

The Contributing Factors to Anxiety and Depression among the Chinese International Students

during COVID-19

by

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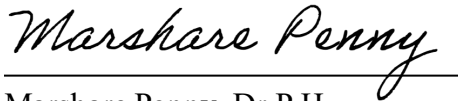
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Abstract

Introduction: The Coronavirus Disease 2019 (COVID-19) outbreak erupted worldwide in 2019, and COVID-related psychological impacts have become a pervasive issue. However, its impacts are unclear on overlooked and yet sizeable groups such as international students in the U.S. This study examined factors significantly correlated with Chinese international students' anxiety and depression during COVID-19. **Method:** A cross-sectional research design was conducted in this study. A survey sample of 100 Chinese international students from three postsecondary institutions was collected to analyze their mental health status during COVID-19. **Results:** There is a statistically significant association found between anxiety and financial difficulty ($\beta = 0.22$, $t = 2.14$, $p = 0.04$). Remote learning ($\beta = -1.01$, $t = -2.34$, $p = 0.02$), social support ($\beta = -0.60$, $t = -2.50$, $p = 0.01$), and financial difficulty ($\beta = 0.21$, $t = 2.16$, $p = 0.03$) significantly predict depression. There was no significant difference in anxiety or depression between Chinese international students studying in the U.S. and those studying remotely in China. **Discussion:** The study results indicated that increased social support and remote learning satisfaction could help international students reduce depression, and reducing financial difficulties could decrease both anxiety and depression. Future studies should explore the causal link between these factors and mental health.

Keywords: Covid-19, international student, mental health, remote learning, social support.

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Introduction

The Coronavirus Disease 2019 (COVID-19) outbreak erupted worldwide in December 2019 and has since resulted in 122 million confirmed COVID cases and 2.69 million deaths (WHO, 2020). COVID-related psychological impacts have become a critical issue. For college students, mental health struggles such as depression and anxiety had already been increasing before the pandemic (Center for Collegiate Mental Health, 2016). The issues became more widespread when the pandemic hit the U.S soil in March 2020, as college students experienced intensified psychological distress from worries about infection, academic frustration, lack of trust in the governments' policies, concerns about lifestyle changes, financial pressure, lack of social connections, academic stress and others (Ma et al., 2020; Wang et al., 2020; Lederer et al., 2021).

One particular subgroup, the Chinese international students in the U.S., not only endured the pressures faced by the general college student population but also faced additional stress from travel restrictions, separation from families, and loneliness (Bijia, Zhao, & Zhu, 2020). At the beginning of the COVID-19 epidemic, derogatory and prejudicial remarks spread quickly on social media platforms and stirred hate against the Chinese (Li et al., 2020). As a result, many Chinese international students experience unfair treatment and discrimination during COVID-19. Additionally, for those who returned to China to complete courses remotely, the time zone difference could cause circadian rhythm disorder, negatively affecting their mental health (Ahmad et al., 2020). Furthermore, many students come from middle-class families, so their parents may face bigger financial pressures during the pandemic to support their expensive college tuition (Zhao, 2020). All of these factors may contribute to mental health challenges among Chinese international students. However, Chinese international students may be more

reluctant to seek mental health services because of their Asian culture; research shows that mental health services and social support are underutilized among Chinese international students. (Lian, 2018)

There is a limited number of detailed studies on the mental health status of Chinese international students during COVID-19. Song et al. (2020) examined the factors related to post-traumatic stress disorder (PTSD), anxiety, depression, and stress among 261 Chinese international students. The factors examined were residence, health condition, economic pressure, and academic plan. The research found that the participants with financial pressure were more likely to have a higher PTSD score and higher depression, anxiety, and stress level. Compared with students studying in the U.S., students who returned to China experienced more severe symptoms of anxiety and depression (Song, Zhao & Zhu, 2020). However, other research shows that the average score of PTSD of those who stayed in the U.S. was higher than those who returned to China (Zhao, 2020).

Overview of Literature

The literature review is organized based on the three main themes and their relationship with psychological issues. The three themes are social support, remote learning, and residence. First, the definition of social support used in this study is a combination of emotional support, tangible support, and companionship (Wills, 1991; Langford, Bowsher, Maloney & Lillis, 1997; Heaney & Isreal, 2008). Next, remote learning refers to the type of education that does not require physical presence at a school (Kaplan & Haenlein, 2016). Lastly, residence refers to the country where Chinese international students reside during the time of COVID-19.

Social Support

Before the COVID-19 pandemic, a large body of literature found that social support can significantly impact college students' psychological well-being (Rankin, Paisley, Mulla & Tomeny, 2018; Yasin & Dzulkifli, 2010; Bhochhibhoya, Dong & Branscum, 2017). In a recent study, Rankin et al. (2018) examined the relationship between social support needs and social support received and their relation to depressive and anxiety symptoms. Among the 428 undergraduate college students who completed the questionnaires, the results indicated that students in general perceived that they did not receive enough social-emotional support. The greater the discrepancy between support needed and support received, the higher the depressive symptoms. However, anxiety symptoms are not related to such discrepancies.

Similarly, Yasin & Dzulkifli's (2010) study examined the association between social support and psychological problems (e.g., depression, anxiety, and stress) among college students. The Social Support Behavior scale was applied to measure depression, anxiety, and stress, and the Depression Anxiety Stress Scale was used to measure the psychological symptoms. The results showed that social support had a significant negative relationship to psychological problems, which means that the more social support received, the lesser the psychological issues.

A defining component of being an international student is living far from home and families, which implies fewer resources for social support. Bhochhibhoya, Dong, and Branscum (2017) focused on the different sources of social support among international students and their mental health. The sources of social support come from friends or family who resided in the home country (e.g., parents); friends or family who resided in the United States and came from the same home country (e.g., sibling); friends who came from the same college and different

home country (e.g., international students come from another country than their own); friends living in the local community, born in the United States (e.g., domestic college students). This study indicated that the duration of stay in the United States was negatively associated with social support coming from close people who lived in the home country—in contrast, positively related to close people who lived in the local community and were born in the United States.

