Never too far away?

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Chapter 2

Facebook and Face-to-Face: Examining the Short-term and Long-Term Reciprocal Effects of Interactions, Perceived Social Support, and Depression among International Students

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Abstract

We investigated the proposition that among international students, face-to-face (FtF) interaction with the host-country network, and Facebook interaction with the host- and the home-country networks predict perceived social support, which, in turn, predicts psychological adjustment. We tested the model using cross-lagged and non-lagged reciprocal effects path analyses on three-wave panel data gathered via online surveys. The results indicated that whereas FtF interaction with the host-country increased perceived social support in the short-term, Facebook interaction with the host-country lowered perceived social support in the long-term. Perceived social support increased Facebook interaction with the host-country both in the short- and the long-term. At the same time, perceived social support, in the long-term, decreased depressive symptoms. In the short-term, perceived social support and depressive symptoms negatively reinforced each other. Our longitudinal study contributes to existing literature by elucidating the complex interplay of communication channels and their implications on international students' experiences.

International student sojourners are individuals who temporarily leave their home countries to pursue academic careers in another country. Aside from academic and psychological pressures commonly experienced by most students, international students might also experience adjustment difficulties while in the host-country (Ward, Bochner, & Furnham, 2001). Most of the time, student sojourners rely on their social network support to cope with these difficulties (Smith & Khawaja, 2011; Zhang & Goodson, 2011). Social network support comprises both home- and host-country networks. Home- country networks are less accessible than host-country networks via face-to-face (FtF) interaction. However, home and host-country networks are both accessible via computer-mediated communication (CMC) (Johnson, Haigh, Becker, Craig, & Wigley, 2008). One benefit of CMC use is the perceived availability of support when needed (Cemalcilar, 2008; Trepte & Scharkow, 2016).

Social network sites (SNSs) are a popular form of CMC (Hutt, 2017). What makes SNSs unique is that they combine many of the features of other forms of CMC: They enable both social (public) and interpersonal (private) interactions, and they can be used in a synchronous or asynchronous manner. Facebook is currently the most popular SNS and is widely used by students (Ellison, Steinfield, & Lampe, 2007; Hutt, 2017). Facebook enables users to build new and maintain old social support networks (Ellison et al., 2007). Moreover, Facebook and other SNSs "offer an environment with distinct opportunities for members to exchange various types of social support" (Meng, Martinez, Holmstrom, Chung, & Cox, 2017, p. 44). Given that international students have access to their home- and host- country networks using Facebook, and can also contact their host-country network via FtF interaction, we posed the following question: How do these various forms of interaction, in conjunction with one another, impact perceived social support, and consequently, psychological adjustment of international student sojourners? This study aimed to: (a) compare student sojourners' social interactions (i.e., Facebook interaction with the home- and the host-country networks, as well as

their FtF interaction with the host-country network) and their influence on perceived social support; and, subsequently, the impact of such support on psychological adjustment; (b) clarify the long-term and the short-term reciprocal associations; and (c) address the question of directionality of the associations between communication and perceived social support, as well as perceived social support and psychological adjustment, in order to improve causality inference (Meng et al., 2017).

Theoretical Background

Interactions, Support, and Adjustment of Sojourners

Sojourners, also called short-term or temporary migrants, are expected to return to their home country once the purpose of stay has been achieved (Dustmann, 1999; Ward et al., 2001). Temporary migration entails cross-cultural transition experiences that could impact psychological adjustment (Mikal, Rice, Abeyta, & De Vilbiss, 2013). Often, a challenge in cross-cultural transitions is to achieve effective psychological adjustment in the new context (Berry, 2006). Psychological adjustment, which refers to optimal psychological functioning or well-being, involves coping with stress and depression (Ward et al., 2001). During temporary migration, intercultural interactions influence coping strategies (e.g., social support) which in turn affect adjustment. Earlier models of sojourners' adjustment emphasized the importance of FtF communication in facilitating social support (Adelman, 1988; Ward et al., 2001). Moreover, earlier studies often described access to social support of sojourners being mostly limited to the host-country network (Ward et al., 2001).

The development of CMC has provided possibilities of social interaction beyond geographic boundaries. Studies have shown that international students use CMC to overcome geographic limitations in maintaining their home-country network, and to deal with social difficulties in building a host-country network (Ellison et al., 2007; Lee, Lee, & Jang, 2011). It was found that CMC use of international students with the home-country network facilitated

perceived social support, which, in turn, enhanced adjustment (Cemalcilar, 2008). However, CMC use might not always help international students' adjustment. CMC use may hinder adjustment when used heavily with the home-country network because it might increase reliance on home networks and limit host-country integration (Lee et al., 2011).

For social support, we focused on perceived social support, or the belief that support is available if needed (Mikal et al., 2013). In the context of temporary migration, the belief that one has others to turn to for support is important considering that sojourners are geographically separated from and have limited FtF interaction with their established networks of support. Perceived social support has been shown to predict psychological adjustment better than SNSs-based received support and FtF received support (Li, Chen, & Popiel, 2015; Trepte, Dienlin, & Reinecke, 2015; Trepte & Scharkow, 2016).

For psychological adjustment, we focused on depressive symptoms, consistent with conceptualizations in previous studies (Ward et al., 2001; Zhang & Goodson, 2011). Depressive symptoms were one of the major complaints of international students who went for counseling (Smith & Khawaja, 2011). Thus, it is important to examine how communication and social support may alleviate or exacerbate depressive symptoms.

A Concurrent Communication Model

Most studies on international sojourners' adjustment have investigated the relevance of the host- and the home-country networks, and the roles of various communication channels in facilitating access to social support separately (Berry, 2006; Cemalcilar, 2008; Lee et al., 2011; Rui & Wang, 2015; Ward et al., 2001). However, these networks and communication channels may have complementary influences on international students' access to social support (Rui & Wang, 2015). Current scholarship provides evidence that SNS interaction reinforces FtF interaction (Dienlin, Masur, & Trepte, 2017). It has been shown that those people who communicated actively via SNSs also communicated actively FtF. This article is premised on

this finding, and presupposes that international students use these communication channels concomitantly. Previous studies have established that offline (FtF) and online (SNS) communication contexts both offer opportunities to access different types of support (Trepte et al., 2015; Wright et al., 2013). When it comes to online communication, the use of multiple online communication modes (such as the Internet, computer, and cellphone) positively influences perceived social support from friends and family (Sarriera, Abs, Casas, & Bedin, 2012). In this study, we aimed to extend existing theories by proposing a concurrent communication model in investigating sojourners' adjustment. Using this model, we investigated the relative importance of three types of interactions (i.e., FtF interaction with the host-country network, Facebook interaction with the host-country network, and Facebook interaction with the home-country network) in perceived social support. Crucially, we also examined the impact of perceived social support on psychological adjustment (i.e., depressive symptoms) of international students. Figure 1 provides a summary of the model we aimed to investigate.

