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Social network sites and international students' cross-cultural adaptation

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ABSTRACT

Prior research demonstrates the great potential of social network sites (SNSs) to international students' cross-cultural adaptation, but fails to explain how specific dimensions of SNS use may be related to cross-cultural adaptation. Extending anxiety/uncertainty management (AUM) theory, we added new antecedents about social ties on SNSs distinguished by cultural origins and geographic locations to understand the role of SNS use in cross-cultural adaptation. Path analysis results from an online survey ($N = 156$) show that directed communication via SNSs with local host nationals was positively associated with uncertainty reduction, but that with local co-nationals was negatively related to uncertainty reduction, suggesting that the effectiveness of SNSs in developing and maintaining local relationships may lie in their ability to provide a supplementary channel to offline communication. Overall, our results demonstrate that SNS effect on cross-cultural adaptation depends on individuals' proficiency of host language, who they communicate with and how they communicate via SNSs.

1. Introduction

The number of international students attending universities in the U.S. has increased significantly in the last decade. By the end of 2014, this number had reached 886,052, constituting 4% of the total U.S. higher education population, and increased 54.6% compared to a decade ago (Open Doors Data, 2014). Although international students can bring talents and diversity to higher education in the U.S., they inevitably experience challenges as they adjust to the American culture. These challenges range from language barriers, relational issues, to loneliness and racial discrimination (Al-Sharide & Goe, 1998; Ying & Liese, 1991). They are all part of the cross-cultural adaptation process that individuals experience while adjusting to the host country.

The extant scholarship on cross-cultural adaptation reveals that interpersonal communication is essential to the outcome of this adjustment process (Gudykunst, 2005). As a popular interpersonal communication tool on American campuses, social network sites (SNSs) provide easy access to social interactions on- and offline and facilitate relationship development and maintenance. Thus, SNSs can hold great potential to facilitating cross-cultural adaptation. Evidence that supports this assumption has started to emerge (Cao & Zhang, 2012; Lin, Peng, Kim, Kim, & LaRose, 2011; Park, Song, & Lee, 2014; Sawyer, 2013; Ye, 2005, 2006a, 2006b). However, these studies lack a theoretical framework which defines cross-cultural adaptation and explains how specific dimensions of SNS use may be related to the adaptation outcome. Furthermore, these studies simply demonstrated a positive relationship between the frequency of SNS use and cross-cultural adaptation. However, besides frequency, the quality of SNS use should also influence the outcome of cross-cultural adaptation. Specifically, we propose that how international students use SNSs for social interactions and who they communicate with via SNSs should be associated with cross-cultural adaptation. Thus, the primary goal of the present study is to provide theoretical explanations of how specific dimensions of SNS use are related to cross-cultural adaptation among international students in the U.S. Specifically, we use anxiety/uncertainty management (AUM) theory and add new antecedents about social ties on SNSs distinguished by cultural origins and geographic locations to the original theory.

We begin this paper by conceptualizing cross-cultural adaptation within the theoretical framework of AUM. We then extend AUM theory by highlighting directed communication via SNSs with social ties distinguished by cultural origins and geographic locations, and propose our original model. After reporting data collection and analytical procedures, we provide results of

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hypothesis testing, overall model goodness of fit, model modifications, and propose the final model. We conclude with a discussion on our major findings as well as their theoretical and practical implications.

2. Theoretical framework and hypotheses

2.1. Applying AUM to cross-cultural adaptation

AUM was first proposed to explain effective intercultural interactions (Gudykunst, 1988) and later extended to research on cross-cultural adaptation (Gudykunst, 2005). This theory is limited to explaining cross-cultural adaptation by *sojourners*, which refers to temporary visitors in another culture (Gudykunst, 2005). This assumption makes AUM applicable to international students, which the present study focuses on. While some international students stay in the host country after they graduate, very few intentionally planned so when they first arrived (Hazen & Alberts, 2006). Therefore, most international students are sojourners, making AUM well suited for the present study.

AUM has two core constructs: *uncertainty* about behaviors and values embodied by individuals from the host culture (hereafter host nationals), and *anxiety* about communicating with host nationals. Uncertainty describes cognitive difficulty in intercultural communication, whereas anxiety describes affective challenges. When uncertainty is reduced, individuals become more confident in explaining and predicting host nationals' behaviors. When anxiety is reduced, individuals are more likely to feel at ease when communicating with host nationals. Thus, individuals can better communicate with host nationals and are considered better adapted to the host culture when both uncertainty and anxiety are low (Gudykunst, 1988, 2005). Therefore, AUM suggests that cross-cultural adaptation involves both cognition and affect, and effective communication with host nationals is the core of cross-cultural adaptation.

To be consistent with AUM, we adopted Ward (2001)'s conceptualization of cross-cultural adaptation that integrates *sociocultural* and *psychological* adaptation. Ward (2001) combined two main theoretical approaches to cross-cultural adaptation. First, *the cultural-learning approach* proposes that problems of cross-cultural adaptation result from lack of understanding of host culture (Ward & Kennedy, 1999). Therefore, cross-cultural adaptation is a process by which sojourners learn new cultural knowledge, acquire new skills, and gradually fit in the host cultural environment (Masgoret & Ward, 2006). Based on this approach, Ward (2001) proposed *sociocultural adaptation*, which was defined as individuals' ability to understand the host culture and function appropriately in the new cultural environment. Second, *the stress-coping approach* focuses on acculturative stress—the stress associated with cross-cultural adaptation (Berry & Annis, 1974), and maintains that social support can alleviate acculturative stress and facilitate cross-cultural adaptation (Adelman, 1988). Ward (2001) thus argued that an additional dimension of cross-cultural adaptation should be considered: *psychological adaptation*, which was defined as individuals' general well-being or emotional satisfaction.

By integrating sociocultural and psychological adaptation, our conceptualization addresses cognitive and affective dimensions of cross-cultural adaptation, thereby aligned closely with AUM. Furthermore, Ward (2001) argued that individuals who can communicate effectively with host nationals are more likely to acquire survival skills and receive stress-coping support, thereby exhibiting higher levels of sociocultural and psychological adaptation. Therefore, this definition suggests that effective communication with host nationals is the core of cross-cultural adaptation, consistent with the premise of AUM.

Although uncertainty and anxiety are two key constructs in AUM, the extant literature demonstrates ambiguity about their relationships. Originally, Gudykunst and Hammer (1987) argued that uncertainty and anxiety are "independent aspects of the adaptation process" (p. 108). The only empirical evidence that supports this argument is Gao and Gudykunst (1990). They found a nonsignificant relationship between attributional confidence (the opposite to uncertainty) and anxiety. However, the anxiety scale in their study demonstrated poor reliability (Cronbach's $\alpha = .65$), so attenuated correlations due to unreliable measurement might account for the nonsignificant finding. Besides, failing to find a significant relationship cannot claim null relationship (Cohen, 1990).

Gudykunst (2005) later proposed that uncertainty and anxiety represent two equivalent but different dimensions of cross-cultural adaptation. Thus, they should be correlated, as Gudykunst and Nishida (2001) found.