Since the COVID-19 pandemic began, researchers have started to revisit the impact of social support factors on people's psychological states. Grey et al. (2020) examined the relationship between the role of social support and a range of psychological health outcomes among individuals who were experiencing social isolation and social distancing during COVID-19. This study used the Multidimensional Scale of Perceived Social Support (MSPSS) to measure three domains: family, friends, and other significant relationships. The study found that individuals undergoing self-isolation were more likely to experience higher rates of depression and loneliness. When comparing the individuals who had lower levels of social support to those who had higher levels of social support, those with more social support had a 63% lower risk of depressive symptoms. Thus, social support was found to have a significant negative association with the risk of depression. Furthermore, individuals who live alone may have a higher risk of depressive symptoms, while living with others is a protective factor for college students against anxiety and depression (Miki, Yamamoto, Inoue, & Fukunaga, 2021; Cao, 2020; Ahmmed, 2020).

Studies also examined the psychological impact of the COVID-19 epidemic on college students in China, which found that social support enabled college students to better manage anxiety and depression (Cao, Fang, Hou, & Han, 2020; Ma, Zhao, Li, & Chen, 2020; Li, Zhao, Ma, & McReynolds, 2020; Li, Wu, Meng, & Li, 2020). For example, Ma (2020) gathered data

from 108 colleges and universities and 70,000 students, and applied the Scale of Perceived Social Support with twelve items to assess perceived social support from family, friends, and other significant relationships. His findings indicated that low perceived social support was significantly associated with increased risk for anxiety and depressive symptoms, while high perceived social support helped to decrease anxiety and stress.

In a related study, Li et al, (2020) examined the association between the social support of Chinese college students and their psychological symptoms (e.g., anxiety, depression, PTSD) during COVID-19. They used the Generalized Anxiety Disorder Scale (GAD-7) to assess the anxiety symptoms and the Patient Health Questionnaire (PHQ-9) to measure the level of depression severity. When evaluating students' degree of satisfaction with receiving social support from family, friends, and other relationships, they found the psychological symptoms of students increased sharply in the group with lesser social support. In contrast, the psychological symptoms increased relatively slowly in the group with more social support during COVID-19. A similar study was done using a longitudinal design. The first survey was administered during the onset of the outbreak, and the follow-up surveys were collected during the remission period (Li, Zhao, Ma, & McReynolds et al., 2020). The results also showed a significant association between higher anxiety symptoms and low perceived social support.

Lee and Waters (2021) examined self-reported racial discrimination and mental health outcomes among Asians and Asian Americans living in the United States during COVID-19. They found a positive relationship between discrimination and depressive symptoms at the lower level of social support. In other words, a higher level of social support is a protective factor to negate the harmful impact of discrimination and depression.

Remote Learning

Traditional face-to-face classroom teaching was forced to immediately transition into online learning or remote class on digital platforms and has since become the new normal (Tesar, 2020). Based on the National Center for Education Statistics report, 6,932,074 (or 34.5% of all college students) students enrolled in at least one distance education course at degree-granting postsecondary institutions in 2018. After the pandemic, physical classes at over 300 colleges and universities were suddenly moved online in the United States, impacting millions of students (DePietro, 2020). This unprecedented scale of remote learning resulted in many unforeseen challenges, which include the inexperience of teachers with new technologies, limited time to prepare the online courses, lack of resources to support educational technology, weak online teaching infrastructure, the information gap, and the complex learning environment (Bao, 2020; Ali, 2020)

Armstrong-Mensah (2020) studied how the transition to remote learning during COVID-19 impacted undergraduate and graduate students. They found that faculty activity (e.g., communication of online class, class engagement, faculty accessibility to students) is significantly related to students' learning motivation, but did not find a significant relationship between students learning motivation and academic workload or technology. However, students indicated their workload had increased significantly due to online learning. Yet, the majority of the students (69.9%) preferred the asynchronous approach to online teaching due to its flexibility. Financially, most students (66.1%) indicated that the pandemic had affected them economically.

Huckins et al. (2020) used a longitudinal study to compare the academic terms before and after the COVID-19 pandemic and found that the academic term (i.e., Winter 2020 semester)

affected by COVID-19 exhibited significantly increased sedentary time, depression, and anxiety. Similarly, Tasso, Sahin, and Roman (2021) examined the influence of academic frustrations on college students in the U.S., including changes in teaching methods, workload, course expectations, quality of education, and successful completion of the academic year. Study participants completed the online survey on the Perceived Academic Frustration scale. Results showed that the highest level of academic frustration is significantly associated with an increased workload, the ambiguity of curriculum expectations, poorer quality of education, and worries about completing education. About 85% of the student sample were born in the United States; therefore, this study cannot predict how the challenge of remote learning and academic changes affects international students. No current research addresses the association between COVID-19-induced remote learning and psychological effects among international students.

Residence

There is a limited number of studies on the impact of the place of residence on psychological outcomes among Chinese international students during COVID-19. Song et al. (2020) examined the factors related to post-traumatic stress disorder (PTSD), anxiety, depression, and stress among 261 Chinese international students. The respondents' mental health was assessed by the Depression, Anxiety, and Stress Scale-21 (DASS-21) measure and the Post-Traumatic Stress Disorder Civilian Version (PCL-C). The study compared the psychological states between Chinese international students studying remotely in the U.S. and Chinese international students studying remotely in China. They found the percentages of DASS depression, DASS anxiety, and DASS stress subscale scores of Chinese international students in China were higher than Chinese international students in the U.S., and the percentage of PTSD PCL-C scores of Chinese international students in China were greater than those in the U.S. In

other words, compared with students studying in the U.S, students who returned to China experienced more severe symptoms of anxiety and depression.

