Multi-Dimensionality of Acculturative Stress Among Chinese International Students: What Lies Behind Their Struggles?

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Abstract

This study aimed to identify the underlying dimensions of acculturative stress that Chinese international students may encounter in the U.S. In addition, we re-examined students' background characteristics and perceived social support from family, friends, and their school as predictors of students' different dimensions of acculturative stress. In total, 262 Chinese international students (average age 23 years; 142 male and 120 female students) from a diverse university completed an online questionnaire in the U.S. This study identified multiple dimensions of acculturative stress, including perceived discrimination, fearfulness, homesickness, stress due to change, and guilt, among Chinese international students. The results indicated that students' comfort level in using the English language and academic status (i.e., undergraduate/graduate) significantly predicted acculturative stress. Notably, as students' comfort level in using the English language increased, their feelings of perceived discrimination, fearfulness, homesickness, and stress due to change decreased. Undergraduate students reported more discrimination and fearfulness than did graduate students. Perceived social support from family indicated an intriguingly different pattern than perceived social support from school in relation to acculturative stress among Chinese international students. This study confirmed the multi-dimensional nature of acculturative stress and highlighted the role of students' background characteristics and perceived social support systems in illuminating each acculturative stress dimension among Chinese international students.

Keywords: acculturative stress, Chinese international students, cross-cultural experience

For many international students, coming to the United States to further their studies can be exciting, since it can be a path to fulfill personal, familial, or career goals. However, their experience may also involve many challenges regarding adaptation into another society, such as switching to a new language, learning to self-manage finances and housing, and fitting into social norms while families and friends might not be with them (Wan, 2001; Wei et al., 2007). Given these challenges, students often undergo a process of adjustment to how the dominant host culture may expect them to behave in a way that differs from what is done in their home culture (Wang & Mallinckrodt, 2006; Wei, Liao, Heppner, Chao, & Ku, 2012). When individuals find it difficult to adjust and discouragement leads them to see the challenges they face as insurmountable, adapting to the new culture can be stressful (Sam & Berry, 2010).

To facilitate cross-cultural education in America's higher education settings and assist international students in smoothly adapting into American universities, understanding their adaptation experiences in relation to their psychological concerns, stress levels, and the other factors associated with students' adjustment is a necessity. Studies focusing on international students have stated that individuals' psychological stress during cultural adaptation (i.e. acculturative stress; Ward, 1996) is complex and multidimensional (Abe-Kim, Okazaki & Goto, 2001; Lee et al., 2004; Zhang & Goodson, 2011). Additionally, past research has suggested that an individual's background characteristics (Andrade, 2006; Chung & Epstein, 2014; Yan & Berliner, 2010; Ye, 2005) and support systems (Lee et al., 2004; Lin, 2006; Misra et al., 2003; Ramsay, Jones, & Barker, 2007; Ye, 2006a; Ye, 2006b) influence one's interpretation of the stress experiences during adaption; therefore, individuals are likely to vary in their understanding and degree of stress experiences.

In this study, we gave particular attention to examining Chinese international students' acculturative stress experiences for the following reasons. According to the Institute of International Education (IIE) network, Chinese international students remain the largest and fastest-growing group among the international students in American universities (IIE, 2016). According to the IIE (2016), in 2015-2016, Chinese students comprised 31.5% (328,547) of the total international student enrollment across colleges and universities in the U.S. This is more than a 400% increase in Chinese student enrollment in the U.S., within a decade (from 62,582 enrolled students in the 2005-2006 school year to 328,547 in the 2015-2016 school year). Chinese international students' experiences in American universities are worthy of exploration, considering that their experiences may transmit to other prospective students in China. Studies have frequently claimed that Asian students (Chinese international students as the major group represented in such research) experience higher levels of acculturative stress than those from other backgrounds (e.g. European students) (Poyrazli & Grahame, 2007; Yan & Berliner, 2009; Yeh & Inose, 2003). However, research on Chinese international students has not fully articulated individuals' stress experiences during their integration into the host society, as well as the factors associated with their stress feelings. As such, understanding the complex underlying dimensions of acculturative stress and examining correlates of acculturative stress among Chinese international students are the foci of the current study.

Acculturative Stress in International Students

Sam and Berry (2010) suggest an acculturation framework which explains at an individual level how well individuals can behaviorally and psychologically adapt to the new cultural environment. This acculturation framework provides us a lens to understand one's acculturative stress. It suggests that people from different cultural backgrounds who come to a new culture for a short- or long-term stay (e.g., international students studying in a place other than their native country) may experience adaptations and changes related to many aspects of life, such as learning a new language and acquiring new social norms to fit into new environments (Wei et al., 2007).

