OJED
OPEN JOURNALS IN EDUCATION

Who Spends Too Much Time Online? Associated Factors of Internet Addiction Among International College Students in the United States

Katie K. Koo
Texas A&M University-Commerce, USA

Gudrun Nyunt
Northern Illinois University, USA

Boshi Whang
Northern Arizona University, USA

ABSTRACT

This study investigated the relation between Internet addiction and several associated factors (mental health, academic performance, socioeconomic status, self-esteem, demographic characteristics) for international students in the United States. One hundred and fifty-seven international students at a U.S. university completed five questionnaires: an Internet usage behavior questionnaire, an Internet addiction scale, a self-esteem inventory, a mental health inventory, and a demographic questionnaire. Data were analyzed using SPSS to examine the relation between Internet addiction and associated factors. The results indicated that male students who speak English as a second language and who are not religious are more likely to develop Internet addiction. Academic performance and socioeconomic status were found to be positive predictors of Internet addiction, and mental health and self-esteem were found to be negative predictors of Internet addiction. The relations between other associated factors were also examined.

Keywords: academic performance, English proficiency, international students, Internet addiction, mental health

INTRODUCTION

College students in the United States spend a significant amount of their day online (Jones et al., 2009). They use the Internet more frequently than the general population and are often the first to adopt new Internet tools and applications (Jones et al., 2009). The Pew Research Center (2019) reported that in 2019, 100% of U.S. 18- to 29-year-olds used the Internet. But while the Internet has become woven into the fabric of college students' lives, excessive use can negatively influence physical and mental health (Derbyshire et al., 2013).

International students in the United States may be particularly at risk for problematic Internet use (Park et al., 2014). They often rely on the Internet to seek information needed for daily life, to stay connected to friends and family at home, to make new friends in the host country, and for entertainment and relaxation (Lee et al., 2011; Sin & Kim, 2013; Yoon & Kim, 2014). Spending a lot of time online, coupled with feeling isolated and struggling to make friends, particularly with domestic students (Girmay & Singh, 2019; Liu, 2009), could lead to problematic reliance on the Internet.

Problematic use of the Internet has been referred to as Internet addiction (Cash et al., 2012). Internet addiction is defined as "non-chemical dependency on the use of the Internet" (Tikhonov & Bogoslovskii, 2015, p. 97). Individuals suffering from Internet addiction experience excessive or poorly controlled preoccupations, desires, or behaviors regarding Internet access that lead to impairment or distress (Shaw & Black, 2008).

While research on international students' Internet use is growing (e.g., Lee et al., 2011; Mikal et al., 2015; Sin & Kim, 2013; Yoon & Kim, 2013), many studies focus on how students use the Internet to help adjust to a new environment, failing to explore potential negative effects on students' mental health. The few studies that have looked at Internet use and mental health indicate that there may be a connection between mental health issues and frequent Internet use among international students (Han et al., 2013; S. E. Kim et al., 2015; Park et al., 2014). However, there is still the paucity of studies exploring Internet addiction and its associated factors among international students in the United States.

Purpose of the Study and Research Questions

The purpose of this quantitative study is to examine factors associated with international students' Internet addiction. Specifically, the study strives to answer the following three research questions: (a) How does the rate of Internet addiction among international college students vary based upon demographic factors?; (b) What are predictors of Internet addiction among international college students?; and (c) To what extent are academic performance, parents' education, socioeconomic status (SES), self-esteem, mental health, and Internet addiction associated with one another among international college students? To answer these questions, we explored the rate of Internet addiction associated with students' demographic factors and other factors to provide an in-depth understanding of Internet addiction among international college students.

LITERATURE REVIEW

International Students in the United States

In 2018–2019, over 1 million international students attended a higher education institution in the United States (Institute of International Education [IIE], 2019). International students, defined as anyone studying at a U.S. higher education institution on a temporary visa that allows for academic coursework, now make up 5.5% of the U.S. higher education student population (IIE, 2019). International students contribute billions to the U.S. economy each year (IIE, 2019), enhance intellectual capital, contribute to innovations, and promote diverse campus climates (National Association of International Educators, 2019).

Past research has documented the challenges international students face (e.g., Bastien et al., 2018; Koo & Nyunt, 2020; Liu, 2009; Li et al., 2018; Wu et al., 2015). International students, particularly those from non-English speaking countries with cultures that differ greatly from the United States, often experience language and academic barriers, homesickness, and social isolation (Liu, 2009; Koo et al., 2021; Mori, 2000; Wu et al., 2015). Individuals' struggle to adjust to a new cultural environment, referred to as "acculturative stress" (Berry, 2006), has been linked to mental health issues (Girmay & Singh, 2019; Liu, 2009; Mori, 2000; Zhang & Goodson, 2011a). For example, Zhang and Goodson (2011a) found that international students who experienced higher levels of acculturative stress and had less social support experienced more negative psychological symptoms.

Mental health issues, in general, seem to be on the rise among the college-age population (American College Health Association, 2008, 2017). International students seem to be particularly at risk of developing anxiety and other mental health issues (Forbes-Mewett & Sawyer, 2016). Researchers estimate that 15%–20% of international students in the United States experience poor mental health (Zhang & Goodson, 2011b). Such statistics are particularly concerning as much literature documents international students' hesitance to seek professional help (Forbes-Mewett & Sawyer, 2016).

Internet Usage and Acculturation

Internet use has been expanding rapidly. In 2001, 513 million users existed worldwide (Cohen-Almagor, 2011). By 2016, there were over 3.4 billion users worldwide, with China and India reporting the most, despite only 50% and 26% of their population being online, respectively (Roser et al., 2019). The amount of time individuals spend online has also increased. In 2019, about eight in 10 U.S. adults indicated that they accessed the Internet daily (Perrin & Kumar, 2019). About three in 10 (28%) indicated that they were online almost constantly; among those aged 18–29, almost half (48%) were online almost constantly (Perrin & Kumar, 2019).

To our knowledge, specific statistics on the Internet usage of international students in the United States are not available. However, as international students

fall in the 18–29 age range, they are likely to be among those using the Internet frequently. In addition, previous research indicates that the unique acculturation challenges international students face may make them turn to the Internet, which has been found to, at times, be helpful in the acculturation process (Mikal et al., 2015). Using English-language Internet sites can positively impact English proficiency, which reduces acculturative stress (Ye, 2005). International students may use the Internet to look up everyday life information such as health information (Yoon & Kim, 2014) or to build emotional and social support networks with individuals in their home or the host country (Mikal et al., 2015). This can be positive or negative as, when such networks consist primarily of co-nationals, the Internet may allow international students to limit their cultural learning and integration into the new environment (Mikal et al., 2015; Park et al., 2014).

