A Mediation Analysis of International Students' Patterns of Computer-Mediated Communication

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This research proposes and tests a mediation model of interrelationships among multiple factors shaping international students' online communication. Drawing from social capital and Internet-enhanced self-disclosure theories, this article analyzes the mechanisms underlying differences in students' employment of computer-mediated communication (CMC) channels. Data collected from 168 international students are used to assess the extent to which comfort levels in using CMC tools mediate relationships among student-centered factors (i.e., age, English language proficiency, length of direct exposure to the host cultural environment, degree of individualism versus collectivism), and the frequency of their communication through social networking profiles and instant messaging. Additionally, the research investigates the moderating influence of gender on the observed pattern of interrelationships.

Introduction

Nowadays, an increasing number of people's interactions takes place online (Phulari et al., 2010) by means of various communication channels, such as e-mail, instant messaging (IM), and social network profiles (SNPs) hosted on social networking sites (SNSs). Importantly, the increased availability of these computer-mediated communication (CMC) utilities has provided individuals with "greater access to a broad range of social contacts, including those with whom face-to-face interaction is infrequent" (Ranney & Troop-Gordon, 2012, p. 848). As a result, the employment of these novel ways to communicate effects pivotal changes in people's social lives (Ellison, Lampe, & Steinfield, 2009; Lin, 1999a; Stefanone, Kwon, & Lackaff, 2011) and transforms their views of mediated communication (Emanuel et al., 2008). More precisely, by facilitating the creation of bonding (i.e., strong ties, Granovetter, 1982) and bridging (i.e., weak ties, Granovetter, 1982) social capital (Putnam, 2000), usage of SNPs impacts the ways in which relationships among people are created and maintained (Ellison et al., 2009; Ellison, Steinfield, & Lampe, 2007; Pfeil, Arjan, & Zaphiris, 2009; Stefanone et al., 2011). To understand this complex phenomenon, it is important to unearth more information about how people relate to each other in online settings (Pfeil et al., 2009).

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Although CMC tools previously were used mostly by adolescents and young adults, currently older adults and other groups of users have caught on (Ellison et al., 2009). Thus, as Ellison and colleagues maintain, it is now important to gauge the effects associated with a "mainstream use" (p. 6) of these technologies. However, most studies analyzing the use of SNPs, IM, and similar CMC tools have targeted primarily young U.S. undergraduate students, adolescents, or teenagers (e.g., Ellison et al., 2007; Hargittai, 2008; Mikami et al., 2010; Stefanone et al., 2011; Steinfield, Ellison, & Lampe, 2008; Valenzuela, Park, & Kee, 2009; Valkenburg & Peter, 2007, 2009; Valkenburg, Peter, & Schouten, 2006; for a comparison of differences in SNS-mediated social capital between teenagers and older people, see Pfeil et al., 2009). To overcome this narrow focus, research that compares and contrasts patterns of usage among different groups is needed (Ellison et al., 2009; Pfeil et al., 2009; Williams, 2007). In particular, although international students form a distinct and important population, research investigating how these students use SNPs and IM to communicate and build social capital is thin.

Getting information about factors that influence the extent to which individuals use technology to supplement—or replace, in Nie's (2001) view—face-to-face (F2F) communication provides important insights about people's ability to navigate successfully their social environment. Recent findings have noted that usage of SNPs interacts with measures of people's psychological well-being (Ellison et al., 2007) and that a strong positive relationship exists between the use of SNSs (e.g., Facebook) and one's level of bridging social capital (Ellison et al., 2007; Steinfield et al., 2008). Moreover, research has found that usage of SNSs is likely to be most beneficial for people having low life satisfaction (Ellison et al., 2007). This aspect could be of special salience for international students, because they experience added stress associated with moving into a new culture and adapting to a high-stakes academic environment (Cemalcilar, Falbo, & Stapleton, 2005). Findings from recent studies have also revealed that users of CMC tools transfer social capital from F2F to online relationships (Pfeil et al., 2009). Noting that most international students have few opportunities to interact F2F with family members and close friends and that Internet-based social networking transcends time and space (Lin, 2001) and provides "the opportunity of social links for people who, otherwise, will live more limited social lives, because their ties are increasingly spatially dispersed" (Castells, 2000, p. 389), it becomes clear how important it is to assess the extent to which international students employ CMC to maintain bonds and create new ones.

Goals of the Study

This study aims to shed light on the mechanisms underlying the way in which international students use technology to communicate and build social capital. To this end, it hypothesizes and tests a mediation model linking student-specific variables (i.e., age, English language proficiency, degree of individualism versus collectivism, length of direct exposure to the host cultural environment), perceived self-efficacy beliefs related to communication in F2F and CMC settings, and the frequency of communicating through SNP and IM. Additionally, this research assesses the extent to which gender is a significant moderator of the hypothesized patterns of interrelationships.

Theoretical Framework

The numbers of SNSs that host SNPs and of platforms that enable users to send IMs have grown steadily. However, there is scant quantitative academic research exploring the implications of this phenomenon. Some studies assessed respondents' frequency of using IM (e.g., Hu, Wood, Smith, & Westbrook, 2004; Leung, 2001; Quan-Haase, 2007, 2008), but less has been written about how SNP and IM usage interact. Additionally, although positive relationships have been found between the intensity of SNS usage and several dimensions underlying social capital (Valenzuela et al., 2009), we are aware of no study that examines in-depth the mechanisms underlying differential patterns of usage in SNPs. Furthermore, despite the fact that findings indicate that more intense usage of SNPs is associated with increased levels of social capital (Ellison et al., 2009; Stefanone et al., 2011), little is known of factors affecting the frequency with which international students employ SNP and IM to build and maintain weak and strong ties. This lack of knowledge hampers our understanding of the causes that shape differences in people's levels of social capital.

This study is grounded in two interrelated frameworks: social capital (Bourdieu, 1986; Coleman, 1988) and Internet-enhanced self-disclosure (Valkenburg & Peter, 2009). Social capital is a well-known multidimensional concept (Hazleton & Kennan, 2000) that can be thought of as being the sum of resources pertaining to a network of relationships among people (Bourdieu, 1986). These resources are embedded in individuals' personal and organizational social networks (Lin, 1999a, 1999b, 2001; Son & Lin, 2008). Two elements are at the core of social capital: "the social relationship itself that allows individuals to claim access to resources possessed by their associates" (Portes, 1999, pp. 3–4) and the "amount and quality of those resources" (p. 4). Along the same lines, Lin (1999a, 1999b) distinguished between network (i.e., accessible) resources and contact resources (i.e., resources that are mobilized in instrumental actions). Fussell, Harrison-Rexrode, Kennan, and Hazleton (2006) noted that "human messaging" (p. 151) plays a key role in how people form relationships and argued that people's communicative predispositions influence the ways in which they acquire, maintain, and expend social capital.