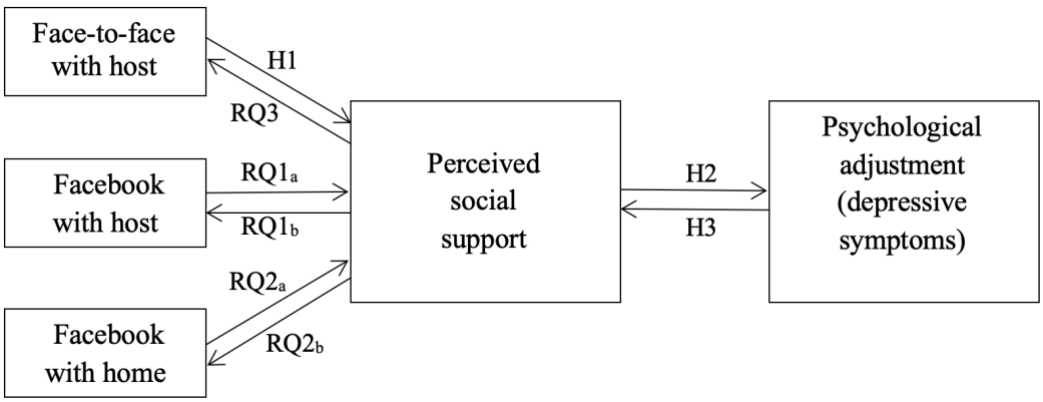


Figure 1. The proposed model for three types of interaction (FtF interaction with the host-country network, Facebook interaction with the host-country network, and Facebook interaction with the home-country network), perceived social support, and psychological adjustment (depressive symptoms).

FtF interaction with the host-country network. Consistent with the previous theories and research, we hypothesized that FtF interaction with the host-country network would predict perceived social support (Adelman, 1988; Berry, 2006; Ward et al., 2001). We limited host-country network to international students' significant others, such as family and friends. We present our first hypothesis:

H1: Greater FtF interaction with the host-country network predicts higher perceived social support.

Facebook interaction with the host- and the home-country networks. Previous studies on SNS use and perceived social support yielded inconsistent results (Li et al., 2015; Meng et al., 2017). Several studies show that SNS use is positively associated with perceived social support (Burke & Kraut, 2016; Meng et al., 2017). Other studies point to the lack of association between SNS use and perceived social support (Li et al., 2015; Seo, Harn, Ebrahim, & Aldana, 2016). These inconsistencies in results were attributed to the diverse ways SNS use was measured (Seo et al., 2016). We defined SNS use as active Facebook interaction with significant others (such as family and friends). Thus, in this study, Facebook interaction with the home- and the host-country network means engaging in social interactions with family and friends on Facebook (Gerson, Plagnol, & Corr, 2017).

Transactional feature of media effects. Transactional models of media effects assume reciprocal causal relationships between media use and outcomes of media use (Slater, 2015; Valkenburg, Peter, & Walther, 2016). These reciprocal paths have been depicted as dynamic and imply that one process (e.g., media use) affects another (e.g., outcome), which in turn, affects the one in the beginning (e.g., media use). Meng et al. (2017) considered the directionality of effects as a critical gap in research, stating that "it remains unclear as to whether SNS impacts social support (...) or if social support shapes use of SNSs, or both" (p. 49). In this

study, we aimed to test the reciprocal associations between interactions and perceived social support, and clarify the direction of influence. Thus, we asked:

RQ1a&b: What are the associations between Facebook interaction with the host-country network and perceived social support?

RQ2a&b: What are the associations between Facebook interaction with the home-country network and perceived social support?

RQ3: Does perceived social support predict FtF interaction with the host-country network?

Perceived Social Support and Depression

Previous research on cross-cultural adjustment provided strong support for the positive impact of perceived social support on psychological adjustment (Adelman, 1988; Berry, 2006; Cemalcilar, 2008; Mikal et al., 2013; Trepte & Scharkow, 2016; Ward et al., 2001; Ye, 2006). Moreover, research on social support and depression provides evidence on their possible reciprocal associations: Higher levels of social support predicted fewer depressive symptoms; while fewer depressive symptoms predicted higher levels of social support (Burns, Deschênes, & Schmitz, 2015; Pettit, Roberts, Lewinsohn, Seeley, & Yaroslavsky, 2011). Thus, we expected these reciprocal effects:

H2: Higher perceived social support predicts fewer depressive symptoms.

H3: A greater number of depressive symptoms predicts lower perceived social support.

Long-term versus Short-term Reciprocal Associations

One crucial factor to consider in testing the model in Figure 1 is the time lag. There exist neither established nor compelling theoretical bases for the timing of assessments (in terms of intervals between waves) of interactions and perceived social support, or perceived social support and depressive symptoms. In this study, we used a longitudinal design with an interval of three months between measurements, consistent with a previous longitudinal study

on student sojourners (Hechanova-Alampay, Beehr, Christiansen, & Van Horn, 2002). The longitudinal design is helpful in providing a clearer interpretation of relational impacts and useful in establishing the temporal order (Meng et al., 2017). It also allows the investigation of the short- and long-term reciprocal associations between communication and perceived social support, as well as between perceived social support and depressive symptoms.

Method

Participants and Procedures

Participants were international students who answered our online survey on Qualtrics. The survey questionnaire was in English. We collected data on three time points (T1, T2, T3), with an interval of three months between data collections. For the first survey (T1), we recruited participants on Facebook by posting an announcement about the study on various international student group Facebook pages (e.g., Erasmus Student Network). The announcement was also shared on Facebook by a few university-based international students' offices and international student organizations (e.g., VU Amsterdam International Office, International Students Lund University, etc.). Participation was entirely voluntary. As a form of compensation, the participants had the option to join a raffle draw at each time point, where 10 participants were randomly selected to each receive a €50 euro gift voucher. A total of 414 participants (n = 246, 59.4% women, n = 168, 40.6% men) answered the first survey (T1). We asked in the first survey if they were willing to participate in second and third follow-up surveys and 350 (84.5%) participants agreed. For the second survey (T2), 174 completed the questionnaire (49.7% of those who agreed for follow-up surveys). For the third survey (T3), we sent the questionnaire to those who participated in T2. A total of 98 participants completed the questionnaire (56% of those who participated in T2). The mean age of participants at T1 was 25.21 (SD = 4.50), ranging from 16 to 49 years. They were from 76 different countries (43.4% from Europe, 27.6% from Asia, and the rest from South America, Africa, North America, and

Australia), and studying in 32 host countries. The average length of stay in the host-country is 18 months (*SD* = 19.34). The demographic characteristics of the participants across the three time points are summarized in Table 1.