Individual differences and approaches to acculturation may shape how international students use the Internet (Wang & Sun, 2009). Chinese students in the United States who felt lonely have been found to be more likely to use the Internet for companionship and to pass time, while students who were not lonely used it for acculturation purposes (Wang & Sun, 2009). How Chinese international students in the United States approached acculturation (whether they focused on assimilating to U.S. culture, maintaining their own culture, etc.) has been found to influence whether they accessed U.S. or Chinese Websites (J. Li et al., 2018).

Internet Addiction and its Associated Factors

While the Internet presents many opportunities, the use of the Internet can become problematic, and turn into Internet addiction (Cash et al., 2012). Clinicians and scholars have disagreed on what exactly Internet addiction is and how to diagnose it (Yellowlees & Marks, 2007). Some argue that it should be classified as its own disease; others see the Internet as a tool used for addictive behaviors such as gambling, gaming, or pornography (Yellowlees & Marks, 2007). The American Psychiatric Association (2013) listed "Internet gaming disorder" as a mental illness but does not highlight Internet addiction as a separate disorder in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders*.

Many scholars, however, have suggested definitions and diagnostic criteria for Internet addiction, sometimes referred to as "problematic Internet use," "computer addiction," "Internetomania," or "pathological Internet use" (e.g., Griffith, 2000; Shapira et al., 2003; M. C. Shaw & Black, 2008; Tikhonov & Bogoslovskii, 2015). Shapira et al. (2003) classified Internet addiction as an impulse control disorder. Diagnostic criteria include use for longer periods than planned, preoccupation with the Internet, and/or Internet use becoming one's most important activity (Griffith, 2000; Shapira et al., 2003). In addition, for addicted individuals, Internet use leads to significant distress or impairment in social, occupational, or other important areas of functioning (Shapira et al., 2003).

Much research has linked problematic Internet use to other mental illnesses (e.g., J. Kim et al., 2009; Şenormancı et al., 2014; Shang-Yu et al., 2019). For example, several studies indicate that problematic Internet usage such as excessive online shopping, gambling, gaming, and aimless surfing lead to higher levels of depression (Morgan & Cotton, 2003; Şenormancı et al., 2014; Shang-Yu et al., 2019; Yau et al., 2013). Others found that loneliness and/or depression can be the cause as well as the effect of problematic use (Ceyhan & Ceyhan, 2008; J. Kim et al., 2009). Connections seem to exist between low mental well-being, low self-esteem, and problematic Internet use (Akin & Isekender, 2011; H. K. Kim & Davis, 2009; Nie et al., 2017; Niemz et al., 2005; Younes et al., 2016). While most studies highlight negative impacts on mental health, some indicate that Internet use can also have positive impacts. For example, L. H. Shaw and Gant (2002) found that it can decrease loneliness and depression and increase self-esteem and social support. These studies indicate a need to further explore the connections between mental health, Internet use, and other factors.

While much literature exists on associations between Internet addiction, mental well-being, and self-esteem, fewer studies address additional factors associated with Internet addiction. A study on Korean youth (Heo et al., 2004) revealed that a higher SES has an indirect, inverse association with Internet addiction, as children with higher SESs were found to have higher self-esteem, which was considered as a negative factor associated with Internet addiction in that study. In another study on Korean youth, Hur (2006) found an association between academic performance and Internet addiction with students who received poor grades in school being more likely to be addicted to the Internet.

Several studies have examined the association between Internet addiction and demographic factors, though none of the studies focused on international students. Several studies found that men are at greater risk than women (Anderson, 2001; Lee et al., 2001; Şenormancı et al., 2014). Studies on Malaysian youth (Charlton et al., 2013) and Muslim university students (Nadeem et al., 2019) found that religious affiliation was associated with lower Internet usage.

A study on the association between parents' education and Internet addiction found that parental education was inversely associated with Internet addiction among boys but found no association among girls (Heo et al., 2014). Heo et al. (2014) argued that parents with a higher educational status are more likely to guide their children toward healthy and desirable Internet use, and the different results among genders might indicate Korean parents (where this study was conducted) had more concern and supervision on boys' Internet use as they were perceived as more vulnerable to video games and sexual and violent images.

Very few studies have focused on the topics of Internet addiction among international students in the United States. A few studies, however, have explored this topic among international students in other countries. For example, a study on Chinese international students in Korea by S. E. Kim et al. (2015) found that international students' smartphone addiction, a particular form of Internet addiction, could lead to poorer physical health. This could be caused by international students spending less time on physical activities when excessively using their smartphone (S. E. Kim et al., 2015). A study on international students

in Singapore by Dutta and Chye (2017) found that international students who felt depressed, lonely, and socially isolated reported higher levels of problematic Internet use. The authors suggested that international students may use the Internet to escape from psychological distress, which could lead to overuse and addiction. They also noted that depression may interfere with one's ability to self-regulate.

One of the few studies on international students in the United States indicated that little use of Internet could also be an indicator of poorer mental health (Han et al., 2013). Based on a mental health survey from Yale University, the study revealed that international students at Yale who spent a moderate amount of time on the Internet had better mental health than students who spent too little time using the Internet (Han et al., 2013). Spending too little time using the Internet could indicate that the students' work or academic schedules are too rigorous, which could negatively impact students' mental health (Han et al., 2013).

In conclusion, although a wide range of studies have examined the association between various demographic factors, mental health, and Internet addiction, study participants were typically domestic residents of the country where the studies were conducted. As discussed earlier, international students' experience of living in a foreign country is quite unique and could affect their mental health and relationship with the Internet. To our knowledge, no study has systematically explored the relation between problematic Internet use (or Internet addiction), mental health, and other associated (demographic) factors for international students in the United States. Building on previous research, this study will examine these relations among international students in the United States.

METHOD

Data and Procedure

Data was collected through self-reported Internet surveys in Fall 2010. Upon receiving Institutional Review Board approval, the first author and three international student advisors from the Office for International Students and Scholars recruited participants via flyers, online advertisements, international student orientations, seminars and workshops for international students, and word of mouth. Only international undergraduate students enrolled in a degree program under an F-1 student visa were recruited. We gave interested participants detailed information about the purpose of the study and directed them to an online informed consent form and online survey. Out of the 200 students we initially targeted, 166 responded. Nine students did not fully complete the questionnaire; thus their data were excluded, resulting in a final sample of 157 participants.