The importance of studying social capital in online settings—or in cybernetworks, to use Lin's (1999a; 2001) term—has been long recognized: "much work is urgently needed to understand how cybernetworks build and segment social capital" (Lin, 1999a, p. 47). Despite this fact, research focusing on social communication in online settings is limited (Mikami et al., 2010). Case in point, it is unclear how well current findings describe groups other than young Americans (Ellison et al., 2007, 2009; Stefanone et al., 2011). In particular, although international students are a distinct population that faces specific challenges (e.g., adjustment to a host culture, homesickness, studying in a second language, and social connectedness), there is scant knowledge of the mechanisms that influence the way they use CMC channels to communicate and to create and maintain social capital (Hendrickson, Rosen, & Aune, 2011). This is a problematic aspect, because, as Castells (2000) noted, in the absence of the connectivity facilitated by various CMC mediums, individuals construct their inner as well as their collective projection of themselves "without global, instrumental reference" (p. 24) and, thus, run the risk of becoming socially disconnected. In turn, this lack of social connectedness is detrimental for people's well-being as illustrated

by recent findings that have unearthed "a significant positive relationship between feelings of social connectedness, satisfaction, and contentment" (Hendrickson et al., 2011, p. 290).

Valkenburg and Peter's (2009) Internet-enhanced self-disclosure theory posits that online communication exerts a positive influence on well-being by increasing self-disclosure and social connectedness as well as enhancing the quality of relationships (see, e.g., Ward, Bochner, & Furnham, 2001, for a detailed account on social connectedness and its relations to psychological well-being). On a similar note, Castells (2000) and Lin (2001) noted that Internet-mediated communication helps to create social bonds and "broadens the scope of communication over time" (Castells, 2000, p. 388). An additional benefit of using CMC stems from the fact that it plays an important role in "expanding sociability beyond the socially defined boundaries of self-recognition" (Castells, 2000, p. 388). It is important to note that all these positive outcomes are moderated by the type of CMC technologies employed, by the specific ways in which they are used, and by the user's gender and level of social anxiety (Valkenburg & Peter, 2009). A similar view is shared by Quan-Haase (2008), who argued that a specific CMC tool (IM) facilitates contact with close and distant social ties and helps users "develop and maintain social relationships" (Quan-Haase, 2008, p. 112). However, more research is needed to unearth the influence of variables that mediate or moderate these positive effects, because the impact of various factors has "not yet been investigated in an integrated effects model" (Valkenburg & Peter, 2009, p. 3).

Numerous studies (e.g., Bargh, McKenna, & Fitzsimons, 2002; Ellison et al., 2007; Helliwell & Putnam, 2004; Steinfield et al., 2008) have found that social capital can be an important factor in predicting people's well-being and life satisfaction. Kennan, Hazleton, Janoske, and Short (2008) argued that the introduction and adoption of new CMC options impacts the nature of social capital and recognized that the precise nature of this impact is not well understood. In Kennan et al.'s view, significant limitations of the research stem from its inability to recognize that (a) numerous and diverse media facilitate people's interactions, and (b) the creation and maintenance of social capital is shaped by how people select from and use available means of communication. Along the same lines, Valkenburg and Peter (2009) noted the importance of investigating the social consequences of Internet usage in comprehensive frameworks that take into consideration the "simultaneous effect of different communication technologies" (p. 4; see also Valkenburg & Peter, 2007). This argument is consistent with Castells' (2000) stance that the focal characteristics of the CMC tools (i.e., pervasiveness, multifaceted decentralization, and flexibility) are rooted in the "digitized, networked integration of multiple communication modes" (p. 405). Moreover, Valkenburg and Peter's (2009) call for integrative studies of different CMC media receives further support from findings suggesting that one popular CMC medium (again, IM) "is frequently used asynchronously, in tandem with multitasking behaviors" (Baron, 2004, pp. 419–420; for similar findings, see also Shiau, 2008).

Users' online behavior is influenced by how they relate to others in F2F relationships (Mikami et al., 2010), by the constraints of their offline social networks (Hargittai, 2008), and by their offline characteristics (Pfeil et al., 2009). Specifically, gender-based, age-related, and cultural differences in SNS and IM usage have been reported for various populations (Baron, 2004; Hargittai, 2008; Hargittai & Hsieh, 2010; Leung, 2001, 2004; Mikami et al., 2010; Pfeil et al., 2009; Valenzuela et al., 2009; Zaphiris

& Sarwar, 2006). Thus, an examination of the effect(s) that these factors have on the frequency with which international students use CMC to communicate is needed.
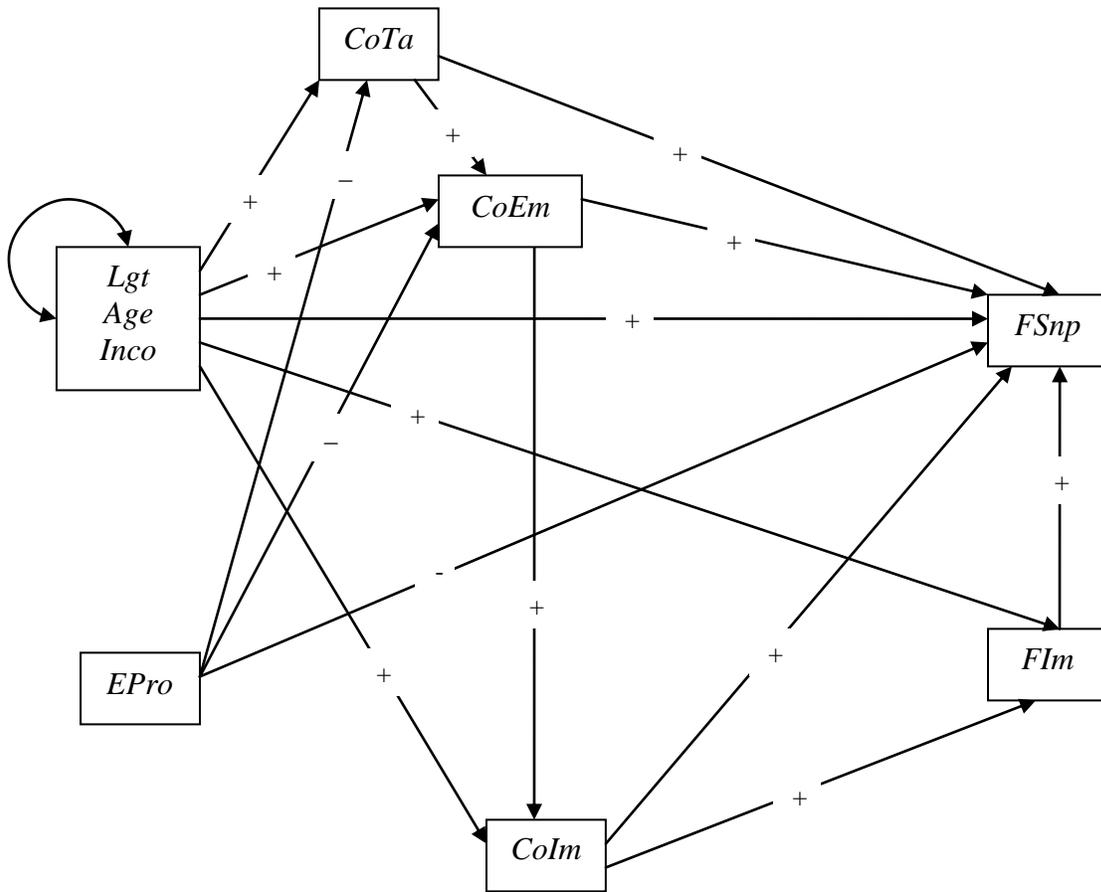
People's self-beliefs, including their self-perceptions of capabilities, are important determinants of the outcomes of various activities. Specifically, self-perceptions of communicative competence (i.e., self-efficacy beliefs; Bandura, 1997) affect communication processes in important ways, because people's perceptions of their own skills determine their communication-related decisions over and above the effect of actual skills (McCroskey, 1995; Richmond & McCroskey, 1995). Moreover, self-efficacy beliefs related to communication have broad effects, because they influence communicative performance across various communication contexts (Ford & Wolvin, 1993).