Table 1

Demographic Characteristics of the Participants Across the Three Time Points

Demographic Variables	Time 1 (*n*=414)		Time 2 (*n*=174)		Time 3 (*n*=98)	
Gender	*n*		*n*		*n*	
Women	246	(59.4%)	104	(59.8%)	61	(62.2%)
Men	168	(40.6%)	70	(40.2%)	37	(37.8%)
Civil status						
Single	359	(86.7%)	153	(87.9%)	90	(91.8%)
Engaged	31	(7.5%)	13	(7.5%)	4	(4.1%)
Married	23	(5.6%)	8	(4.6%)	4	(4.1%)
Divorced	1	(.2%)	0		0	
Degree Program						
Bachelor's	97	(23.4%)	35	(20.1%)	16	(16.3%)
Master's	231	(55.8%)	98	(56.3%)	59	(60.2%)
PhD	74	(17.9%)	36	(20.7%)	20	(20.4%)
Professional studies	10	(2.4%)	3	(1.7%)	2	(2.0%)
Post-doc	2	(.5%)	2	(1.1%)	1	(1.0%)
Mean Age	25.21 (*SD* = 4.50)		25.78 (*SD* = 4.26)		26.49 (*SD* = 4.92)	

Measures

The data were collected as part of a research project that aimed to examine factors influencing adjustment among sojourners. For this article, we report only those measures relevant to the research questions.

Social interaction with significant others. Three items were used to measure the frequency of each of the three types of interaction: Facebook interaction with the host-country network, Facebook interaction with the home-country network, and FtF interaction with the host-country network. The main instruction was "Please rate the frequency with which you interacted with (home-/host-country) significant others (e.g., family and friends) (via

Facebook/in person) in the past two weeks". Items were rated on a 5-point Likert scale (1 = *never; 5 = all of the time*).

Perceived social support. Perceived social support was measured using the validated 10-item Social Provisions Scale (SPS-10) based on the original 24-item version of Cutrona and Russell (1987) (Gottlieb & Bergen, 2010; Hoven, 2012). Participants rated the items (e.g., "There are people I can depend on to help me if I really need it") using a 4-point Likert-type scale (1 = *strongly disagree*; 4 = *strongly agree*). In our ensuing model testing, we used the scale unidimensionally (α_{t1} = .88; α_{t2} = .89; α_{t2} = .89). Confirmatory factor analysis (CFA) using Time 1 data revealed that a one-factor solution for SPS-10 fits the data well ($\chi^2(30) = 78.20$; χ^2/df = 2.60; RMSEA = .06; CFI = .97; TLI = .95; SRMR = .04).

Depressive symptoms. We used the validated 10-item Center for Epidemiologic Studies Depression Scale (CES-D-10) derived by Andressen, Malmgreen, Carter, and Patrick (1994) from Radloff's (1977) 20-item original version. Participants rated each item (e.g., "I was bothered by things that usually don't bother me") in terms of the frequency that each mood or symptom occurred "during the past two weeks" on a four-point scale (1 = *Rarely/none of the time*; 4 = *Most/all of the time*). We used the CES-D-10 unidimensionally in our subsequent model testing (α_{t1} = .82; α_{t2} = .85; α_{t3} = .84). Using CFA with Time 1 data, we found that a one-factor solution for CES-D-10 fits the data well ($\chi^2(29) = 44.52.$; χ^2/df = 1.54; RMSEA = .04; CFI = .99; TLI = .98; SRMR = .03).

Control variables. We controlled for gender and length of stay in the host country. In their systematic review, Zhang and Goodson (2011) mentioned that gender and length of stay are among the most frequently reported predictors of psychosocial adjustment of international undergraduate and graduate students.

Results

Panel Attrition

The participants who were retained until T3 did not differ significantly from those who dropped out after T1 in terms of gender ($\chi^2(1, N = 414) = .42$, $p = .515$, $\varphi = .032$). However, those who were retained had a significantly shorter stay in the host-country during T1 compared to those who dropped out ($M_{retained} = 13.69$, SD = 15.76; $M_{dropped} = 19.17$, $SD = 20.18$; $t(204.36) = -2.80$, $p = .006$, Cohen's $d = .30$). It is possible that some of those who dropped out had already completed their studies at T2 or T3, which made them ineligible for the succeeding surveys. There were no significant differences between the retained and dropouts with regard to the mean levels of the main study variables. We also examined the pattern of missing data for the main variables using Little's missing completely at random (MCAR) test. The results indicated that the missing data can be regarded as completely at random, $\chi^2(69, N = 414) = 84.22$, $p = .103$. Thus, we assumed that the retained participants and the dropouts were comparable and that there were no serious selection problems due to attrition.

Across the three time points, the rank order of the three types of interaction in terms of frequency was similar; with FtF interaction with the host-country network as the most frequent ($M_1 = 4.17$, $SD = 1.05$; $M_2 = 4.32$, $SD = 0.89$; $M_3 = 3.98$, $SD = 1.20$), followed by Facebook interaction with the host- country ($M_1 = 3.97$, $SD = 1.05$; $M_2 = 3.98$, $SD = 1.01$; $M_3 = 3.97$, $SD = 0.95$), and lastly, Facebook interaction with the home-country as the least frequent ($M_1 = 3.83$, $SD = 1.10$; $M_2 = 3.89$, $SD = 1.03$; $M_3 = 3.66$, $SD = 1.01$). The means of perceived social support across the three time points were: $M_1 = 3.24$ ($SD = 0.51$); $M_2 = 3.30$ ($SD = 0.49$); $M_3 = 3.29$ ($SD = 0.48$); and for depressive symptoms were: $M_1 = 1.94$ ($SD = 0.56$); $M_2 = 1.91$ ($SD = 0.57$); $M_3 = 1.86$ ($SD = 0.52$).

Model Testing

We tested our proposed model in Figure 1 using cross-lagged (for the long-term effects) and non-lagged (for the short-term effects) reciprocal causal paths analyses. The non-lagged reciprocal analysis assumes causal effects that occur within a short span of time (Finkel, 1995; Kline, 2016). Although panel designs do not prove causality as conclusively as experimental designs, they are useful means to estimate reciprocal effects and assess whether a set of results is consistent with a causal model (Finkel, 1995). We conducted structural equation modeling (SEM) with the observed variables for the three types of interaction and the composite means for perceived social support and depressive symptoms, using Stata 14 and the maximum likelihood for missing values (MLMV) estimation method. Perceived social support and depressive symptoms were represented by composite scales rather than latent constructs in order to reduce the number of parameters to be estimated and ensure adequate power, also given the high reliability of these multiple indicator scales. We applied z-score standardization to ascertain the comparability of the coefficients across the variables. We also applied the assumption of constancy of structural effects and estimated the models by placing equality constraints on the parameters since: (a) the panel waves were equally spaced (Finkel, 1995); and (b) the participants were in varying stages of their studies at T1. We assumed equilibrium in the model such that "the changes in the underlying reciprocal causations have already manifested their effects and that the system is already in a steady state" (Kline, 2016, p. 137). Starting with the cross-lagged model, we constrained the autoregressive paths from T1 to T2, and from T2 to T3 to be equal and the corresponding cross-lagged causal paths across the waves to be equal. We also constrained the residual variances between variables within waves to be equal. Then, for the non-lagged model, we removed the cross-lagged paths from the previous cross-lagged model, and replaced the correlations of the variables within waves with reciprocal causal paths. These reciprocal causal paths within waves (represented by two distinct

reciprocal arrows in the model) disentangle the correlational association (single bidirectional arrow) within waves in the cross-lagged model. Thus, the directions of influence in the short-term are clarified (see Mathisen et al. (2007) for the application of similar procedures).

