measure assessed relational closeness with the Facebook Friend. Sample items include the following: "How often do you talk about personal things with this person?" and "How close are you to this person?" Participants responded on a 7-point Likert-type scale with response options ranging from 1 (*not at all*) to 7 (*very much*). The measure demonstrated strong internal reliability (α = .93).

Data Analysis

All hypotheses and research questions were addressed via structural equation modeling (SEM) using the LISREL 8.80 for Windows software package. Two chief advantages of SEM are holistic assessment of an a priori specified model, which is clearly advantageous for the model specified in this study (Figure 1); in addition, SEM corrects for error variance and thus more accurately identifies parameters of interest. We assessed model fit using four frequently reported fit indices: (1) model chi-square, (2) the root mean square error of approximation (RMSEA), (3) the non-normed fit index (NNFI), and (4) the comparative fit index (CFI; Kline, 2005). For the RMSEA statistic, lower values indicate better model fit, with 0.08 the traditional threshold for acceptable fit (and 0.05 for close fit). For the NNFI and CFI statistics, better fitting models achieve higher values, with 0.90 and 0.95 as traditional thresholds for acceptable and close model fit, respectively (Kline, 2005).

As shown in Figure 1, the hypothesized model contained 6 latent constructs: (1) attitude toward online self-disclosure (i.e., OSD), (2) attitude toward online social connection (i.e., OSC), (3) an interaction term for OSD and OSC, (4) Facebook communication frequency, (5) offline communication frequency, and (6) relational closeness. The OSD, OSC, Facebook communication, and relational closeness constructs were identified by creating three *parcels* ("aggregate-level [indicators] comprised of the sum (or average) of two or more items, responses, or behaviors"; Little, Cunningham, Shahar, & Widaman, 2002, p. 152) per latent construct. Given the unidimensional nature of these constructs, items were assigned to

Table 1. Descriptive Statistics and Bivariate Correlations Among Manifest Indicators

Variables	*M*	*SD*	1	2	3	4
1. Self-disclosure (OSD)	3.60	1.38	1.00			
2. Social connection (OSC)	3.85	1.36	0.46**	1.00		
3. Facebook communication	1.10	1.01	−0.05	0.07	1.00	
4. Offline communication	1.63	1.43	−0.05	−0.10	0.60**	1.00
5. Closeness	3.92	1.62	−0.12*	−0.10	0.58**	0.75**

Note: $N = 325$. OSD = online self-disclosure; OSC = online social connection.
*$p < .05$. **$p < .01$.

parcels by thirds (e.g., for the 6-item OSD measure, the first parcel contained Items 1 and 4, the second parcel contained Items 2 and 5, and the third parcel contained Items 3 and 6). Offline communication was identified by single-item indicators of face-to-face, telephone, and text messaging communication. The interaction effect was modeled by creating an orthogonalized interaction term, a method that more effectively removes multicollinearity than Baron and Kenny's (1986) method of mean-centering predictors prior to computing the interaction term. As described by Little, Card, Bovaird, Preacher, and Crandall (2007), this necessitates forming a series of nine product terms between the mean-centered parcels for each construct (i.e., all possible multiplicative interactions between one of the three OSD parcels and one of the three OSC parcels). These product terms were then regressed onto the first-order parcels, and their unstandardized residuals were saved. These unstandardized residuals were then combined into three parcels such that each interaction-term parcel contains only one instance of each of the first-order parcels (see Marsh et al., 2007), resulting in indicators that are entirely orthogonal to the first-order indicators (e.g., Soliz & Harwood, 2006).

Results

Structural Model

Table 1 presents the correlation matrix between the continuous study variables at the manifest level of measurement. Before latent variable analyses, an EM (expectation–maximization) algorithm imputed the trivial amount of missing data (less than 1%) in the data set (Vriens & Melton, 2002). Consistent with standard two-step procedures for SEM (Kline, 2005), confirmatory factor analysis (CFA) first evaluated the fit between the manifest indicators and their respective latent constructs. To evaluate potential covariates, a series of three metric invariance tests (Little, 1997) compared (1) male and female participants, (2) undergraduate-student status (i.e., undergraduate versus nonundergraduate participants), and (3) local and long-distance friends. Specifically, this procedure invokes a sequential series of model constraints that evaluate equality of indicator loadings (i.e., weak metric invariance), equality of indicator means (i.e., strong metric invariance), and homogeneity of the variance/covariance matrix among latent constructs. These tests indicated both weak and strong metric invariance

regardless of participant sex or student status. When comparing local and long-distance friendships, the initial test of strong metric invariance failed, but examination of the model results indicated a large amount of misfit for the face-to-face frequency intercept. As both theory and intuition suggest that long-distance friends would score lower on this measure (Rohlfing, 1995) and, when theoretically expected, it is acceptable to free indicators across groups in the strong metric invariance test (Vanderberg & Lance, 2000, p. 38), a subsequent test constrained all intercepts except for this indicator; strong metric invariance was then tenable. Subsequent tests for homogeneity of the variance/covariance matrix revealed no statistically significant differences for participant sex, $\Delta\chi^2(19) = 21.34$, $p > .05$; under-graduate student status, $\Delta\chi^2(19) = 26.63$, $p > .05$; or friendship distance, $\Delta\chi^2(19) = 28.58$, $p > .05$. Thus, any apparent differences between groups are likely due to chance variation, and thus all groups should be analyzed in a single structural model (Ledbetter, 2009a). A combined groups confirmatory model produced close model fit, $\chi^2(120) = 209.00$, RMSEA $= 0.045$ (90% CI $= 0.033\text{-}0.056$), NNFI $= 0.98$, CFI $= 0.99$, and examination of the modification indices did not suggest any alterations to the model.