Bandura (1997) posits that "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainment" (p. 3). Grounded in Bandura's perspective, this research conceptualizes communicative self-efficacy as one's beliefs in one's own capability to communicate effectively in given contexts. Taking into account that, to our knowledge, measures of communicative self-efficacy beliefs related to specific CMC encounters have yet to be developed, this study employs students' confidence levels in using various CMC tools as measures of given communicative self-efficacy beliefs. Considering that general levels of confidence in using a communication tool impact the extent to which the given tool is employed for specific purposes (Eastin & LaRose, 2005), it is important to study the extent to which students' levels of comfort in using various communication channels (i.e., F2F, e-mail, IM) mediate relationships among student-centered factors (i.e., age, gender, English language proficiency, etc.) and the frequency of their communication through IM and SNP.

Current Study

This research integrates the analysis of various CMC activities and investigates how international students employ IM and SNPs to communicate. This approach enables an examination of how permeable and elastic boundaries between CMC tools interact to influence social capital building (Resnick, 2001). The underlying assumptions of this study are that social capital is produced and reproduced through social interactions and that the convergence of social relationships and new CMC technologies has the potential to generate novel forms of social capital (Resnick, 2001; see also Phulari et al., 2010). More precisely, based on evidence that (a) the time one spends online is positively related to one's level of social capital (Williams, 2007) and (b) more intensive usage of IM and SNP is associated with enhanced connectedness and increased levels of social capital (Shiau, 2008; Tomai et al., 2010), this research assumes that a positive linear relationship exists between the frequency of communicating through SNP or IM and the level of social capital created or maintained.

This study proposes a specific model of mediated relationships among contextual factors, comfort (i.e., self-efficacy) levels, and frequency of communication through SNP and IM (see Figure 1).

Figure 1. Conceptual representation of the full mediation model.

Single-headed arrow lines hypothesize direct effects, whereas the double-headed arrow denotes a correlation. To avoid cluttering the model, variables Lgt, Age, *and* Inco *were represented in a single rectangle as opposed to three rectangles, and each path originating from this rectangle substitutes three individual paths (i.e., one from* Age, *one from* Lgt, *and one from* Inco). *The signs represented in the diagram indicate the direction of the hypothesized effects.* Lgt = *length of time in the United States (in months);* Age = *age of participant;* Inco = *indicator of individualism versus collectivism;* EPro = *English language proficiency;* CoTa = *comfort level in talking in English;* CoEm = *comfort level in writing e-mails in English;* CoIm = *comfort level in sending instant messages in English;* FSnp = *frequency of using (English-language) SNP;* FIm = *frequency of using instant messaging (in English).*

The choice of variables in the model was guided by two main considerations. First, age, gender, and proficiency in the language of the host culture have been found to be instrumental factors affecting international students' adaptation to and functioning in the host culture (for a detailed examination of this aspect, see Cemalcilar et al., 2005, and references therein). Second, the association between general Internet usage and demographic variables (i.e., age, gender) is also well documented (e.g., Coget, Yamauchi, Suman, 2002; Williams, 2006, 2007). Taking into account these aspects, the model posits direct and positive influences of age (*Age*), length of time (in months) respondents had been in the United States (*Lgt*), and their degree of individualism versus collectivism (*Inco*) on the frequency of communication through SNP (*FSnp*) and IM (*FIm*). The model additionally hypothesizes that comfort levels students experience when talking to (*CoTa*), writing e-mails (*CoEm*), and, sending IMs (*CoIm*) (in English) to various recipients act as mediators between contextual factors and criteria. Finally, the model posits that English language proficiency (*EPro*) influences directly *CoTa* and *CoEm*, both directly and indirectly *FSnp*, and only indirectly *FIm*. Because *EPro* is inverse-coded (i.e., higher values of *EPro* are associated with lower levels of proficiency), all paths indicating a positive relationship between *EPro* and criteria are associated with negative signs.

This study will assess the tenability of one hypothesis and will answer one research question:

Hypothesis: The influence of contextual factors on the frequency of communicating through SNP and IM is partially mediated by students' comfort levels to talk in English and use CMC tools.

Research question: How does gender moderate the hypothesized patterns of interrelationships?

Method
Participants

Data used in this research were collected via a sample of 168 international students (15.70% response rate) enrolled at a large Midwestern university in the United States. Ninety-two (54.80%) students were women, and 76 (45.24%) were men. In the sample, most students (i.e., 35) were from India (20.83%) or China (17; 10.12%) and were graduate students (88.10%). The majority of respondents (77.38%) were living for the first time outside their home country. The mean (*M*) age of the participants was 28.87 years, with a minimum of 18 years and a maximum of 55 years; the standard deviation (*SD*) was 6.62 years. The characteristics of the sample match closely those of the population in terms of the percentage of international students who were from China (11% in the population) and average age (27 years in the population). The percentage of women was higher in the sample than in the population (36%), and the percentage of international students who were from India was smaller in the sample than in the population (32%).

