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Master Thesis

在臺之國際學生於新冠肺炎大流行期間的心理健康與相關因素

Mental Health and Associated Factors in International Students in Taiwan During the COVID-19 Pandemic

蘇念柔

Claire Su

指導教授：張書森 博士

Advisor: Shu-Sen Chang, MD, MSc, PhD

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本論文係 MEN-JUN CLAIRE SU 許 (學號 R10853004) 在國立臺灣大學全球衛生碩士學位學程完成之碩士學位論文，於民國 2023 年 05 月 08 日承下列考試委員審查通過及口試及格，特此證明。

This Thesis is written by MEN-JUN CLAIRE SU (R10853004) studying in the graduate program in the Global Health Program. The author of this thesis is qualified for a master's degree through the verification of the committee.

張書喬 (指導教授簽名Advisor Signature)

口試委員 Committee Members:

李[illegible] 乾依蓁

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Abstract & Keywords (Chinese)

背景

COVID-19 大流行對全球心理健康產生了負面影響，原因包括了它可能對身體健康造成影響，遏制病毒傳播的措施會對日常生活造成干擾，以及流行本身的社會經濟效果。 學者已經在不同人群中研究了大流行對心理健康的影響，但在國際學生中的研究相對較少，然而，國際學生同時面臨著 COVID-19 與文化適應的壓力。

目標

本研究旨在探究 COVID-19 大流行期間臺灣國際學生各種心理健康後果的發生率和潛在影響因素。

方法

本研究使用橫斷面的線上匿名調查，調查時間為 2022 年 7 月至 2023 年 4 月，調查內容包括人口學變項、大學相關變項、社會經濟變項、COVID-19 相關變項，和移民相關變項。 心理健康方面則使用世界衛生組織幸福指數(WHO-5)來測量心理健康，使用病人健康問卷-2 (PHQ-2) 測量可能的憂鬱症，使用廣泛性焦慮障礙量表-2 (GAD-2) 測量可能的焦慮症，以及感知壓力量表-4 (PSS-4)測量感知壓力。COVID-19 壓力量表、國際學生文化適應壓力量表 (ASSIS)、與感知社會支持多維量表 (MSPSS)的修改版則分別用於測量 COVID-19 相關

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壓力、文化適應壓力，與社會支持。 最後，調查也包括與心理健康資源需求相關的問題，並使用開放性問題來了解導致壓力的其他因素，以及機構的心理健康支持服務可以如何改善。 T 檢驗和變異數分析用於比較組間的心理健康評分。 採用卡方檢定比較心理健康不良（WHO-5 總分<13）、可能憂鬱（PHQ-2 總分≥3）、可能焦慮（GAD-2 總分≥3）和高感知壓力（PSS-4 總分≥16）的組間差異。 我們使用線性回歸研究 WHO-5 和 PSS-4 之相關因素，以及使用羅吉斯回歸來研究心理健康不佳、可能憂鬱和焦慮，以及高感知壓力的風險因素。

結果

在 427 名國際學生的樣本中，心理健康狀況不佳 (44.28%)、可能憂鬱 (24.59%) 和焦慮 (37.70%)，以及高感知壓力 (80.09%) 的情形相當常見。COVID-19 壓力與感知壓力呈正相關（校正後的勝算比 [aOR] = 1.02）。COVID-19 壓力大的人患憂鬱症（aOR = 1.36）和焦慮症（aOR = 2.06）的風險也較高。高文化適應壓力是心理健康不佳（aOR = 3.34）和可能出現憂鬱症（aOR = 2.96）和焦慮症（aOR = 3.08）的危險因素。 社會支持與良好的心理健康（調整後的 Beta [aB] = 0.20）和感知壓力（aB = 0.20）呈正相關，而與心理健康狀況不佳（aOR = 0.92）、可能憂鬱（aOR = 0.95）和可能焦慮（aOR = 0.96）呈現負相關。 大約 30% 的國際學生不知道他們可以獲得任何心理健康服務。 學生們還回覆說需要增