On the contrary, Zhao (2020) also compared anxiety, depression, and PTSD between Chinese international students who remained abroad and returned to China. Instead, the results showed that the average score for PTSD among those who stayed in the U.S. was higher than those who returned to China.

Purpose of the Study

The purpose of the study is to better understand the current status of mental health (i.e., anxiety and depression) of Chinese international students during COVID-19 and to find which factors (e.g., place of residence, living with others, social support, academic stress, and economic pressure) are significantly associated with the anxiety and depression symptoms during COVID-19. The results can assist the governments, communities, and universities in developing evidence-based preventive strategies and helping international students cope with anxiety, depression, and stress during this pandemic and for future ones.

Research Questions and Hypotheses

1. What are the levels of anxiety and depression among Chinese international students during COVID-19?
2. Which factors (e.g., place of residence, living with others, social support, academic stress, and economic pressure) strongly predict symptoms of anxiety or depression among Chinese international students during COVID-19?

H₁ At least one of the factors (e.g., place of residence, living with others, social support, academic stress, and economic pressure) has a significant association with symptoms of anxiety or depression among Chinese international students during COVID-19.

H_0 None of the factors (e.g., place of residence, living with others, social support, academic stress, and economic pressure) have a significant association with symptoms of anxiety or depression among Chinese international students during COVID-19.

3. Is there a difference in the level of anxiety between Chinese international students studying in the U.S. and those studying remotely in China?

H_1 There is a significant difference in anxiety between Chinese international students studying in the U.S. and those studying remotely in China.

H_0 There is no difference in anxiety between Chinese international students studying in the U.S. and those studying remotely in China.

4. Is there a difference in the level of depression between Chinese international students studying in the U.S. and those studying remotely in China?

H_1 There is a significant difference in depression between Chinese international students studying in the U.S. and those studying remotely in China.

H_0 There is no difference in depression between Chinese international students studying in the U.S. and those studying remotely in China.

Method

Study Design

A cross-sectional design was used in this study to examine which factors (i.e., place of residence, living with others, social support, academic stress, and economic pressure) are significantly associated with anxiety and depression during COVID-19 among Chinese international students. This study collected the primary data from Chinese international students of three U.S. colleges (two public universities and one private university) through an online survey. The items used to measure anxiety and depression levels are based on the Generalized Anxiety Disorder 2-items (GAD-2) and the Patient Health Questionnaire-2 (PHQ-2) screening tools for anxiety disorders and depressive disorders. Both scales are time-efficient and maintain good sensitivity and specificity for diagnosis.

Participants

The target population for this study was Chinese international students who were, at the time of the survey, enrolled in a college or university in the U.S. The definition of a Chinese international student is a college student whose nationality is Chinese, who has a current F-1 visa and I-20 documents to study in the U.S. The participants came from three public and private colleges and universities across the U.S. Using G*Power Software version 3.1, a medium effect size of 0.20, an alpha level of 0.05, and a power of 0.80, the minimum required sample size was 84 participants. The total number of collected survey responses was 159. However, because students could choose to skip questions or terminate the survey at any time, 30% of the responses contained missing values. After the 59 incomplete responses were removed, 100 complete responses were retained and used in the analysis.

Procedures

The data used in this study was collected using a survey instrument that contains 24 items in four sequential parts. The first part contained questions on student demographic information. The second part contained questions on the perceptions of remote learning. The third part contained questions on perceived social support, and the final part had queries on anxiety and depression levels. Except for the first part, all the other parts of the survey are perception questions that require Likert scale responses. The survey questions were presented in both English and Mandarin languages.

The primary recruitment method was through the WeChat platform, a phone application in which Chinese students actively participate. The online survey link was created by Qualtrics and shared in different WeChat groups where the members are Chinese international students studying in the U.S. or remotely from China at the time of the survey. Although disseminating the survey in these WeChat groups does not require special permission, the hosts or moderators were first informed about the purpose of the survey and its IRB approval. It was made clear that participation in this survey was completely voluntary – a consent form is placed on the first page of the survey, and willing participants would have to agree to the terms and conditions before proceeding to the survey questions. Participants would have to agree to the terms and conditions by checking on the “I agree” box before answering the survey questions. If “I disagree” is checked, the survey would be automatically aborted. This informed consent was presented on the opening page of the survey when a participant clicked on the survey link, which described the general purpose of the study, the confidentiality of response, the time commitment, the risk and benefit of the participation, and the contact information of the principal investigator. The survey

was created on the Qualtrics platform. The survey instrument and study were reviewed and approved by the Institutional Review Board at the California Baptist University in May 2021.

Independent Variables

There are eight independent variables in this study: demographic variables, perceived social support, and perception of remote learning. The self-reported demographics-related independent variables contain age (continuous: numeric values), gender (categorical: male or female), place of residence (categorical: China, U.S., or others), academic standing (categorical: undergraduate, graduate, or others), living with others (categorical: by myself, friends, families, or others), and financial pressure (categorical: difficult, moderately difficult, no difficulty).

The perceived social support was measured by the Multidimensional Scale of Perceived Social Support (MSPSS). It involves subjective assessment of the social support from three specific sources: family, friends, and significant others. Each domain has four items and a total of 12 questions in its original instrumentation. The internal consistencies of each question in each domain are very high (family: $\alpha = .90$, friends: $\alpha = .91$, and significant others: $\alpha = .90$) (Wongpakaran, Wongpakaran, & Ruktrakul, 2011). For this study, however, an abbreviated version of MSPSS was used. It contains two representative questions from each domain, with a total of 6 questions to measure the perceived social support. Each item uses a seven-point Likert-type scale, and the scale ranges from 1, being strongly disagree, to 7, being strongly agree, with a neutral midpoint, being neither agree nor disagree. The total possible score ranges from 6 to 42. Scores within 6-24 indicate low social support, scores within 25-34 indicate moderate social support, and scores within 35-42 indicate high social support (Grey et al., 2020). For the analysis, low, moderate, and increased social support are categorically coded as 1, 2, and 3, respectively.