Evaluation of the cross-lagged model. Table 2 provides a summary of the effect sizes (unstandardized estimates of the paths based on z-scores) in all the models we tested. Only the values between T1 and T2 are presented because we imposed equality constraints across the waves (i.e., values between T1 and T2, T2 and T3 are the same). We first tested a cross-lagged model without the control variables (Model 1a). The results showed that Model 1a had a good fit to the data ($\chi^2(80) = 96.49$; $p = .101$; $\chi^2/df = 1.21$; RMSEA = .02; CFI = .98; TLI = .97). To check if the assumption of constancy of structural effects is warranted, we then tested Model 1a where we relaxed the equality constraints. We found that Model 1a without the equality constraints did not represent a statistically significant improvement in fit to the data ($\chi^2(55) = 70.48$; $p = .078$; $\chi^2/df = 1.28$; RMSEA = .03; CFI = .98; TLI = .97) compared to Model 1a with equality constraints ($\chi^2_{diff} = 26.01$; $df_{diff} = 25$; $p = 0.407$); thus, the assumption of constancy of structural effects was acceptable. The results showed that perceived social support predicted higher Facebook interaction with the host-country network at a later time point ($RQ1_b$). Also, perceived social support predicted lower depressive symptoms at a later time point ($b = -0.10$; $SE = 0.05$; $p = .030$, one-tailed), supporting H2.

We then tested a cross-lagged model with the control variables gender and length of stay included (Model 1b). Model 1b showed an adequate fit to the data ($\chi^2(90) = 113.99$; $p = .045$; $\chi^2/df = 1.27$; RMSEA = .03; CFI = .97; TLI = .96). We found that Model 1b with and without equality constraints ($\chi^2(65) = 87.64$; $p = .032$; $\chi^2/df = 1.35$; RMSEA = .03; CFI = .97; TLI = .95) did not differ significantly in terms of model fit ($\chi^2_{diff} = 26.35$; $df_{diff} = 25$; $p =$

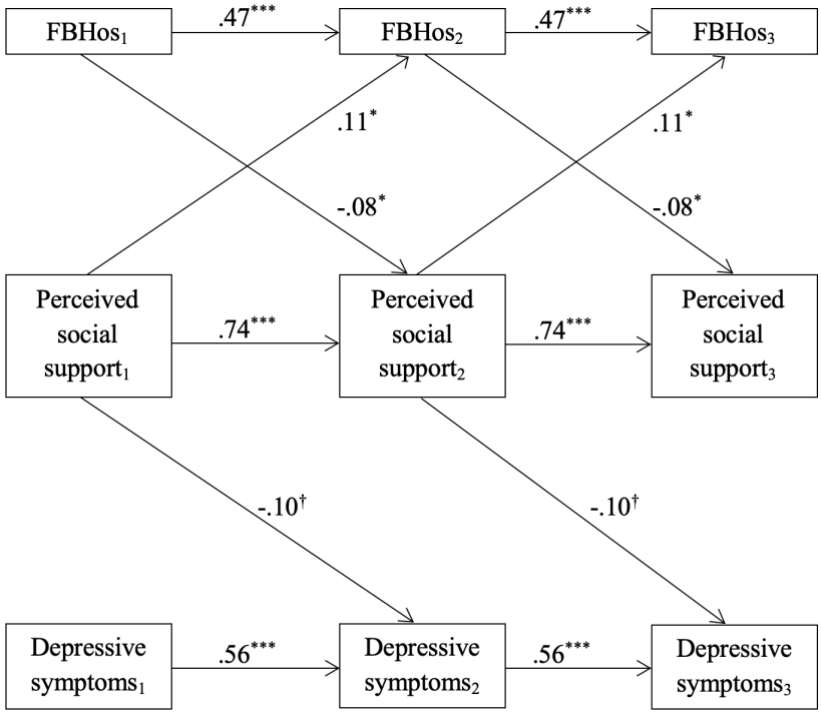
Table 2

Unstandardized Parameter Estimates, Standard Errors, and P-values (two-tailed) of the Cross-lagged and Non-lagged Reciprocal Causality Path Analyses