After establishing close fit for the measurement model, we tested the hypothesized regression paths in a structural equation model (see Figure 1). The initial structural model not only demonstrated close fit, $\chi^2(125) = 215.41$, RMSEA $= 0.044$ (90% CI $= 0.033\text{-}0.055$), NNFI $= 0.98$, CFI $= 0.99$, but also revealed the presence of nonsignificant regression paths. Specifically, the paths between online communication attitude and offline communication were weak. As the hypothesized predictive association between online communication attitude and Facebook communication holds greater face validity than that between online communication attitude and offline communication, these paths were removed from the model (these paths also would be removed if trimming proceeded through iterations using parameter z scores as the removal criterion; Kline, 2005). This trimmed model (see Figure 2) also demonstrated close fit, $\chi^2(128) = 218.30$, RMSEA $= 0.044$ (90% CI $= 0.032\text{-}0.054$), NNFI $= 0.98$, CFI $= 0.99$, with a chi-square difference test indicating a nonsignificant decline in fit relative to the initial structural model, $\Delta\chi^2(3) = 2.89$, $p > .05$.

The final model revealed significant main effects between online communication attitude and Facebook communication frequency. As expected, OSC positively predicted Facebook communication, $B = 0.23$ (95% CI $= 0.11\text{-}0.35$) and $\beta = .23$ (95% CI $= 0.11\text{-}0.35$, $p < .01$), with OSD emerging as an inverse predictor, $\beta = -.13$ (95% CI $= -0.02$ to -0.24) and $\beta = -.13$ (95% CI $= -0.02$ to -0.24, $p < .05$). In addition to these main effects, the interaction effect between OSD and OSC significantly predicted Facebook communication: $B = -0.10$ (95% CI $= -0.004$ to -0.19) and $\beta = -.09$ (95% CI $= -0.004$ to -0.18, $p < .05$). Together, the main and interaction effects explained 4.7% of the variance in Facebook communication with a specific Facebook friend.

To further probe the nature of the association between the two components of online communication attitude and Facebook communication, the interaction effect was decomposed using the method described by Cohen, Cohen, West, and Aiken (2003). To do this, we recomputed the structural model as a mean and covariance structures (MACS) model. As Kline noted, standard SEM lacks a mean structure (i.e., all latent variables are assumed to be standardized with a mean of 0), and thus information about means is lost. A mean
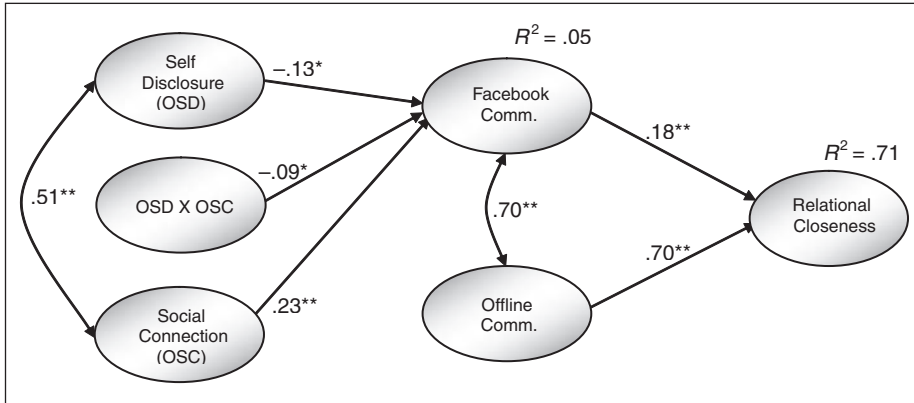
Figure 2. Structural model predicting communication frequency and relational closeness
Note: $\Delta\chi^2(128) = 218.30$, RMSEA = 0.044 (90% CI: 0.032-0.054), NNFI = 0.98, CFI = 0.99.

structure is added to a structural model "by regressing exogenous or endogenous variables on a constant that equals 1.0" (2005, p. 287). From the standpoint of regression analysis, this essentially adds intercept terms to both the manifest and latent variables. By identifying the model and mean structure via the contrast coding method described by Little, Slegers, and Card (2005), we obtained intercepts and predicted values that reflect the original measurement metric of the manifest indicators, thus aiding interpretation of the interaction effect decomposition. Using these values to generate linear regression equations, we plotted the relationship between OSC and Facebook communication at three different levels of OSD (i.e., at the minimum value of 1, at the latent mean value of 3.63, and at the maximum value of 7). Figure 3 presents results of this decomposition.