The perception of remote learning is another independent variable in this study. This composite variable is constructed by averaging the five-point Likert scale values from 6 items. Each item asks about a particular aspect of remote learning experiences students had. For example, participants were asked whether they preferred remote learning over face-to-face classes, whether the content was easier to understand, whether they experienced technique challenges, and whether they had enough resources to succeed. The aim is to measure students' attitudes towards remote learning (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). These items are adapted and revised from the Test of e-Learning Related Attitudes Scale (TeLRA) (Kisanga and Ireson, 2016), which was designed to investigate teachers' attitudes toward e-learning, with a high internal consistency ($\alpha = 0.857$). The perception of remote learning also includes two short-answer questions. One is designed to understand the specific challenges regarding remote learning, and the other is personal suggestions for improving their own remote learning experiences. The responses to these two questions shed light on the online learning experience of the respondents.

All variables are recoded appropriately for the analysis. The categorical variables are female (0 = male, 1 = female), roommate (0 = live alone, 1 = has roommate), academic year (1 = freshman, 2 = sophomore, 3 = junior, 4 = senior, 5 = graduate, 6 = recent graduate), financial difficulty (0 = no difficulty, 1 = has difficulty), residence (0 = China, 1 = U.S.), and social support (1 = low, 2 = moderate, 3 = high). The continuous variables are age and remote learning (1-5).

Dependent Variables

The dependent variables for this study are anxiety and depression levels. Anxiety level was measured by the Generalized Anxiety Disorder (GAD-2). GAD-2 is a self-report tool for

screening, diagnosing, and assessing the severity of anxiety disorders. The participants were asked to use a four-point Likert scale ranging from 0 to 3 to rate the frequency of anxiety symptoms in the last two weeks (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day). The two items are then added to result in a total score ranging from 0 to 6. Its cutoff value is 3, meaning that any value at 3 or above signifies possible cases of a clinically significant anxiety disorder (Plummer, Manea, Trepel, & McMillan, 2016).

Depression was measured by the Patient Health Questionnaire-2 (PHQ-2), a two-item depression self-reporting instrument. It is the short version of the Patient Health Questionnaire-9 (PHQ-9). PHQ-2's test-retest reliability within two weeks is 0.70, and Cronbach's α is 0.76 (Yu, Stewart, Wong, & Lam, 2011). PHQ-2 is an effective instrument for detecting depression, with a sensitivity of 83% and a specificity of 92% (McManus et al., 2005). Each item of PHQ-2 uses the same four-point Likert scale as the GAD-2, and the calculation and cutoff value are the same. This means that a score of 3 or higher would indicate possible cases of major depressive disorder (Kroenke, Spitzer, & Williams, 2003).

Data Analysis

The appropriate statistical analyses were chosen to answer the proposed research questions. The first research question only requires basic descriptive analysis. To answer the second and third research questions, a multiple linear regression was performed to determine how the independent variables were associated with anxiety or depression among Chinese international students during the COVID-19 pandemic. The full regression model specifications are as follows:

$$Anxiety_i \text{ or } Depression_i = b_0 + b_1Female_i + b_2Age_i + b_3Academic_year_i + b_4Roommate_i + b_5Financial_difficulty_i + b_6Residence_i + b_7Remote_learning_i + b_8Social_support_i + e_i \quad (1)$$

The goal here is to examine the factors of interest (i.e., country of residence, roommate, financial pressure, remote learning, and social support) that strongly predict the levels of anxiety or depression after controlling for student demographic characteristics (i.e., age, gender, academic year). Each regression coefficient and corresponding P values were examined to determine the strongest predictors.

To answer the fourth research question, an independent samples T-test was conducted to determine whether a different level of anxiety or depression existed between Chinese international students studying in the U.S and those studying remotely in China. All statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) 25.0 statistical software (SPSS Inc., Chicago, IL, USA).

Results

Demographics

The primary data of this study was collected in 2021. The study aims to determine which factors (e.g., place of residence, living with others, social support, academic stress, and economic pressure) are significantly associated with the anxiety and depression symptoms during COVID-19. The target population for this study was Chinese international students enrolled in a college or university in the U.S. at the time of the survey. Table 1 provides the demographic details for the study participants. Among the participants (n=100), forty-six percent were male, and fifty-four percent were female college students. Forty percent were undergraduate students, and forty-six percent were graduates. Sixty-three percent of the students were 25 years old or younger. Most (70%) of the participant indicated they lived with a roommate (parent, spouse, friend, etc.). The majority (78%) of the participants were living in the U.S., and thirty-two percent indicated they were experiencing financial difficulty (see Table 1).

Table 1. Demographic Summary Statistics of the Survey Sample (n = 100)

Variable	N	%
Gender		
Female	54	54%
Male	46	46%
Age		
18 - 25	63	63%
26 and older	37	37%
Academic year		
Freshman	6	6%
Sophomore	11	11%
Junior	8	8%
Senior	15	15%
Graduate	46	46%
Recent graduates	14	14%
Country of Residence		
China	22	22%
U.S.	78	78%
Living		
Parent	20	20%
Spouse	14	14%
Friend/roommate	33	33%
Landlord	3	3%
By myself	29	29%
Other	1	1%
Finance		
Has financial difficulty	32	32%
Does not have difficulty	68	68%

Note. N = total number, % = valid percent

Major Findings

To answer the first research question, what are the levels of anxiety and depression among Chinese international students during COVID-19, a descriptive analysis was done on the anxiety and depression scores. The average score of anxiety of the sample is 2.68, which is below the cutoff value of 3. This means, on average, the Chinese international students in the sample would not be considered as having clinically significant anxiety symptoms. Similarly, the average score for depression is 2.44, which is below the cutoff value of 3. This implies that, on average, the sample does not show clinically significant depression symptoms (see Table 2). However, 37% of the participants had an anxiety score above 3, and 42% had a depression score over 3.