	Cross-lagged						Non-lagged					
	Model 1a			Model 1b (with covariates)			Model 2a			Model 2b (with covariates)		
Paths	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
Autoregressive paths												
$FtFhos_1 \rightarrow FtFhos_2$	0.41	0.06	.000	0.42	0.06	.000	0.42	0.06	.000	0.42	0.06	.000
$FBhos_1 \rightarrow FBhos_2$	0.48	0.05	.000	0.47	0.05	.000	0.48	0.05	.000	0.47	0.05	.000
$FBhom_1 \rightarrow FBhom_2$	0.57	0.05	.000	0.56	0.05	.000	0.58	0.05	.000	0.57	0.05	.000
$PSS_1 \rightarrow PSS_2$	0.75	0.05	.000	0.74	0.05	.000	0.70	0.04	.000	0.70	0.04	.000
$Dep_1 \rightarrow Dep_2$	0.56	0.05	.000	0.56	0.05	.000	0.54	0.05	.000	0.54	0.05	.000
Causal Paths												
FtFhos → PSS	0.03	0.04	.438	0.03	0.04	.461	0.09	0.05	.075	0.09	0.05	.074
FBhos → PSS	-0.08	0.04	.054	-0.08	0.04	.049	-0.08	0.05	.159	-0.08	0.06	.150
FBhom → PSS	0.02	0.04	.677	0.02	0.04	.670	0.04	0.05	.418	0.04	0.05	.412
PSS → FtFhos	0.06	0.06	.286	0.06	0.06	.295	0.09	0.07	.181	0.10	0.07	.175
PSS → FBhos	0.11	0.05	.039	0.11	0.05	.041	0.18	0.06	.003	0.18	0.06	.003
PSS → FBhom	0.07	0.05	.135	0.08	0.05	.097	0.08	0.06	.150	0.09	0.06	.108
PSS → Dep	-0.10	0.05	.060	-0.10	0.05	.058	-0.17	0.06	.003	-0.17	0.06	.003
Dep → PSS	-0.03	0.04	.393	-0.04	0.04	.372	-0.13	0.05	.005	-0.13	0.05	.006
Covariances												
$FtFhos_2$ – $FBhos_2$	0.15	0.05	.001	0.15	0.05	.001	0.13	0.04	.004	0.13	0.04	.003
$FtFhos_2$ – $FBhom_2$	-0.04	0.04	.297	-0.04	0.04	.268	-0.05	0.04	.203	-0.06	0.04	.171
$FBhos_2$ – $FBhom_2$	0.20	0.04	.000	0.21	0.04	.000	0.19	0.04	.000	0.20	0.04	.000
$FtFhos_2$ – PSS_2	0.10	0.03	.003	0.10	0.03	.003						
$FBhos_2$ – PSS_2	0.05	0.03	.097	0.05	0.03	.097						
$FBhom_2$ – PSS_2	0.04	0.03	.210	0.04	0.03	.187						
PSS_2 – Dep_2	-0.16	0.03	.000	-0.16	0.03	.000						
Control variables												
Male → $FtFhos_3$				0.07	0.09	.461				0.07	0.09	.417
Male → $FBhos_3$				-0.08	0.09	.345				-0.07	0.09	.422
Male → $FBhom_3$				0.15	0.08	.056				0.16	0.08	.051
Male → PSS_3				-0.06	0.07	.368				-0.05	0.06	.399
Male → Dep_3				0.14	0.08	.071				0.13	0.08	.086
Stay → $FtFhos_3$				0.03	0.08	.724				0.02	0.07	.741
Stay → $FBhos_3$				-0.001	0.07	.985				-0.006	0.07	.932
Stay → $FBhom_3$				-0.02	0.07	.725				-0.02	0.07	.723
Stay → PSS_3				0.01	0.06	.912				0.02	0.05	.753
Stay → Dep_3				0.09	0.07	.193				0.09	0.06	.154

Note. FtFHos = Face-to-Face with the host-country network; FBHos = Facebook with the host-country network; FBHom = Facebook with the home-country network; PSS = Perceived social support; Dep = Depressive symptoms; Stay = length of stay. All variables were standardized within waves. Since equality constraints were imposed: for the autoregressive paths, only the values between T1 to T2 are shown; for the causal paths, only the values between T1 to T2 (cross-lagged models), and the values within T2 (non-lagged models) are shown; for the covariances, only the values within T2 are shown.

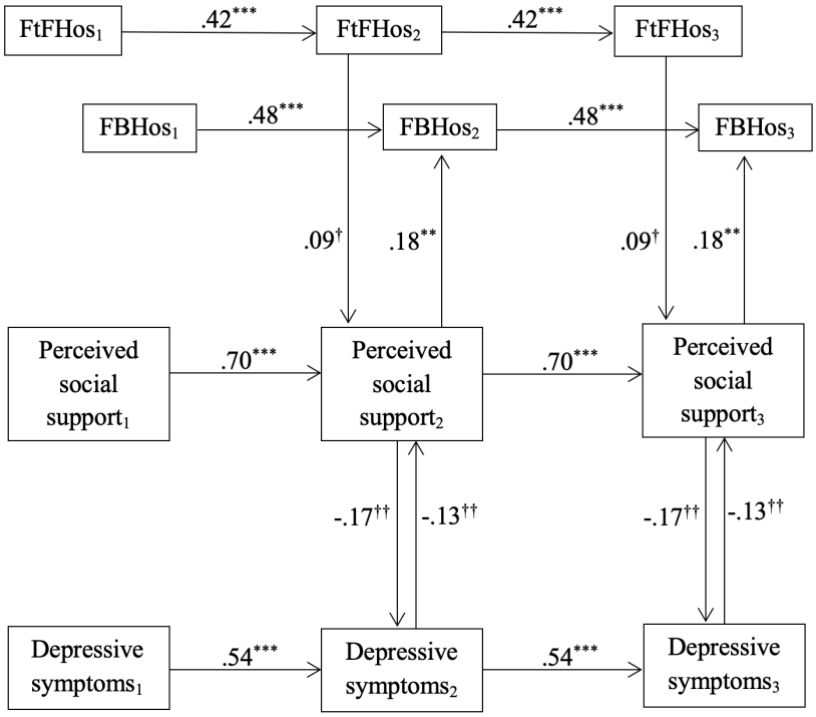
.389); thus, the assumption of constancy was acceptable. When gender and length of stay were accounted for, the coefficients showed that Facebook interaction with the host-country network lowered perceived social support at a later time point ($RQ1_a$); and higher perceived social support increased Facebook interaction with the host-country network at a later time point ($RQ1_b$). We also found that greater perceived social support decreased depressive symptoms at a later time point, supporting H2. Regarding the control variables, gender and length of stay had no effect on the main variables in the model. In both cross-lagged models (Models 1a and 1b), H1and H3 were not supported. Figure 2 provides a summary of the statistically significant results for Model 1b.



Note. $^{***}p < .001$; $^{*}p < .05$, two-tailed; $^{\dagger}p < .05$, one-tailed; FBHos = Facebook interaction with the host-country network. All variables were standardized within waves. For visual clarity, correlations between error terms were not included.

Figure 2. Simplified version of the cross-lagged model (Model 1b) presented with the unstandardized regression coefficients of the statistically significant paths.

Evaluation of the non-lagged reciprocal causation model. We then tested a non-lagged model without the control variables (Model 2a). Model 2a showed a good fit to the data (χ^2 (84) = 99.11; p = .124; χ^2/df = 1.18; RMSEA = .02; CFI = .98; TLI = .98). We also found that the assumption of constancy of structural effects was valid for Model 2a (χ^2(63) = 77.36; p = .105; χ^2/df = 1.23; RMSEA = .02; CFI = .98; TLI = .97; χ^2_{diff} = 21.75; df_{diff} = 21; p =.414). Within time points, FtF interaction with the host-country network predicted higher perceived social support (b = 0.09; SE = 0.05; p = .038, one-tailed), confirming H1. Moreover, perceived support predicted higher Facebook interaction with the host-country network ($RQ1_b$). Higher perceived social support predicted lower depressive symptoms, confirming H2. Reciprocally, lower depressive symptoms predicted greater perceived social support, confirming H3. Next, we tested a non-lagged model accounting for the control variables gender and length of stay (Model 2b). Model 2b showed a good fit to the data (χ^2(94) = 116.53; p = 0.058; χ^2/df = 1.24; RMSEA = .02; CFI = .97; TLI = .96). Chi-square difference test showed that Model 2b without equality constraints (χ^2(73) = 94.35; p = 0.047; χ^2/df = 1.29; RMSEA = .03; CFI = .97; TLI = .96) was not significantly different from Model 2b with equality constraints (χ^2_{diff} = 22.18; df_{diff} = 21; p = 0.389); thus, the assumption of constancy of structural effects is warranted. The pattern of results in Model 2b (with control variables) testing was similar to that of Model 2a (see Figure 3). Gender and length of stay were not associated with the main variables. Overall, the effect sizes were small. However, they are similar in magnitude to those found in previous studies (Shakya & Christakis, 2017). Moreover, despite the effects being small, they are statistically significant even in the rather modest sample.