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加獲得心理健康服務的機會（特別是面對面的諮詢）、心理健康促進活動（例如瑜伽和冥想），以及校外心理健康治療的補助。

結論

本研究表明，文化適應壓力和低社會支持是疫情期間國際學生心理健康狀況不佳的重要危險因素。 大學應該了解這一群體的心理健康狀況和需求，並為他們提供信息和語言友好服務，以改善心理健康。

關鍵詞

心理健康、COVID-19 大流行、國際學生、焦慮、壓力、抑鬱、文化適應壓力、社會支持、心理健康資源、心理健康支持、幸福感、尋求幫助

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Abstract & Keywords (English)

Background

The COVID-19 pandemic had an adverse effect on global mental health because of its physical health implications, the disruptions on daily life in an effort to curb its spread, and the socioeconomic consequences. The pandemic's effect on mental health was researched in various populations, but less so in international students, a group that faced stress associated with both the COVID-19 and acculturation.

Objectives

This study aimed to investigate the prevalence of various mental health outcomes and potential contributing factors among international students in Taiwan during the COVID-19 pandemic.

Methods

This study utilized a cross-sectional, online, anonymous survey conducted in English from July 2022 – April 2023. Survey questions included demographic variables, university-related variables, socioeconomic variables, COVID-19 related variables, and migration-related variables. Mental health outcomes were measured using the World Health Organization Well-Being Index (WHO-5) for mental wellbeing, the Patient Health Questionnaire-2 (PHQ-2) for possible depression, the Generalized Anxiety Disorder Scale-2 (GAD-2) for possible anxiety, and the Perceived Stress Scale-4 (PSS-4) for perceived stress. The modified versions of the COVID-19 Stressor Scale, the Acculturative Stress Scale for International Students (ASSIS), and the Multidimensional Scale of Perceived

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Social Support (MSPSS) were used to measure COVID-19 stress, acculturative stress, and social support, respectively. Finally, questions related to mental health resource need and open-ended questions about other factors contributing to stress and how institutional mental health support could be improved were included. T test and ANOVA were used to compare the means of the mental health scores across groups. Chi-square test was used to compare the prevalence of poor mental health (WHO-5 total score < 13), possible depression (PHQ-2 total score ≥ 3), possible anxiety (GAD-2 total score ≥ 3), and high perceived stress (PSS-4 total score ≥ 16) across groups. Linear regression was used to study factors associated with the WHO-5 and PSS-4. Logistic regression was used to study factors associated with the risk of poor mental health, possible depression and anxiety, and high perceived stress.

Results

There were relatively high levels of poor mental health (44.28%), possible depression (24.59%) and anxiety (37.70%), and perceived stress (80.09%) in our sample of 427 international students in Taiwan. COVID-19 stress was positively correlated with perceived stress (adjusted odds ratio [aOR] = 1.02). Those with high COVID-19 stress were also at a higher risk of possible depression (adjusted odds ratio [aOR] = 1.36) and anxiety (adjusted odds ratio [aOR] = 2.06). High acculturative stress was associated with poor mental health (aOR = 3.34) and possible depression (aOR = 2.96) and anxiety (aOR = 3.08). Social support was positively correlated with good mental health (adjusted Beta [aB] = 0.20) and perceived stress (aB = 0.20) while negatively associated with poor mental wellbeing (aOR = 0.92) or possible depression (aOR = 0.95) and anxiety (aOR = 0.96). Approximately 30% of international students did not know about any mental health services available to them.

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The students also reported needs for increased access to mental health services (specifically face-to-face counseling), mental health promoting activities (e.g., yoga and meditation), and reimbursements for mental health treatments off-campus.

Conclusion

This study showed that acculturative stress and low social support were important risk factors of poor mental health in international students during the pandemic. The universities should become aware of the mental health situation and need in this group and provide them with information and access to language-friendly services to improve mental wellbeing.