Table 1: Characteristics of Participants (*N* = 157)

Category	%
Gender	
Male	46.0
Female	54.0
Year in college	
First	17.6
Second	25.5
Third	19.6
Fourth	25.5
Fifth+	15.2
Major	
Pre-med	35.0
Biology	27.0
Nursing	15.0
Business	11.0
Engineering	5.0
Education	4.0
Grade point average	
3.5–4.0	7.1
3.0–3.5	39.8
2.5–3.0	26.9
2.0–2.5	18.2
1.5–2.0	6.7
Length of stay in the US	
<6 mo	3.0
6 mo–1 yr	12.1
1–2 yr	24.2
2–3 yr	13.5
3–4 yr	33.8
4–5 yr	12.5
>5 yr	7.3
Socioeconomic Status	
High	36.0
Middle-high	54.3
Middle	8.3
Middle-low	1.1
Religion	
Protestant	32.3
Buddhist	28.6
Catholic	18.0
Muslim	16.9
Other	0.9
Father's highest education	
High school	18.9

Category	%
College	46.2
Graduate	35.9
Mother's highest education	
High school	16.2
College	36.1
Graduate	47.1
Parents' marital status	
Together	67
Divorced	25.7
Separated	7.0
Deceased	2.6

Participants

Participants in this study were 157 international undergraduate students from 14 different countries who were enrolled in a large private research institution located in the Mid-Atlantic region of the United States. Fifty-four percent were female. Over 80% were Asian, 9% Hispanic, 7% White, and 5% African American. Regarding country of origin, 35% were from China, 31% from India, 17% from Korea, 10% from Saudi Arabia, 7% from Taiwan, 2% Turkey, and 2% from Mexico. More than half were in pre-med or biology majors. Approximately 40% had lived in the United States for less than 2 years. Thirty-six percent indicated that they came from a high SES family, while 54% reported coming from a middle-upper class and 8% from a middle SES family. Lastly, 81% spoke English as a second language. See Table 1 for demographics of participants.

Instruments

Based on previous studies on Internet addiction and associated factors (Şenormancı et al., 2014; Shang-Yu et al., 2019), we examined how demographic factors (gender, primary language, and religion), family factors (parents' marital status, SES, birth order, and parents' education), and personal characteristics (grade point average [GPA], self-esteem and mental health) were associated with Internet addiction. Instruments used to measure the various factors are described below.

Internet Addiction Scale

The Internet Addiction Scale (I-Scale) developed by C. T. Kim et al. (2002) was employed to measure the presence and severity of Internet addiction. The Internet Addiction Scale is a self-reported questionnaire composed of 40 questions using 4-point Likert scales (1 = *never* to 4 = *always*). Sample questions include: "Do you stay online longer than originally intended?" and "Have you jeopardized or risked the loss of a significant relationship, job, educational or career opportunity because of the Internet?" Cronbach's alpha for the current

study was .95. We treated Internet addiction as a continuous variable for all statistical performance in the study.

Self-Esteem Inventory

The Self-Esteem Inventory (SEI; Coopersmith, 1981) was applied to measure self-esteem in this study. The SEI is a self-reported questionnaire composed of 25 questions using 4-point Likert scales (1 = *never* to 4 = *frequently*) with the following sample questions: "There are lots of things about myself I'd change if I could" and "I can make up my mind without too much trouble." Cronbach's alpha was .85.

Mental Health Inventory

Mental health was measured by a brief version of the Mental Health Inventory-5 (MHI-5) by Berwick et al. (1991), which is based on the MHI developed by Veit and Ware (1983). The brief version of the MHI-5 is a self-reported questionnaire composed of five questions using 6-point Likert scales (1 = *never* to 6 = *always*). Five questions asked participants about their mental health status in the past month. Sample questions include: "How much of the time, during the last month, have you been very nervous?" and "How much of the time, during the last month, have you felt downhearted and blue?" A high score represents good mental health, and a low score indicates poor mental health. Cronbach's alpha was .91.

The aforementioned instruments were selected for the study after confirmatory factor analysis for validity testing (Johnson, 1983; C. T. Kim et al., 2002; Rivera-Riquelme et al., 2019).

Demographic Questionnaire

In the demographic questionnaire, participants reported information about gender, age, type of school, GPA, family background, religion, SES, religiosity, parents' highest degree, and parents' marital status.

Data Analysis

After we completed coding and data-cleaning procedures, we analyzed the data from our 157 participants using SPSS Version 22. We first analyzed our data through descriptive statistics to get a sense of who our participants were. We then conducted *t* tests to compare Internet addiction, which we treated as a continuous variable, by demographic factors (gender, native English speakers, religiosity—comparing religious vs. nonreligious, and parents' marital status—comparing together vs. not together). Next, we conducted correlation analysis with Pearson Product-Moment and hierarchical multiple regression analysis to gain insights into relations between Internet addiction and other associated factors.

RESULTS

We performed a preliminary analysis to examine whether relations existed among dependent variables, independent variables, and demographic variables. With the presence of relations, we performed advanced analysis on all variables. Prior to performing regression analysis, statistics for multicollinearity were conducted. For all variables, the variance inflation factor was between 1.14 and 2.77, and the collinearity tolerance was above .9, indicating that the variables were not multicollinear. In addition, we evaluated the normality of all variables for skewness, kurtosis, and quantile-quantile plots. Because skewness and kurtosis for all of the independent variables in this study were within normal ranges (Boylan & Cho, 2012), further transformation of variables was not necessary. Lastly, for missing data, we employed pairwise deletion for data cleaning.

Internet Addiction by Demographic Factors

Independent *t* tests were conducted to examine distributions of Internet addiction by demographic factors (gender, native English speaker, religiosity, and parents' marital status) for international students (see Table 2). Men ($M = 68.22$, $SD = 20.296$) reported significantly higher scores for Internet addiction than women ($M = 60.31$, $SD = 16.99$), $t = 11.697$, $p < .01$, and international students who spoke English as their second language showed significantly higher scores ($M = 63.22$, $SD = 18.90$) than native English speakers ($M = 61.49$, $SD = 18.90$), $t = 2.62$, $p < .01$. The Internet addiction scores of religious international students were significantly lower ($M = 58.33$, $SD = 17.71$) than those of nonreligious international students ($M = 61.84$, $SD = 19.26$), $t = 3.51$, $p < .05$. There was no significant difference by parents' marital status.