However, other research generates different opinions about the relationship between uncertainty and anxiety. Scholarship on social psychology shows that individuals experience heightened level of self-presentational concerns when they are uncertain of their performances in some social situations (Leary, 1995). Heightened self-presentational concerns can result in a series of negative affect such as anxiety (Leary, Kowalski, & Campbell, 1988) and embarrassment (Edelmann, 1985). Specifically, Schlenker and Leary (1982) argued that anxiety aroused when individuals were motivated for positive self-presentation but doubted they could because they were uncertain about forthcoming social interactions. These studies demonstrate that anxiety, as an affective response, may result from cognitive evaluations of one's inability to effectively fulfill social tasks, which is close to uncertainty, thereby suggesting a causal relationship between uncertainty and anxiety.

Specifically in intercultural communication research, Gudykunst and Kim (1977) argued that interactions with people from different cultures often involved high levels of uncertainty, and actual or anticipation of these uncertain experiences could heighten individuals' anxiety. Later, Hammer, Wiseman, Rasmussen, and Bruschke (1998) supported those speculations with empirical evidence which shows that uncertainty reduction positively predicted anxiety reduction.

Based on the scholarship presented above, we predict a causal link from uncertainty to anxiety because social psychology research has generated enough theoretical reasoning on the causal relationship between these two variables (e.g. Leary et al., 1988; Schlenker & Leary, 1982). Moreover, empirical result from Hammer et al. (1998) provides additional support to their causal relationship. Hence,

H1. Uncertainty reduction predicts anxiety reduction.

Next, AUM theory predicts high levels of cross-cultural adaptation when uncertainty and anxiety are low (Gudykunst, 2005). Hence,

H2. (a) Uncertainty reduction and (b) anxiety reduction are positively related to cross-cultural adaptation.

In addition, language is the tool of and provides basis for communication. AUM proposes that host language proficiency reduces uncertainty and anxiety in cross-cultural interactions (Gudykunst, 2005). Empirical studies also found that host language proficiency reduced anxiety about communicating with host nationals (Stephan & Stephan, 1985) and uncertainty about behaviors and values of host nationals (Hammer et al., 1998). Hence,

H3. Host language proficiency is positively related to (a) uncertainty reduction and (b) anxiety reduction.

2.2. Extending AUM to SNS use

One axiom of AUM maintains that the quantity and quality of contact with strangers reduce uncertainty and anxiety (Gudykunst, 2005). This axiom suggests that effective communication is essential to cross-cultural adaptation. Thus, SNSs may exhibit great potential to cross-cultural adaptation for following reasons. First, SNSs facilitate large amounts of information exchange and provide ample opportunities to maintain preexisting relationships as well as develop new social ties. Thus, international students should be able to access resources needed for cross-cultural adaptation (Li & Chen, 2014; Lin et al., 2011).

In addition, the boundary between online and offline communication is blurred in the context of SNSs. According to a PEW report, on average SNS users' online contacts overlapped with their offline network by 48% (Hampton, Goulet, Rainie, & Purcell, 2011). This connection suggests that support sought through these sites can be easily translated offline, making SNSs able to facilitate cross-cultural adaptation.

Previous research demonstrates a positive relationship between using new communication technology and cross-cultural adaptation. For example, exchanging and viewing messages in online newsgroups and on bulletin boards helped Chinese immigrants adapt to the U.S. (Ye, 2005, 2006a, 2006b). The frequency of using Facebook positively predicted Chinese students' bridging social capital (Li & Chen, 2014) and international students' social adjustment to the U.S. (Lin et al., 2011). One limitation of these studies is that SNS use was operationalized as the frequency of using these sites. This operationalization only addresses the *quantity* of communication between international students and their social contacts, and may exaggerate the effectiveness of SNSs. However, according to AUM theory, the *quality* of contact can also reduce uncertainty and anxiety (Gudykunst, 2005). Therefore, we incorporate both dimensions in our framework to address this limitation.

We propose that the *quality* of contact depends on *how* international students use SNSs to communicate and *whom* they communicate with via these sites. First, recent scholarship on SNSs reveals that positive outcome of SNS use depends on how individuals use these sites to communicate (Burke, Kraut, & Marlow, 2011; Ellison, Steinfield, & Lampe, 2011). Different communication activities lead to different relational and instrumental outcomes due to their communication modes. Specifically, two communication activities are available on these sites: directed communication with specific individuals (hereafter directed communication) and broadcasting (Burke et al., 2011). Because directed communication happens in one-to-one communication context, social interactions can be more targeted at one specific individual and hence more effective to develop and maintain relationships, ultimately producing more social capital (Burke et al., 2011). On the contrary, the communication mode of broadcasting on SNSs makes targeting interactions to specific individuals impossible, so it is not effective to relationship development and maintenance (Burke et al., 2011). As effective communication is the core of cross-cultural adaptation, we only focus on directed communication as a proxy for *how* international students communicate via SNSs.

In addition, recall AUM maintains that the quantity and quality of contact with *strangers* reduce uncertainty and anxiety (Gudykunst, 2005). This axiom leaves the meaning of stranger ambiguous. As communication partner can change the outcome of communication, it is necessary to specify *who* international students communicate with via SNSs, which is missing in prior research. We categorize international students' social connections based on cultural origins and geographic locations.

International students keep both host nationals and connections from their home country (hereafter co-nationals) in their network (Furnham & Alibhai, 1985; Hendrickson, Rosen, & Aune, 2011), but these two types of social ties can have different impacts on uncertainty and anxiety. *Host nationals* have vast and precise knowledge of the host culture, so more interactions with them enable international students to believe that they can better understand values and behaviors embodied by host nationals. Besides, consider the close connection between uncertainty and anxiety (Gudykunst, 2005; Hammer et al., 1998). Therefore, more interactions with host nationals should also reduce anxiety (Ward & Kennedy, 1993).

The impact of *co-nationals* on cross-cultural adaptation is more complicated. While Ye (2006b) showed that interacting with co-nationals could increase international students' *life satisfaction*, Kim (2001) argued that those interactions may not help reduce *uncertainty* and *anxiety* in cross-cultural interactions. These findings suggest that co-nationals may have different influences on different dimensions of cross-cultural adaptation. On one hand, communicating with co-nationals may provide emotional support to international students, thus improving their life satisfaction. On the other hand, co-nationals in general know less about host culture than host nationals. Sometimes, they may even exhibit biased knowledge of the host culture. Thus, interacting with co-nationals may not increase international students' confidence in understanding host nationals' values and predicting their behaviors. Furthermore, the principle of homophily (McPherson, Smith-Lovin, & Cook, 2001) maintains that people naturally prefer to interact with co-nationals than host nationals (Furnham & Alibhai, 1985). Hence, spending too much time with co-nationals may reduce international students' potential opportunities to communicate with host nationals (Kim, 2001). In fact, Park et al. (2014) found that mediated communication with co-nationals increased Korean and Chinese students' stress. Therefore, directed communication with co-nationals may not help reduce uncertainty and anxiety.