At the time of data collection, about 50% of respondents had a Facebook profile, 25.60% had an Orkut profile, and 20.83% had a MySpace profile. The SNP respondents reported using most often was Facebook (32.14%), followed by Orkut (17.26%) and Hi5 (4.76%). In contrast to most other research studies on this topic that used suboptimal procedures to deal with missing data (usually resorting to data purging), this investigation employed all information in the data. More precisely, because full information

maximum likelihood was used to estimate the parameters of the model, no participant was dropped from the sample regardless of how many questions she or he answered. In this way, any potential biasing effect of purging respondents was avoided.

Procedure

After the research was reviewed and approved by the university's institutional review board, all 1,068 international students enrolled in the selected semester at the university were sent a paper-based questionnaire and an addressed return envelope to their address on file at the Office of International Students and Scholars. Because every member of this population was sent a questionnaire and was invited to participate in the study, sampling bias was avoided (Groves et al., 2004).

Measures

The topic of this study is novel and touches on several research fields. Thus, it was not possible to find a suitable standardized instrument, and so original questions were created for a questionnaire. Excellent reliabilities were found for all subscales employed (see Table 1). The two criteria, the frequency with which students used their favorite (English-based) SNP ($FSnp$) and IM (FIm), were obtained averaging seven items; each item asked respondents to estimate how often they communicate through IM and through their SNP of choice with family members, friends, classmates, and other international students. Because items were recorded on a 5-point Likert scale ranging from *once a week* to *several times a day*, higher values indicate heavier usage.

The set of mediators used in this investigation includes the level of comfort students have in talking ($CoTa$), writing e-mails ($CoEm$), and sending IMs in English ($CoIm$). These mediators were obtained averaging eight items assessing respondents' levels of comfort of performing the given task in social and school-related settings with other men and women, and with domestic and international students. Each item was recorded on a 5-point Likert scale ranging from *not at all comfortable* to *totally comfortable*; thus, higher values on the mediators indicate higher perceived levels of comfort. The contextual factors employed in this study were the length of time students have been in the United States (Lgt) (measured in months); their age (Age) (measured in years); and their level of proficiency in speaking, reading, understanding, and writing (in) English ($EPro$). $EPro$ was obtained by averaging four items on a 5-point Likert scale ranging from *very easy* to *very hard*; thus, higher scores on $EPro$ indicate lower levels of self-perceived ability of using English language. Finally, an index of individualism versus collectivism ($Inco$) was calculated as the average of four items. Each item was recorded on a 5-point Likert scale ranging from *not at all important* to *very important* and gauged students' position on a fundamental dimension underlying the individualism–collectivism construct (e.g., maintaining face). The means, standard deviations, correlations, and reliabilities for all variables are presented in Table 1.

Table 1. Full Information Maximum Likelihood Estimates of Standard Deviations, Correlations, and Reliabilities for Focal, Mediator, and Predictor Variables in the Reduced Model.

	1	2	3	4	5	6	7	8
1. *Lgt*	**33.85**							
2. *Age*	0.38	**6.60**						
3. *EPro*	−0.05	−0.04	**1.20**					
4. *CoTa*	0.20	0.00	−0.25	**0.67**				
5. *CoEm*	0.15	−0.04	−0.15	0.66	**0.66**			
6. *CoIm*	−0.04	−0.18	−0.08	0.44	0.61	**0.94**		
7. *FSnp*	−0.26	−0.48	−0.02	−0.01	0.08	0.25	**1.18**	
8. *FIm*	−0.37	−0.38	−0.09	0.02	0.09	0.24	0.55	**0.96**
Mean	34.11	28.89	2.34	4.20	4.44	4.09	1.44	1.77
Reliability	1.00	1.00	0.95	0.93	0.95	0.99	0.80	0.95
Number of items	1	1	4	8	8	8	7	7

Note. Lgt = length of time in the United States (in months); Age = age of participant; EPro = English language proficiency; CoTa = comfort level in talking in English; CoEm = comfort level in writing e-mails in English; CoIm = comfort level in sending instant messages in English; FSnp = frequency of using (English-language) SNP; FIm = frequency of using instant messaging (in English); Number of items = number of items included in the calculation of the given index. The reliabilities are the α coefficient of internal consistency; these values are assumed to be 1.00 for the demographic variables collected (i.e., for Age and Lgt). Standard deviations are shown in bold type on the main diagonal of the table and correlations in the lower triangular part.
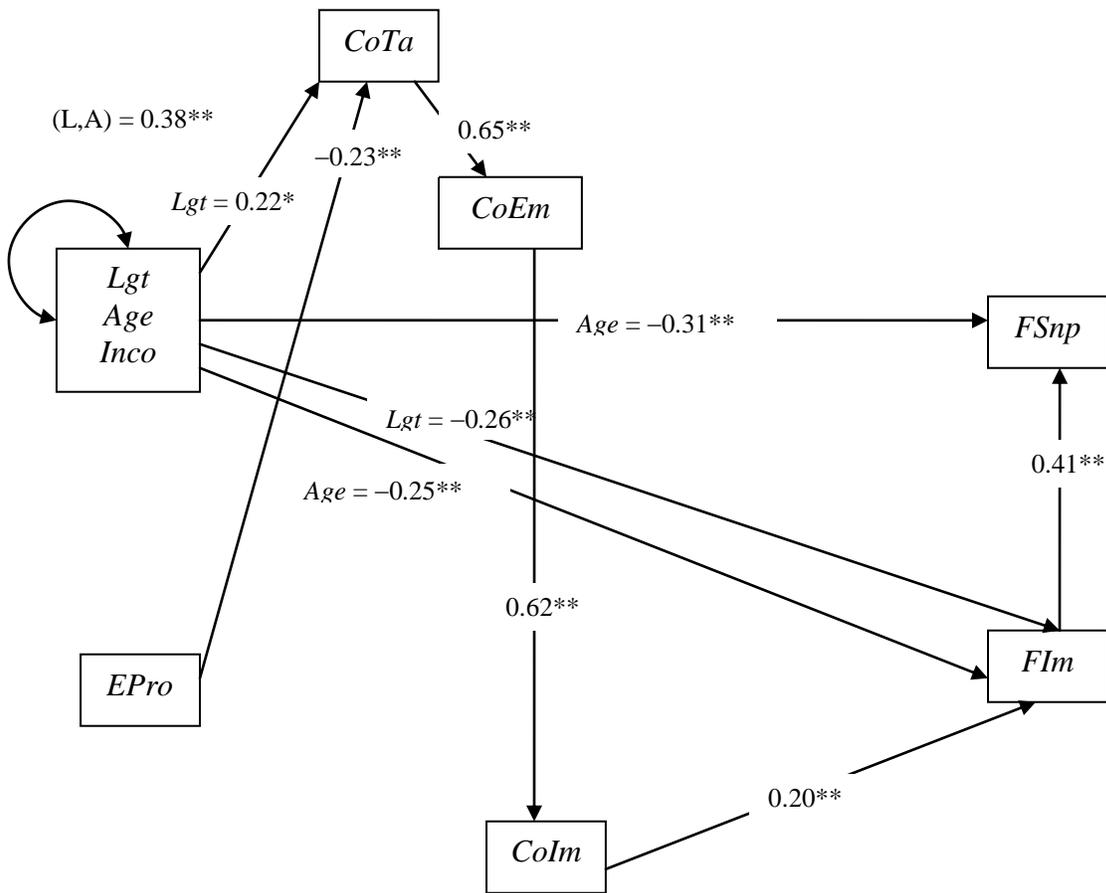
Data Analytic Technique