Table 2: Means, Standard Deviations, and Results of the *t* Test Comparisons for Internet Addiction by Demographic Factors

Categories	n	M	SD	t
Gender				
Male	71	68.22	20.30	11.69**
Female	86	60.31	16.99	
Native English speaker				
Native	32	61.49	18.90	2.62**
Nonnative	125	63.22	18.08	
Religiosity				
Religious	110	58.33	17.71	3.51*
Non-religious	47	61.84	19.26	
Parents' marital status				
Together	95	62.72	19.29	0.82
Not together	66	62.18	17.74	

*Note. N = 157. *p < .05, **p < .01, **p < .001*

Correlations Among Internet Addiction and Associated Factors

We conduced correlation analyses to examine how each associated factor related to Internet addiction (see Table 3). International students' Internet addiction was positively associated with academic performance ($r = .09$, $p < .01$) and SES ($r = .09$, $p < .01$) and negatively associated with self-esteem ($r = -.38$, $p < .01$), and mental health ($r = -.24$, $p < .01$). Internet addiction tended to be positively associated with parents' education ($r = .02$) and birth order ($r = .03$), but these results were not statistically significant.

We further analyzed how other factors were correlated with one another (see Table 3). Students' academic performance was positively associated not only with Internet addiction but also with SES ($r = .16$, $p < .01$) and birth order ($r = .07$, $p < .01$), while it was negatively associated with self-esteem ($r = -.17$, $p < .01$) and mental health ($r = -.07$, $p < .01$). SES was positively associated with Internet addiction ($r = .09$, $p < .01$), academic performance ($r = .16$, $p < .01$), and parents' education ($r = .14$, $p < .01$), and negatively associated with self-esteem ($r = -.28$, $p < .01$). Self-esteem was positively associated with mental health ($r = .56$, $p < .01$) and negatively associated with Internet addiction ($r = -.38$, $p < .01$), academic performance ($r = -.17$, $p < .01$), and SES ($r = -.28$, $p < .01$). The last factor, mental health, was positively associated with self-esteem ($r = .56$, $p < .01$) and negatively associated with Internet addiction ($r = -.24$, $p = <.01$), academic performance ($r = -.07$, $p < .01$), and SESs ($r = -.18$, $p < .01$).

Predictors of Internet Addiction

Lastly, we performed a hierarchical multiple regression analysis to examine predictors of international students' Internet addiction guided by conceptualizations of Internet addiction and associated factors (Şenormancı et al., 2014; Shang-Yu et al., 2019). As presented in Table 3, the regression model accounted for 20.5% of the variance in international students' Internet addiction ($R^2 = .205$).

Table 3: Correlations Among Variables

Variable	M	SD	1	2	3	4	5	6	7
1 Internet addiction	62.45	18.54	1						
2 Academic performance	3.08	1.01	.106**	1					
3 Parents' education	4.58	1.13	.02	.10	1				
4 Socioeconomic status	2.87	.85	.09**	.16**	.14**	1			
5 Self-esteem	83.12	12.58	−.38**	−.17**	−.01	−.28**	1		
6 Birth order	2.04	1.06	.03	.07**	−.01	.02	−.01	1	
7 Mental health	19.73	4.80	−.24**	−.07**	.02	−.18**	.56**	.03	1

Note. $N = 157$. *$p < .05$, **$p < .01$, ***$p < .001$

Table 4 illustrates a summary of the hierarchical multiple regression analysis. Each column contains the final beta (standardized regression coefficient) of each

independent variable after all variables were entered into the regression model. Among six independent variables, four were significant predictors. SES and academic performance were positive predictors ($\beta = .09$, $p < .01$ and $\beta = -.103$, $p < .01$, respectively), meaning that affluent students and students with high GPAs were more likely to be addicted to the Internet. Self-esteem and mental health were negative predictors ($\beta = -.120$, $p < .001$ and $\beta = -.130$, $p < .001$, respectively), indicating that students with high self-esteem and those who were psychologically well were less likely to be addicted.

Table 4: Predictors of Internet Addiction

Variable	R^2	r	Step 1	Step 2	Final β Step 3	Step 4	Step 5	Step 6
Birth order	.008	.032	.04	.04	.05	.05	.05.	.05
Parents' education	.010	.026		.03	.03	.03	.04	.04
SES	.101	.098			.09**	.11**	.11**	.11**
Self-esteem	.150	−.380				−.120***	−.122***	−.122***
Academic performance	.177	.106					.103**	.107**
Psychological well-being	.205	−.240						−.130***

Note. $N = 157$. *$p < .05$, **$p < .01$, ***$p < .001$

DISCUSSION

While international students in the United States often benefit from using the Internet to find information, stay connected to family and friends back home, and have access to entertainment (Lee et al., 2011; Sin & Kim, 2013; Yoon & Kim, 2014), problematic use, or Internet addiction, can lead to negative outcomes (Derbyshire et al., 2013). This study explored factors associated with Internet addiction to get a better sense of who, among international students in the United States, may be particularly at risk.

Our first research question asked how the rate of Internet addiction varies based on demographic factors among international students in the United States. We found that men and international students who spoke English as a second language showed significantly higher scores of Internet addiction than women and native-English speaking international students, respectively, while students who were religious had significantly lower scores in Internet addiction than nonreligious peers.

Our findings support previous studies that found gender differences in Internet addiction (Anderson, 2001; Lee et al., 2011; Senormanic et al., 2014). Gender dynamics among international students in the United Sates appear to be similar to those among U.S. college students (Anderson, 2001), with men being

at greater risk of Internet addiction. Research on U.S. college student men indicates that they spend more time videogaming and other leisure activities online, while women spend more time on communication and educational activities (Weiser, 2000). These differing activities may explain the higher risk for men of developing an addiction, as online gaming has been found to have a strong association with problematic Internet use (Van Rooij et al., 2010).

Our findings further support previous studies that found that religious students are less likely to be addicted to the Internet than their nonreligious peers (Charlton et al., 2013; Nadeem et al., 2019). This difference, previously explored for Malaysian youth (Charleton et al., 2013) and Hong Kong university students (Nadeem, 2019) appears to hold true for our participants as well. This finding could be explained by the current literature (Charlton et al., 2013; Laurin et al., 2012; Rounding et al., 2012) indicating that religiosity is associated with better self-control and ability to delay gratification, which may weaken dependence on addictive behaviors such as Internet use.