Moreover, another possible confounding variable that prior research does not take into account is physical proximity. Being physically close provides more opportunities for social interactions, as well as relationship development and maintenance. Although individuals living in different places can rely on new technology for social interactions, their chance of communication is still restricted by time and geographic locations. For instance, Mok, Wellman, and Carrasco (2010) found that overall as physical distance increased, the frequency of contact decreased across different communication channels including Internet-based new technology. Besides, according to communication multiplexity (Haythornthwaite, 2002), physically proximal individuals likely use both face-to-face (FtF) communication and new technology for social interactions. As a consequence, physically proximal individuals should engage in more interactions and form stronger relationships due to increased communication opportunities (Athanasiou & Yoshika, 1973; Rubin & Shenker, 1978). Therefore, although interactions with local and distant host nationals may both reduce uncertainty and anxiety, the former may exhibit stronger associations with uncertainty reduction and anxiety reduction. This prediction should also apply to local and distant co-nationals.

H4. Directed communication with *local host nationals* via SNSs is positively related to (a) uncertainty reduction and (b) anxiety reduction.

H5. Directed communication with *distant host nationals* via SNSs is positively related to (a) uncertainty reduction and (b) anxiety reduction, but (c) exhibits weaker association with them than directed communication with *local host nationals*.

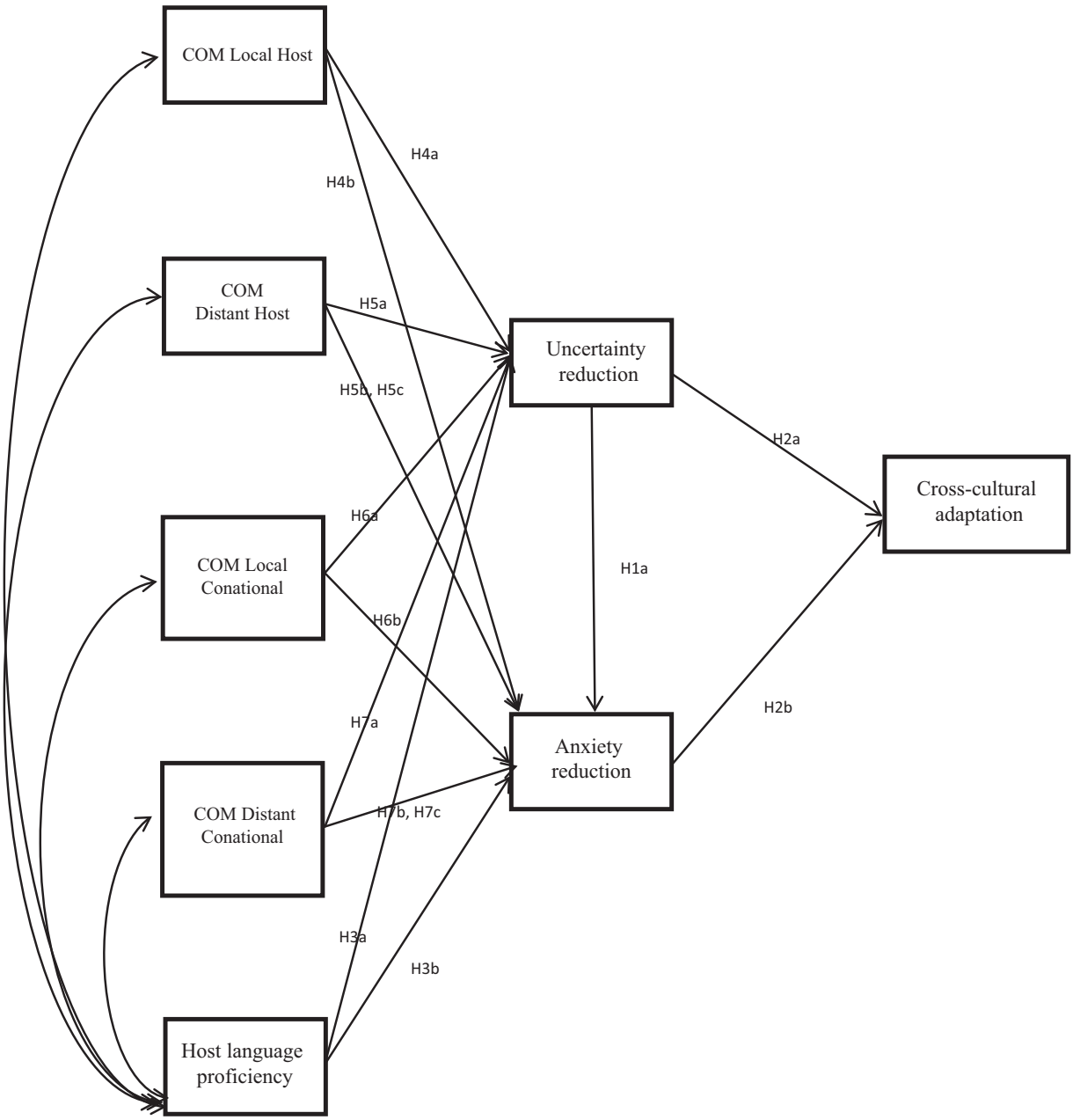

Fig. 1. The original model.

H6. Directed communication with *local co-nationals* via SNSs is negatively related to (a) uncertainty reduction and (b) anxiety reduction.

H7. Directed communication with *distant co-nationals* via SNSs is negatively related to (a) uncertainty reduction and (b) anxiety reduction, but (c) exhibits weaker association with them than directed communication with *local co-nationals*.

Note that prior research shows that host language proficiency is positively related to the propensity to communicate with host nationals (Hulinger, 1982). Therefore, we created four covariance links between host language proficiency and directed communication with four types of social ties. Fig. 1 shows *our original model*.

3. Method

3.1. Sampling and procedure

An online survey was conducted at a northeastern public university. International students that were SNS users and at least 18 years of age were qualified to participate. The research was announced at English Language Institute classes which were offered to international students only, and then posted on their course websites. Additionally, it was also distributed through the email listservs that the Office of International Student and Scholar Services and Graduate Student Association operate. All participants were offered a chance to win a raffle of $20 Amazon gift card. All procedures were approved by the institutional review board.

202 responses were received initially. After deleting incomplete responses, the final sample included 156 complete responses. 64 were male and 92 were female. Their average age was about 24 years old (M = 24.29, SD = 4.99). 63 participants were undergraduates and 93 were graduate students. They lived in the U.S. for an average of 1.91 years (SD = 2.42). Participants came from 33 countries, with the largest group from China (27.56%), followed by India (19.23%), Singapore (8.33%), and South Korea (8.33%).

3.2. Measurement

Attributional confidence was used as a proxy for *uncertainty reduction*, following prior research (Clatterbuck, 1979). We used Gudykunst and Nishida (2001)'s scale assessing attributional confidence, which includes seven items on a Likert scale of 1 (*total guess*) to 10 (*total certainty*; M = 5.82, SD = 1.43; Cronbach's α = .88).