A path analysis was employed to analyze the feasibility of the proposed model. This technique is suitable for testing the appropriateness of complex models, because it enables variables to play different roles (e.g., dependent variables in some equations, independent variables in others) within the system of relationships being investigated (Raykov & Marcoulides, 2006). Thus, path analysis overcomes serious limitations of traditional techniques (e.g., multiple regression) that impose artificial separations between predictors and dependent variables.

Results

The hypothesized model had an excellent fit: χ^2 (5, N = 168) = 3.33, p = .65, Comparative Fit Index (CFI = 1.00), Tucker-Lewis Index (TLI = 1.00), Root Mean Square Error of Approximation (RMSEA = .00), Standardized Root Mean Square Residual (SRMR = .02). The nonsignificant p value of the χ^2 goodness-of-fit test together with values of CFI and TLI in excess of .95 and values of RMSEA and SRMR smaller than .05 indicate that the model is consistent with the data (Grace & Bollen, 2005; Hu & Bentler, 1999). Thus, the model offers a plausible representation of interrelationships among contextual factors, mediators, and criteria. An analysis of findings associated with the full model (see Figure 2) indicates that respondents' levels of individualism versus collectivism influenced neither the mediators nor the criteria. In addition, no significant mediated effects were revealed for this variable. As a result, in subsequent

steps, *Inco* was dropped from the model. Fitting the full model also revealed that age had no significant effect on any of the mediators, whereas length of time in the United States influenced significantly the level of comfort to talk but not the other two mediators. Moreover, an analysis of the relationships among mediators and criteria indicates that, with the exception of *CoIM* (which predicts significantly *FIm*), no other mediator had a significant direct impact on criteria. These findings suggest that a more parsimonious representation of observed relationships can be achieved.
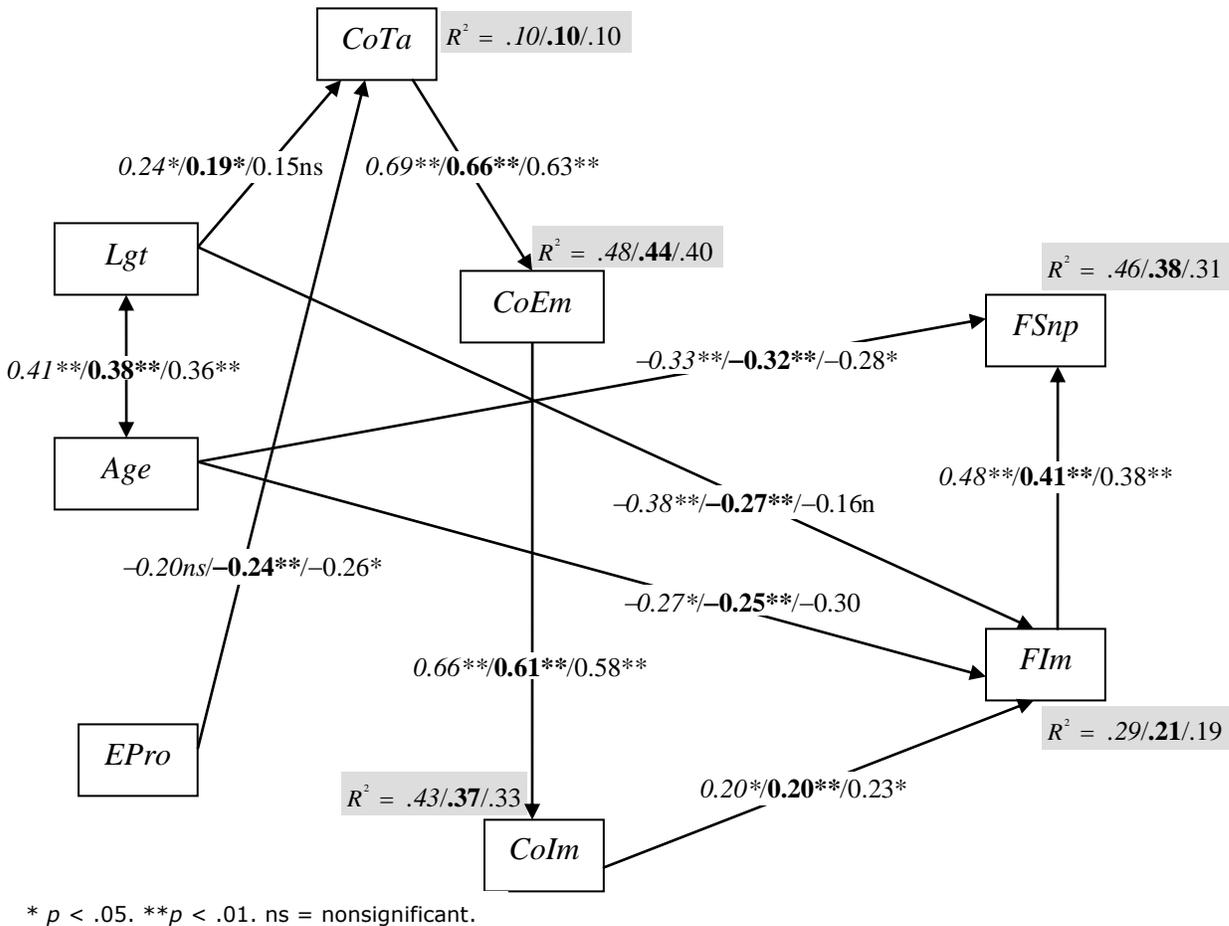

Figure 2. Standardized results for the full mediation model.