Facing the new environment, individuals may experience psychological discomfort or distress due to struggles in adapting to the host culture (Allen, Amason, & Holmes, 1998). Studies on international students' acculturative stress have suggested that this concept consists of separate dimensions, including perceived discrimination (Chung & Epstein, 2014; Ye, 2005), negative feelings due to change (Bradley, 2000), and feelings of guilt (Constantine et al., 2005). For example, Asian international students commonly experience perceived discrimination or stereotypes from the majority group (Chung & Epstein, 2014; Kim et al., 2011; Rice et al., 2012). Especially those international students travelling from Far East to the Western world may face culture shocks due to change and difficulties in cross-cultural adjustment (Li, Chen, & Duanmu, 2009). Another study specifically investigated Chinese international students who were studying and living in foreign countries for a long time. Students reported that they felt guilty because they were not fulfilling their responsibilities to take care of their parents due to absence from their families (Constantine et al., 2005). Ye (2005) examined East Asian international students (N=115, average age: 28, most of whom were from Mainland China, Taiwan, Korea, and Japan) from one large, diverse university in the southeastern U.S. In this study, acculturative stress was interpreted as belonging to five dimensions: fearfulness, perceived discrimination, perceived hatred, homesickness, and cultural shock (Ye, 2005). As these different dimensional breakdowns show, acculturative stress may not be a single construct and can be interpreted as different experiences by different individuals. The current study collected a sample from Chinese international students and sought to identify the underlying dimensions of acculturative stress. The study also explored how these students' background characteristics were associated with different dimensions of acculturative stress. In addition, according to the stress and coping model under the acculturation framework (Sam & Berry, 2010), individual's stress experiences during adaptation are influenced by their personal characteristics and support systems that operate as coping resources for stress reduction (Kim & Omizo, 2006). As such, background characteristics and social support system are important factors in understanding individuals' acculturative stress.

Background Characteristics

Building on the literature noted above, we examined the three important background characteristic variables in this study. First, international students' skill and comfort level with the English language was found to be strongly associated with their acculturative stress levels (Misra & Castillo, 2004; Msengi, 2003; Poyrazli, Kavanaugh, Baker & Al-Timimi, 2004; Rajapaksa & Dundes, 2002; Sumer, Poyrazli, & Grahame, 2008; Yeh & Inose, 2003). While studies (Rice et al., 2012; Ye, 2005) found a positive association with students' self-rated scales from poor to excellent in English proficiency, another study (Wang et al., 2012) used standardized test scores (e.g., TOEFL or IELTS) and found that students' actual English test scores were not related to acculturative stress among Chinese international students. These studies showed that students' personal assessment of their own skills and proficiency of English are related to their acculturative stress yet their actual testable proficiency is not. According to these studies, the measurable correlation may not be between proficiency and acculturation stress, but it is between

students' self-assurance in English (or perceived proficiency) and acculturation stress. According to Lin (2006), from the perspective of intercultural adjustment, a good indicator of successful adaptation is an individual's feeling comfortable in a new cultural environment (e.g. being comfortable using the language or behaving in the ways the host culture expects). Therefore, we examine students' comfort level in using English in association with students' acculturative stress and expect that the more comfortable they are in using English the fewer stressful experiences they may have during adaptation.

Second, a student's field of study tends to be an important factor in influencing that individual's cultural adaptation experiences. A larger number of Chinese international students (42% of total outbound Chinese students in 2014, according to IIE) come to the U.S. majoring in STEM-related fields. According to a qualitative study (Yan & Berliner, 2011), interviews with Chinese international students about their experiences and concerns studying in the U.S. revealed that students majoring in social science-related fields appeared to have more stress than did students majoring in STEM ("hard" Science, Technology, Engineering, and Math), perhaps because the social sciences majors may require that students have higher English language skills as well as a better understanding of American culture, values and social norms compared with STEM-related majors. If social science students fail to meet these many demands and expectations, they may have to face more pressures and potential setbacks to their progress. Although this qualitative study suggested that identifying major fields of study could help explain Chinese international students' stress experiences during adaptation, to our knowledge, no quantitative study has validated this association between fields of study and students' acculturative stress.

Third, academic level (i.e. undergraduate versus graduate) is a salient demographic factor to consider since undergraduates and graduates may differ in their experience of acculturative stress. One study (Nesheim, Guentzel, Ansemer-Topf, Ross, & Turrentine, 2006) suggested that both undergraduate and graduate international students may experience similar adjustment challenges, such as language difficulties, dealing with culture shock and adapting to a new social environment; however, undergraduates reported more problems and difficulties in social interactions with American students (Nesheim et al, 2006), a higher level of difficulties in cultural and personal adjustment, and more psychological needs (Hanassab & Tidwell, 2002). Other studies did not differentiate between international undergraduate and graduate students (Andrade, 2006; Hendrckson, Rosen & Aune, 2011; Misra et al., 2003; Zhang & Goodson, 2011). Although international undergraduate and graduate students might be different in their perception of the adjustment difficulties, there is a lack of research on the similarities and differences in acculturative stress as a function of their academic level.