Anxiety reduction was measured by Stephan and Stephan (1985)'s 10-item scale assessing emotional reactions to Americans during social interactions (e.g. awkward, defensive, irritated) on a Likert scale of 1 (*not at all*) to 10 (*extremely*). We reverse coded the data so that higher values indicate lower anxiety (M = 6.93, SD = 1.24, Cronbach's α = .77).

Cross-cultural adaptation was measured by an additive index of sociocultural adaptation and psychological adaptation (M = 7.1, SD = 1.21, Cronbach's α = .91). Sociocultural adaptation was measured by a 5-point Likert scale (Ward & Kennedy, 1999) assessing the level of difficulty that immigrants perceive in the listed situations (1 = *no difficulty*, 5 = *extreme difficulty*). Sample items include "understanding American jokes and humor", "getting used to the pace of life", and "talking about yourself with Americans" (M = 3.52, SD = .67, Cronbach's α = .89). Psychological adaptation was operationalized as acculturative stress, referring to psychological reactions to life-changing events in a different cultural context (Berry & Annis, 1974), and measured by a 5-point Likert scale (Sandhu & Asrabadi, 1994; M = 3.57, SD = .70, Cronbach's α = .82). In order not to exhaust participants and affect internal validity, we selected 18 and 12 items with the highest loadings respectively from the original scales on sociocultural adaptation and acculturative stress.

Host language proficiency was operationalized as English language proficiency and measured by self-reported proficiency of English in listening, speaking, reading, and writing on a four-item scale of 1 (the least proficient) to 10 (extremely proficient; Hammer et al., 1998; M = 7.61, SD = 1.77, Cronbach's α = .92).

Directed communication with different ties was measured by following steps. First, we asked participants to list three SNSs they used most. We did not limit to one specific site because international students may use multiple SNSs including those popular in their home country. Participants listed 46 SNSs. Facebook was used the most, mentioned by 154 participants, followed by Twitter (56), LinkedIn (32), Renren (26), Google + (20), sina weibo (19), QQ (18), Skype (11), and Instagram (11).

We then employed the scale on the use pattern of Facebook (Burke et al., 2011) to measure the *frequency* of directed communication on nominated SNSs, which was operationalized as SNS features that support one-to-one communication. The original scale contains 6 items, but it was built on the data obtained from server logs, which is infeasible in this study. Therefore, we selected 3 items available: writing wall posts, sending private messages, commenting to friends' statuses. We chose this scale because the majority of our participants used Facebook regularly. Furthermore, different SNSs share similar affordances. For example, Google + users can write on their contacts' profile pages, similar to Facebook wall; Twitter users can also send private messages and comment to their contacts' Tweets. Therefore, this scale can be applied to most SNSs. Participants were asked to report the frequency of use on an 8-point scale (1 = never, 2 = once a month, 3 = every two weeks, 4 = every week, 5 = several days per week, 6 = every day, 7 = several times per day, 8 = every hour; M = 4.10, SD = 1.35, Cronbach's α = .74).

We then asked participants four questions, "of your total friends on *all* these sites you use most often, about what *percentage* are Americans living in the same city as you/people from your home country living in the same city as you/Americans living in a different city than you/people from your home country living in a different city than you". We employed the proportional approach because it is easier to recall and report. On average, 14% of their SNS networks were local host nationals (SD = .21), 15% distant host nationals (SD = .26), 35% local co-nationals (SD = .34), 37% distant co-nationals (SD = .32).

Finally, we multiplied the frequency of directed communication and the percent of four ties among their SNS network. This measure addresses three important aspects of SNS use: frequency, how individuals communicate, and whom they communicate with, thus incorporating both the *quantity* and *quality* of international students' communication. Descriptive statistics are listed as follows: directed communication with local host nationals (M = .60, SD = .93; abbreviated as COMLocalHost), directed communication with distant host nationals (M = .59, SD = 1.06; abbreviated as COMDistantHost), directed communication with local co-nationals (M = 1.49, SD = 1.58; abbreviated as COMLocalConational), and directed communication with distant co-nationals (M = 1.55, SD = 1.49; abbreviated as COMDistantConational).

Possible control variables include gender, age, cultural similarity, and length of residence in the U.S., as prior research indicates (Hammer et al., 1998; Kim, 2001; Lin et al., 2011). *Cultural similarity* was measured with a 5-point Likert scale asking respondents to rate the perceived similarity between their own culture and American culture in customs, beliefs, and attitudes (Hammer et al., 1998; M = 2.34, SD = .99, Cronbach's α = .82). *Length of residence in the U.S.* was measured by asking respondents how many years they had been in the U.S. (M = 1.91, SD = 2.42). However, they were not significantly related to most variables in the model.[1] We thus decided not to include them to keep models parsimonious.

3.3. Data analysis strategy

We conducted structural equation modeling (SEM) by using the Lavaan package in R 3.1.1. First, all variables in the present study are measured by established scales from prior studies except

[1] Gender, age, cultural similarity, and length of residence in the U.S. were not significantly correlated to most variables in the model. We only found significant correlations between length of residence in the U.S. and the frequency of directed communication with co-nationals (r = −.30, p < .01), between age and the frequency of directed communication with co-nationals (r = −.17, p < .05). The other correlations ranged from −.02 to .11. Although intuitively cultural similarity should be significantly related to uncertainty reduction, anxiety reduction, and cross-cultural adaptation, we are not the first that failed to find a significant relationship between cultural similarity and these variables (e.g. Gao & Gudykunst, 1990). Of course whether a null relationship can be truly claimed requires equivalence testing, but one speculation is that international students identified themselves as out-group members regardless of how close their ethnic culture is to the host culture. Therefore, international students from different cultures exhibit no difference in their perceived levels of uncertainty, anxiety, and cross-cultural adaptation. Second, length of residence in the U.S. may exhibit a nonlinear relationship with uncertainty reduction, anxiety reduction, and cross-cultural adaptation. Ward, Okura, Kennedy, and Kojima (1998) found a u-shaped curve of international students' cross-cultural adaptation over time. At first, international students were enthusiastic for adjusting to the host culture, but after a certain amount of time, they became withdrawn, lonely, and confused of their dual cultural identity. This can explain why no significant linear relationship was found between length of residence in the U.S. and any endogenous variables. This explanation can also apply to the relationship between age and uncertainty reduction, anxiety reduction, and cross-cultural adaptation.

Table 1
Zero-order correlations for variables.

	Host language proficiency	COM local host	COM distant host	COM local conational	COM distant conational	Uncertainty reduction	Anxiety reduction	Cross-cultural adaptation
Host language proficiency	–							
COM Local Host	.20*	–						
COM Distant Host	−.15	.08	–					
COM Local Conational	−.02	.01	−.01	–				
COM Distant Conational	.04	.04	.08	−.01	–			
Uncertainty reduction	.37**	.24**	.03	−.24**	.07	–		
Anxiety reduction	.23**	.07	−.05	−.03	.04	.34**	–	
Cross-cultural adaptation	.53**	.23**	−.02	−.06	.03	.42**	.50**	–

Note: COMLocalHost = directed communication with local host nationals, COMDistantHost = directed communication with distant host nationals, COMLocalConational = directed communication with local co-nationals, COMDistantConational = directed communication with distant co-nationals.
* $p < .05$.
** $p < .01$.

cross-cultural adaptation. Therefore, we only conducted confirmatory factor analysis (CFA) on cross-cultural adaptation.