Keywords

Mental health, COVID-19 pandemic, international student, anxiety, stress, depression, acculturative stress, social support, mental health resource, mental health support, well-being, help-seeking

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Background

Taiwan has been an increasingly popular destination for international students to pursue higher education. In 2018, Taiwan's Ministry of Education (MOE) reported 126,997 international university students, a 4.6% increase from 2017, which saw 121,000 international degree students (MOE, 2019). This number decreased to 93,706 in 2021 (MOE, 2022), due to the disruption that the COVID-19 pandemic caused. However, even with the decrease from previous years, this is still a sizable population and numbers are rising again as borders continue to open, with 104,011 international students in Taiwan in 2022 (MOE, 2023). According to the Ministry of Justice (MOJ) regulations, international students have to hold an alien resident certificate from Taiwan and stay in the country for more than six months to be eligible for the country's National Health Insurance (NHI) (MOJ, 1995).

At the beginning of the COVID-19 pandemic, Taiwan had been relatively successful in keeping COVID-19 cases and community transmission extremely low through tight border control and 2-week quarantine measures. Taiwan experienced its first spike in May of 2021 (CDC, 2022), with the government instituting a nationwide Level 3 alert. The pandemic was swiftly brought under control in the following months. Taiwan had its second, more serious spike, reaching tens of thousands of new cases a day (CDC, 2022). However, the Taiwanese government did not raise the alert for this peak, and has gradually released restrictions regarding outdoor and indoor masking (CDC, 2023a) and discontinuing isolation for mild cases (CDC, 2023b).

As the world continues through the second year of the COVID-19 pandemic, one can clearly see the severe negative impact it has had on everyone's lives. Not only have

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people's physical health and livelihood been affected, but the pandemic has also caused a huge decline in mental health. Even without the pressures of the pandemic, international students already have a multitude of stressors that can be detrimental to their mental health. Their mental health status is only exacerbated with the added stress that the pandemic brings. Having experienced the two extremes of the COVID-19 pandemic, Taiwan poses a unique context for its international students.

The COVID-19 Pandemic and Mental Health

The COVID-19 pandemic has forced many significant lifestyle changes, all of which play a role in one's mental health. There have been many studies conducted on how the pandemic has influenced the mental health of the general public. Santomauro et al. (2021) performed a meta-analysis of the global prevalence and burden of depressive and anxiety disorders in 204 countries and found that after the start of the pandemic, major depression disorders increased by 27.6% and anxiety increased by 25.6%, while psychological well-being significantly decreased, resulting in an additional 93.9 million Disability-Adjusted Life Years (DALYs) (Santomauro et al., 2021). There are also generally high levels of anxiety, depression, PTSD, psychological distress, and stress among the global population (Vindegaard & Benros, 2020). Though Taiwan had an initially low exposure to COVID-19, 50% of participants reported at least one COVID-19 stressor, which was significantly associated with suicidality, loneliness, and self-efficacy (Wu et al., 2022).

There are a variety of risk factors and covariates that are associated with these increased levels of mental health issues. Females, younger people, and countries greatly affected by COVID-19 (with many being low- and middle-income countries [LMIC]) were more

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affected (Santomauro et al., 2021). Risk factors included loneliness, psychological distress, lifetime suicide ideation, and self-efficacy (Wu et al., 2022). Risk perception regarding COVID-19 was found to be positively related to levels of perceived stress, anxiety, and depression, with perceived stress as a potential mediator (Li & Lyu, 2021).

There has also been abundant research examining the mental health of specific populations. Healthcare workers (HCW) have the added responsibility of treating COVID-19 patients, placing them under even higher pressure. During the pandemic, they showed a high prevalence of moderate depression, anxiety, and PTSD (Y. Li et al., 2021), with frontline HCWs showing even worse mental health outcomes (Sanghera et al., 2020).