As such, the current study explores associations between acculturative stress and the background characteristic variables of students' comfort level in using English, fields of study (STEM/non-STEM) and academic level (undergraduate/graduate) among Chinese international students.

Perceived Social Support

Perceived social support refers to a person's perceived access to social resources (Misra & Castillo, 2004). It reflects an individual's appraisal of both the actual function and the quality of those available resources (Misra & Castillo, 2004). Past studies have stressed the positive function of individuals' perceived social support and classified it into different forms on the basis of an individual's demands for specific supports to cope with life difficulties and psychological stress. For example, researchers stressed the importance of international students' perceived emotional support and informational support (Hendrickson et al., 2011; Poyrazli et al., 2004; Ramsay et al., 2007) for emotion-sharing (e.g., joy, suffering, or pressure) and information exchange as ways students can better cope with adjustment difficulties and stress in the host country (Lin 2006; Ramsay et al., 2007; Ye, 2006a). Therefore, individuals may search out different sources as ways to obtain the specific supports they need (Ye, 2006b). To all students on campus, including international students, family, friends, and the school itself are important sources that they commonly have access to, but their perception of the available support from these different sources may influence to whom or where they tend to reach out and how comfortable they feel in accessing these supports in times of stress. However, fewer studies to date have investigated the role of international students' perceptions of the support provided by family, friends, and school in their coping with complex acculturative stress experiences.

Current Study

This study first investigated the underlying dimensions of acculturative stress among Chinese international students to better understand their acculturation experiences. Building on previous research that indicates that students' background characteristics and perceived social support influence their acculturation experiences (Andrade, 2006; Chung & Epstein, 2014; Yan & Berliner, 2010; Ye, 2005), we further examined the association between students' background characteristics (i.e. comfort level in using English, field of study, and academic level) and ~~each~~ dimensions of acculturative stress, and the association between students' perceived social support from family, friends, and school and each dimension of acculturative stress.

Method

Participants

A sample of 262 Chinese international students (M age = 23; SD=2.8; range: 18-39) from a Northeastern U.S. university participated in this study by completing the consent form and survey on-line. This study was approved by the Institutional Review Board of the university. Of the sample, slightly more than half (54 %) identify as males and slightly less than half (46%) identify as females. Most (75%) participants were graduate students, and the remainder (25%) undergraduates. Half of the students (49.4%) were majoring in science, technology, engineering, and mathematics (STEM) related fields, and the other half were majoring in non-STEM areas (e.g., business or the social sciences). Students also provided information about their comfort in using English. Of the sample, few (10%) students reported that they were very comfortable using

English; most students (70%) reported that they were somewhat comfortable using English, and the remaining (20%) students reported that they were not comfortable using English.

Measures

The English language instruments used to gather information from students about their background characteristics, acculturative stress, and perceived social support are described in detail below.

Student background characteristics. This section included Chinese international students' age, gender identification, comfort in using English, field of study, and academic status. Students' comfort level in using English was measured as students' self-reported perception of comfort when using English (1=not comfortable; 2=comfortable; 3= very comfortable). Students indicated their field of study. Based on their responses to the field of study question, science, technology, engineering, and mathematics were coded as STEM fields, and social science, business and other majors were coded as non-STEM fields. Students were also asked to indicate their academic level and were coded as undergraduate or graduate students.

Acculturative stress. Students completed a 26-item modified Acculturative Stress Scale for International Students (ASSIS), which was created by Sandhu & Asrabadi (1994). This measure has been used with international students previously and shows high reliability and validity (e.g. Ye, 2005). Originally, when Sandhu and Asrabadi developed the ASSIS instrument, there were 36 items, and they reported these items can be decomposed into six factors: perceived discrimination, homesickness, perceived hate/rejection, fear, stress due to change, and guilt. They also reported that 10 items failed to group on any one factor and thus called these 10 items non-specific concerns. Consistent with previous studies (Ye, 2005; Ye, 2006a), we only included the remaining 26 items in the analysis. A 5-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree) was used for each item. The reported Cronbach's alpha for the 26-item scale was 0.95 in the current study.

Perceived social support. Students' perceived social support was measured with the 12-item modified Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988), which was originally designed to assess to students' perceived social support from friends (4 items), family (4 items) and significant others (4 items). This measure had previously been tested on general groups of college students (e.g., Bishop, 1997) and specifically on international students (Moore & Constantine, 2005) and shows high reliability and validity. The current study used the original eight items that assessed perceived social support from family and friends, but we modified the four items used to measure perceived social support from significant others into three items that measured students' perceived social support from school resources (e.g., "The International Student Center on campus is available when I need it."). Response choices were presented on a 7-point Likert-type scale that ranged from 1 (very strongly disagree) to 7 (very strongly agree). In the present study, we calculated

Cronbach's alpha of 0.88, 0.96 and 0.91 for subscales of perceived social support from family, friends, and school, respectively.