Single-headed arrow lines hypothesize direct effects, whereas the double-headed arrow denotes a correlation. For the sake of simplicity, variables Lgt*, Age, and* Inco *were represented in a single rectangle as opposed to three rectangles. Paths including the name of a variable and a numerical value should be interpreted as illustrating a direct effect from only that particular variable.* Lgt = *length of time in the United States (in months);* Age = *age of participant;* Inco = *indicator of individualism–collectivism;* EPro = *English language proficiency;* CoTa = *comfort level in talking in English;* CoEm = *comfort level in writing e-mails in English; CoIm = comfort level in sending instant messages in English;* FSnp = *frequency of using (English language) SNP;* FIm = *frequency of using instant messaging (in English); (L,A) = correlation between* Lgt *and* Age*.*

To test the hypothesis, a reduced model was developed (see Figure 3). The reduced model included all original variables (with the exception of *Inco*) and dropped all paths that were not significant in the full model (purging of nonsignificant paths was further supported by the fact that none of the paths that were eliminated facilitated any significant indirect effect). The reduced model had an excellent fit to the data: χ^2 (16, *N* = 168) = 16.53, *p* = .42, CFI = 1.00, TLI = 1.00, RMSEA = .01, SRMR = .05. The chi-square difference test comparing the fit of the full and reduced models was not statistically significant: $\Delta\chi^2$ (11, *N* = 168) = 13.20, *p* = .28, thus supporting the conclusion that relationships among factors, mediators, and criteria can be adequately modeled in a more parsimonious way than that depicted in Figure 1. In conclusion, the effect of the set of contextual factors on the criteria is partially mediated by the set of three mediators. Estimates of standardized direct effects in the reduced model are summarized in Figure 3.

**Figure 3. Standardized results of the reduced mediation model
for female/total sample/male respondents.**

Single-headed arrow lines hypothesize direct effects, whereas the double-headed arrow denotes a correlation. Lgt = *length of time in the United States (in months);* Age = *age of participant;* EPro = *English language proficiency;* CoTa = *comfort level in talking in English;* CoEm = *comfort level in writing e-mails in English;* CoIm = *comfort level in sending instant messages in English;* FSnp = *frequency of using (English-language) SNP;* FIm = *frequency of using instant messaging (in English).*

To explicate thoroughly the relationships among factors, mediators, and criteria, an in-depth analysis of total, direct, and mediated effects is needed. The results of this analysis are presented in the Appendix. Several major points can be emphasized. Students' length of time in the United States had a significant indirect effect on *FSnp*. In the absence of a direct effect, the total effect equals the overall

indirect effect (MacKinnon, 2008). Of the two specific indirect effects linking *Lgt* and *FSnp,* the one in which the influence of *Lgt* on *FSnp* was mediated only by *FIm* (i.e., *Lgt → FIm → FSnp*) was statistically significant. The other specific indirect effect (i.e., *Lgt → CoTa → CoEm → CoIm → FIm → FSnp*) was not significant. Thus, the length of time in the United States affected only indirectly students' frequency of communication through SNP: an increase of one standard deviation in *Lgt* was associated with a decrease of about 10% standard deviation units in *FSnp* by means of the mediating effect of *FIm*. Length of time in the United States had significant direct and total effects on the frequency of using IM but an insignificant mediated effect. The interpretation of the direct effect is immediate: after controlling for the three mediators, *CoTa*, *CoEm*, and *CoIm*, a one–standard deviation increase in *Lgt* was associated with an adjusted decrease of 0.27 standard deviation units in *FIm*. These results indicate that, although length of residence in the host culture had a negative effect on both *FSnp* and *FIm*, the impact was much stronger for *FIm*.

The age of international students had significant direct, mediated, and total effects on the frequency of using SNP. The direct effect was much larger than the indirect one, accounting for 76.19% of the total effect. Participants' age had a direct influence only on *FIm*: a one–standard deviation increase in students' age was associated with a quarter of a standard deviation decrease in their frequency of IM usage. These findings indicate that older students communicated less frequently through IM and SNP than younger ones. Finally, students' levels of English proficiency had neither significant direct nor indirect effect on their frequency of using SNP and IM.

Relationships among mediators were quite strong, as students' level of comfort in talking in English had a significant direct effect on their level of comfort in writing e-mails and a significant indirect effect on their level of comfort in sending IMs. A significant direct effect was also apparent between *CoEm* and *CoIm*. Additionally, a significant direct effect linked the two criteria: an increase of one standard deviation in *FIm* was associated with an increase of 0.41 standard deviation units in *FSnp*. With regard to the ability of the model's predictors to account for variations in the dependent variables, the results are encouraging: Differences in predictor levels accounted for 37.50% of variability in *FSnp* and for 21.40% of variability in *FIm*. In terms of mediator variables, the model had a good performance for *CoEm* (43.50% of variability accounted for) and *CoIm* (37.40% of variability accounted for) but not for *CoTa* (9.7% of variability accounted for).

To answer the research question and examine whether relationships among contextual factors, mediators, and criteria were moderated by gender, the reduced mediation model was fit separately for female and male respondents. A summary of the results is shown in Figure 3, where, for each path, the first number (in italics) pertains to the female subsample, the second number (in bold) pertains to the total sample, and the last number pertains to the male subsample. A comparison of the parameter estimates for female and male subgroups revealed some important results.

First, although the hypothesized model had a very good fit to the data for both female (χ^2 (16, *n* = 92) = 19.50, *p* = .24, CFI = 0.98, TLI = 0.97, RMSEA = .05, SRMR = .07) and male subsamples (χ^2 (16, *n* = 75) = 14.96, *p* = .53, CFI = 1.00, TLI = 1.00, RMSEA = .00, SRMR = .06), the fit was slightly better for men. Second, with three exceptions, all paths that were significantly different from zero in the

total sample were also significant in the female and male subgroups. Specifically, for men there were no significant direct effects of the length of time students resided in the United States, their level of comfort to talk in F2F situations, and their frequency of communicating through IM. For women, the only nonsignificant direct effect was the one from students' English language proficiency to their level of comfort to talk in English.

Statistical significance is affected by the precision of estimation which, in turn, is connected to the size of the sample. Thus, to obtain an accurate depiction of the extent to which relationships among factors, mediators, and criteria are different for female and male students, a comparison of the magnitude of corresponding paths was performed. Results of this comparison indicate that in 30% of the cases (i.e., 3 out of 10 direct effects/correlation) that were significant in the total sample, standardized effects were higher for men than for women. In particular, the direct influence of English language proficiency on level of comfort to talk in English, of age on the frequency of using IM, and of level of comfort in using IM on the frequency of IM usage were stronger in the male subgroup than in the female subgroup. These differences were relatively small, as the standardized direct effects for women were only 13% to 23% smaller than the corresponding effects for men. The biggest difference was recorded for the direct effect of *EPro* on *CoTa* and the smallest for the direct effect from *CoIm* to *FIm*.