Our study adds to the literature by finding that international students who speak English as a second language are at a greater risk than their native English-speaking peers. Much research indicates that those who speak English as a second language face unique challenges related to adjusting to U.S. culture and academics (Liu, 2009; Mori, 2000; Wolf & Phung, 2019). Being socially isolated and struggling academically may lead those for whom English is a second language to turn to the Internet to get support from family and friends at home, find information about the host country, or access entertainment and leisure activities in their native language. Such reliance may lead to overuse, which may result in addiction.
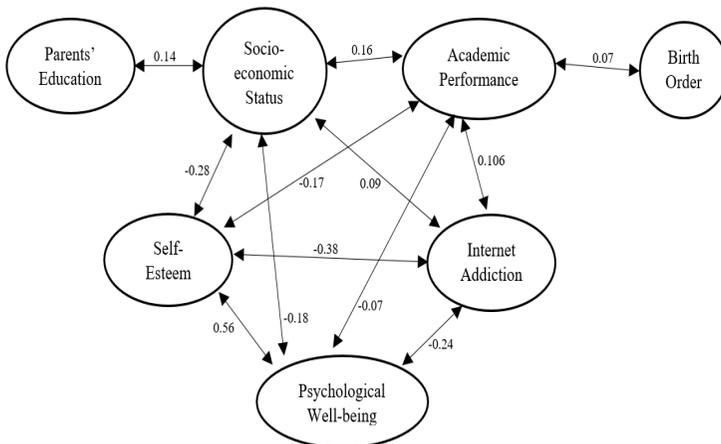

Figure 1: Relations of Internet Addiction and Associated Factors

Our second research question asked to what extent academic performance, parents' education, SES, self-esteem, mental health, and Internet addiction are associated with one another among international college students in the United States. Our findings indicate that SES, academic performance, self-esteem, and mental health are associated with Internet addiction as well as with each other. Our model (see Figure 1) supports and expands on existing research. Previous research on various populations has found associations between Internet addiction and academic performance (Hur, 2006), SES (Heo et al., 2014), self-esteem (Akin & Isekender, 2011; H. K. Kim & Davis, 2009; Nie et al., 2017; Niemz et al., 2005; Younes et al., 2016), and mental health (Ceyhan & Ceyhan, 2008; J. Kim et al., 2009; Morgan & Cotton, 2003; Şenormancı et al., 2014; Shang-Yu et al., 2019; Yau et al., 2013). Our study indicates that the same associations exist for international students.

Our final research question explored predictors of Internet addiction among international college students in the United States. Our regression analysis found that affluent students, students with high GPAs, students with low self-esteem, and those with poor mental well-being are more likely to be addicted. Our study supports findings from previous studies and indicates that these apply to international students in the United States as well; our study also contradicts some findings from previous studies.

First, unlike Heo et al. (2004) found, participants in our study who were from a higher SES were more likely to be addicted to the Internet. The difference in findings may be due to the different populations. Heo et al.'s (2004) participants were Korean youth. For our participants, international students in the United States, being more affluent may mean having access to more devices that provide Internet access, and thus more opportunities to spend time online. Previous studies indicate that the amount of time spent online is a significant predictor of addiction (Hur, 2006).

Second, our study contradicted previous research that found a relation between low grades and Internet addiction (Akhter, 2003; Hur, 2006; Kubey et al., 2001) by indicating that international students with higher GPAs were more likely to be addicted to the Internet. Previous studies focused on different populations: domestic college students (Akhter, 2003; Kubey et al., 2009) and Korean youth (Hur, 2006). More research is needed to understand why this dynamic may be different for international students in the United States.

Finally, our findings support previous research indicating that low levels of well-being and self-esteem are predictors of Internet addiction (Akin & Iskender, 2011; Ceyhan & Ceyhan, 2008; J. Kim et al., 2009; Nie et al., 2017). Individuals who experience high levels of stress or anxiety and those experiencing low self-esteem, loneliness, depression, or other mental health issues may turn to the Internet for distraction, comfort, and to find connections, which may increase their likelihood of becoming addicted. Considering that many international students experience loneliness, homesickness, and other mental health issues while adjusting to studying in the United States (Girmay & Singh, 2019; Koo & Nyunt, 2020; Liu, 2009; Mori, 2000; Zhang & Goodson, 2011b), the connection between these symptoms and Internet addiction is concerning and indicates a need to

provide information and support related to healthy Internet use to international students.

Limitations

While this study's results provide meaningful insights regarding Internet addiction and international students' experiences, several limitations must be acknowledged. First, generalizability of our findings is limited since data were collected only in one institution and from only 157 students. Since international students at this institution may differ in important ways from those at other institutions, these findings cannot be generalized to the entire population of international students at U.S. higher education institutions. Our study, however, is one of the first exploring associated factors of Internet addiction for international students in the United States. As such, our study can be seen as an exploratory study indicating factors that may be associated with Internet addiction for international students in the United States. Future research should replicate this study with different international student populations in the United States.

Another limitation is that all measures elicited self-reported data and thus were vulnerable to common method bias and inflated correlations because of halo rating effects. Because participants were young adults, ranging in age from 19 to 27, and researchers could not closely supervise all 157 participants, the reliability of the survey results is limited. In addition, although correlation and regression analyses provide a snapshot of predictors of a dependent variable and the predictive value of independent variables, they do not prove cause and effect relations or directional relations between dependent and independent variables. Thus, the methodology is limited in its ability to show causal relations.

Finally, our data was collected in Fall 2010. Access to Internet and thus Internet usage has drastically increased in the past 10 years; new technologies have also altered the ways we access the Internet. This may raise concerns that our study results no longer hold. We, however, do not regard this as likely. Our study was not concerned with specific ways individuals access the Internet nor how much time individuals spend on the Internet; rather we were exploring the relations between various factors such as student demographics and Internet addiction. These relations are likely to stay constant over time. For example, research has consistently shown that men are more likely to be addicted to the Internet than women, a gender dynamic that was found about 20 years ago by Anderson (2001) but held true for our data, which was collected 10 years later.