Next, we conducted path analysis to test our proposed model. At the local level, we assessed the statistical significance of each link in the original model with p values. Besides, at the global level, we conducted the goodness of fit tests, demonstrated by a non-significant χ^2 goodness-of-fit statistic, χ^2/df ratios of less than 5, root mean square error of approximation (RMSEA) less than .05, and comparative fit index (CFI) greater than .95 (Kline, 2011). Finally, we modified our model based on modification indices and theoretical reasoning, proposing the final model.

4. Results

4.1. The measurement model of cross-cultural adaptation

Sociocultural adaptation and psychological adaptation were modeled as first-order factors of cross-cultural adaptation which was modeled as second-order factor. Results of CFA show that our measurement model of cross-cultural adaptation had a good fit ($\chi^2 = 348.31$, $\chi^2/df = 1.27$, $p < .003$, RMSEA = .04, CFI = .96).

4.2. The original model

4.2.1. Hypothesis testing

Table 1 shows results of descriptive analyses and bivariate correlations. First, the path from uncertainty reduction to anxiety reduction was significant ($\beta = .28$, $p < .001$), supporting H1. Next, uncertainty reduction ($\beta = .24$, $p < .001$) and anxiety reduction ($\beta = .38$, $p < .001$) were positively related to cross-cultural adaptation, supporting H2a and H2b. Host language proficiency was positively related to uncertainty reduction ($\beta = .28$, $p < .001$), but not to anxiety reduction ($\beta = .07$, $p < .21$). Hence, H3a was supported, but H3b was rejected.

Directed communication with local host nationals was positively associated with uncertainty reduction ($\beta = .26$, $p < .02$) but not to anxiety reduction ($\beta = -.03$, $p < .78$), supporting H4a but rejecting H4b. Directed communication with distant host nationals was not significantly related to uncertainty reduction ($\beta = .08$, $p < .43$) and anxiety reduction ($\beta = .05$, $p < .58$), rejecting H5a and H5b. Recall that H5c stated that directed communication with local host nationals had a stronger association with uncertainty reduction and anxiety reduction. Thus, H5c was partially supported.

Directed communication with local co-nationals was negatively related to uncertainty reduction ($\beta = -.22$, $p < .002$) but not to anxiety reduction ($\beta = .04$, $p < .50$), supporting H6a but rejecting H6b. Directed communication with distant host nationals was not significantly related to uncertainty reduction ($\beta = .04$, $p < .52$) and anxiety reduction ($\beta = .01$, $p < .84$), rejecting H7a and H7b. Recall that H7c stated that directed communication with local host nationals had a stronger association with uncertainty reduction and anxiety reduction. Thus, H7c was partially supported.

Finally, host language proficiency was positively correlated to directed communication with local host nationals ($r = .35$, $p < .009$) and negatively correlated to directed communication with distant host nationals ($r = -.31$, $p < .04$). However, its covariances with directed communication with local co-nationals ($r = -.05$, $p < .82$) and distant co-nationals ($r = .12$, $p < .57$) were not significant. Fig. 2 shows results of path analysis of the original model.

4.2.2. Model testing

The chi-square test of the original model was significant, $\chi^2 = 37.05$, $\chi^2/df = 3.37$, $p < .001$, RMSEA = .12, CFI = .82. Thus, the model can be improved.

4.2.3. Model modification

The R modification indices suggested dropping all links from the frequency of directed communication with four types of social ties to anxiety reduction. This suggestion was taken because previous research demonstrates that uncertainty predicts anxiety (Gudykunst & Kim, 1977; Hammer et al., 1998; Schlenker & Leary, 1982) and our result supports this research. Therefore, anxiety reduction may be an indirect outcome of directed communication via uncertainty reduction.

Modification indices also suggested adding a direct link from host language proficiency to cross-cultural adaptation. This suggestion was also taken because language is the channel of communication, through which cross-cultural adaptation occurs (Ward & Kennedy, 1993). See Fig. 3 for the final model.

4.3. The final model

The chi-square test of the final model produced nonsignificant results, $\chi^2 = 6.49$, $\chi^2/df = .46$, $p < .96$, RMSEA = .00, CFI = 1.00, indicating a good model fit. Table 2 shows indirect, direct, and total effects of all variables in the *final* model.

At the local level, host language proficiency was positively related to cross-cultural adaptation ($\beta = .26$, $p < .001$). Again, host language proficiency was not significantly related to anxiety