When standardized direct effects for women exceeded those for men, differences in magnitude between these two groups were generally larger. The largest difference between the estimates in the two groups was found for the *Lgt → FIm* effect. In this situation, the direct effect was not statistically significant for the male subsample, and its magnitude was only 42% of that of its counterpart in the female subsample. Similarly, the effect of *Lgt* on *CoTa* was not significant for men, and its magnitude was with 37% smaller than that of its counterpart in the female subgroup. The effect of *FIm* on *FSnp* was also notably smaller for men, as its magnitude was only 79% of that of the corresponding effect in the female subgroup. For the other direct paths/correlation, the size of the effects was similar for the two groups, with effects for men being 9% to 12% smaller than those for women.

Compared to the male subsample, the female one recorded both stronger relationships among factors, mediators, and criteria (with the noted three exceptions) and higher proportions of variation in outcomes accounted for by predictors. The most notable differences were found for the two criteria: For both *FSnp* and *FIm*, R^2 in the male subgroup was about one-third smaller than its female-subgroup counterpart (see Figure 3). These differences were smaller for *CoIM* (i.e., $R^2_{male\_CoIm} = 0.77 * R^2_{female\_CoIm}$) and for *CoEm* (i.e., $R^2_{male\_CoEm} = 0.83 * R^2_{female\_CoEm}$), whereas for *CoTa*, R^2 had equal values in the two groups. Altogether, these results indicate that gender moderates significantly some of the hypothesized relationships.

Discussion

Answering recent calls "for more nuanced future efforts examining particular populations" (Williams, 2007, p. 405; for a similar stance, see also Ellison et al., 2007, 2009), this study analyzes pivotal aspects concerning the computer-mediated communication patterns of international students. Examination of this particular population provides important insights not only because its members face more challenges than domestic students (e.g., functioning in a second language and adapting to a new culture) but also because it includes mature respondents. This study broadens knowledge in the field by offering insights about an age group that is seldom, if ever, targeted by research, which tends to focus on teenagers, adolescents, or young undergraduate U.S. students (e.g., Ellison et al., 2007; Hargittai, 2008; Mikami et al., 2010; Steinfield et al., 2008; Valenzuela et al., 2009; Valkenburg & Peter, 2007, 2009; Valkenburg et al., 2006).

This research proposed a conceptual model to link student-centered factors, levels of comfort to engage in F2F and CMC, and frequency of using SNP and IM. Estimation of the model revealed that students' (self-reported) levels of English language proficiency had significant direct impact only on their levels of comfort to talk in F2F situations. Thus, it can be concluded that no significant relationship exists between how comfortable a student is to use CMC tools and her or his English language proficiency. This conclusion is further supported by the small magnitude of corresponding indirect effects and brings about an interesting implication: International students who have difficulties with the English language might engage more in class activities if they are offered the opportunity to use CMC tools to communicate with instructors and colleagues. Moreover, consistent with Eastin and LaRose's (2005) stance, we found that students' general levels of comfort (i.e., self-efficacy) using a specific CMC medium (i.e., IM) had a positive relationship with the frequency of employing the medium for a specific purpose.

Students' age had no significant bearings on how comfortable they felt to engage in F2F and CMC. However, age had a negative influence on the frequency of SNP and IM usage as older students used SNP and IM less frequently to communicate with family members, friends, and classmates. These results are consistent with findings that point toward relationships between participants' age and their overall use of the Internet (Coget et al., 2002) or SNS (Hargittai, 2008; Valenzuela et al., 2009). Additionally, results of this study are similar to those of Cemalcilar and colleagues (2005), who found that older students were more likely than younger ones to engage in more passive uses of the Internet (e.g., surfing or reading newspapers). Because only some (e.g., SNP and IM usage) but not all online activities contribute to increases in social capital (Ellison et al., 2009; Zhao, 2006), it appears that older students in this sample engaged to a lesser extent than their younger counterparts in CMC that facilitates the creation or maintenance of social capital.

Consistent with Kennan et al. (2008) and Valkenburg and Peter (2009), this study revealed that lumping together information about SNP- and IM-mediated communication in a single variable might not be warranted. Particularly, the pattern of age and length of stay effects (in which age predicted significantly both the frequency of communication through SNP and IM, and length of stay predicted significantly only frequency of using instant messaging in English) suggests that these two types of CMC are not isomorphic. This conclusion is further supported by the small correlation recorded between *FSnp*

and *FIm* (i.e., *r* = .55) and by the medium-sized influence (β = 0.41) *FIm* exerted on *FSnp* and is consistent with patterns of multitasking that were detected with respect to IM usage (Baron, 2004; Shiau, 2008).

Important findings emerged with regard to the moderating role of gender. First, the relationship between students' English language proficiency and their comfort to talk in F2F interactions was significant only for the male subsample, indicating that for male international students, the level of comfort in talking in English is more heavily dependent on their language skills than for women. Although we don't have a clear explanation of this finding, we hypothesize that because women make more use of CMC tools to engage in social activities than men (Pfeil et al., 2009), they also have a more accentuated desire to connect on a social level. Thus, women may regard F2F interactions as opportunities to socialize and make the most of them regardless of their confidence in their English language abilities. This idea is in line with Ranney and Troop-Gordon (2012), who note that the experience of friendship, as well as the value derived from it differs for women and men (for similar points, see Johnson, 2004; Lepore, 1992; Shulman, Laursen, Kalman, & Karpovski, 1997).

Second, the influence of length of residence in the United States on the frequency of IM communication was significant only for women. Put simply, a significant decrease in *FIm* associated with living for a longer time in the United States was apparent for female but not for male international students. These results are consistent with previous findings: Earlier studies of IM usage (e.g., Leung, 2001) found that women used IM for longer times and with increased frequency "for reasons of sociability" (p. 497) than men. Moreover, Mikami et al. (2010) found that women' SNPs were more likely than men' SNPs to contain supportive comments from friends. Furthermore, findings from Pfeil et al. (2009) indicate that women were more expressive than men when using SNPs, and findings from Baron, (2004) indicate that women were more likely to use emoticons when communicating through IM). In this light, it appears that a plausible explanation for our finding (i.e., that the longer female international students stayed in the United States, the less they used IM) is that women found F2F interactions or other CMC channels (e.g., SNSs) to be more conducive than IM to express themselves and/or receive support. This explanation is also in line with recent findings (Hargittai & Hsieh, 2010) indicating that women are more likely than men to use SNSs to "maintain their existing social relationships" (p. 531) and less likely to use their SNPs to meet new people.