College students' mental health during the pandemic has also been studied. A meta-analysis found that the prevalence of depression and anxiety have significantly increased (Yang Li et al., 2021), with possible risk factors including being a woman and/or Latinx, cognitive and behavioral avoidance, online social engagement, and problematic Internet use (Zimmermann et al., 2021). However, suicidal ideation, plan, and attempts were significantly lower in 2021 than in 2017 (Zhai & Du, 2022). In China, who enacted the strictest lockdown guidelines during their zero-COVID policy, university students' rates of suicidal ideation significantly increased, with significant predictors including education level, only-child families, mental health history, confirmed community cases, depressive symptoms, and negative coping strategies (Huang et al., 2022). However, social support, positive coping strategies, and better family functioning were associated with a lower probability of dysfunction (Huang et al., 2022).

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Mental Health Services During the COVID-19 Pandemic

Not only has mental health been on the decline since the start of the pandemic, but mental health services have also been disrupted as resources are redirected to fighting COVID-19. One-third of responding WHO member countries reported complete or partial disruption of mental, neurological, and substance use services (MNS), with a majority being prevention and promotion programs (WHO, 2020). Moreover, these MNS disruptions disproportionately affect individuals with severe mental illness and those from disadvantaged populations, even with the innovation of telemedicine (Busch et al., 2022).

In college students, peer support interventions, online stress management and learning, brief online mindfulness and compassion-based interventions, and online single-session interventions show promising results in improving mental health and positive thinking and reducing depression, anxiety, stress, and other negative emotions during the pandemic (Arenas et al., 2021; Charbonnier et al., 2022; González-García et al., 2021; Wasil et al., 2021).

International Student Mental Health Pre-COVID-19

Even before the start of the COVID-19 pandemic, studies regarding the mental health of international students have been scarce. In the United States (U.S.), though international students have less mental health diagnoses, they have significantly more suicide attempts and depressive symptoms than local students (Yeung et al., 2021). Australian mental health professionals who worked with international students observed a significant increase in mental health problems, exacerbated by adjusting to living in a

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foreign environment, language difficulties, and the taboo of mental health (Forbes-Mewett & Sawyer, 2016).

A major unique contributor to the stress of international students is acculturation, including adjustments to language, education, sociocultural issues, discrimination, and finances (Smith & Khawaja, 2011). Acculturative stress has been found to be positively associated with depression (Liu et al., 2016) and other psychological and physical outcomes (Smith & Khawaja, 2011). However, the presence of social support has been shown to buffer the negative effect of acculturative stress on mental health (Smith & Khawaja, 2011).

COVID-19 and International Student Mental Health

With the COVID-19 pandemic, international students' mental health is only more affected since they already have existing stressors that come with their international status. There is some research that looked into this issue, but most were conducted in the U.S. and China and many only explored the influence of a couple factors instead of the whole international student experience. Studies show an overall high prevalence of anxiety, stress, depression, post-traumatic stress disorder, insomnia, loneliness, and fear, with age, gender, roommates, length of stay, student status, language media usage, COVID-19 experiences, social support, coping, and finances as factors (Alam et al., 2021; Kim & Kim, 2021; Lin et al., 2022; Lu et al., 2022; Song et al., 2021). Moreover, those who stayed in the country rather than return home reported worse mental health (Lai et al., 2020).

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Compared to local students, international students also had more depressive symptoms, suicidal ideation, anxiety, PTSD, academic stress, and loneliness (Kivelä et al., 2022). Maleku et al. (2021) in the U.S., found that high levels of discrimination were significantly associated with high loneliness, in turn significantly associated with high anxiety which led to high depressive symptoms (Maleku et al., 2021). A qualitative study identified that residency and lifestyle changes and challenges directly influenced the negative affect of international students, but coping, social support, and university structure moderated this relationship (Mbous et al., 2022).