Table 2. Average Score of Anxiety and Depression for Students during COVID-19 (n=100)

Variable	N	Mean	Std. Dev.	Min	Max
Anxiety	100	2.68	1.69	0	6
Depression	100	2.44	1.83	0	6

The correlation coefficient matrix shows that anxiety is significantly correlated with depression ($p = 0.69$). Factors such as gender, age, country of residence, and having a roommate are not significantly associated with anxiety and depression. On the other hand, financial difficulty, academic year, remote learning satisfaction, and social support are significantly associated with anxiety and depression.

Table 3. Pairwise correlations of the variables (n = 100)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Anxiety	1.00									
(2) Depression	0.69*	1.00								
(3) Female	-0.02	-0.02	1.00							
(4) Age	-0.16	-0.07	-0.10	1.00						
(5) Residence: US	0.01	-0.03	-0.01	0.15	1.00					
(6) Roommate	0.04	0.00	-0.15	0.12	-0.23*	1.00				
(7) Financial difficulty	0.26*	0.22*	0.03	-0.06	0.05	-0.03	1.00			
(8) Academic year	-0.31*	-0.23*	-0.06	0.58*	0.32*	0.05	-0.17	1.00		
(9) Remote learning	-0.22*	-0.34*	-0.13	0.13	0.06	0.22*	-0.10	0.15	1.00	
(10) Social support	-0.15	-0.31*	0.20	-0.17	0.02	-0.17	-0.13	0.10	0.24*	1.00

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

To answer the second research question, which factors (e.g., place of residence, living with others, social support, academic stress, and economic pressure) strongly predict symptoms of anxiety or depression among Chinese international students during COVID-19, a multiple linear regression was used to assess whether age, gender, academic standing, residence, roommate, financial status, social support, or remote learning satisfaction would significantly predict the score for anxiety or depression. First, regressing anxiety on these factors, the significant overall F-test indicates that at least one of the predictors is significantly associated with anxiety ($F(8, 90) = 2.33$, $p = 0.03$, $R^2 = 0.17$), and these variables all together explain about 17.2% of the variations in the anxiety levels. It was found that financial difficulty significantly predicted the level of anxiety ($\beta = 0.22$, $t = 2.14$, $p = 0.04$). This means that having financial difficulty would increase anxiety score by 0.22 on average. However, the model did not find any significant association between anxiety and remote learning, social support, gender, age, residence, roommate, and academic year (see Table 4).

Second, regressing depression on the predictors, the significant overall F-test indicates that at least one predictor is significantly associated with depression ($F(8, 90) = 3.48, p = 0.002, R^2 = 0.24$). The predictors explained 23.7% of the variations in depression. It was found that remote learning ($\beta = -1.01, t = -2.34, p = 0.02$), social support ($\beta = -0.60, t = -2.50, p = 0.01$), and financial difficulty ($\beta = 0.21, t = 2.16, p = 0.03$) significantly predict level of depression. This means the higher the satisfaction with remote learning, the lower the depression level. Specifically, a one-unit increase in satisfaction with remote learning is associated with a one-point decrease in depression score on average, all else being equal. Similarly, a one-unit increase in the perceived social support is associated with 0.60-point decrease in depression score on average. On the other hand, having financial difficulty would increase depression score by 0.21 on average. The rest of the factors did not significantly predict the level of depression (see Table 4).

Table 4. Results from Multiple Linear Regression for Anxiety or Depression Scores among International Students during COVID-19 (n = 99)

VARIABLES	(1) Anxiety	(2) Depression
Female	-0.06 (0.41)	-0.23 (0.44)
Age	0.04 (0.10)	0.09 (0.09)
Residence: US	0.48 (0.53)	0.12 (0.59)
Roommate	0.50 (0.50)	0.44 (0.50)
Financial difficulty	0.22* (0.10)	0.21* (0.10)
Academic year	-0.42 (0.22)	-0.31 (0.24)
Remote learning	-0.61 (0.39)	-1.01* (0.43)
Social support	-0.06 (0.31)	-0.60* (0.24)
Constant	4.54* (2.00)	5.10* (2.15)
N	99	99
adj. R ²	0.17	0.24

Note: Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To answer the third and fourth research questions, an independent sample T-test was conducted to determine whether a different level of anxiety or depression existed between Chinese international students studying in the U.S and those studying remotely in China. There was no significant difference ($t = -0.14$, $p = 0.89$) in the level of anxiety between those studying in the U.S. ($M = 2.69$, $SD = 1.62$) and those studying remotely in China ($M = 2.64$, $SD = 1.97$). Likewise, there was no significant difference ($t = 0.31$, $p = 0.76$) in the level of depression between Chinese international students studying in the U.S ($M = 2.41$, $SD = 1.78$) and those studying remotely in China ($M = 2.55$, $SD = 2.04$).

Discussion

Summary of Major Findings

The purpose of this study is to examine the factors that are significantly associated with anxiety and depression in Chinese international students during the COVID-19 pandemic. The results for the first research question show that the overall average anxiety (2.68) and depression scores (2.44) of our analytic sample do not meet the cutoff value of 3 for the clinically significant anxiety or depression symptoms according to PHQ-2 and GAD-2. However, 37% of the participants had anxiety, and 42% had depression among the analytic sample. This shows that there were still a sizeable number of students experiencing mental health challenges during the time of the survey.