Third, the length of residence in the host culture had a significant direct effect on levels of comfort in talking for women but not for men. Thus, it appears that only for women, the longer they stayed in the United States, the more comfortable they were to talk in English. One plausible explanation for this finding is that women are more interested than men to connect on a social level, and the longer they resided in the United States, the more opportunities they had (created for themselves) to interact in English. As a result, they became increasingly comfortable to communicate in this language. Fourth, the percent of variation in outcomes accounted for by predictors was higher for women than for men, indicating that the model has differential explanatory power for men and women. Overall, these results clearly indicate that gender moderates certain aspects of the relationships among contextual factors, mediators, and criteria.

Limitations and Future Directions

As is the case with any other research, findings from this study have certain limitations. First, measuring participants at a single point in time made it possible to test only linear hypotheses. Although these hypotheses received strong support from the empirical data (i.e., the models had excellent fit), this study has not ruled out the possibility that relationships among factors, mediators, and criteria could be nonlinear. Second, although several demographic variables were collected and used in the analysis, they predicted only a part of the variability in the criteria. Thus, variation in the frequency of SNP and IM usage might also be related to some other variables that were not included in this study. The third limitation of this research stems from the fact that network data measuring students' actual (as opposed to self-reported) usage of IM and SNP were not available. Such data are difficult to obtain for such a diverse population, but their availability could be instrumental for further testing the plausibility of the model. Fourth, although hypothesized directions of relationships among contextual factors, mediators, and criteria are consistent with findings from other research, in the absence of a true experimental design, no causal relationships should be inferred from the results of this study. A final potential limitation of this study pertains to the number of respondents surveyed. Even though this sample size ensures the precise estimation of the parameters of the proposed models, which are parsimonious and relatively simple, testing more complex associations involving additional variables is likely to require a larger sample.

Future research could overcome some of these limitations by using a longitudinal framework of inquiry in which changes in contextual factors are studied in conjunction with changes in mediators and criteria to provide more information on hypothesized effects. In this way, for example, the presence or absence of nonlinear relationships could be assessed. Moreover, by including additional predictors and making use of network data, the proposed model could be further refined. Future research also could include direct measures of social capital, so that the model can be extended to assess the influence of factors and mediators not only on the intensity of SNP and IM usage but also on the level and/or nature of social capital.

In sum, as technological advances rapidly change the way in which international students relate to families, friends, and classmates, it is important to examine how these new communication channels are employed. By providing an in-depth examination of factors that influence students' use of IM and SNP, this study facilitates a better understanding of mechanisms shaping social capital formation and maintenance.

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APPENDIX

Standardized Values of Total, Direct, and Indirect Effects for the Reduced Model.

Total Effect				Direct Effect			Indirect Effects			
Name	Estimate	*SE*	*p*	Estimate	*SE*	*p*	Name	Estimate	*SE*	*p*
$Lgt \rightarrow FSnp$	−0.11	0.04	< .01				Overall indirect effect	−0.11	0.04	< .01
							$Lgt \rightarrow FIm \rightarrow FSnp$	−0.12	0.04	< .01
							$Lgt \rightarrow CoTa \rightarrow CoEm \rightarrow CoIM \rightarrow FIm \rightarrow FSnp$	0.01	0.01	.11
$Lgt \rightarrow FIm$	−0.26	0.07	< .01	−0.27	0.07	< .01	$Lgt \rightarrow CoTa \rightarrow CoEm \rightarrow CoIM \rightarrow FIm$	0.02	0.01	.09
$Age \rightarrow FSnp$	−0.42	0.05	< .01	−0.32	0.06	< .01	$Age \rightarrow FIm \rightarrow FSnp$	−0.10	0.04	< .01
$Age \rightarrow FIm$	−0.25	0.07	< .01	−0.25	0.07	< .01				
$EPro \rightarrow FIm$	−0.02	0.01	.07				$EPro \rightarrow CoTa \rightarrow CoEm \rightarrow CoIm \rightarrow FIm$	−0.02	0.01	.07
$EPro \rightarrow FSnp$	−0.01	0.01	.10				$EPro \rightarrow CoTa \rightarrow CoEm \rightarrow CoIm \rightarrow FSnp$	−0.01	0.01	.10
$Lgt \rightarrow CoTa$	0.19	0.01	.04	0.19	0.01	.04				
$Lgt \rightarrow CoEm$	0.12	0.06	.04				$Lgt \rightarrow CoTa \rightarrow CoEm$	0.12	0.06	.04
$EPro \rightarrow CoTa$	−0.24	0.05	< .01	−0.24	0.05	< .01				
$EPro \rightarrow CoEm$	−0.16	0.05	< .01				$EPro \rightarrow CoTa \rightarrow CoEm$	−0.16	0.05	< .01
$EPro \rightarrow CoIm$	−0.10	0.04	< .01				$EPro \rightarrow CoTa \rightarrow CoIm$	−0.10	0.04	< .01
$CoTa \rightarrow FSnp$	0.03	0.02	.03				$CoTa \rightarrow CoEm \rightarrow CoIM \rightarrow FIm \rightarrow FSnp$	0.03	0.02	.03
$CoTa \rightarrow FIm$	0.08	0.03	.01				$CoTa \rightarrow CoEm \rightarrow CoIM \rightarrow FIm$	0.08	0.03	.01
$CoEm \rightarrow FSnp$	0.05	0.02	.02				$CoEm \rightarrow CoIM \rightarrow FIm \rightarrow FSnp$	0.05	0.02	.02
$CoEm \rightarrow FIm$	0.12	0.04	< .01				$CoEm \rightarrow CoIM \rightarrow FIm$	0.12	0.04	< .01
$CoIm \rightarrow FSnp$	0.08	0.03	.01				$CoIM \rightarrow FIm \rightarrow FSnp$	0.08	0.03	.01
$CoIm \rightarrow FIm$	0.20	0.07	< .01	0.20	0.07	< .01				
$CoTa \rightarrow CoEm$	0.66	0.07	< .01	0.66	0.07	< .01				
$CoTa \rightarrow CoIm$	0.40	0.07	< .01				$CoTa \rightarrow CoEm \rightarrow CoIM$	0.40	0.07	< .01
$CoEm \rightarrow CoIm$	0.61	0.09	< .01	0.61	0.09	< .01				
$FIm \rightarrow FSnp$	0.41	0.09	< .01	0.41	0.09	< .01				

Note. Lgt = length of time in the United States (in months); Age = age of participant; EPro = English language proficiency; CoTa = comfort level in talking in English; CoEm = comfort level in writing e-mails in English; CoIm = comfort level in sending instant messages in English; FSnp = frequency of using (English-language) SNP; FIm = frequency of using instant messaging (in English-language) SNP; FIm = frequency of using instant messaging (in English).