Implications

Our study suggests several important implications for future research and practice. First, considering the vulnerability of international students in the United States to Internet addiction and the limitations of this study, future research should explore factors associated with addiction with a larger sample from multiple institutions. In addition, research should explore how unique aspects of international students' experiences and acculturation shape their Internet use and

thus impact addiction, such as looking at links between acculturation strategies and addiction. Other research may strive to identify types of Internet use that lead to addiction for international students in hopes of providing practitioners with insights into types (e.g., social media use, entertainment, academic use) that should be encouraged or discouraged.

Our study also provides important insights for practitioners working with international students in the United States. While the Internet can provide international students with helpful information and opportunities to connect (Lee et al., 2011; Sin & Kim, 2013; Yoon & Kim, 2014), practitioners should proactively address the differences between healthy and unhealthy use. Advisors and counselors may also ask questions about international students' Internet use, particularly for those at higher risk of becoming addicted, in hopes of recognizing problematic use and being able to intervene early on.

Proactive interventions should also address various factors associated with Internet addiction, particularly those to which international students may be most vulnerable. Proactive measures may include fostering friendships between domestic and international students to reduce loneliness and homesickness and thus improve international students' well-being. Proactive measures could also focus on providing academic support specifically geared toward international students to reduce the risk of academic stress.

Finally, when working with international students who struggle with problematic Internet use, practitioners should not only address the addiction but also consider factors associated with it. Adequate support may require identifying underlying factors that may have led to problematic use, which could include academic stress, low self-esteem, or poor mental well-being, and providing assistance to address these.

CONCLUSION

Most importantly, practitioners and educators need to recognize that while the Internet provides many opportunities and beneficial resources to international students in the United States, excessive use may place international students at risk of addiction (Park et al., 2014). This study highlighted who, among international students in the United States, may be particularly at risk of developing an addiction and the factors associated with addiction. We hope that researchers, educators, and higher education administrators can use this information to develop proactive educational interventions to better support international students who are struggling with problematic Internet use.

REFERENCES

Akhter, N. (2013). Relationship between internet addiction and academic performance among university undergraduates. *Educational Research and Reviews*, *8*(19), 1793–1796. https://doi.org/10.5897/ERR2013.1539

Akin, A., & Iskender, M. (2011). Internet addiction and depression, anxiety and stress. *International Online Journal of Educational Sciences*, *3*(1), 138–148.

American College Health Association. (2008). *American College Health Association National College Health Assessment Fall 2008 Reference Group Data Report*. http://www.acha-ncha.org/docs/ACHANCHA_Reference_Group_Report_Fall2008.pdf

American College Health Association. (2017). *American College Health Association National College Health Assessment Fall 2008 Reference Group Data Report.* http://www.acha-ncha.org/docs/ACHANCHA_Reference_Group_Report_Fall2017.pdf

American Psychological Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.).

Anderson, K. J. (2001). Internet use among college students: An exploratory study. *Journal of American College Health, 50*(1), 21–26. https://doi.org/10.1080/07448480109595707

Bastien, G., Seifen-Adkins, T., & Johnson, L. R. (2018). Striving for success: Academic adjustment of international students in the U.S. *Journal of International Students, 8*(2), 1198–1219. https://doi.org/10.32674/jis.v8i2.143

Berry, J. W. (2006). Acculturative stress. In P. T. P. Wong &. L. C. J. Wong (Eds.), *Handbook of multicultural perspectives on stress and coping* (pp. 287–298). Springer.

Berwick, D., Murphy, J., Goldman, P., Ware, J., Barsky, A., & Weinstein, M. (1991). Performance of a five-item mental health screening test. *Medical Care, 29*(2), 169–176. https://doi.org/10.1097/00005650-199102000-00008

Boylan, G. L., & Cho, B. R. (2012). The normal probability plot as a tool for understanding data: A shape analysis from the perspective of skewness, kurtosis, and variability. *Quality and Reliability Engineering International, 28*(3), 249–264. https://doi.org/10.1002/qre.1241

Cash, H., Rae, C. D., Steel, A. H., & Winkler, A. (2012). Internet addiction: A brief summary of research and practice. *Current Psychiatry Review*, *8*(4), 292–298. https://doi.org/10.2174/157340012803520513

Ceyhan, A. A., & Ceyhan, E. (2008). Loneliness, depression, and computer self-efficacy as predictors of problematic internet use. *Cyberpsychology & Behavior*, *11*(6), 699–701. https://doi.org/10.1089/cpb.2007.0255

Charlton, J. P., Soh, P. C., Ang, P. H., & Chew, K. W. (2013). Religiosity, adolescent internet usage motives and addiction: An exploratory study. *Information, Communication & Society*, *16*(10), 1619–1638. https://doi.org/10.1080/1369118X.2012.735251

Cohen-Almagor, R. (2011). Internet history. *International Journal of Technoethics, 2*(2), 45–64.

Coopersmith, S. (1981). *SEI: Self-esteem Inventory*. Consulting Psychologist Press.

Derbyshire, K. L., Lust, K. A., Schreiber, L. R., Odlaug, B. L., Christenson, G. A., Golden, D. J., & Grant, J. E. (2013). Problematic Internet use and associated risks in a college sample. *Comprehensive Psychiatry*, *54*(5), 415–422. https://doi.org/10.1016/j.comppsych.2012.11.003

Dutta, O., & Chye, S. Y. L. (2017). Internet use and psychological wellbeing: A study of international students in Singapore. *Journal of International Students, 7*(3), 825. https://doi.org/10.5281/zenodo.570036

Forbes-Mewett, H., & Sawyer, A. (2016). International students and mental health. *Journal of International Students, 6*(3), 661–677.

Girmay, M., & Singh, G. K. (2019). Social isolation, loneliness, and mental and emotional well-being among international students in the United States. *International Journal of Translational Medical Research and Public Health*, *3*(2), 75–82. https://doi.org/10.21106/ijtmrph.82

Griffith, M. D. (2000). Does Internet and computer "addiction" exist? Some case studies. *Cyberpsychology & Behavior*, *3*, 211–218.