Note. ···$p < .001$; ··$p < .01$; ·$p < .05$, two-tailed; ††$p < .01$; †$p < .05$, one-tailed; FtFHos = Face-to-face interaction with the host-country network; FBHos = Facebook interaction with the host-country network. All variables were standardized within waves. For visual clarity, correlations between error terms were not included.

Figure 3. Simplified version of the non-lagged model (Model 2b) presented with the unstandardized regression coefficients of the statistically significant paths.

Discussion

This study aimed to test a model which proposed that concurrent communication (FtF interaction with the host-country, Facebook interaction with the host- and the home-country networks) of international students predicts perceived social support, which, in turn, predicts depressive symptoms. We extended previous theorizing by investigating the reciprocal associations between communication and perceived social support, as well as between perceived social support and depressive symptoms. We tested the model under two separate temporal assumptions, the long- and short-term reciprocal associations, using cross-lagged and non-lagged path analyses, respectively. We controlled for gender and length of stay in the host-country since they were identified as relevant in international students' psychological

adjustment (Smith & Khawaja, 2011; Zhang & Goodson, 2011). We found that FtF interaction with the host-country network increased perceived social support in the short-term. In turn, perceived social support lowered depressive symptoms both in the long- and short-term. Moreover, depressive symptoms lowered perceived social support in the short-term, indicating the mutual influence of perceived social support and depressive symptoms in the short-term. Also, Facebook interaction with the host-country network lowered perceived social support in the long-term. In turn, perceived social support increased Facebook interaction with the host-country network in the long- and the short-term.

Concurrent Communication Model and Perceived Social Support

Host versus home-country network. The results showed that only the interactions with the host-country networks (both Facebook and FtF), and not Facebook interaction with the home-country network, were associated with perceived social support. A previous study indicated that CMC communication with the home-country networks predicted perceived social support (Cemalcilar, 2008). The differences in the results could be due to the use of the concurrent model of communication in our study, which was lacking in the earlier study. Our results suggest that by taking into consideration the concomitant impacts of FtF interaction with the host-country network and Facebook (CMC) interaction with the host- and the home-country networks, Facebook interaction with the home-country network may be relatively less relevant for perceived social support. Previous studies have shown that international students tend to hesitate when it comes to disclosing stressful situations and seeking social support from the home-country network (Seo et al., 2016; Smith & Khawaja, 2011). It could be that the home-country network is seen as a less viable source of support because of physical separation (Mikal et al., 2013). Moreover, it is possible that international students keep their negative feelings and experiences secret from their home-country network to avoid burdening their family and friends with their problems, and avoid being perceived as a failure in managing

emotional distress on their own (Seo et al., 2016; Smith & Khawaja, 2011). These results point to the crucial role of the host-country network in sojourners' experiences since international students seem more likely to depend on this network for perceived social support. Future studies should also look into how Facebook interaction with the home- and the host-country networks relate to other forms of social support (e.g., received offline social support, SNS-based social support).

FtF versus Facebook interaction. FtF interaction with the host-country network increased perceived social support in the short-term, consistent with previous findings (Adelman, 1988; Hechanova-Alampay et al., 2002; Smith & Khawaja, 2011; Ward et al., 2001). However, there was no long-term impact of FtF interaction with the host-country network on perceived social support. Taken together, these results suggest that regular FtF interactions with the host network are important to sustain international students' perceived social support. Meanwhile, we found that there was a significant negative influence of Facebook with the host-country network on perceived social support in the long-term. On one hand, this might imply that a high frequency of Facebook interaction with the host-country network detracts international students from "real life" interaction which are important in fostering support (Shakya & Christakis, 2016). On the other hand, it may not simply be the physical social isolation, because FtF interactions with the host-country network were frequent. It could also be that certain characteristics of the Facebook context itself contributed to lowered perceived social support over time. For example, certain social dynamics on Facebook could make students feel ignored, such as not getting the likes or comments they expected for their posts from friends in their host-country network. Note though that a previous study showed that social interactions on Facebook had no association with perceived social support (Li et al., 2015). Moreover, Utz and Breuer (2017) found that the number of strong ties on SNS was not

related to social support. Thus, we propose that future studies test the robustness of our findings.

The Transactional Feature of Media Effects

Perceived social support predicted Facebook interaction with the host-country network both in the long- and the short-term. Together, the findings that FtF interaction with the host-country network increased perceived social support (in the short-term), and that perceived social support increased Facebook interaction with the host-country network (in the long-term) validate the social enhancement hypothesis which postulates that those with developed FtF social networks tend to have more active CMC use (Valkenburg & Peter, 2007a). Thus, international students who felt socially supported by others via FtF interaction were more likely to expand venues of interaction with the host network by using Facebook. Our findings also suggest a transactional effect, particularly a negative feedback loop (Slater, 2015): Following the social enhancement hypothesis, perceived social support may increase Facebook interaction with the host-country both in the short- and the long-term. However, high frequency of Facebook interaction with the host-country network diminishes perceived social support in the long-term, resulting in homeostasis. This could partly explain why Facebook use does not grow out of control over time (Slater, 2015).

Perceived Social Support and Depressive Symptoms

Perceived social support and depressive symptoms had reciprocal relationships. These suggest that because depressed students are less likely to perceive the availability of support, they are also less likely to use Facebook to interact with the host-country network. Thus, depressed international students might have difficulties recognizing the availability of support and may be less likely to socialize with others (even online). Furthermore, decreased perceived social support could exacerbate international students' negative state, indicating a downward spiral (Peterson & Seligman, 1984).

Theoretical and Practical Contributions

This current study extends theorizing in the fields of communication and cross-cultural studies. One major contribution of this study is the integrative conceptualization of the various social interactions of international students. Previous studies on international sojourners examined the roles of FtF and online interactions with the home- and the host-country networks using separate models (Berry, 2006; Cemalcilar, 2008; Lee et al., 2011; Rui & Wang, 2015; Ward et al., 2001). By proposing and testing a concurrent communication model, we were able to examine the relative importance of these social interactions in perceived social support and, in turn, adjustment. This conceptualization extends the application of the reinforcement hypothesis in FtF and SNS communication in temporary migration context (Dienlin et al., 2017). Consequently, this conceptualization also expands earlier sojourners' adjustment models that focused on FtF host-country network interactions (Berry, 2006; Ward et al., 2001). This study also contributes by extending the application of important theoretical assumptions in communication, such as the transactional feature of media effects and reinforcing spirals (Slater, 2015; Valkenburg et al., 2016). Specifically, our findings demonstrated reciprocal causal associations, particularly a negative feedback loop, between Facebook interactions with the host-country network and perceived social support of international students. Another contribution of this study is to disentangle the reciprocal causal associations of social interactions and perceived social support, as well as perceived social support and depression, that could occur in a long or a short span of time. The directionality of associations in both the long- and the short-term time lags are important contributions that were lacking in previous investigations (Meng et al., 2017; Trepte & Scharkow, 2016).