Analytic Plan

The analyses were executed in two stages. First, we performed a series of preliminary analyses, including Pearson correlations and independent T-tests. Pearson correlations were conducted for overall acculturative stress, students' background characteristics, and perceived social support from family, friends, and school. Independent T-tests were conducted to examine acculturative stress in students with different background characteristics (e.g. gender identification, comfort in using English, field of study, and academic status).

Second, we aimed to investigate two issues. First, the 26 acculturative stress items were analyzed using principal components exploratory factor analysis (EFA) with Varimax rotation to decompose acculturative stress. The internal consistency of the underlying dimensions of acculturative stress was then examined with Cronbach's alpha reliability coefficients. According to Cortina (1993), an alpha coefficient of greater than 0.65 (≥ 0.65) indicates that items are justified as measuring the same concept and can be combined into a single index (Cortina, 1993).

We then examined predictors of the confirmed dimensions of acculturative stress. A series of hierarchical regression analyses was conducted to further examine students' background characteristics and perceived social support from family, friends, and school in predicting different acculturative stress dimensions. Before conducting regression analyses, we examined whether there were any violations in regression modeling assumptions of multicollinearity, normality, linearity, and homoscedasticity of residuals by correlation matrix, normal P-P plot, scatter plot, and Mahalanobis distance (J. Cohen, Cohen, West, & Aiken, 2003). Then, students' background characteristics were entered as the first group of predictors to explore their predictive power in relation to the different acculturative stress dimensions. Perceived social support from family, friends, and school was entered as the second group of predictors to explore the relationship between perceived social support and the different dimensions of acculturative stress while controlling for students' background characteristics.

Results

Descriptive Analyses

The current sample had a moderate level of overall acculturative stress (M=2.41, SD= 0.67). Male-identifying (M=2.36, SD=0.69) and female-identifying (M=2.46, SD=0.65) students had similar levels of acculturative stress (t= 0.95, df=167, $p> .05$). Students with a greater comfort level in using English were more inclined to report less acculturative stress (r = -0.33, $p< .05$). There was no difference between students in STEM (M=2.35, SD=0.66) vs. non-STEM majors (M=2.46, SD=0.75) in acculturative stress (t= -0.79, df=123, $p> .05$). Undergraduate students (M=2.65, SD=0.76) reported a higher level of overall acculturative stress than graduate students (M=2.35, SD=0.63; t=2.5, df=166, $p< .05$). In addition, this sample of Chinese international students perceived a low level of social support from school (M= 4.81, SD=1.31)

but a high level of social support from family (M=5.4, SD=1.35) and friends (M=5.45, SD=1.37).

Dimensions of Acculturative Stress

The EFA of the 26-acculturative stress (ASSIS) items revealed five factors accounting for 70.84% of the variance in acculturative stress. We determined the number of factors using the following criteria: 1) Kaiser's criterion of eigenvalues greater than 1.0 (Kaiser, 1960); 2) a scree-plot test to obtain the number of data points above the "break," which indicates the number of factors to retain (Costello & Osborne, 2005); and 3) the conceptual meaningfulness of factors (Field, 2009). Items that loaded less than 0.40 or loaded on two factors were deleted (Stevens, 2002). The factor loadings for acculturative stress scale is shown in Table 1. All loadings were above 0.40, but three items were cross-loaded between factors and thus were excluded, leaving 23 items. Re-running the numbers after these exclusions, the EFA with the 23 items revealed five factors explaining 71.27% of the variance in acculturative stress.

Table 1
Factor Loadings for Exploratory Factor Analysis of Acculturative Stress Subscales among Chinese International Students