International Students in Taiwan

Taiwan defines international student (外國學生) as "a person of foreign nationality who has never held Republic of China ("R.O.C.") nationality" along with a list of subsequent requirements the individual has to meet (MOE, 1973). Because of its history with China and the resulting legal implications, there are even more stringent regulations for Chinese citizens and overseas Chinese individuals. After Taiwan experienced its own COVID-19 case spikes, it halted the issuing of visas from May 2021-August 2021, which also impacted incoming international students. In the meantime, they could only wait in their home countries and attend classes online, waiting for the Ministry of Education (MOE) to announce the reopening of visa issuances.

International Student Mental Health During COVID-19 in Taiwan

To date, there has only been one study that examined the mental health of international students in Taiwan during the pandemic. The authors found that compared to local students, international students had higher anxiety and lower susceptibility to COVID-

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19 (Ahorsu et al., 2021). They also found that among international students, staying with family, support satisfaction with support, and information seeking predicted anxiety, while staying with family, COVID-19 susceptibility, and resource sufficiency predicted suicidal ideation (Ahorsu et al., 2021). However, the two groups that were compared had fundamentally different demographic characteristics and studied measures were not comprehensive.

Research Significance

Though the pandemic caused the number of incoming international students in Taiwan to go down, in 2021, the Ministry of Education in Taiwan allowed in a first batch of 13,000 international students for the fall semester, indicating that they anticipated having at least this number. More recently, the Taiwan MOE published data indicating that there with 104,011 international students in Taiwan in 2022 (MOE, 2023). With countries slowly reopening, this number will continue to increase.

During this pandemic, mental health and its support services have all been negatively affected. Though much research has been done to provide empirical evidence for this, few studies have analyzed international students' mental health, even before the pandemic. Existing studies have been concentrated in only a couple of geographic regions (the U.S. and China) and do not include a comprehensive set of factors that is able to encompass the entirety of the international student experience. Only two of these studies were conducted in East Asia: South Korea and Taiwan. In Taiwan, there has only been one study conducted that studied the mental health of international students in Taiwan during the pandemic and examined its contributing factors. However, it has a number of limitations regarding its comparison group and the few measures and

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associated questions that were included. Thus, this study aims to include more comprehensive factors to provide a fuller, more in-depth understanding of this topic to capture a clearer picture of the situation in the unique Taiwanese context.

Research Aims

1. Measure the levels of depression, anxiety, stress, and wellbeing in international students in Taiwan during the COVID-19 pandemic;
2. Identify potential factors that affect mental health in international students in Taiwan during the COVID-19 pandemic;
3. Explore mental health needs and preferences in this group

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Methods

Survey

This study utilized a cross-sectional, online, anonymous survey conducted in English. Data collection lasted from July 2022 – April 2023.

Participants

A list of Taiwanese universities was obtained from the Ministry of Education (MOE). The emails of as many international student affairs office of each university in Taiwan was found. Five rounds of emails were sent out to ask the respective departments to forward promotional materials about the survey to its international students in order to recruit participants. Posts were also made on all found Facebook groups that targeted international students in Taiwan. Inclusion criteria for this study included being 18 years or older, having a non-Taiwanese citizenship, currently at least a part-time and degree-seeking student, studying at a Taiwanese university, and living in Taiwan. RedCap was used for data collection purposes.

Measures

Background variables

This study collected the following demographic characteristics: age, sex, race, country of origin, degree level, previous Taiwan degrees, major, language of instruction, Mandarin fluency, baseline mental health status, number of roommates, type of accommodation, university, number of units taken in the 110-2 spring 2022 semester and how many were online, COVID-19 vaccination status, highest education level of parent(s), main source of financial support, household monthly income, employment status, monthly income, number of work hours a week, current isolation status, reason for isolation, most recent isolation start date, marital status, having family in Taiwan,

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start date of current program of study, total amount of time spent in Taiwan, and area of residence in Taiwan.