In terms of practical contributions, this study informs international students of the social factors that may contribute to their adjustment. Moreover, our findings bear some insights that might be useful for support providers (e.g., counselors, organizations, university

offices, government institutions, etc.) in designing programs and services for sojourners. For instance, programs should gear towards organizing activities that encourage regular interactions between sojourners and host-country members. Also, there should be available trainings for both sojourners and host-country members that promote greater communication and understanding (e.g., language learning, intercultural competence training, etc.).

Limitations and Recommendations

There are several limitations that need to be considered when interpreting the results. Longitudinal research on sojourners is scarce (Smith & Khawaja, 2011). This is one of the few longitudinal studies on international students. In their systematic review of articles on international students' psychosocial adjustment in the United States, Zhang and Goodson (2011) found that the sample sizes of the 64 articles they reviewed ranged from 21 to 631. Based on this finding, this study can be considered having a good sample size. Nevertheless, the number of participants limited statistical power and prevented the inclusion of potential control variables (e.g., general Facebook use, public versus private communication on Facebook, host-country versus co-national host-country networks, country of origin, Facebook penetration rate and access, home-country visits, language competence, etc.). Future studies should account for these control variables to better capture the complexities of the patterns of SNS use and sojourners' adjustment. Another limitation is the interval between each wave. It is possible that a three-month interval between waves is not enough or may even be too long to detect changes in FtF and Facebook interaction. Both more fine-grained and longer time-intervals in assessing developmental trajectories would be promising. This current study assessed directions of influence but did not conclusively establish causal effects (Finkel, 1995). We suggest for future research to validate our results not only using similar longitudinal designs, but also quasi-experiments and diary studies. We measured Facebook/FtF interactions in a broad manner by asking the participants to think of their "significant others (e.g., family

and friends)." It was not possible to determine specifically who respondents were thinking of (family or friends); and if they were thinking of the same set of individuals across time points. Moreover, it was difficult to ascertain whether the participants were thinking of strong ties or weak ties (e.g., close friends or friends in general). We measured perceived social support because it is context sensitive (e.g., online and FtF, home- and host-country networks) and comparable across contexts (Trepte et al., 2015). However, SPS-10 was originally developed based on co-located network support. We suggest that future studies validate our findings using measures of perceived social support that were developed for both online and offline contexts. Moreover, the measurement of received support would be informative, especially in the development of support programs. We also recommend expanding the application of the models we tested on other forms of CMC. We acknowledge that our findings are limited to international students' context. We recommend that future studies test the applicability of our assumptions and the generalizability of our findings in other populations that might be voluntarily or involuntarily displaced and far away from home (e.g., domestic student sojourners, expatriates, immigrants, refugees, and asylum seekers); as well as in the general population.

Conclusions

We found that FtF interaction with the host-country network had immediate positive impacts on international students' perceived social support, which in turn, predicted lower depressive symptoms. Moreover, by perceiving more social support, international students were more encouraged to interact on Facebook with the host-country networks, both in the short- and in the long-term. However, high frequency of interaction on Facebook with the host-country network decreased perceived social support in the long-term. Lastly, perceived social support was shown to have short-term reciprocal associations with depressive symptoms. This implies that depressed international students were less likely to perceive support, which in turn,

made them less likely to use Facebook to reach out to others in the host-country. Facebook interaction with the home-country network had no influence on perceived social support. This study provided initial insights on the short-term and the long-term reciprocal causal structures of types of communication, perceived support, and psychological adjustment among sojourners. We hope that future research can build on the theoretical assumptions and the findings reported in this study, and further decompose the associations of different types of communication, social support, and adjustment in various social contexts.

References

Adelman, M. (1988). Cross-cultural adjustment: A theoretical perspective on social support. *International Journal of Intercultural Relations*, 12(3), 183-204. doi: 10.1016/0147-1767(88)90015-6

Andressen, E., Malmgreen, J., Carter, W., & Patrick, D. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *American Journal of Preventive Medicine.* 10, 77-84.

Berry, J. W. (2006). Stress perspectives on acculturation. In D. Sam & J. Berry (Eds.), *The Cambridge Handbook of Acculturation Psychology*, 43-57. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511489891.007

Burke, M., & Kraut, R. (2016). The relationship between Facebook use and well-being depends on communication type and tie strength. *Journal of Computer-Mediated Communication,* 21(4), 265-281. doi:10.1111/jcc4.12162

Burns, R. J., Deschênes, S. S., Schmitz, N. (2015). Associations between depressive symptoms and social support in adults with diabetes. *Annals of Behavioral Medicine*, 50(3), 348-357. doi 10.1007/s12160-015-9760-x

Cemalcilar, Z. (2008). Communicating electronically: Keeping contact when too far away to visit. In K. St-Amant & S. Kelsey (Eds.) *Handbook of Research on Computer Mediated Communication*, 365-378. New York: IGI Global.

Cutrona, C. E., & Russell, D. W. (1987). The provisions of social relationships and adaptation to stress. In W. H. Jones, & D. Perlman (Eds.), *Advances in Personal Relationships*, 37-67. Greenwich, CT: JAI Press.

Dienlin, T., Masur, P. K., & Trepte, S. (2017). Reinforcement or displacement? The reciprocity of FtF, IM, and SNS communication and their effects on loneliness and life

satisfaction. *Journal of Computer-Mediated Communication*, 22, 71–87. https://doi.org/10.1111/jcc4.12183

Dustmann, C. (1999). Temporary migration, human capital, and language fluency of migrants. *The Scandinavian Journal of Economics*, 101, 297–314. doi: 10.1111/1467-9442.00158

Ellison, N., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, *12*(4), article 1. Retrieved from http://jcmc.indiana.edu/vol12/issue4/ellison.html

Finkel, S. E. (1995). *Causal Analysis with Panel Data*. Thousand Oaks, CA: Sage.