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Perceived discrimination	Fearfulness	Homesickness	Stress due to change	Guilt
AS_1. I was treated differently because of my race.	**.86**	.11	.02	.09	.10
AS_2. I was treated differently because of my color.	**.83**	.20	.06	.07	.08
AS_3. I was treated differently in social situations.	**.77**	.06	-.08	.03	.13
AS_4. My people are discriminated against.	**.76**	.10	.02	.06	.32
AS_5. I feel that I receive unequal treatment.	**.69**	.28	.31	.10	.07
AS_6. Others are biased toward me.	**.68**	.29	.19	.11	.19
AS_7. People show hatred toward me nonverbally.	**.63**	.05	.20	.03	.36
AS_8. Others are sarcastic toward my cultural values.	**.63**	.25	.26	.11	.22
AS_9. I'm denied what I deserve.	**.61**	.46	.46	.06	-.07
AS_{10}. Many opportunities are denied to me.	**.60**	.42	.44	.05	-.04
AS_{11}. Others don't appreciate my cultural values.	**.58**	.35	.42	.07	-.03
AS_{12}. I'm fear for my personal safety because of my different cultural background.	.25	**.81**	.07	.15	.25
AS_{13}. I frequently relocate for fear of others.	.28	**.80**	.17	.10	.15
AS_{14}. I feel insecure here.	.22	**.79**	.10	.18	.25
AS_{15}. I generally keep a low profile due to fear.	.16	**.75**	.25	.22	.15
AS_{16}. I miss the people and country of my origin.	.12	.03	**.83**	.17	-.13
AS_{17}. I feel sad leaving my relatives behind.	.04	.06	**.79**	.20	.30
AS_{18}. Homesickness bothers me.	.05	.31	**.76**	.07	.07
AS_{19}. Multiple pressures are placed on me after migration.	.26	.15	.27	**.72**	.05
AS_{20}. I feel uncomfortable to adjust to new foods.	.19	.17	.16	**.72**	.10
AS_{21}. I feel uncomfortable to adjust to new cultural values.	.17	.38	.18	**.67**	.19
AS_{22}. I feel guilty to leave my family and friends behind.	.06	.01	.26	.38	**.75**
AS_{23}. I feel guilty that I'm living a different lifestyle here.	.17	.37	.00	.25	**.72**

As shown, the factors were labeled as relating to perceived discrimination (11 items), fearfulness (4 items), homesickness (3 items), stress due to change (3 items), and guilt (2 items). The factor loadings were between 0.58 and 0.86 for perceived discrimination, 0.75 and 0.81 for fearfulness, 0.76 and 0.83 for homesickness, 0.67 and 0.72 for stress due to change, and 0.72 and 0.75 for guilt.

After the five dimensions of acculturative stress had been generated with a principal component analysis, we examined the inter-correlations among these five dimensions. The inter-correlations among the five acculturative stress dimensions indicated that perceived discrimination, fearfulness, homesickness, stress due to change, and guilt had moderate to strong positive associations that ranged between 0.26 ($p < .01$) and 0.59 ($p < .01$). Additional correlates were displayed in Table 2. All factor loadings were between 0.61 and 0.81 for perceived discrimination, 0.79 and 0.89 for fearfulness, 0.63 and 0.77 for homesickness, 0.67 and 0.81 for stress due to change, and 0.65 and 0.91 for guilt. Each of the first-order latent variables loaded highly on the second-order construct of acculturative stress (perceived discrimination = 0.77, fearfulness = 0.86, homesickness = 0.61, stress due to change = 0.77, and gilt =0.70). All factor loadings were significant at $p < .05$. Cronbach's reliability for perceived discrimination ($\alpha = 0.93$), fearfulness ($\alpha = 0.91$), homesickness ($\alpha = 0.78$), stress due to change ($\alpha = 0.79$), and guilt ($\alpha = 0.75$) indicated these factors had high internal consistency. These results indicated that this measure of acculturative stress contained five underlying dimensions of perceived discrimination, fearfulness, homesickness, stress due to change, and guilt among the current Chinese international student sample. Comparing the mean values among these dimensions, homesickness was the most concerning among Chinese international students (M=3.09, SD= 0.87) and was followed by stress due to change (M=2.66, SD=0.90), perceived discrimination (M=2.28, SD=0.73), guilt (M=2.20, SD=0.86), and fearfulness (M=2.12, SD=0.82).

Multi-Dimension of Acculturative Stress, Students' Background Characteristics and Perceived Social Support

Pearson correlation testing was conducted to examine the associations between students' background characteristics and the five dimensions of accumulative stress as well as the associations between the five dimensions of acculturative stress and students perceived social support from family, friends, and school. As shown in Table 2, students' comfort level using English was negatively correlated with all acculturative stress dimensions, including perceived discrimination ($r = - 0.22$, $p < .01$), fearfulness ($r = - 0.29$, $p < .01$), homesickness ($r = - 0.18$, $p < .01$), stress due to change ($r = - 0.30$, $p < .01$), and guilt ($r = - 0.15$, $p < .05$). Students' STEM or non-STEM majors had no significant correlation with any acculturative stress dimension. Undergraduate students in our findings were more likely to experience perceived discrimination ($r = - 0.18$, $p < .01$) than graduate students. The patterns among the different acculturative stress dimensions and perceived social support from family, friends, and school indicated that perceived social support from family was positively associated with students' homesickness (r =

Table 2
Correlation Matrix for Background Characteristics, Perceived Social Support and Dimensions of Acculturative Stress