Though OSC positively predicts Facebook communication when OSD is low, increased levels of OSD weaken the strength of this association. Specifically, OSC significantly predicts Facebook communication at both the minimum, $B = 0.29$ (95% CI = 0.15-0.44), $\beta = .39$ (95% CI = 0.20-0.58, $p < .01$), and mean, $B = 0.17$ (95% CI = 0.09-0.26), $\beta = .23$ (95% CI = 0.11-0.34, $p < .01$), levels of OSD, but the association is nonsignificant at a maximum OSD score: $B = 0.02$ (95% CI = –0.15 to 0.19) and $\beta = .02$ (95% CI = –0.20 to 0.25, $p > .05$). Examination of the graph indicates that the regression lines converge at an OSC value between the minimum and the mean. Solving the regression equations for this point of convergence reveals that it occurs when an individual's OSC score is 1.88. In other words, when an individual's OSC is slightly below a mean response of 2 (i.e., *disagree*), that individual's Facebook communication with a specific Friend will tend to be 0.77 (i.e., slightly below a mean response of 1, or *very rarely*) regardless of that individual's level of OSD. Taken as a whole, these results suggest that OSD has a moderate inverse association with Facebook communication when OSC is high, and OSC has a moderate positive association with Facebook communication when OSD is low. At low levels of OSC or high levels of OSD, the effect of the other independent variable becomes much weaker.
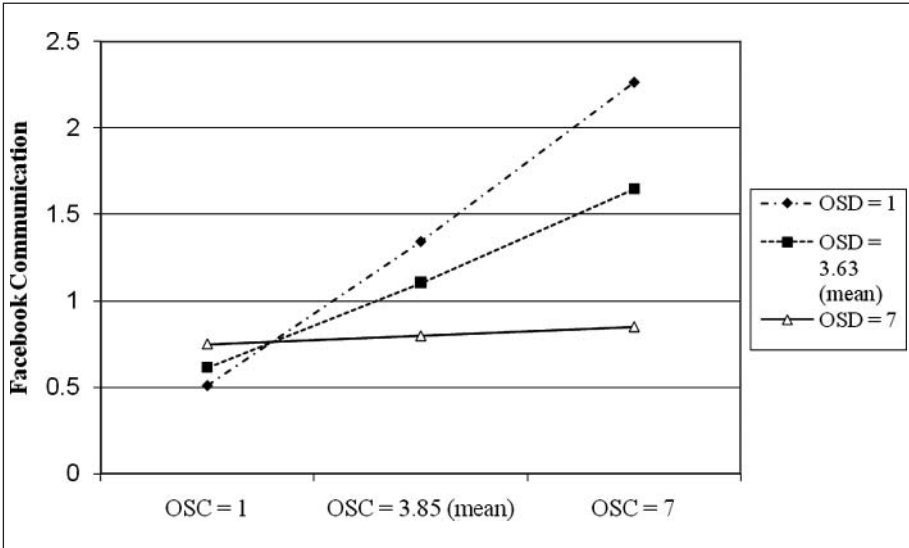
Figure 3. Decomposition of the interaction effect between attitudes toward online self-disclosure (OSD) and social connection (OSC) on Facebook communication
Note: Possible Facebook communication scale scores range from 0 (*never*) to 5 (*very frequently*).

The initially hypothesized model also predicted that both offline and Facebook communication are positively associated with relational closeness. When controlling for the significantly positive covariance between these two latent constructs, $\Psi = .72$ (95% CI = 0.65-0.79, $p < .01$), both offline communication, $B = 1.30$ (95% CI = 1.02-1.57) and $\beta = .70$ (95% CI = 0.55-0.85, $p < .01$), and Facebook communication, $B = 0.33$ (95% CI = 0.13-0.53) and $\beta = .18$ (95% CI = 0.07-0.30, $p < .01$), emerged as separate predictors of relational closeness. Offline communication appeared to be a much stronger predictor than Facebook communication, and thus we formally tested the significance of this difference by creating a nested model with the relevant regression paths constrained to equality; this produced a significant decline in model fit, $\Delta\chi^2(1) = 24.28$, $p < .01$, demonstrating that offline communication is indeed a stronger predictor of closeness.

In addition to direct effects on relational closeness, the model also leaves the possibility that online communication attitude (i.e., OSC and OSD) indirectly predicts relational closeness via Facebook communication. This possibility was tested via Preacher and Hayes's (2004) procedure for generating robust estimates of unstandardized regression weights with *nonparametric bootstrapping*, a technique in which "cases from the original data file are randomly selected with replacement to generate other data sets, usually with the same number of cases as the original" (Kline, 2005, p. 42). After computing the structural model across these data sets, the unstandardized regression weight is defined as the mean of the products of the indirect path's component parameter estimates; statistical significance is

then determined by (a) sorting these estimates in ascending order, and (b) when $\alpha = .05$ and κ represents the number of bootstrapped samples, obtaining the values that appear at $.025 \times \kappa$ and $.975 \times \kappa$ in the ordered list. These represent the boundaries of the confidence interval; if this interval does not contain zero, then the bootstrapped estimate is statistically significant. As bootstrapping does not assume normal distribution of unstandardized regression weights, the boundaries of the confidence interval are not necessarily symmetrical around the estimate. Standardized regression weight estimates were obtained via the covariance matrix of latent constructs from computation of a model based on bootstrapped estimates of the covariance matrix of manifest indicators.

Bootstrap analyses revealed that OSC, $B = 0.08$ (95% CI = 0.01-0.15) and $\beta = .04$ (95% CI = 0.01-0.08, $p < .05$); OSD, $B = -0.04$ (95% CI = -0.10 to -0.001) and $\beta = -.02$ (95% CI = -0.06 to -0.001, $p < .05$); and the interaction effect, $B = -0.03$ (95% CI = -0.07 to -0.001) and $\beta = -.02$ (95% CI = -0.04 to -0.001, $p < .05$), significantly and indirectly predicted relational closeness. As the contrast coding method of identification is not amenable to bootstrapping in LISREL, we could not decompose the interaction effect in the metric of the original variables. Rather, we conducted decomposition using information from bootstrapped models with latent construct variance fixed to 1.0, thus expressing the interaction effect in terms of construct standard deviations. The pattern of results from this decomposition was almost identical to the decomposition for Facebook communication (Figure 3), such that OSC is a significant positive predictor of relational closeness at low, that is, two standard deviations below the mean, $B = 0.14$ (95% CI = 0.04-0.23) and $\beta = .07$ (95% CI = 0.02-0.13, $p < .01$), and mean, $B = 0.08$ (95% CI = 0.01-0.15) and $\beta = .04$ (95% CI = 0.01-0.07, $p < .05$), levels of OSD but not when OSD is high, that is, two standard deviations above the mean, $B = 0.01$ (95% CI = -0.08-0.11) and $\beta = .01$ (95% CI = -0.04-0.06, $p > .05$). Together, the direct and indirect effects explained 70.7% of the variance in relational closeness.