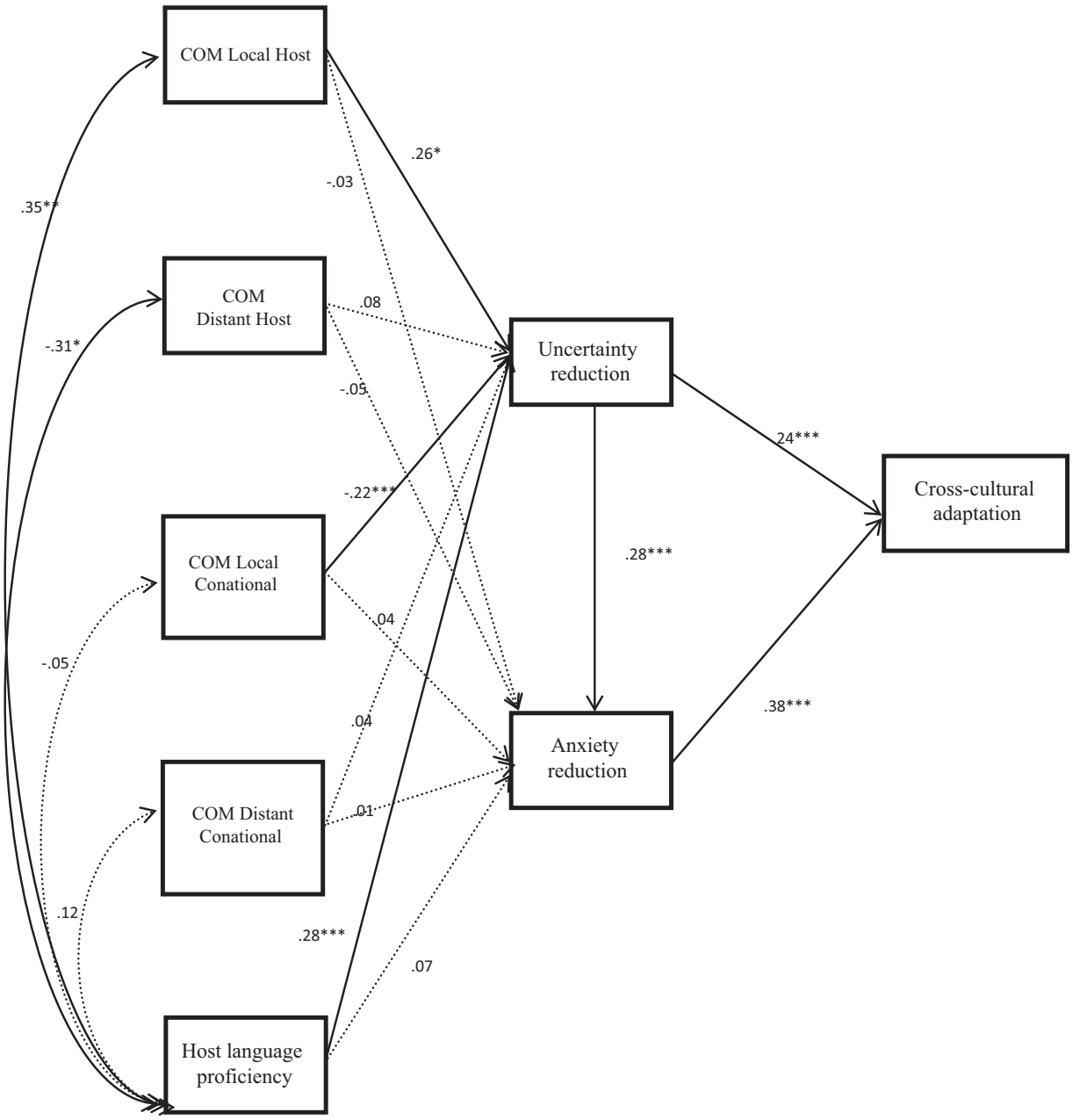

Fig. 2. Results of the original model.

reduction ($\beta = .08$, $p < .17$). Besides, the relationship between uncertainty reduction and cross-cultural adaptation became weak ($\beta = .13$, $p < .021$, see Fig. 3), compared to the original models ($\beta = .24$, $p < .001$).

5. Discussion

This study is a response to two current trends on American campuses: a growing body of international students and the popularity of SNSs. Building on previous research which found positive associations between SNSs and international students' cross-cultural adaptation, this study is aimed at explaining how specific dimensions of SNS use are related to cross-cultural adaptation. Specifically, we used an integrated definition of cross-cultural adaptation consistent with AUM, and highlighted the role of how international students communicated and who they communicated with via SNSs in cross-cultural adaptation. Our path model reveals that SNSs can facilitate cross-cultural adaptation, depending on how proficient international students are in host language, with whom they communicate via these sites, and how they use these sites. These results explicate the relationship between directed communication with social ties differentiated by their cultural origins and geographic locations, and cross-cultural adaptation. Furthermore, these findings suggest that perhaps SNSs are effective to maintaining local relationships because they function as a supplementary tool to offline communication. Based on these findings, we provide theoretical implications for understanding the role of SNSs in cross-cultural adaptation and relationship maintenance, as well as extending AUM theory. Besides, we also generate practical implications to developing programs to help international students' cross-cultural adaptation and educating individuals about how to use SNSs.

5.1. Major findings

5.1.1. SNS and cross-cultural adaptation

We tested cross-cultural adaptation in a new context and explicated the role of SNSs in international students' cross-cultural adaptation. Our results demonstrate that SNS effect depends on international students' proficiency of host language, how they communicate and with whom they communicate via these sites.

First, we found that host language proficiency was positively related to uncertainty reduction and cross-cultural adaptation, supporting AUM (Gudykunst, 2005). Besides, our path model shows a positive correlation between host language proficiency and directed communication with local host nationals. This demonstrates that individuals better at host language are more engaged in social interactions with host nationals, lending support to Hulinger (1982). Our results thus reveal the fundamental role of host language proficiency in cross-cultural adaptation.

A surprising finding is that host language proficiency was negatively correlated with directed communication with distant host nationals via SNSs. One possible explanation is the social compensation hypothesis, which posits that computer-mediated communication (CMC) provides shelter for people who are not good at FtF communication (McKenna, Green, & Gleason, 2002). For instance, because most CMC is asynchronous communication, people have more time to construct and edit their messages before sending them out. Therefore, if international students are not confident in their English, they may prefer to communicate with *distant* host nationals via SNSs because they can take advantage of the increased amount of time for message construction. However, geographic distances make it harder to interact with *distant* host nationals, compared to *local* host nationals (Mok et al., 2010). Therefore, when their English improves, they do not need the shelter from CMC and may reduce interactions with distant host nationals. This finding hence lends support to the social compensation hypothesis.

Second, we found that international students' social ties exhibited different relationships with uncertainty reduction based on where these ties are originally from (cultural origin) and where they are currently located (geographic locations). We found only directed communication with *local* ties was significantly related to uncertainty reduction. This reveals the limited impact of SNSs on relationship development and maintenance. Although SNSs make maintaining and developing distant ties possible, the maintenance and development strategies that these sites allow for involve minimum cost. Therefore, SNSs *alone* may not be effective enough to develop and maintain meaningful distant ties that can provide resources reducing international students' uncertainty about the host culture. Note this does not mean SNSs have no positive impact on managing distant ties. However, if individuals rely exclusively on SNSs to interact with distant ties, they might only be able to maintain these relationships at a superficial level.

On the other hand, physical proximity of local ties provides additional opportunities for FtF communication (Haythornthwaite, 2002). These communication activities may provide extra benefit for developing and maintaining local ties. This hence suggests that SNSs may better be used as a complementary tool to other communication channels.

Recent research has provided empirical support to this implication. Rui, Covert, Stefanone, and Mukherjee (2014) found that SNS profile contains rich information about individuals' social connections and this information can provide common ground for subsequent offline communication. Their finding supports our result because both studies suggest that individuals cannot rely exclusively on SNSs for relationship development and maintenance. Instead, SNSs complement offline communication and together they maximize the benefit of these new technologies.

Furthermore, among these local ties, directed communication with host nationals and co-nationals exhibited opposite relationships with uncertainty reduction. This is because host nationals and co-nationals have different levels of knowledge about the host culture. Although some co-nationals are knowledgeable of the host culture, in general, host nationals have better knowledge about the host culture. Thus, interacting with host nationals can increase international students' confidence in predicting and explaining host nationals' values and behaviors. As too many interactions with co-nationals deprive individuals of their time which could have been spent with host nationals, these activities can heighten their uncertainty.

Additionally, our results highlight the effectiveness of directed communication to cross-cultural adaptation, which lies in the mode of this communication activity. Due to the specificity of communication target, directed communication can be effective for social interactions. As effective communication is essential to cross-cultural adaptation, directed communication via SNSs can facilitate this adjustment outcome. This does not mean that broadcasting via SNSs is useless to cross-cultural adaptation. Instead, broadcasting may enable individuals to directly acquire knowledge about the host culture, seek help, and consequently increase their survival skills. In other words, broadcasting and directed communication may both facilitate cross-cultural adaptation but through different approaches.