Variables	1	2	3	4	5	6	7	8	9	10	11
Background characteristics											
1. Comfort level of using English	-										
2. STEM/Non-STEM	-.17**	-									
3. Academic status	-.08	.47**	-								
Perceived social support											
4. PSS from family	.20**	-.15*	-.00	-							
5. PSS from friends	.28**	-.18**	-.00	.69**	-						
6. PSS from school	.22**	.00	-.02	.51**	.65**	-					
Acculturative stress											
7. Perceived discrimination	-.22**	-.11	-.18**	-.06	-.17*	-.23**	-				
8. Fearfulness	-.29**	-.00	-.12	.02	-.10	-.20**	.59**	-			
9. Homesickness	-.18**	.02	.03	.19**	.11	-.02	.26**	.40**	-		
10. Stress due to change	-.30**	.06	.01	.10	-.05	-.15*	.47**	.52**	.46**	-	
11. Guilt	-.15*	.05	-.02	.00	-.09	-.21**	.46**	.48**	.32**	.46**	-
Mean	-	-	-	5.40	5.45	4.82	2.28	3.09	2.12	2.66	2.20
SD	-	-	-	1.23	1.24	1.18	.73	.87	.82	.90	.86

*p< .05, **p< .01.

Note. Means and standard deviations are presented for main continuous variables. Comfort level of using English was coded as follows: 1 (not comfortable), 2 (comfortable), and 3 (very comfortable). STEM/Non-STEM was coded 1 (STEM majors) and 0 (Non-STEM majors). Academic status was coded 1 (undergraduates) and 2 (graduates). PSS from family = Perceived social support from family. PSS from friends = Perceived social support from friends. PSS from school = Perceived social support from school.

0.19, p< .01). Perceived social support from friends was negatively associated with students' perceived discrimination (r = - 0.17, p< .05). Perceived social support from school was negatively associated with students' perceived discrimination (r = - 0.23, p< .01), fearfulness (r = - 0.20, p< .01), stress due to change (r = - 0.15, p< .05), and guilt (r = - 0.21, p< .01).

The normal P-P plot of regression standardized residual, scatter plot, and Mahalanobis distance were examined and confirmed that there was no violation of normality, linearity, or homoscedasticity. However, a correlation matrix indicated that there were strong correlations in the explanatory variables; that is to say, academic level was highly correlated with STEM/non-STEM (r= 0.47 > 0.30, *p*< .01), and perceived social support variables (i.e. perceived social support from family, friends and school) were highly correlated with each other (r = 0.51 to r = 0.69, *p*< .01; see Table 2). These correlations might suggest a multicollinearity issue, which might obscure the pattern of the regression results (Mansfield & Helms, 1982). To diagnose this potential multicollinearity issue, we examined variance inflation factors (VIFs) for the predictors. The predictor of perceived social support from friends had a VIF equal to 2.61 (> 2.5), and the VIF of other predictors ranged from 1.1 to 1.9, which suggested the variable of perceived social support from friends might cause multicollinearity (Chatterjee, Hadi, & Price, 2000). To avoid the potential problem of multicollinearity, we decided to remove perceived social support from friends from the model at this point and only used perceived social support from family and perceived social support from school for the regression analysis. After the variable of perceived social support from friends was removed from the model, the VIF of all predictors ranged from 1.1 to 1.4, indicating that multicollinearity was no longer a concern in the study (Cohen, Cohen, West, & Aiken, 2003).

Students' background characteristics. Table 3 presents the hierarchical regression models with students' background characteristics predicting the different dimensions of acculturative stress. Students' comfort in using English was significantly negatively correlated with students' perceived discrimination, fearfulness, homesickness and stress due to change. However, it was not significantly correlated with students' feelings of guilt. Students' field of study (i.e. STEM/Non-STEM) was not significantly correlated with any dimension of acculturative stress. Students' academic level (undergraduate/graduate) was negatively correlated with students' perceived discrimination and fearfulness. This analysis indicated that, on average, graduate students were 0.36 times less likely to experience perceived discrimination and 0.31 times less likely to experience fearfulness than were undergraduate students. In these models, students' background characteristics, including students' comfort level of using English, STEM/Non-STEM major, and academic level, explained 9% of the variance in perceived discrimination, 11% of the variance in fearfulness, and 9% of the variance in stress due to change. However, students' background characteristics only explained 4% of the variance in homesickness and 3% of the variance in students' feelings of guilt. Together, these findings suggest that students' experience of fearfulness, perceived discrimination and stress due to change were more likely to be affected by students' background characteristics compared with the other two dimensions of acculturative stress (i.e. homesickness and guilt).

Perceived social support. As shown in Table 3, after controlling for students' background characteristics, perceived social support from family had a significant positive

correlation with students' experience of fearfulness, homesickness, stress due to change, and guilt. Students' perceived social support from school was significantly and negatively correlated with students' perceived discrimination, fearfulness, stress due to change and guilt. However, perceived social support from school had no significant correlation with homesickness. After controlling for students' background characteristics, perceived social support from family and school explained an additional 5% of the variance in perceived discrimination, 5% of the variance in fearfulness, 5% of the variance in homesickness, 6% of the variance in stress due to change, and 5% of the variance in guilt.