Discussion

The overarching goal of this investigation was to test a theoretical model whereby trait-like attitudes toward online communication predict Facebook and offline communication, with these constructs then predicting relational closeness. Results generally supported the hypothesized model, with the exception of the speculated paths between online communication attitude and offline communication. More important, OSD functioned somewhat differently than predicted by some previous online communication research (e.g., Caplan, 2007; McKenna et al., 2002), not only yielding an inverse main association with Facebook communication but also reducing the positive contribution of OSC to this dependent variable and, indirectly, to relational closeness. Taken as a whole, these results support media multiplexity theory (Haythornthwaite, 2005) yet suggest that the theoretical expectation that social anxiety fosters online communication (Caplan, 2007) may not necessarily describe Facebook communication with specific Friends. We will elaborate subsequent theoretical implications by addressing each component of the model in turn.

Online Communication Attitude and Communication Frequency

One of Facebook's core functions is building connections within a social network (Zuckerberg, 2008), and, as expected (Hypothesis 3), those who use online communication for that purpose (i.e., possess high OSC) are more likely to communicate with their Facebook Friends (Tufekci, 2008). As the OSC variable addresses orientation toward a preexisting social network rather than just a dyad, this calls attention to the need to understand broader network-level forces when examining dyadic relationships. In other words, traditional interpersonal communication theory considers closeness as an outcome of dyad- and individual-level variables, whereas OSC is an individual-level variable that may bespeak group- and network-level realities. Though network forces no doubt operate offline as well (Parks, 2006), Donath (2007) argues that SNSs facilitate creation of social supernets, or social networks, "with many more ties than is feasible without socially assistive tools" (p. 231); this may only augment group- and network-level effects on specific dyads. The social-relationships model (Kenny, Kashy, & Cook, 2006) permits statistical isolation of individual, dyadic, and group effects and thus may be an invaluable tool for identifying which effects are truly individual, truly unique to the dyad, or truly a reflection of broader social forces.

Similarly, drawing from previous research and theory indicating that social anxiety produces attraction to OSD (e.g., Caplan, 2007; McKenna et al., 2002), we predicted that OSD would positively predict Facebook communication with a specific Friend (Hypothesis 1). Instead, OSD inversely predicted Facebook communication in the final model. This differs both from the positive zero-order association with SNS use reported in Ledbetter (2009b) and the nonsignificant zero-order association reported here (see Table 1). This suggests that, when examined in the context of a structural model that controls for the shared variance between Facebook and offline communication, OSD may not foster Facebook use as it does other forms of online communication. Interpreting this unexpected finding requires reconsidering the theoretical mechanisms that underlie the association between preference for OSD and online communication use. One approach is to consider the role of moderating variables. McKenna et al. examined how individuals self-disclose within completely online relationships, whereas most Facebook friendships exist between individuals who also know each other offline (Ellison et al., 2007); thus, considering the moderating influence of a relationship's medium of origin (as well as current degree of multimodality) in future research might further explain this unexpected finding. Alternatively (yet not necessarily in contradiction), as Caplan notes, the logic of the expectation that OSD positively predicts communication frequency rests in the communicator's desire to manage self-presentation and identity:

> In almost all social interactions, people are motivated to engage in strategic self presentation and identity management and to avoid making undesired impressions on others. Social anxiety arises from the desire to create a positive impression of one's self in others along with a lack of self-presentational confidence. Most importantly . . . the self-presentational theory of social anxiety posits that, in order to

increase their perceived self-presentational efficacy, socially anxious individuals are highly motivated to seek low-risk communicative encounters. (p. 235)

Traditional forms of online communication (e.g., e-mail) provide such low-risk encounters, as the private and/or asynchronous nature of the communication medium permits almost complete control over self-presentation (Walther, 1996). Yet Donath (2007) argued (and Tong, Van Der Heide, Langwell, & Walther, 2008, empirically confirm) that users of an SNS are evaluated, in part, in terms of the nature of their social connections with others; thus, it stands to reason that identity management partially lies within the control of social network members (and outside the control of the individual). Recent empirical evidence supports this theoretical claim, finding that wall posts written by friends and the physical attractiveness of those friends influences perception of a Facebook profile's owner (Walther et al., 2008). Walther and his colleagues explained these findings in terms of the information's level of *warrant*, or "degree to which that information is perceived to be immune to manipulation from the target to whom the information pertains" (p. 32); a wall post by a Facebook Friend is an example of such high-warrant information. Because the information target cannot favorably alter that information, Walther, Van Der Heide, Hamel, and Shulman (2009) argue that others perceive that information as more trustworthy than low-warrant information. Recent empirical evidence supports this expectation. Taken together with Caplan's findings (2007) and results of the current study, it is possible that those who are socially anxious may prefer traditional forms of online communication because they wish to control their own self-presentation by avoiding high-warrant information. As Facebook's site design encourages proliferation of high-warrant information (Zuckerberg, 2006), those with high OSD may avoid it in favor of other low-warrant forms of online communication.

This line of argument is further supported by decomposition of the interaction effect between OSD and OSC on Facebook communication (Research Question 1). Though OSC is a positive predictor of Facebook communication when OSD is low, this association is nonsignificant at high levels of OSD. That is, high levels of OSD tend to weaken the association between OSC and Facebook communication. As noted in the theoretical warrant, such a finding supports Caplan's argument that OSD is socially debilitating, perhaps reducing beneficial outcomes that might otherwise accrue from the desire to maintain preexisting relationships online. In other words, if preference for OSD does reflect a desire for greater control over self-presentation (Caplan, 2007), such a motivation may override a person's desire to build online social connections. Following Walther and his colleagues' (2008) recent research, perhaps those who possess both high OSC and high OSD seek out forms of online communication that do not provide high-warrant information. In terms of theoretical development, this suggests that social anxiety is not necessarily associated with online communication as a whole but rather encourages use of media that lack high-warrant information, online or otherwise. Testing this theoretical claim via experiment is a clear direction for future research.