Han, X., Han, X., Luo, Q., Jacobs, S., & Jean-Baptiste, M. (2013). Report of a mental health survey among Chinese international students at Yale University. *Journal of American College Health, 61*(1), 1–8. https://doi.org/10.1080/07448481.2012.738267

Heo, J., Oh, J., Subramanian, S.V., Kim, Y., & Kawachi, I. (2014). Addictive Internet use among Korean adolescents: A national survey. *PLoS ONE, 9*(2), e87819. https://doi.org/10.1371/journal.pone.0087819

Hur, M. H. (2006). Demographic, habitual, and socioeconomic determinants of internet addiction disorder: An empirical study of Korean teenagers. *Cyberpsychology & Behavior*, *9*(5), 514–526. https://doi.org/10.1089/cpb.2006.9.514

Institute of International Education. (2019). *Open Doors 2019 report on international students in the United States*. https://opendoorsdata.org/fast_facts/fast-facts-2019/

Johnson, B. (1983). The Coopersmith self-esteem Inventory: A construct validity study. *Educational and Psychological Measurement, 43*(3), 907–913. https://doi.org/10.1177/001316448304300332

Jones, S., Johnson-Yale, C., Millermaier, S., & Perez, F. S. (2009, October 5). Everyday life, online: U.S. college students' use of the internet. *First Monday: Peer-reviewed Journal on the Internet*, *14*(10). https://doi.org/10.5210/fm.v14i10.2649

Kim, C. T., Kim, D. I., Park, J. K., & Lee, S. J. (2002). *A study on Internet addiction counseling and the development of prevention programs*. National IT Industrial Promotion Agency.

Kim, H. K., & Davis, K. E. (2009). Toward a comprehensive theory of problematic Internet use: Evaluating the role of self-esteem, anxiety, flow, and the self-rated importance of Internet activities. *Computers in Human Behavior*, *25*(2), 490–500. https://doi.org/10.1016/j.chb.2008.11.001

Kim, J., LaRose, R., & Peng, W. (2009). Loneliness as the cause and the effect of problematic Internet use: The relationship between Internet use and psychological well-being. *Cyberpsychology & Behavior*, *12*(4), 451–455. https://doi.org/10.1089/cpb.2008.0327

Kim, S. E., Kim, J. W., & Jee, Y. S. (2015). Relationship between smartphone addiction and physical activity in Chinese international students in Korea.

Journal of Behavioral Addictions, *4*(3), 200–205. https://doi.org/10.1556/2006.4.2015.028

Koo, K., & Nyunt, G. (2020). Culturally sensitive assessment of mental health for international students. *New Directions for Student Services*, *2020*(169), 43–52. https://doi.org/10.1002/ss.20343

Koo, K., Baker, I., & Yoon, J. (2021). The first year acculturation: A longitudinal study on acculturative stress and adjustment among the first year international college students. *Journal of International Students*, *11*(2). https://doi.org/10.32674/jis.v11i2.1726

Kubey, R. W., Lavin, M. J., & Barrows, J. R. (2001). Internet use and collegiate academic performance decrements: Early findings. *Journal of Communication*, *51*(2), 366–382. https://doi.org/10.1111/j.1460-2466.2001.tb02885.x

Laurin, K., Kay, A. C., & Fitzsimons, G. M. (2012). Divergent effects of activating thoughts of God on self-regulation. *Journal of Personality and Social Psychology*, *102*, 4–21. https://doi.org/10.1037/a0025971

Lee, E. J., Lee, L., & Jang, J. (2011). Internet for the internationals: Effects of internet use motivations on international students' college adjustment. *Cyberpsychology, Behavior, and Social Networking*, *14*(7–8), 433–437. https://doi.org/10.1089/cyber.2010.0406

Li, J., Wang, Y., Liu, X., Xu, Y., & Cui, T. (2018). Academic adaptation among international students from East Asian countries: A consensual qualitative research. *Journal of International Students, 8*(1), 194–214. https://doi.org/10.32674/jis.v8i1.160

Liu, M. (2009). Addressing the mental health problems of Chinese international college students in the United States. *Advances in Social Work, 10*(1), 69–86. https://doi.org/10.18060/164

Mikal, J. P., Yang, J., & Lewis, A. (2015). Surfing USA: How Internet use prior to and during study abroad affects Chinese students' stress, integration, and cultural learning while in the United States. *Journal of Studies in International Education*, *19*(3), 203–224. https://doi.org/10.1177/1028315314536990

Morgan, C., & Cotton, S. R. (2003). The relationship between Internet activities and depressive symptoms in a sample of college freshmen. *Cyberpsychology & Behavior, 6*(2), 133–142. https://doi.org/10.1089/109493103321640329

Mori, S. C. (2000). Addressing the mental health concerns of international students. *Journal of Counseling and Development, 78*(2), 137–144. https://doi.org/10.1002/j.1556-6676.2000.tb02571.x

National Association of International Educators. (2019). *International students contribute to our economy and American innovation.* https://www.nafsa.org/Policy_and_Advocacy/Policy_Resources/Policy_Trends_and_Data/International_Students_Contribute_to_Our_Economy_and_American_Innovation/

Nadeem, N., Buzdar, M. A., Shakir, M., & Naseer, S. (2019). The association between Muslim religiosity and Internet addiction among young adult

college students. *Journal of Religion and Health*, *58*(6), 1953–1960. https://doi.org/10.1007/s10943-018-0697-9

Nie, J., Zhang, W., & Liu, Y. (2017). Exploring depression, self-esteem and verbal fluency with different degrees of internet addiction among Chinese college students. *Comprehensive Psychiatry*, *72*, 114–120. https://doi.org/10.1016/j.comppsych.2016.10.006

Niemz, K., Griffiths, M., & Banyard, P. (2005). Prevalence of pathological Internet use among university students and correlations with self-esteem, the General Health Questionnaire (GHQ), and disinhibition. *Cyberpsychology & Behavior*, *8*(6), 562–570. https://doi.org/10.1089/cpb.2005.8.562

Park, N., Song, H., & Lee, K. M. (2014). Social networking sites and other media use, acculturation stress, and psychological well-being among East Asian college students in the United States. *Computers in Human Behavior*, *36*, 138–146. https://doi.org/10.1016/j.chb.2014.03.037

Perrin, A., & Kumar, M. (2019). *About three-in-ten U.S. adults say they are "almost constantly" online.* Pew Research Center. https://www.pewresearch.org/fact-tank/2019/07/25/americans-going-online-almost-constantly/

Pew Research Center. (2019). *Internet/broadband fact sheet.* https://www.pewresearch.org/internet/fact-sheet/internet-broadband/#internet-use-over-time

Rivera-Riquelme, M., Piqueras, J. A., & Cuijpers, P. (2019). The Revised Mental Health Inventory-5 (MHI-5) as an ultra-brief screening measure of bidimensional mental health in children and adolescents. *Psychiatry Research*, *274*, 247–253. https://doi.org/10.1016/j.psychres.2019.02.045