Three major findings can be drawn from the results for the second research question. First, depression and anxiety are significantly associated with financial stress. The positive relationship between depression or anxiety and financial stress implies that the higher the financial stress, the higher the anxiety or depression. This result is consistent with Song et al.'s (2020) findings, which reported that international students with financial stress reported higher levels of depression and anxiety when compared with those without financial stress. They concluded that limited financial support might be one of the most anxiety-inducing factors for international students. Zhao's (2020) study also found that international students are more likely to experience anxiety in comparison to domestic students, and financial stress is one of the key factors that contributed to their anxiety. Han et al. (2013) showed that financial support can help maintain students' mental health. It is important to note that international students are often fully funded by family income; for example, Lian (2017) showed that 84% of international students obtain financial support from their families. This suggests that the COVID-19 pandemic only

exacerbates the problem by causing financial insecurities to families and thus an immediate detrimental effect on international students' mental health.

Second, there is a significant negative relationship between depression and social support. This means that as social support increases, depression level decreases ($\beta = -0.60$, $p = 0.01$). Interestingly, while the relationship between anxiety and social support is also negative, such a relationship is not significant and has a very small effect size ($\beta = -0.06$, $p = 0.85$). This could be explained by the distinctive nature between anxiety and depression — for instance, anxiety is more closely characterized as “worry” in GAD-2, while depression is characterized as “sadness or hopelessness” in PHQ-2. It is reasonable to conclude that social support from families and friends may effectively alleviate the feeling of sadness or hopelessness, but the feeling of worry may not easily go away while the pandemic is still ongoing. These results are consistent with the literature, suggesting that social support is a protective factor in preventing or reducing depression (Rankin et al., 2018; Yasin et al., 2010; Grey et al., 2020; and Ma et al., 2020). For example, according to Rankin et al. (2018), when the discrepancy between support needed and support received becomes larger, more depressive symptoms appear. Grey and colleagues (2020) found that people who receive more social support have a 63% lower risk of depression. Ma et al. (2020) reported that individuals with low perceived social support are 4.84-5.98 times more likely to have symptoms of anxiety and depression than individuals with high perceived social support.

Third, there is a significant negative association between depression and remote learning satisfaction — as remote learning satisfaction increased, depression level decreased. However, such an association was not effective for anxiety. One explanation could be since international students had been learning remotely for over a year at the time of the survey, students who were

in constant frustration with the process of remote learning would be more likely to find themselves in a state of depression (or hopelessness) than anxiety (or worry). This finding is similar to Tasso et al. (2021), which found a significant relationship between mental health symptoms and concerns about course changes. Their analyses revealed a positive relationship between anxiety or depression and academic frustrations, which include changes in teaching methods, workload, curriculum expectations, educational quality, and successful completion of the school year (Tasso et al., 2021).

To further investigate the dissatisfactions with remote learning, the survey participants were asked to write down the most challenging aspects of remote learning. The most frequent challenges reported included the lack of concentration in class (or easy distractions), the absence of interactions and communication in class, the challenge of time zone differences (having classes at midnight), and technological issues (e.g., internet connection problems and difficulties accessing class materials). When asked about the changes they would make to remote learning, the participants' top suggestions include more class interaction and communication, more study groups, an open webcam policy (i.e., students must turn on their webcams), more readily accessible technological support, and more online studying resources. Given remote learning is here to stay as COVID-19 remains an ongoing presence across the world, these challenges and suggestions could serve as important and practical considerations for the future development and implementation of remote classes.

Finally, the results from the third and fourth research questions show no significant association between the country of residence and psychological symptoms (depression or anxiety). This means that the anxiety and depression levels between international students who stayed behind in the U.S. and those who returned to their home country (i.e., China) are

statistically indistinguishable. This finding is inconsistent with research from Song et al. (2020) and Zhao (2020). Song et al. (2020) found that Chinese international students who studied remotely in China scored higher on depression, anxiety, and stress than Chinese students in the United States. Zhao (2020) found that the average score of PTSD (a form of anxiety disorder) of those who stayed in the United States is higher than those who returned to China. One plausible explanation for our finding is that COVID-19 is a global pandemic that affects both U.S. and China. The cultural and political differences in the two countries' COVID-19 prevention strategies and policies, result in students facing different psychological impacts. For example, international students who returned to China could suffer from a long-term sleep disorder, undergo constant scrutiny because of their international traveling status, and experience heavy surveillance under the strict “zero-covid” policy. On the other hand, international students who stayed behind in the U.S. could suffer from loneliness, financial and housing insecurities, and the constant fear of catching the virus. Therefore, the psychological impact of COVID-19 may be difficult to distinguish between the two countries.

Public Health Implications

The study results indicated that an increase in social support and remote learning satisfaction could help international students lessen depression, and reducing financial difficulties could reduce both anxiety and depression. Based on these findings, we proposed some recommendations. First, university campuses should develop effective procedures to monitor the mental health of students closely, for example, through weekly text messages or email surveys. Second, universities should make the information about accessing counseling services readily available to students and promote the use of counseling services. Because of cultural perception, many Chinese international students may feel afraid of being stigmatized as

“weak” when considering whether to use counseling services. Therefore, information sessions about the benefits of counseling services should be made mandatory for international students. Third, academic advisors should be trained and actively participate in monitoring the mental health of students since they meet with students regularly -- academic advisors can quickly refer students to counseling services when signs of mental health problems are identified. Fourth, to improve social support for international students, designated offices (e.g., student affairs, international center, and student health center) should encourage students to build strong support networks to better navigate the experience of being an international student. This could include department-hosted social events such as game nights or movie nights.

At the individual level, international students should also reconsider whether continuing their enrollment in the U.S. or remotely in China is feasible given the circumstances under COVID-19. Given the change in the instructional modalities, students can weigh the options between continuing education and taking a gap year. As the findings suggest, remote learning may not be suitable for everyone. At the institutional level, there should be a comprehensive college readiness assessment for international students applying or matriculating into college in the U.S. Historically, cognitive skills such as SAT and high school GPA are the main factors colleges consider for qualification. However, non-cognitive skills such as self-efficacy, effort, and motivation are equally important factors for international students to succeed. Such an assessment can serve as a qualification or an early warning indicator to help students succeed.