The expectations that self-disclosure (Hypothesis 2), social connection (Hypothesis 4), and the interaction between them (Research Question 3) would predict offline

communication were not supported in the final model. Though previous research reports significant zero-order associations between these constructs and face-to-face communication frequency (Ledbetter, 2009b), a significant association did not emerge when modeling offline communication as a latent construct and controlling for variance shared with Facebook communication. Perhaps other structural/contextual variables (such as temporal ability to synchronize schedules for offline contact; Ling & Yttri, 2002) influence frequency of offline communication with specific Facebook Friends, and thus the hypothesized associations did not emerge.

Relational Closeness

As predicted by media multiplexity theory (Haythornthwaite, 2005), both offline communication (Hypothesis 6) and Facebook communication (Hypothesis 7) positively predicted relational closeness. This replicates the pattern of results obtained by Baym and Ledbetter's (2009) study of Last.fm, a music-oriented SNS, suggesting that the predictions of media multiplexity theory apply across many types of SNSs. What remains unanswered is whether use of multiple SNSs with the same friend also additively contributes to relational outcomes; indeed, we are not aware of any study that examines SNS use as a multimodal phenomenon. But if researchers cannot fully understand online communication use apart from patterns of offline communication behavior (Baym et al., 2004, and as our final model indicates), then one might expect that continually examining single SNSs in isolation may yield an incomplete theoretical picture of their role in interpersonal relationships. The measures employed here offer at least some of the tools necessary for such future research. It is important to note that our Facebook communication scale was developed and used in the present study before some recent alterations were made to Facebook's status message feature; when these data were collected, the status-message feature forced users to include the word "is" (e.g., "John is tired" was possible, whereas "John stayed up too late last night" was not), and the feature did not include the ability to attach direct comments to a status message. Even though the instrument demonstrated strong internal reliability and unidimensional structure (as did Baym & Ledbetter's measure of Last.fm communication), scholars should consider the status message as a possible scale item in future investigations, as well as any other new forms of communication developed on such a continuously evolving website.

Both dimensions of online communication attitude and the interaction effect between them produced significant indirect effects on relational closeness. OSD inversely predicted relational closeness (thus answering Research Question 1), and OSC emerged as a positive predictor (Hypothesis 8). This pattern of results supports our chief contention that OSC is a healthy, communicatively competent motivation for using online communication; however, motivation arising from OSD is associated with negative relational outcomes (Ledbetter, 2009b). As such, this investigation provides empirical evidence consistent with the theoretical expectation that attraction to OSD produces not only negative psychosocial outcomes but also negative relational outcomes (Caplan, 2003). These results are also consistent with the finding that Facebook communication better supports and facilitates the

concept of *bridging* (versus *bonding*) *of social capital* (Ellison et al., 2007). As with decomposition of the interaction effect's association with Facebook communication, OSD and OSC interact in such a way that high OSD reduces the positive indirect association between OSC and relational closeness to nonsignificance. This is consistent with media multiplexity theory (Haythornthwaite, 2005) as, to the extent that high OSD reduces OSC's association with Facebook communication, the theory suggests that losses in closeness would occur unless dyad members compensate with the addition of another medium. Such an interpretation also follows Haythornthwaite's finding that different social networks enact different hierarchies of media use.

The direct and indirect effects in the model explained a large amount of the variance in relational closeness (approximately 71%). Along with other recent empirical evidence (Baym & Ledbetter, 2009; Ledbetter, 2009c), this suggests that media multiplexity is a parsimonious yet robust account of how media use is associated with strength of a relational tie. In turn, this further supports the importance of studying individual attitudinal factors that may foster or inhibit use of particular communication media. On a more practical level, these results refute some popular claims that SNSs reduce relational closeness (Henry, 2007; Tilsner, 2008), as Facebook communication positively predicted relational closeness even when controlling for the contribution of offline communication. However, this finding must be interpreted in light of the significantly stronger association between offline communication and relational closeness (perhaps reflecting that relational maintenance is more temporally efficient via media with multiple nonverbal cues; Walther, 1996).

Conclusion

Of course, any study must be interpreted within the limitations imposed by the research design. Though it is tempting to make causal inferences from analytic methods that model endogenous and exogenous variables, the cross-sectional nature of the data necessitates caution. Future longitudinal research might test the extent to which closeness predicts communication frequency or vice versa. Though a particular strength of the study is the inclusion of data beyond a college-student sample and establishment of metric invariance across groups, the sample is relatively homogeneous regarding racial and ethnic identity. Future research may consider cultural dimensions such as individualism and collectivism that have demonstrated associations with online communication in previous research (Lee & Choi, 2005; Zhang, Lowry, Zhou, & Fu, 2007). Our sample also contained more women than men, even though our recruitment procedures were not sex specific in any respect. We do not possess an explanation for why more women completed our questionnaire, and nonsignificant metric invariance tests suggest this probably does not influence study results greatly. The study also explained a relatively small amount of variance in Facebook communication; this is perhaps to be expected when global trait-like constructs predict variables located within specific relational contexts. Future research might address this by more explicitly examining the degree of variance that exists within individual SNS networks; dyadic data analyses (Kenny et al., 2006) may also yield higher effect sizes by accounting for the attitudes of both friends.