5.1.2. Developing AUM

The present study also generates important implications to developing AUM. First, we distinguished international students' social contacts based on these contacts' cultural origins and geographic locations. We found that only local ties significantly influenced uncertainty reduction, and directed communication with local host nationals and co-nationals exhibited opposite relationships with uncertainty reduction. This finding develops AUM in at least two following ways. First, the original theory contends that the quantity and quality of social contact with *strangers* in the host culture can reduce uncertainty and anxiety. Yet what stranger means is unclear. Our finding extends the definition by adding the cultural and geographic dimensions. Besides, our result suggests how international students use SNSs and who they communicate with make a difference to uncertainty reduction. These two dimensions thus extend the meaning of the quality of social contact.

Second, our results provide support to Hammer et al. (1998)'s finding that uncertainty predicted anxiety. This result challenges AUM theory (Gudykunst, 2005) and some prior research (e.g. Gao & Gudykunst, 1990). Note that the cross-sectional nature of the present study makes it impossible to claim causal relationship. However, as argued earlier, prior research provides theoretical basis for our results (e.g. Gudykunst & Kim, 1977; Leary et al., 1988; Schlenker & Leary, 1982). Besides, our post-hoc analysis found two mediation relationships.[2] Uncertainty reduction fully mediated the relationship between host language proficiency and

[2] We conducted post-hoc analysis to investigate two potential mediation relationships: (1) uncertainty reduction mediating the relationship between host language proficiency and anxiety reduction, (2) anxiety reduction mediating the relationship between uncertainty reduction and cross-cultural adaptation. Hayes (2013) was employed for our analysis, which estimated the model for 10,000 bootstrapped samples. We found that while the indirect effect of host language proficiency on anxiety reduction via uncertainty reduction was significant (.08, 95% confidence interval: [.03, .14]), their direct effect was not significant (.08, 95% confidence interval: [−.03, .20]). Thus, uncertainty reduction fully mediated the relationship between host language proficiency and anxiety reduction. Besides, both the direct effect of uncertainty reduction on cross-cultural adaptation (.24, 95% confidence interval: [.12, .36]) and their indirect effect via anxiety reduction (.12, 95% confidence interval: [.06, .20]) were significant. Thus, anxiety reduction partially mediated the relationship between uncertainty reduction and cross-cultural adaptation.

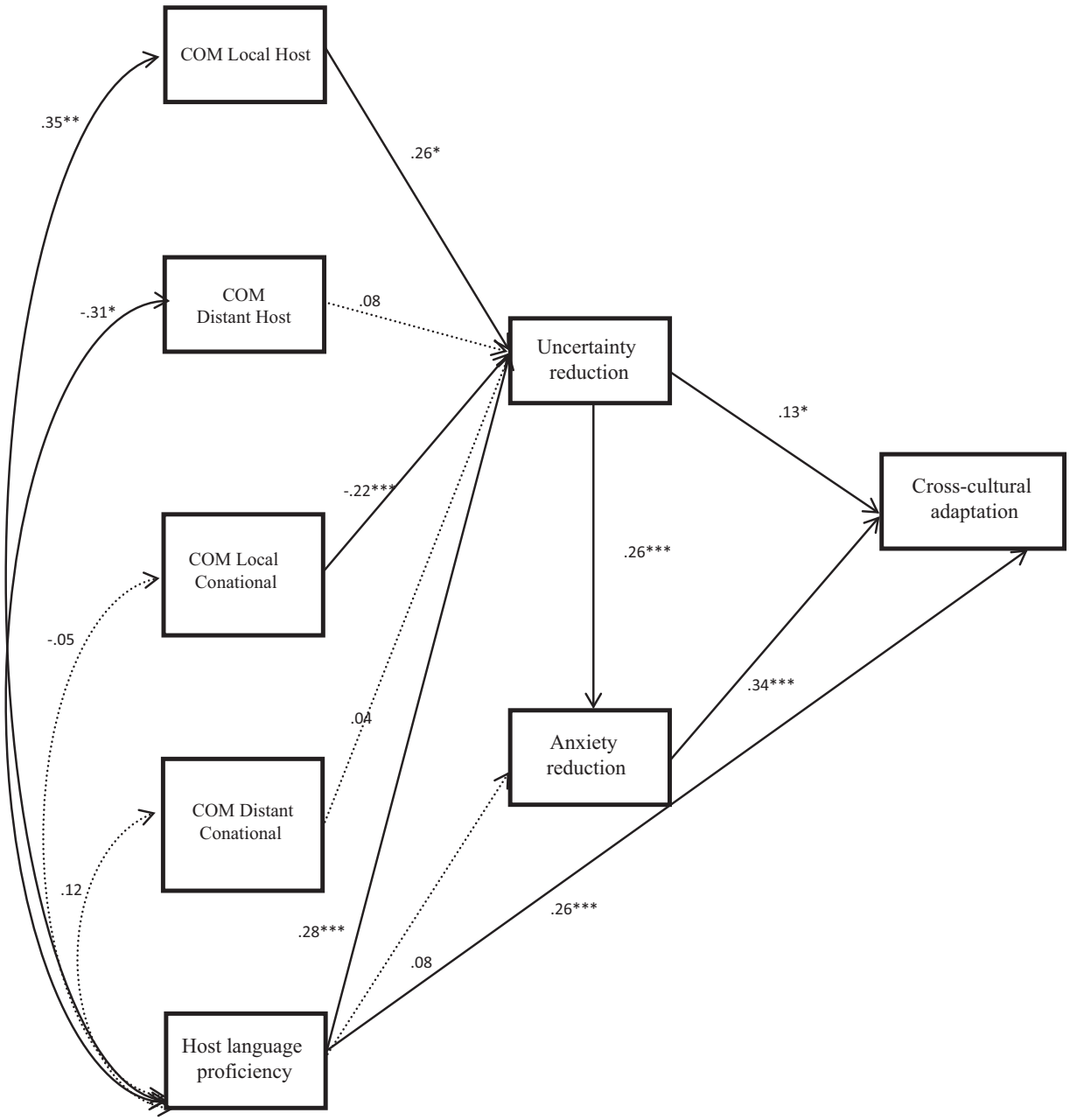

Fig. 3. Results of the final model.

Table 2
Direct, indirect, and total effects for the final model.