Psychological assessment tools

WHO-5 Well-Being Index (WHO-5)

The WHO-5 is a 5-item self-reported survey of wellbeing within the past 2 weeks, with answers on a scale from 0 (at no time) to 5 (all the time). A total score is obtained by adding up answers from all 5 questions. A total score of 0 indicates the worst quality of life and a total score of 25 indicates the best. A systematic analysis found that the WHO-5 has high clinimetric validity, sensitivity, and specificity when screening for depression and as an outcome measure in clinical trials (Topp et al., 2015).

Patient Health Questionaire-2 (PHQ-2)

The PHQ-2 (Kroenke et al., 2003) is a shortened version of the PHQ-9 (Kroenke et al., 2001). The PHQ-2 assesses depressed mood and anhedonia frequency within a 2-week period. This 2-item assessment is scored on a scale of 0 (not at all) to 3 (nearly every day). The total score ranges from 0-6, with a score of 3 determined as the cutoff for depression by the authors. An additional question from the PHQ-9 was added to inquire about participants' quality of sleep. Both the PHQ-2 and the PHQ-9 have been shown to have high validity, sensitivity, and specificity for depression (Kroenke et al., 2001, 2003).

Generalized Anxiety Disorder-2 (GAD-2)

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The GAD-2 (Kroenke et al., 2007) is a shortened version of the GAD-7, both of which are used to screen for generalized anxiety disorder, posttraumatic stress disorder, panic disorder, and social anxiety disorder. This 2-item assessment asks about anxiety symptoms and is scored on a scale of 0 (not at all) to 3 (nearly every day). The total score is obtained by adding up all responses. Thus, the total score ranges from 0-6, with a score of 3 determined to be the cutoff for anxiety disorders by the authors. The GAD-2 has been shown to have high validity as a screening tool for all 4 anxiety disorders (Kroenke et al., 2007).

Perceived Stress Scale-4 (PSS-4)

The PSS-4 (Cohen et al., 1983) is a shortened version of the PSS-10. These 2 measures are used to assess how stressful life events are perceived to be. This 4-item assessment is scored on a scale of 0 (never) to 4 (very often). Since it is not meant to be a diagnostic tool, there is no cutoff score. However, many studies utilizing the PSS-4 have used a cut-off score of 16, so this study will also use this cut-off point. The PSS-4 has adequate reliability and validity as an outcome measure of stress levels (Cohen et al., 1983).

Independent Variables

COVID-19 Stressor Scale

This assessment (Tambling et al., 2021) aims to measure COVID-19-related stressor exposure and appraisal. It is originally a 23-item scale; however, 2 items (“cancellation of meaningful personal or religious rituals” and “inability to travel”) were removed because of its similarity to other existing items (e.g., “Cancellation of planned or

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scheduled celebrations, entertainment, vacations or trips"). Additionally, items regarding (1) receiving treatment, testing, vaccines, and/or PPE for COVID-19, (2) testing positive for COVID-19, and (3) having to quarantine as a result of close contact or having COVID-19 were added. This 24-item measurement are first posed as a Yes (1)/No (2) question as to whether the participants have experienced this exposure. If participants respond with "Yes", they are then asked to rate how stressful the exposure was on a scale of Likert 1 (not at all stressful) to 5 (extremely stressful). A composite variable for each item is calculated by multiplying the binary code of the Y/N component by the appraisal score. This scale has strong internal consistency and has convergent and discriminant validity (Tambling et al., 2021).

Multidimensional Scale of Perceived Social Support (MSPSS)

This measure (Zimet et al., 1988) assesses perceived social support. It is originally a 12-item scale; items about a significant other were taken out as it assumes participants have a significant other and is already asked about with items about friends. One question about support in Taiwan was added, bringing the total number of items to 9. Items are scored on a Likert scale from 1 (very strongly disagree) to 7 (very strongly agree). Original items showed high factorial validity, internal reliability, and test-retest reliability along with moderate construct validity (Zimet et al., 1988).