It is also worth noting that this investigation did not directly measure participant social anxiety. Though multiple studies establish preference for OSD as positively associated with social anxiety and related constructs (Caplan, 2007; Ho & McLeod, 2008; Kelly & Keaten, 2007; McKenna et al., 2002; Morahan-Martin & Schumacher, 2003; Valkenburg & Peter, 2008) and thus warrants use as an interpretive heuristic in this investigation, it remains possible that other forces foster a positive attitude toward OSD, such as the desire to create a sense of relational immediacy (e.g., in teacher–student relationships; Mazer et al., 2007) or finding others who share rare or stigmatized conditions (Walther & Boyd, 2002). To the extent that social anxiety is not perfectly associated with OSD, it remains possible that OSD is positively associated with relational outcomes if shared variance with social anxiety were controlled. Of course, verifying this speculation requires further empirical investigation.

Given their widespread proliferation and adoption, especially among younger users (Lenhart & Madden, 2007), it stands to reason that SNSs will remain an important medium for maintaining social connections. The existence of these sites raises important questions regarding individual traits that might influence online communication frequency and the integration of dyads into larger social structures (Parks, 2006). These results inform these broader projects by further identifying attitude toward online self-disclosure and social connection as two such traits that may produce divergent effects on both media use and, to some degree, subsequent outcomes in interpersonal relationships.

Declaration of Conflicting Interests

Funding

References

Acquisti, A., & Gross, R. (2006). Imagined communities: Awareness, information sharing, and privacy on the Facebook. In P. Golle & G. Danezis (Eds.), *Proceedings of the 6th workshop on privacy enhancing technologies* (pp. 36-58). Cambridge, UK: Robinson College.

Altman, I., & Taylor, D. (1973). *Social penetration: The development of interpersonal relationships*. New York: Henry Holt.

Aron, A. P., Mashek, D. J., & Aron, E. N. (2004). Closeness as including other in the self. In D. J. Mashek & A. Aron (Eds.), *Handbook of closeness and intimacy* (pp. 27-41). Mahwah, NJ: Lawrence Erlbaum.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Baym, N. K., & Ledbetter, A. M. (2009). Tunes that bind? Predicting friendship strength in a music-based social network. *Information, Communication & Society, 12*, 408-427.

Baym, N. K., Zhang, Y. B., & Lin, M.-C. (2004). Social interactions across media: Interpersonal communication on the internet, telephone, and face-to-face. *New Media & Society, 6*, 299-318.

boyd, d. m., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer Mediated Communication, 13*. Retrieved June 9, 2008, from http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html.

Burleson, B. R., & MacGeorge, E. L. (2002). Supportive communication. In M. L. Knapp & J. A. Daly (Eds.), *Handbook of Interpersonal Communication* (3rd ed., pp. 374-424). Thousand Oaks, CA: SAGE.

Caplan, S. E. (2002). Problematic Internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measure. *Computers in Human Behavior, 18*, 533-575.

Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic Internet use and psychosocial well-being. *Communication Research, 30*, 625-648.

Caplan, S. E. (2007). Relations among loneliness, social anxiety, and problematic Internet use. *CyberPsychology & Behavior, 10*, 234-242.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.

Donath, J. (2007). Signals in social supernets. *Journal of Computer-Mediated Communication, 13*. Retrieved June 9, 2009, from http://jcmc.indiana.edu/vol13/issue1/donath.html

Dunbar, R. (1998). *Grooming, gossip, and the evolution of language*. London: Faber and Faber.

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends": Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*. Retrieved June 9, 2009, from http://jcmc.indiana.edu/vol12/issue4/ellison.html.

Facebook.com. (2009). Retrieved June 3, 2009, from www.facebook.com.

Fischer, C. S. (1992). *America calling: A social history of the telephone to 1940*. Berkeley: University of California.

Hargittai, E. (2007). Whose space? Differences among users and non-users of social network sites. *Journal of Computer-Mediated Communication, 13*. Retrieved June 9, 2009, from http://jcmc.indiana.edu/vol13/issue1/hargittai.html.

Haythornthwaite, C. (2005). Social networks and internet connectivity effects. *Information, Communication & Society, 8*, 125-147.

Henry, F. (2007, January 15). How do you define a friend? *Newhouse News Service*. Retrieved September 22, 2008, from LexisNexis Academic.

Ho, S. S., & McLeod, D. M. (2008). Social-psychological influences on opinion expression in face-to-face and computer-mediated communication. *Communication Research, 35*, 190-207.

Johnson, A. J., Wittenberg, E., Villagran, M. M., Mazur, M., & Villagran, P. (2003). Relational progression as a dialectic: Examining turning points in communication among friends. *Communication Monographs, 70*, 230-249.

Joinson, A. N. (2001). Self-disclosure in computer-mediated communication: The role of self-awareness and visual anonymity. *European Journal of Social Psychology, 31*, 177-192.

Kelly, L., & Keaten, J. A. (2007). Development of the affect for communication channels scale. *Journal of Communication, 57*, 349-365.

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York: Guilford.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford.

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*, 1017-1031.

Laurenceau, J.-P., Barrett, L. F., & Pietromonaco, P. R. (1998). Intimacy as an interpersonal process: The importance of self-disclosure, partner disclosure, and perceived partner responsiveness in interpersonal exchanges. *Journal of Personality and Social Psychology, 74*, 1238-1251.

Ledbetter, A. M. (2009a). Family communication patterns and relational maintenance behavior: Direct and mediated associations with friendship closeness. *Human Communication Research, 35*, 130-147.

Ledbetter, A. M. (2009b). Measuring online communication attitude: Instrument development and validation. *Communication Monographs, 76*, 463-486.