All exploratory variables (i.e. background characteristics and perceived social support variables) together accounted for 14% of the variance in perceived discrimination, 16% of the variance in fearfulness, 9% of the variance in homesickness, 15% of the variance in stress due to change and 8% of the variance in guilt (see Table 3).

Discussion

This study viewed Chinese international students' studying and living in the U.S. as a process of adaptation through an acculturation framework lens (Sam & Berry, 2010). We found that acculturative stress was multi-dimensional. Students' background characteristics carried different weights in explaining different dimensions of acculturative stress. Perceived social support from family indicated different impacts on students' perceived discrimination, fearfulness, homesickness, stress due to change, and guilt, compared the impacts from perceived social support from school.

This study identified five distinct but related dimensions of acculturative stress among Chinese international students. These dimensions included perceived discrimination, fearfulness, homesickness, stress due to change, and guilt. This is consistent with previous studies that indicate that international students' acculturative stress experience is multi-dimensional (Ye, 2005; Ye, 2006a). However, the difference between this current study and previous studies (Ye, 2005; Ye, 2006a) lies in the items that have been loaded onto the specific dimensions. Past studies (Ye, 2005; Ye, 2006a) have reported that perceived discrimination and perceived hatred/rejection were separate dimensions among East Asian international students, but our study found that these were one dimension among Chinese international students. One possible explanation is that our participants tended to strongly associate their sense of negative feedback from others (e.g., perceived rejection or hatred) with a stereotype or prejudiced attitude towards a group (e.g., perceived discrimination). In other words, they were likely to attribute the feeling of being rejected to discrimination. Variations in the underlying factor structure may reflect a difference in the individual's interpretations of these abstractions, such as "discrimination," "hatred," or "rejection." Future research may need to address the subtle differences in interpreting international students' experiences of being "discriminated" against, "hated" or "rejected" to better understand their acculturation experiences.

Table 3

Hierarchical Regression of Background Characteristic and Perceived Social Support on Acculturative

Predictors	B	SE B	β	R^2	ΔR^2	ΔF (df)
Perceived discrimination						
Step 1 (n=230)				.09**	.09**	7.75 (3,226)
Comfort level in using English	-.28	.09	-.21**			
STEM/Non-STEM	-.06	.10	-.04			
Academic status	-.31	.12	-.19**			
Step 2 (n=230)				.14**	.05**	5.63 (2,224)
PSS from family	.08	.04	.14			
PSS from school	-.15	.05	-.25**			
Fearfulness						
Step 1 (n=230)				.11**	.11**	9.16 (3,226)
Comfort level in using English	-.43	.09	-.28**			
STEM/Non-STEM	.11	.17	.07			
Academic status	-.36	.13	-.19**			
Step 2 (n=230)				.16**	.05**	7.29 (2,224)
PSS from family	.16	.05	.23**			
PSS from school	-.17	.05	-.25**			
Homesickness						
Step 1 (n=230)				.04*	.04*	2.71 (3,226)
Comfort level in using English	-.34	.11	-.22**			
STEM/Non-STEM	.05	.13	.03			
Academic status	-.04	.14	-.02			
Step 2 (n=230)				.09**	.05**	7.24 (2,224)
PSS from family	.20	.05	.28**			
PSS from school	-.07	.06	-.10			
Stress due to change						
Step 1 (n=230)						
Comfort level in using English	-.50	.11	-.31**	.09**	.09**	7.86 (3,226)
STEM/Non-STEM	.13	.13	.07			
Academic status	-.14	.14	-.07			
Step 2 (n=230)				.15**	.06**	8.17 (2,224)
PSS from family	.21	.05	.28**			
PSS from school	-.16	.06	-.22**			
Guilt						
Step 1 (n=230)				.03	.03	2.07 (3,226)
Comfort level in using English	-.19	.11	-.12			
STEM/Non-STEM	.16	.13	.09			
Academic status	-.17	.14	-.09			
Step 2 (n=230)				.08**	.05**	6.52 (2,224)
PSS from family	.13	.05	.18*			
PSS from school	.20	.06	-.27**			

Stress, Note. *$p < .05$, **$p < .01$.

Multi-Dimensionality of Acculturative Stress

Predictors of Different Dimensions underlying Acculturative Stress

Students' background characteristics. This study first highlighted the importance of students' background characteristics in understanding Chinese international students' perceived discrimination, fearfulness, and stress due to change. Specifically, our study suggested students' comfort level in using English language and academic level are two important factors in understanding these students' acculturative stress experiences.