Roser, M., Ritchie, H., & Ortiz-Ospina, E. (2019). *Internet*. Our World in Data. https://ourworldindata.org/internet

Rounding, K., Lee, A., Jacobson, J. A., & Ji, L. J. (2012). Religion replenishes self-control. *Psychological Science*, *23*, 635–642. https://doi.org/10.1177/0956797611431987

Şenormancı, Ö., Saraçlı, Ö., Atasoy, N., Şenormancı, G., Koktürk, F., & Atik, L. (2014). Relationship of internet addiction with cognitive style, personality, and depression in university students. *Comprehensive Psychiatry, 55*(6), 1385–1390. https://doi.org/10.1016/j.comppsych.2014.04.025

Shang-Yu, Y., Shih-Hau, F., Kai-Li, C., Pei-Lun Hsieh, & Lin, P. (2019). Relationships between depression, health-related behaviors, and Internet addiction in female junior college students. *PLoS One, 14*(8). https://doi.org/10.1371/journal.pone.0220784

Shapira, N. A., Lessig, M. C., Goldsmith, T. D., Szabo, S. T., Lazoritz, M., Gold, M. S., & Stein, D. J. (2003). Problematic Internet use: Proposed classification and diagnostic criteria. *Depression and Anxiety*, *17*(4), 207–216. https://doi.org/10.1002/da.10094

Shaw, L. H., & Gant, L. M. (2002). In defense of the Internet: The relationship between Internet communication and depression, loneliness, self-esteem, and perceived social support. *Cyberpsychology & Behavior*, *5*(2), 157–171. https://doi.org/10.1089/109493102753770552

Shaw, M. C., & Black, D. (2008). Internet addiction: Definition, assessment, epidemiology and clinical management. *CNS Drugs,* 22(5), 353–365. https://doi.org/10.2165/00023210-200822050-00001

Sin, S. C. J., & Kim, K. S. (2013). International students' everyday life information seeking: The informational value of social networking sites. *Library & Information Science Research*, *35*(2), 107–116. https://doi.org/10.1016/j.lisr.2012.11.006

Tikhonov, M. N., & Bogoslovskii, M. M. (2015). Internet addiction factors. *Automatic Documentation and Mathematical Linguistics, 49*(3), 96–102. https://doi.org/10.3103/S0005105515030073

Van Rooij, A. J., Schoenmakers, T. M., Van de Eijnden, R. J., & Van de Mheen, D. (2010). Compulsive internet use: The role of online gaming and other internet applications. *Journal of Adolescent Health*, *47*(1), 51–57. https://doi.org/10.1016/j.jadohealth.2009.12.021

Veit, C. T., & Ware, J. E. (1983). The structure of psychological distress and well-being in general populations. *Journal of Consulting and Clinical Psychology, 51*(5), 730-742. https://doi.org/10.1037/0022-006X.51.5.730

Wang, Y., & Sun, S. (2009). Examining Chinese students' internet use and cross-cultural adaptation: Does loneliness speak much? *Asian Journal of Communication, 19*(1), 80–96. https:// doi.org/10.1080/01292980802618494

Weiser, E. B. (2000). Gender differences in Internet use patterns and Internet application preferences: A two-sample comparison. *Cyberpsychology & Behavior*, *3*(2), 167–178. https://doi.org/10.1089/109493100316012

Wolf, D. M., & Phung, L. (2019). Studying in the United States: Language learning challenges, strategies and support services. *Journal of International Students, 9*(1), 211–224. https://doi.org/10.32674/jis.v9i1.273

Wu, H. P., Garza, E., & Guzman, N. (2015). International student's challenge and adjustment to college. *Education Research International*, *2015*. https://doi.org/10.1155/2015/202753

Yau, Y. H., Potenza, M. N., & White, M. A. (2013). Problematic Internet use, mental health and impulse control in an online survey of adults. *Journal of Behavioral Addictions*, *2*(2), 72–81. https://doi.org/10.1556/jba.1.2012.015

Ye, J. (2005). Acculturative stress and use of the internet among East Asian international students in the United States. *Cyberpsychology & Behavior*, *8*(2), 154–161. https://doi.org/10.1089/cpb.2005.8.154

Yellowlees, P. M., & Marks, S. (2007). Problematic Internet use or Internet addiction? *Computers in Human Behavior*, *23*(3), 1447–1453. https://doi.org/10.1016/j.chb.2005.05.004

Yoon, J., & Kim, S. (2014). Internet use by international graduate students in the USA seeking health information. *Aslib Journal of Information Management*, *66*(2), 117–133. https://doi.org/10.1108/AJIM-01-2013-0005

Younes, F., Halawi, G., Jabbour, H., Osta, N. E., Karam, L., Hajj, A., & Khabbaz, L. R. (2016). Internet addiction and relationships with insomnia, anxiety, depression, stress and self-esteem in university students: A cross-sectional designed study. *PLoS ONE,* 11(9), e0161126. https://doi.org/10.1371/journal.pone.0161126

Zhang, J., & Goodson, P. (2011a). Acculturation and psychosocial adjustment of Chinese international students: Examining mediation and moderation effects. *International Journal of Intercultural Relations, 35*(5), 614–627. https://doi.org/10.1016/j.ijintrel.2010.11.004

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

KATIE KOO, PhD, is an Assistant Professor in Higher Education at Texas A&M University-Commerce. Her research focuses on diversity issues in higher education and underrepresented students' mental health and psychological well-being. She is interested in marginalized students' collegiate experiences and mental health issues, and international students' adjustment and well-being. Email: katie.koo@tamuc.edu

GUDRUN NYUNT, PhD, is a Clinical Assistant Professor in Higher Education at Northern Illinois University. Her research interests revolves around educational practices that foster the development of intercultural maturity and prepare students for active engagement in a global society. In addition, she engages in research that strives to better understand the experiences of international, underrepresented minority, and women graduate students, faculty, and student affairs staff at U.S. higher education institutions. Email: gnyunt@niu.edu

BOSHI WANG, MA, is a Senior Academic Advisor at Northern Arizona University, where he advises first year and major-exploratory students. Prior to this position, he worked at Center for International Education at NAU. His research interests include the mental health of international students, quantitative studies, and student development theories. Email: boshi.wang@nau.edu