Ledbetter, A. M. (2009c). Patterns of media use and multiplexity: Associations with sex, geographic distance, and friendship interdependence. *New Media & Society, 11*, 1187-1208.

Ledbetter, A. M., Griffin, E., & Sparks, G. G. (2007). Forecasting "friends forever": A longitudinal investigation of sustained closeness between college best friends. *Personal Relationships, 14*, 343-350.

Lee, W.-N., & Choi, S. M. (2005). The role of horizontal and vertical individualism and collectivism in online consumers' response toward persuasive communication on the Web. *Journal of Computer-Mediated Communication, 11*. Retrieved June 9, 2009, from http://jcmc.indiana.edu/vol11/issue1/wnlee.html

Lenhart, A., & Madden, M. (2007). Teens, privacy and online social networks: How teens manage their online identities and personal information in the age of MySpace. *Pew Internet & American Life Project*. Retrieved June 8, 2009, from http://www.pewinternet.org/PPF/r/211/report_display.asp

Ling, R., & Yttri, B. (2002). Hyper-coordination via mobile phones in Norway. In J. Katz & M. Aakhus (Eds.), *Perpetual contact: Mobile communication, private talk, public performance* (pp. 139-69). Cambridge, UK: Cambridge University Press. Retrieved June 9, 2009, from http://www.richardling.com/papers/2002_Nobody_sits_at_home_and_waits.pdf.

Little, T. D. (1997). Mean and covariance structures (MACS) analyses of cross-cultural data: Practical and theoretical issues. *Multivariate Behavioral Research, 32*(5), 53-76.

Little, T. D., Card, N. A., Bovaird, J. A., Preacher, K., & Crandall, C. S. (2007). Structural equation modeling of mediation and moderation with contextual factors. In T. D. Little, J. A. Bovaird, & N. A. Card (Eds.), *Modeling contextual effects in longitudinal studies* (pp. 207-230). Mahwah, NJ: Lawrence Erlbaum.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling, 9*, 151-173.

Little, T. D., Slegers, D. W., & Card, N. A. (2006). A non-arbitrary method of identifying and scaling latent variables in SEM and MACS models. *Structural Equation Modeling, 13*, 59-72.

Liu, H. (2007). Social network profiles as taste performances. *Journal of Computer-Mediated Communication, 13*. Retrieved June 8, 2009, from http://jcmc.indiana.edu/vol13/issue1/liu.html.

Marsh, H. W., Wen, Z., Hau, K.-T., Little, T. D., Bovaird, J. A., & Widaman, K. F. (2007). Unconstrained structural equation models of latent interactions: Contrasting residual- and mean-centered approaches. *Structural Equation Modeling, 14*, 570-580.

Mazer, J. P., Murphy, R. E., & Simonds, C. J. (2007). I'll see you on "Facebook": The effects of computer-mediated teacher self-disclosure on student motivation, affective learning, and classroom climate. *Communication Education, 56*, 1-17.

McCroskey, J. C., & Young, T. J. (1979). The use and abuse of factor analysis in communication research. *Human Communication Research, 5*, 375-382.

McKenna, K. Y. A., Green, A. S., & Gleason, M. E. J. (2002). Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues, 58*, 659-671.

Mesch, G., & Talmud, I. (2006). The quality of online and offline relationships: The role of multiplexity and duration of social relationships. *The Information Society, 22*, 137-148.

Morahan-Martin, J., & Schumacher, P. (2003). Loneliness and social uses of the Internet. *Computers in Human Behavior, 19*, 659-671.

Nie, N. H., Hillygus, D. S., & Erbring, L. (2002). Internet use, interpersonal relations, and sociability. In B. Wellman & C. Haythornthwaite (Eds.), *The Internet in everyday life* (pp. 215-243). Malden, MA: Blackwell.

O'Sullivan, P. B. (2000). What you don't know won't hurt *me*: Impression management functions of communication channels in relationships. *Human Communication Research, 26*, 403-431.

Parks, M. R. (2006). *Personal relationships and personal networks*. Mahwah, NJ: Lawrence Erlbaum.

Petronio, S. (2002). *Boundaries of privacy: Dialectics of disclosure.* Albany: State University of New York.

Postmes, T., Spears, R., & Lea, M. (1998). Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication Research, 25*, 689-715.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*, 717-731.

Quan-Haase, A. (2007). University students' local and distant social ties: Using and integrating modes of communication on campus. *Information, Communication & Society, 10*, 671-693.

Quan-Haase, A., Wellman, B., Witte, J. C., & Hampton, K. N. (2002). Capitalizing on the net: Social contact, civic engagement, and sense of community. In B. Wellman & C. Haythornthwaite (Eds.), *The Internet in everyday life* (pp. 291-324). Malden, MA: Blackwell.

Ramirez, A., Jr., & Broneck, K. (2009). "IM me": Instant messaging as relational maintenance and everyday communication. *Journal of Social and Personal Relationships, 26*, 291-314.

Rawlins, W. K. (1992). *Friendship matters: Communication, dialectics, and the life course*. Hawthorne, NY: Aldine.

Rohlfing, M. E. (1995). "Doesn't anybody stay in one place anymore?" An exploration of the under-studied phenomenon of long-distance relationships. In J. T. Wood & S. Duck (Eds.), *Under-studied relationships: Off the beaten track* (pp. 173-196). Thousand Oaks, CA: SAGE.

Rokeach, M. (1968). *Beliefs, attitudes, and values: A theory of organization and change.* San Francisco: Jossey-Bass.

Sawhney, H. (2007). Strategies for increasing the conceptual yield of new technologies research. *Communication Monographs, 74*, 395-401.