	Effects on								
	Uncertainty reduction			Anxiety reduction			Cross-cultural adaptation		
	Indirect	Direct	Total	Indirect	Direct	Total	Indirect	Direct	Total
Host language proficiency	.00	.28	.28	.07	.08	.15	.09	.26	.35
COMLocalHost	.00	.26	.26	.07	.00	.07	.06	.00	.06
COMDistantHost	.00	.08	.08	.02	.00	.02	.02	.00	.02
COMLocalConational	.00	−.22	−.22	−.06	.00	−.06	−.05	.00	−.05
COMDistantConational	.00	.04	.04	.01	.00	.01	.01	.00	.01
Uncertainty reduction	–	–	–	.00	.26	.26	.09	.13	.22
Anxiety reduction	–	–	–	–	–	–	.00	.34	.34

Note: COMLocalHost = directed communication with local host nationals, COMDistantHost = directed communication with distant host nationals, COMLocalConational = directed communication with local co-nationals, COMDistantConational = directed communication with distant co-nationals.

anxiety reduction, and anxiety reduction partially mediated the relationship between uncertainty reduction and cross-cultural adaptation. These results also lend support to the causal link from uncertainty reduction to anxiety reduction. Therefore, although we cannot make definitive claim of the causal relationship between uncertainty and anxiety, this causal relationship should demonstrate more strength than the correlational argument stated in Gudykunst (2005) because our hypothesis was proposed based on theoretical reasoning and prior empirical research and our data supported our prediction. Future research should employ longitudinal method to investigate the relationship between these two variables.

This causal link between uncertainty and anxiety might explain why we did not find direct relationships between directed communication with all four types of social ties and anxiety. If uncertainty predicted anxiety, social interactions with different ties may first affect one's level of uncertainty, which then influences anxiety.

One interesting result is that anxiety reduction had a stronger effect on cross-cultural adaptation (total effect: $\beta = .34$) than uncertainty reduction (total effect: $\beta = .22$, Table 2). This finding suggests that affective experience of intercultural encounters may be central to cross-cultural adaptation. Only when individuals feel comfortable to interact with host nationals, they can be adapted to the host culture. However, this does not mean that uncertainty reduction is unimportant to cross-cultural adaptation. In fact, given the relationship between uncertainty and anxiety, developing confidence in understanding host nationals is key to anxiety management. Taken together, these results suggest that uncertainty reduction is key to anxiety reduction and anxiety reduction is central to cross-cultural adaptation.

5.2. Theoretical implications

The present study demonstrates the first step to extend AUM to new media. We found how to communicate and who to communicate with via SNSs make a difference to the outcome of cross-cultural adaptation. This hence extends prior research, which focuses exclusively on the *frequency* of SNS use and thus demonstrates that the more sojourners use SNSs, the better they will be adapted to the host country. Our results suggest that prior work may exaggerate the effectiveness of SNSs. Instead, the effect of SNS use on international students' cross-cultural adaptation may depend on how proficient their English is, who they communicate with, and how they communicate via SNSs.

Furthermore, we found that only directed communication with *local* ties had significant associations with uncertainty reduction. This suggests that SNSs can facilitate relationship development and maintenance when used as a supplementary channel to FtF communication. Perhaps individuals can benefit most when they use new communication technology along with other communication channels. Note that these results do not mean SNSs have minimal impact on cross-cultural adaptation. Instead, we argue that an ecological perspective is needed for future research to explicate how SNSs intersect with other communication channels to influence human relationships, given that SNSs are only one of many tools individuals use for social interactions. Taken together, our results suggest that perhaps SNSs are effective to cross-cultural adaptation because they can help international students connect with individuals from different cultural backgrounds and provide additional communication opportunities with local host nationals.

Finally, we developed AUM by differentiating international students' social contacts based on cultural origins and geographic locations. Our results highlight the role of cultural background and physical proximity in affecting cross-cultural adaptation, and extend the theory with additional dimensions that explicate how individuals communicate.

5.3. Practical implications

Our findings provide the basis for program development at American higher education institutions. First, these institutions should give priority to improving international students' English. Second, programs and events can be organized to encourage international students to step out of their comfort zone with their co-nationals and communicate with Americans. For example, schools may want to avoid arranging international students to live with their co-nationals.

In addition, education on how to effectively use SNSs can be helpful. Based on our findings, individuals can be trained to raise awareness of their network composition (e.g. the cultural diversity of their social network). It is also useful to make individuals understand the nuanced differences between multiple communication channels on SNSs so that they can adjust communication strategies to their goals (e.g. directed communication vs. broadcasting). These suggestions provide directions for future educational campaigns on new media literacy.

5.4. Limitations

We identify following limitations of our study. First, our sample size is too small. Second, our sample exhibits large variances, for instance, the percent of different types of social ties international students have. These two problems violate the assumptions of SEM and can bias our findings.

Next, we did not include all items that measure sociocultural and psychological adaptation, which may affect internal validity. Yet considering the length of our survey (72 questions), adding more questions may exhaust participants, which can also threaten internal validity.

Additionally, the cross-sectional nature of the present study prevents us from making causal arguments. Although every step of our model building is strictly based on prior research and theory, analyzing path model is inherently correlational test. In order to make strong causal arguments, longitudinal research is needed.

Furthermore, we proposed that the quality of social contact depends on how to communicate and who to communicate with via SNSs, but the content of interactions also influences the quality. For instance, if two host nationals provide different information about the same cultural topic, this can increase international students' uncertainty. Future research should take the content of intercultural discussions into consideration.

Finally, we only tested communication with host/co-nationals via SNSs, but individuals in the contemporary society employ multiple communication channels for social interactions. When controlling for the amount of communication that happens outside SNSs, the relationships between directed communication via SNSs and uncertainty reduction may attenuate.

5.5. Future directions

This study presents several directions for future research. First, researchers should replicate this study by using a large and more diverse sample. One possibility is to change the population to refugees or immigrants. Although AUM does not apply to these permanent residents from another country, it is interesting to examine if their process of cross-cultural adaptation presents any differences from international students.

Second, longitudinal study is recommended because it can better capture the dynamics of cross-cultural adaptation and enables researchers to make causal arguments. Specifically, future research can employ longitudinal research to replicate our study and examine the impacts of some variables on cross-cultural adaptation that were not tested in the present study such as gender. Given that

most extant work on cross-cultural adaptation and new media is cross-sectional, longitudinal research can generate important implications to this line of research and help clarify the relationship between uncertainty and anxiety.

Next, besides host nationals and co-nationals, international students are also connected with other international students. These connections can also provide valuable resources that help international students reduce uncertainty and anxiety as well as adjust to the host environment. Future research can examine how interactions with these contacts affect their cross-cultural adaptation and whether these interactions have different impacts on cross-cultural adaptation, compared to host nationals and co-nationals.

Additionally, future research should investigate what uncertainty and anxiety reduction strategies are used on SNSs. Prior research focuses on uncertainty reduction strategies on dating websites (Gibbs, Ellison, & Lai, 2011) and in the context of job recruitment (Carr & Walther, 2014). Examining what strategies international students use to reduce uncertainty and anxiety on SNSs can extend this line of research.

Finally, future research can investigate the interdependent relationship of social interactions between different communication channels, for instance, offline communication and directed communication via SNSs, and examine how their interdependent relationship affects cross-cultural adaptation.

6. Conclusion

The present research situates cross-cultural adaptation in a novel context. Directed communication with local host nationals and local co-nationals via SNSs exhibited opposite relationships with uncertainty reduction. Our findings suggest that cross-cultural adaptation is a process that SNSs can facilitate, depending on how proficient international students are in the host language, how they use these sites, and with whom they communicate via these sites.

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