Gerson, J., Plagnol, A. C., & Corr, P. J. (2017). Passive and active Facebook use measure (PAUM): Validation and relationship to the reinforcement sensitivity theory. *Personality and Individual Differences*, 117, 81–90. doi:10.1016/j.paid.2017.05.034

Gottlieb, B., & Bergen, A. (2010). Social support concepts and measures. *Journal of Psychosomatic Research*, 69(5), 511–520. doi:10.1016/j.jpsychores.2009.10.001

Hechanova-Alampay, R., Beehr, T. A., Christiansen, N. D., & Van Horn, R. K. (2002). Adjustment and strain among domestic and international student sojourners. *School Psychology International*, 23(4), 458-474. doi:10.1177/0143034302234007

Hoven, M. (2012). *Investigating the relationship between perceived social support and parent self-efficacy in parents of preschool-aged children* (Unpublished master's thesis). The University of British Columbia, Vancouver, Canada.

Hutt, R. (2017, March 20). *The world's most popular social networks, mapped.* Retrieved from https://www.weforum.org/agenda/2017/03/most-popular-social-networks-mapped/

Johnson, A., Haigh, M., Becker, J., Craig, E., & Wigley, S. (2008). College students' use of relational management strategies in email in long-distance and geographically close

relationships. *Journal of Computer-Mediated Communication*, 13, 381–404. doi: 10.1111/j.1083-6101.2008.00401.x

Kline, R. B. (2016). *Methodology in the Social Sciences. Principles and Practice of Structural Equation Modeling,* 4th ed. New York: Guilford Press.

Lee, E., Lee, L., & Jang, J. (2011). Effects of Internet use motivations on international students' college adjustment. *Cyberpsychology, Behavior and Social Networking*, 14, 433-437. doi: 10.1089/cyber.2010.0406

Li, X., Chen, W., & Popiel, P. (2015). The implications of Facebook interaction for perceived, receiving, and giving social support. *Computers in Human Behavior*, *51*, 106-113. doi: 10.1016/j.chb.2015.04.066

Mathisen, L., Andersen, M. H., Veenstra, M., Wahl, A. K., Hanestad, B. R., & Fosse, E. (2007). Quality of life can both influence and be an outcome of general health perceptions after heart surgery. *Health and Quality of Life Outcomes*, 5(27). doi:10.1186/1477-7525-5-27

Meng, J., Martinez, L., Holmstrom, A., Chung, M., & Cox, J. (2017). Research on social networking sites and social support from 2004 to 2015: A narrative review and directions for future research. *Cyberpsychology, Behavior, and Social Networking*, 20(1), 44–51. doi: 10.1089/cyber.2016.0325

Mikal, J., Rice, R. E., Abeyta, A., & De Vilbiss, J. (2013). Transition, stress and computer-mediated social support, *Computers in Human Behavior*, 29(5), A40-A53. http://dx.doi.org/10.1016/j.chb.2012.12.012

Peterson, C., & Seligman, M. E. P. (1984). Causal explanations as a risk factor for depression. *Psychological Review,* 91, 347-374. doi:10.1037/0033-295X.91.3.347

Pettit, J. W., Roberts, R. E., Lewinsohn, P. M., Seeley, J. R., & Yaroslavsky, I. (2011). Developmental relations between perceived social support and depressive symptoms through emerging adulthood: Blood is thicker than water. *Journal of Family Psychology, 25*(1), 127-136. http://dx.doi.org/10.1037/a0022320

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 13, 385–401. doi: 10.1177/014662167700100306

Rui, J., & Wang, H. (2015). Social network sites and international students' cross-cultural adaptation. *Computers in Human Behavior*, 49, 400-411. doi:10.1016/j.chb.2015.03.041

Sarriera, J. C., Abs, D., Casas, F., & Bedin, L. M. (2012). Relations between media, perceived social support and personal well-being in adolescence. *Social Indicators Research*, 106, 545–561. doi: 10.1007/s11205-011-9821-x

Seo, H., Harn, R. W., Ebrahim, H., & Aldana, J. (2016). International students' social media use and social adjustments. *First Monday*, 21(11). Retrieved from: http://firstmonday.org/ojs/index.php/fm/article/view/6880/5646

Shakya, H. B., & Christakis, N. A. (2017). Association of Facebook use with compromised well-being: A longitudinal study. *American Journal of Epidemiology*, 185(3), 203-211. DOI: 10.1093/aje/kww189.

Slater, M. D. (2015). Reinforcing spirals model: Conceptualizing the relationship between media content exposure and the development and maintenance of attitudes. *Media Psychology*, 18, 370-395. doi: 10.1080/15213269.2014.897236

Smith, R., & Khawaja, N. (2011). A review of the acculturation experiences of international students. *International Journal of Intercultural Relations*, 35, 699-713. doi:10.1016/j.ijintrel.2011.08.004

Trepte, S., Dienlin, T., & Reinecke, L. (2015). Influence of social support received in online and offline contexts on satisfaction with social support and satisfaction with life: A longitudinal study. *Media Psychology*, 18, 74–105. doi: 10.1080/15213269.2013.838904

Trepte, S., & Scharkow, M. (2016). How social capital and social support received in media environments contribute to well-being. In L. Reinecke & M. B. Oliver (Eds.), *The Routledge handbook of media use and well-being: International perspectives on theory and research on positive media effects* (pp. 304–316). New York, NY: Routledge.

Utz, S., & Breuer, J. (2017). The relationship between use of social network sites, online social support, and well-being: Results from a 6-wave longitudinal study. *Journal of Media Psychology,* 29 (3): 115-125. doi: dx.doi.org/10.1027/1864-1105/a000222.

Valkenburg, P. M., & Peter, J. (2007). Online communication and adolescent well-being: Testing the stimulation versus the displacement hypothesis. *Journal of Computer-Mediated Communication*, 12, 1169–1182. doi: 10.1111/j.1083-6101.2007.00368.x

Valkenburg, P. M., Peter, J., & Walther, J. B. (2016). Media effects: Theory and research. *Annual Review of Psychology*, 67. doi: 10.1146/annurev-psych-122414-033608

Ward, C., Bochner, S., & Furnham, A. (2001). *The psychology of culture shock*, 2nd ed. New York, NY, US: Routledge. Retrieved from https://www.academia.edu/2662056/Psychology_of_culture_shock

Wright, K., Rosenberg, J., Egbert, N., Ploeger, N., Bernard, D., & King, K. (2013). Communication competence, social support, and depression among college Students: A model of Facebook and face-to-Face support network influence. *Journal of Health Communication*, 18(1), 41-57. doi: 10.1080/10810730.2012.688250

Ye, Y. (2006). Traditional and online support networks in the cross-cultural adaptation of Chinese international students in the United States. *Journal of Computer-Mediated Communication,* 11, 863-876. doi: 10.1111/j.1083-6101.2006.00039.x

Zhang, J., & Goodson, P. (2011). Predictors of international students' psychosocial adjustment to life in the United States: A systematic review. *International Journal of Intercultural Relations*, 35, 139-162. doi:10.1016/j.ijintrel.2010.11.011