Scott, C. R., & Timmerman, C. E. (2005). Relating computer, communication, and computer-mediated communication apprehensions to new communication technology use in the workplace. *Communication Research, 32*, 683-725.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* New York: John Wiley.

Smith, A., & Rainie, L. (2008). The Internet and the 2008 election. *Pew Internet & American Life Project*. Retrieved June 8, 2009, from http://www.pewinternet.org/PPF/r/252/report_display.asp

Soliz, J., & Harwood, J. (2006). Shared family identity, age salience and intergroup contact: Investigation of the grandparent-grandchild relationship. *Communication Monographs, 73*, 87-107.

Spitzberg, B. H. (2006). Preliminary development of a model and measure of computer-mediated communication (CMC) competence. *Journal of Computer-Mediated Communication, 11*, 629-666.

Sproull, L., & Kiesler, S. (1986). Reducing social context cues: Electronic mail in organizational communication. *Management Science, 32*, 1492-1511.

Stern, L. A., & Taylor, K. (2007). Social networking on Facebook. *Journal of the Communication, Speech & Theater Association of North Dakota, 20*, 9-20.

Tilsner, J. (2008, September 15). Overrated: Social networking can't replace a face to face. *WalletPop*. Retrieved June 8, 2009, from http://www.walletpop.com/blog/2008/09/15/overrated-in-america-social-networking

Tong, S. T., Van Der Heide, B., Langwell, L., & Walther, J. B. (2008). Too much of a good thing? The relationship between number of friends and interpersonal impressions on Facebook. *Journal of Computer-Mediated Communication, 13*, 531-549.

Tufekci, Z. (2008). Grooming, gossip, Facebook and MySpace: What can we learn about these sites from those who won't assimilate? *Information, Communication & Society, 11*, 544-564.

Turkle, S. (1995). *Life on the screen: Identity in the age of the Internet*. New York: Simon & Schuster.

Valkenburg, P. M., & Peter, J. (2007). Preadolescents' and adolescents' online communication and their closeness to friends. *Developmental Psychology, 43*, 267-277.

Valkenburg, P. M., & Peter, J. (2008). Adolescents' identity experiments on the Internet. *Communication Research, 35*, 208-231.

Vanderberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*, 4-70.

Vangelisti, A. L., & Caughlin, J. P. (1997). Revealing family secrets: The influence of topic, function, and relationships. *Journal of Social and Personal Relationships, 14*, 679-707.

Vriens, M., & Melton, E. (2002). Managing missing data. *Marketing Research, 14*, 12-17.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*, 3-43.

Walther, J. B., & Boyd, S. (2002). Attraction to computer-mediated social support. In C. A. Lin & D. Atkin (Eds.), *Communication technology and society: Audience adoption and uses* (pp. 153-188). Cresskill, NJ: Hampton Press.

Walther, J. B., & Burgoon, J. K. (1992). Relational communication in computer-mediated interaction. *Human Communication Research, 19*, 50-88.

Walther, J. B., & Parks, M. R. (2002). Cues filtered out, cues filtered in: Computer-mediated communication and relationships. In M. L. Knapp & J. A. Daly (Eds.), *Handbook of interpersonal communication* (3rd ed., pp. 529-563). Thousand Oaks, CA: SAGE.

Walther, J. B., Van Der Heide, B., Kim, S., Westerman, D., & Tong, S. T. (2008). The role of friends' behavior on evaluations of individuals' Facebook profiles: Are we known by the company we keep? *Human Communication Research, 34*, 28-49.

Walther, J. B., Van Der Heide, B., Hamel, L. M., & Shulman, H. C. (2009). Self-generated versus other-generated statements and impressions in computer-mediated communication: A test of warranting theory using Facebook. *Communication Research, 36*, 229-253.

Wheeless, L. R., Eddleman-Spears, L., Magness, L. D., & Preiss, R. W. (2005). Informational reception apprehension and information from technology aversion: Development and test of a new construct. *Communication Quarterly, 53*, 143-158.

Wheeless, L. R., & Grotz, J. (1976). Conceptualization and measurement of reported self-disclosure. *Human Communication Research, 2*, 338-346.

Wright, K., Craig, E., Cunningham, C., Igiel, M., & Ploeger, N. (2008, November). *Will you (still) be my friend?: Computer-mediated relational maintenance on Facebook.com*. Paper presented at the annual meeting of the National Communication Association, San Diego, CA.

Zhang, D., Lowry, P. B., Zhou, L., & Fu, X. (2007). The impact of individualism-collectivism, social presence, and group diversity on group decision making under majority influence. *Journal of Management Information Systems, 23*, 53-80.

Zuckerberg, M. (2006, September 8). An open letter from Mark Zuckerberg. Retrieved June 8, 2009, from http://blog.facebook.com/blog.php?post=2208562130

Zuckerberg, M. (2008, September 18). *Thoughts on the evolution of Facebook*. Retrieved June 8, 2009, from http://blog.facebook.com/blog.php?post=31033537130

Bios

Andrew M. Ledbetter (PhD, University of Kansas, 2007) is an assistant professor in the Department of Communication Studies at Texas Christian University.

Joseph P. Mazer (MS, Illinois State University) is an assistant professor in the Department of Communication Studies at Clemson University.

Jocelyn M. DeGroot (PhD, Ohio University, 2009) is an assistant professor in the Department of Speech Communication at Southern Illinois University–Edwardsville.

Kevin R. Meyer (PhD, Ohio University, 2009) is an assistant professor in the School of Communication at Illinois State University.

Yuping Mao (MA, Bowling Green State University) is an academic developer in the communication and technology graduate program at the University of Alberta.

Brian Swafford (MA, Ohio University, 2007) is a doctoral student in the School of Communication Studies at Ohio University.