The findings support our earlier expectation and are similar to previous studies (Constantine et al., 2005; Lee & Rice, 2007; Yeh & Inose, 2003) that have emphasized the importance of English language ability in one's adjustment process. Our findings further suggest that Chinese international students who are more comfortable in using the English language may experience less specific acculturative stress experiences such as perceived discrimination, fearfulness, homesickness, and stress due to change. Another significant predictor, academic level (i.e., undergraduate/graduate), indicated different patterns in students' fearfulness and perceived discrimination. Specifically, undergraduates are more likely to experience higher perceived discrimination and fearfulness than are graduate students. Because undergraduates and graduates differ in many aspects, such as academic requirements, time management, and relationships with friends, Chinese undergraduate and graduate international students may have different learning and living microenvironments despite broadly sharing the same university. However, in the current study students' field of study (STEM vs. Non-STEM) was not associated with any acculturative stress dimension. Past research has not explored the international students' academic status or field of study in association with their acculturative stress; thus, future studies may need to validate these findings and address why background characteristics have different impacts on international students' different acculturation experiences.

Perceived social support. This study showed that Chinese international students' perceptions of family support and school support were associated with acculturative stress in different patterns. Perceived social support from family was positively associated with acculturative stress dimensions of fearfulness, homesickness, stress due to change and guilt. In contrast, perceived social support from school was negatively associated with acculturative stress dimensions of perceived discrimination, fearfulness, stress due to change and guilt. This finding may imply that students' perceived family support did not help them address stressful experiences due to acculturation and instead increased students' stressful experiences, whereas students' perceptions of school support help students cope with their difficulties and challenges during studying and living in a new culture. According to Sam and Berry's (2010) stress and coping theory, in the context of acculturation, individuals' perceived social supports act as coping resources that help them re-appraise stressful acculturation situations. Our study contributes to this theory by finding that this effect is not consistent across different types of perceived social support. In fact, while this expectation held true for some sources of perceived

social support, other sources of perceived support showed a very different correlation and may accentuate acculturative stress.

Interestingly, our sample of Chinese international students reported relatively higher levels of perceived family support compared to perceived school support. However, in terms of coping with the multi-dimensions of acculturative stress, specifically in students' experiences of perceived discrimination, fearfulness, stress due to change, and guilt, students' perception of family support is less helpful compared with perceived school support as a coping resource. One possible explanation is that in the context of adaptation to a new cultural environment, these students may often have high expectations of their academic achievement to honor their families back home, as Chinese culture highly values academic achievement (Leong & Chou, 1996; Wei et al., 2007). In the face of difficulties or challenges in the new cultural environment, the sense of school supports may assure and encourage them to overcome these difficulties and reduce their stressful feelings. In contrast, the sense of family support may turn into pressure that adds to Chinese international students' likelihood of experiencing fearfulness, homesickness, stress due to change, and guilt, and thus their perceived family support actually increases the stress feelings in those acculturative stress dimensions.

However, this study also contains several limitations. First, the unequal sample size of STEM and non-STEM students may have reduced the statistical power needed to explore whether Chinese international students' fields of study influenced their acculturative stress experience. Compared with STEM majored students, non-STEM majored students, specifically those who are majoring in liberal arts or the social sciences, may have higher stress because the university may have more requirements for their English language abilities. In addition, because Chinese international students appear to prefer to major in STEM or business-related fields in comparison to liberal arts or the social sciences, it is not clear whether the large proportion of fellow students from the same country benefits Chinese students in adjusting to American universities or whether this prohibits them from reaching out to establish a new support system from local students. Future research should examine how international students' fields of study influence their adjustment process. Second, when examining students' perceived social support from friends, this study was not able to detect its correlation with different dimensions of acculturative stress due to its high correlation with other perceived support sources. Future research may examine international students' friends' support separately from other support sources in relation to their adjustment processes. Third, the current study only collected a sample from one private university that was located in the northeastern U.S. Therefore, it limited the ability to generalize from the sample to Chinese international students in other regions of the U.S. Future studies should recruit participants from different regions and investigate whether international students' acculturation experiences are related to local culture based on geographical location.

Conclusion

The present study examines Chinese international students' acculturative stress by identifying five dimensions of acculturative stress that this population may encounter in the US: homesickness, fearfulness, guilt, stress due to change, and perceived discrimination. Not only does the study highlight the multiple dimensions of acculturative stress, but it also re-examines

students' background characteristics and perceived social support from family, friends, and school as predictors of different dimensions of acculturative stress. The results highlight that students' comfort in using the English language and academic level (i.e., undergraduate/ graduate) in important in understanding students' acculturative stress. Moreover, this study finds that perceived social support from family and school has different association patterns with the five dimensions of acculturative stress. Family support is positively associated with acculturative stress, whereas school supports are negatively and non-significantly associated with acculturative stress.

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