Acculturative Stress Scale for International Students (ASSIS)

The ASSIS is originally a 36-item scale that assesses the acculturative stress that international students experience (Sandhu & Asrabadi, 1994). 13 questions (items 1, 5, 6, 10, 11, 13, 16, 22, 23, 26, 28, and 36) were included. All other items were excluded for length and redundancy concerns. Item 5 was modified to reflect the Mandarin

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language instead of English. 2 items were also added to inquire about the Taiwanese migration process and language as a barrier in accessing COVID-19 resources. This adds up to a total of 15 items, rated on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). Items from the original scale show high validity both in the original preliminary study (Sandhu & Asrabadi, 1994), but also in other studies (Liu et al., 2016).

Mental Health Resource Need and Help-Seeking

7 items about the knowledge, accessibility, and availability of mental health resources and support are measured using a Likert scale of 1 (strongly disagree) to 5 (strongly agree). An additional question asks participants to select what type(s) of mental health support they would like to receive. Options include face-to-face counseling, virtual counseling, group counseling, information sessions, mental health promoting activities (e.g., yoga, meditation), and off-campus mental health treatment reimbursement.

Open-ended Questions

The survey included 2 open-ended questions. One asked about any other factors contributing to stress during the pandemic to allow participants to expand on any topics not covered by other measures. The second asked participants how their institutions' current mental health resources and support can be improved.

Statistical Approach

Data analysis was performed in statistical software SPSS 25. Descriptive analysis was conducted to examine the distribution of each variable and the scores of each scale. T tests and ANOVA were conducted to compare the averages of the total scores of the

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WHO-5, PHQ-2, GAD-2, and PSS-4 scales between different groups. A Chi-Square test was conducted to analyze the proportions of international students with poor mental health (WHO-5 total score <13), possible depression (PHQ total score ≥ 3), possible anxiety (GAD total score ≥ 3), and high stress levels (PSS-4 total score ≥ 16) between different groups.

Linear regression was conducted to examine the association between groups, social support, acculturative stress, COVID-19 stress, and the total continuous score of the WHO-5 and PSS-4. Logistic regression was conducted to examine the association between groups, social support, acculturative stress, COVID-19 stress, and poor mental health, possible depression, possible anxiety, and high stress levels. Both unadjusted and adjusted linear and logistic regressions were conducted. Adjusted linear and logistic regressions adjusted for sex; age; race; time spent in Taiwan; border control quarantine; degree level; number of roommates; country of origin; parent education; source of financial support; start date of current program; mental health baseline; class language; marital status; major; accommodation; and total continuous scores of social support, acculturative stress, and COVID-19 stress. A second stage of adjusted linear and logistic regressions adjusted for the same variables, except social support, acculturative stress, and COVID-19 stress were treated as binary variables, with the cutoff point at the median of the total scores.

Ethics statement

This study was approved by the National Taiwan University Ethics Review Committee (202206HM019). All participant responses were kept confidential. Emails collected to

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compensate the participants via online e-vouchers were permanently deleted after the e-vouchers were all sent.

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Results

Demographic characteristics

450 participants completed the survey. 11 were excluded since they did not meet inclusion criteria and 12 were additionally excluded due to missing data, resulting in a final sample of 427 participants included in the analysis (Figure 1). A total of 104,011 international students were present in Taiwan in 2022. 87.81% (n = 91,334) compared to 77.00% (n = 329) in this study were from Asian countries; 23.01% (n = 23,932) compared to a much lower 8.90% (n = 38) in this study were from Vietnam; 59.24% (n = 61,619) compared to 25.10% (n = 107) in this study attended a university in Northern Taiwan; 62.14% (n = 64,635) compared to 78.90% (n = 337) in this study attended a public university; and 65.47% (N = 68,100) compared to 92.00% (N = 393) in this study attended a general university (Table 1).

Reliability and Collinearity

The MSPSS, COVID-19 Stressor Scale, ASSIS, and mental health need and help-seeking questions showed high internal validity (α = .898, .845, .892, .766 respectively). The WHO-5 and GAD-2 also showed high internal validity (α = .915, .875 respectively) but the PHQ-2 showed moderate internal validity (α = .697) and the PSS-4 had low internal validity (α =.265). Variables included in the adjusted analyses showed low collinearity (VIF < 5).