Unavoidably, the COVID-19 pandemic brought changes to the delivery of academic programming. Therefore, university institutions should provide adequate training for both synchronous and asynchronous online course formats for professors and instructors. The purpose of this training should center on using creative ways to foster effective communication, class

interaction, and student engagement. For example, instructors could integrate tools including Zoom breakout rooms, Google Jamboard, Kahoot, Poll Everywhere, and PlayPosit to improve student engagement and the learning experience. For remote learning, instructors could impose an “open webcam” policy so that students will need to engage with everyone in the class, which may help students improve their concentration. Finally, universities can offer more technological supports, such as 24/7 live chat tech support, to quickly resolve learning interruptions (Morgan, 2020).

In terms of financial support, universities should provide need-based financial aid or relief funds to ease the financial stress of tuition fees and living expenses for international students, which are usually unavailable to them. Universities could reserve specific on-campus jobs (e.g., translator, language partner, etc) for international students, which would relieve financial pressure and help them connect with other students on campus.

Study Limitations

This research study has several limitations. The first limitation of this study is sample selection. Since only Chinese international students were selected as participants, the findings may not generalize to all international students. The second limitation is the bias of recall and self-report. The survey asked participants about their mental state (anxiety and depression) in the past two weeks, which the respondents may have underestimated or overestimated. Lastly, this study is limited by its cross-sectional design. The cross-sectional study design can only compare different population groups at one single point in time and is correlational by nature. As the pandemic progresses, the anxiety and depression of these international students may change. Therefore, if a longitudinal design is applied, this study may reveal more insightful results due to its nature of multiple observations of the same participants during or after the pandemic.

Compared to the cross-sectional study design, the longitudinal research design can better observe which factors significantly affect anxiety and depression among students over the long-term.

Conclusion

Our study found that factors of social support, remote learning satisfaction, and financial difficulties are the most significant predictors of anxiety and depression in Chinese international students during the COVID-19 pandemic. Based on this discovery, I suggested multiple strategies and recommendations to address these areas. Future studies should continue to explore the factors that are significantly associated with the psychological conditions of international students during the COVID-19 pandemic.

References

- Ahmad, M., Md Din, N. S. B., Tharumalay, R. D., Che Din, N., Ibrahim, N., Amit, N., Farah, N. M., Osman, R. A., Abdul Hamid, M. F., Ibrahim, I. A., Jamsari, E. A., Palil, M. R., & Ahmad, S. (2020). The Effects of Circadian Rhythm Disruption on Mental Health and Physiological Responses among Shift Workers and General Population. *International Journal of Environmental Research and Public Health*, 17(19). <https://doi-org.libproxy.calbaptist.edu/10.3390/ijerph17197156>
- Armstrong-Mensah, E., Ramsey-White, K., Yankey, B., & Self-Brown, S. (2020). COVID-19 and Distance Learning: Effects on Georgia State University School of Public Health Students. *Frontiers in Public Health*, 8, 547.
- Ahmmed, S. U., & Maria, A. N. (2020). Graduating into a Pandemic: Exploring the Factors Influencing the Anxiety Level of the University Finalists. *Shanlax International Journal of Education*, 9(1), 68–75.
- Aida Kalok, Shalisah Sharip, Abdul Muzhill Abdul Hafizz, Zulkifli Md Zainuddin, & Mohamad Nasir Shafiee. (2020). The Psychological Impact of Movement Restriction during the COVID-19 Outbreak on Clinical Undergraduates: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, 17(8522), 8522. <https://doi-org.libproxy.calbaptist.edu/10.3390/ijerph17228522>
- Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic. *Higher Education Studies*, 10(3), 16-25.
- Bijia Song, Yilin Zhao, & Junchao Zhu. (2020). COVID-19-related Traumatic Effects and Psychological Reactions among International Students. *Journal of Epidemiology and Global Health*, 11(1). <https://doi-org.libproxy.calbaptist.edu/10.2991/jegh.k.201016.001>

- Bansal, A., Bhardwaj, A., & Sharma, A. (2020). Forecasting the Trend of Covid-19 Epidemic. 2020 Sixth International Conference on Parallel, Distributed and Grid Computing (PDGC), Parallel, Distributed and Grid Computing (PDGC), 2020 Sixth International Conference On, 406–409. <https://doi-org.libproxy.calbaptist.edu/10.1109/PDGC50313.2020.9315795>
- Bao, W. (2020). Covid-19 and online teaching in higher education: A case study of Peking University. *Human Behavior and Emerging Technologies*, 2(2), 113–115.
- Bansal, A., Bhardwaj, A., & Sharma, A. (2020). Forecasting the Trend of Covid-19 Epidemic. 2020 Sixth International Conference on Parallel, Distributed and Grid Computing (PDGC), Parallel, Distributed and Grid Computing (PDGC), 2020 Sixth International Conference On, 406–409. <https://doi-org.libproxy.calbaptist.edu/10.1109/PDGC50313.2020.9315795>
- Bhochhibhoya, A., Dong, Y., & Branscum, P. (2017). Sources of social support among international college students in the United States. *Journal of International Students*, 7(3), 671-686.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287. <https://doi-org.libproxy.calbaptist.edu/10.1016/j.psychres.2020.112934>
- Center for Collegiate Mental Health. (2016). Center for Collegiate Mental Health (CCMH) 2015 annual report: Publication No. STA 15–108 (ED572760). ERIC. Retrieved from <https://eric.ed.gov/?id=ED572760>
- DePietro A. Here's a Look at the Impact of Coronavirus (COVID-19) on Colleges and Universities in the U.S. (2020). Retrieved

from: <https://www.forbes.com/sites/andrewdepietro/2020/04/30/impact-coronavirus-covid-19-colleges-universities/#6ecab23661a6>

- Grey, I., Arora, T., Thomas, J., Saneh, A., Tohme, P., & Abi-Habib, R. (2020). The role of perceived social support on depression and sleep during the COVID-19 pandemic. *Psychiatry Research*, 293, 113452.
- Heaney, C. A., & Israel, B. A. (2008). Social networks and social support. *Health behavior and health education: Theory, research, and practice*, 4, 189-210.
- Huckins, J. F., DaSilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., ... & Campbell, A. T. (2020). Mental health and behavior of college students during the early phases of the COVID-19 pandemic: longitudinal smartphone and ecological momentary assessment study. *Journal of medical Internet research*, 22(6), e20185.
- Kaplan, A. M., & Haenlein, M. (2016). Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. *Business Horizons*, 59(4), 441-450.
- Langford, C. P. H., Bowsher, J., Maloney, J. P., & Lillis, P. P. (1997). Social support: a conceptual analysis. *Journal of advanced nursing*, 25(1), 95-100.
- Lian, Z. (2018). Predictors of depression/anxiety, mental health service utilization, and help-seeking for Chinese international students: Role of acculturation, microaggressions, social Support, Coping Self-Efficacy, Stigma, and College Staffs' Cultural Competence and Cultural Humility [ProQuest Information & Learning]. In *Dissertation Abstracts International Section A: Humanities and Social Sciences* (Vol. 78, Issue 12–A(E)).
- Lederer, A. M., Hoban, M. T., Lipson, S. K., Zhou, S., & Eisenberg, D. (2021). More Than Inconvenienced: The Unique Needs of U.S. College Students During the COVID-19

- Pandemic. *Health Education & Behavior*, 48(1), 14–19. <https://doi-org.libproxy.calbaptist.edu/10.1177/1090198120969372>
- Li, W., Yang, Y., Liu, Z.-H., Zhao, Y.-J., Zhang, Q., Zhang, L., Cheung, T., & Xiang, Y.-T. (2020). Progression of Mental Health Services during the COVID-19 Outbreak in China. *International Journal of Biological Sciences*, 16(10), 1732–1738. <https://doi-org.libproxy.calbaptist.edu/10.7150/ijbs.45120>
- Lee, S., & Waters, S. F. (2020). Asians and Asian Americans' experiences of racial discrimination during the COVID-19 pandemic: Impacts on health outcomes and the buffering role of social support. *Stigma and Health*.
- Ma, Z., Zhao, J., Li, Y., Chen, D., Wang, T., Zhang, Z., Chen, Z., Yu, Q., Jiang, J., Fan, F., & Liu, X. (2020). Mental health problems and correlates among 746 217 college students during the coronavirus disease 2019 outbreak in China. *Epidemiology and Psychiatric Sciences*, 29, e181. <https://doi-org.libproxy.calbaptist.edu/10.1017/S2045796020000931>
- Miki, T., Yamamoto, S., Inoue, Y., Fukunaga, A., Islam, Z., Ishiwari, H., Ishii, M., Miyo, K., Konishi, M., Ohmagari, N., & Mizoue, T. (2021). Association between living with others and depressive symptoms in Japanese hospital workers during the COVID-19 pandemic. *Psychiatry and Clinical Neurosciences*, 75(4), 148–149. <https://doi-org.libproxy.calbaptist.edu/10.1111/pcn.13206>
- Rankin, J. A., Paisley, C. A., Mulla, M. M., & Tomeny, T. S. (2018). Unmet Social Support Needs Among College Students: Relations Between Social Support Discrepancy and Depressive and Anxiety Symptoms. *Journal of Counseling Psychology*, 4, 474.

- Saracino, R., Kolva, E., Rosenfeld, B., & Breitbart, W. (2015). Measuring social support in patients with advanced medical illnesses: An analysis of the Duke–UNC Functional Social Support Questionnaire. *Palliative and Supportive Care*, 13(05), 1153–1163.
- Song, B., Zhao, Y., & Zhu, J. (2021). COVID-19-related traumatic effects and psychological reactions among international students. *Journal of Epidemiology and Global Health*, 11(1), 117.
- Tesar, M. (2020). Towards a post-Covid-19 ‘new normality?’: Physical and social distancing, the move to online and higher education. *Policy Futures in Education*, 18(5), 556–559. <https://doi.org/10.1177/1478210320935671>.
- Tasso, A. F., Hisli Sahin, N., & San Roman, G. J. (2021). COVID-19 disruption on college students: Academic and socioemotional implications. *Psychological Trauma: Theory, Research, Practice, and Policy*, 13(1), 9.
- Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., & Sasangohar, F. (2020). Investigating Mental Health of U.S. College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study. *Journal of Medical Internet Research*, 22(9), e22817. <https://doi.org.libproxy.calbaptist.edu/10.2196/22817>
- Wills, T.A. (1991). Margaret, Clark (ed.). "Social support and interpersonal relationships." *Prosocial Behavior, Review of Personality and Social Psychology*. 12: 265–289.
- World Health Organization. (2020). Pneumonia of unknown cause – China. Retrieved from: <https://www.who.int/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/>
- Worldometer. (2021). COVID-19 Coronavirus Pandemic. Retrieved from: https://www.worldometers.info/coronavirus/?utm_campaign=homeAdvegas1?%22

- Yilin Zhao. (2020). Psychological Impacts of the COVID-19 Outbreak on Chinese International Students: Examining Prevalence and Associated Factors. *World Journal of Educational Research*, 2333-5998. <https://www.scholink.org/ojs/index.php/wjer>
- Yasin, A. S., & Dzulkifli, M. A. (2010). The relationship between social support and psychological problems among students. *International Journal of Business and Social Science*, 1(3).
- Zhao, Y. (2020). Original Paper Psychological Impacts of the COVID-19 Outbreak on Chinese International Students: Examining Prevalence and Associated Factors. *World*, 7(3).