T Test/ANOVA and Chi-Square Analysis

Males had significantly better mental wellbeing (M = 14.35, SD = 5.00) (Table 1). Those 31 years old and older had significantly lower depression (M = 1.95, SD = 1.39) and anxiety (M = 1.82, SD = 1.69) scores (Table 1). Those who had undergone border

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control quarantine had significantly better mental wellbeing (M = 14.37, SD = 5.32), lower depression (M = 2.29, SD = 1.49) scores, and lower anxiety (M = 2.13, SD = 1.78) scores (Table 1). Those whose current academic program started within the past year had significantly better mental wellbeing (M = 15.11, SD = 5.30) and lower stress levels (M = 7.32, SD = 2.64) (Table 1). Those who were married or co-habitated had significantly better mental wellbeing (M = 15.79, SD = 5.49) and lower anxiety scores (M = 1.60, SD = 1.57) (Table 1). Finally, those who lived with family had the best mental wellbeing (M = 17.04, SD = 5.30) (Table 1).

The overall prevalence of poor mental health was 44.28% (n = 209), prevalence of possible depression was 24.60% (n = 105), prevalence of possible anxiety was 37.70% (n = 161), and prevalence of high stress was 80.10% (n = 342) (Table 3).

The prevalence of possible depressive disorders were significantly higher in those aged 26-30 years old (29.51%) and those that did not experience border control quarantine (32.14%) (Table 3). The prevalence of possible anxiety disorders were significantly higher in those aged 21-25 years old (43.87%), those who did not experience border control quarantine (46.45%), and those who are single (40.22%) (Table 3). Significantly higher stress levels were found in those who started their academic programs within the past 1-2 years (85.81%) (Table 3).

Those with low social support (n = 118, 52.68%, $p < 0.001$) and those with high acculturative stress (n = 111, 52.61%, $p < 0.001$) had a significantly higher prevalence of poor mental health; no other variables showed statistical evidence for association with mental health (Table 3). The prevalence of possible depression was significantly

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higher in those with low social support (n = 71, 31.70%, p < 0.001), those with high acculturative stress (n = 76, 36.02%, p < 0.001), and those with high COVID-19 stress (n = 63, 30.00%, p = 0.001) (Table 3).

The prevalence of possible anxiety was significantly higher in those with low social support (n = 107, 47.77%, p < 0.001), those with high acculturative stress (n = 109, 51.66%, p < 0.001), and those with high COVID-19 stress (n = 100, 47.62%, p < 0.001) (Table 3). Significantly higher stress levels were found in those with high COVID-19 stress (n = 180, 85.71%, p = 0.004) (Table 3).

WHO-5 Linear Regression

Linear regression was conducted to examine the correlation between mental health and the variables included in this study (Table 4). In the unadjusted model, a significant correlation with better health was found with social support (B = 0.21; 95% confidence interval [CI] = 0.17, 0.26; p = 0.029). This effect held constant after adjusting for other covariates with social support, acculturative stress, and COVID-19 stress as continuous variables (B = 0.20; 95% CI = 0.15, 0.24; p < 0.001). The high social support group was also significantly correlated with good mental health (B = 3.89, 95% CI = 2.93, 4.95; p < 0.001), with this effect decreasing slightly after adjusting for other covariates with social support, acculturative stress, and COVID-19 stress as categorical variables (B = 3.45; 95% CI = 2.46, 4.44; p < 0.001).

There was a significant negative correlation of health with COVID-19 stress (B = -0.03; 95% CI = -0.05, 0.00; p = 0.033), but this correlation was not present after adjusting for

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covariates. Acculturative stress (B = -0.18; 95% CI = -0.23, -0.14; $p < 0.001$) was also found to have a significant negative correlation with mental health. After adjusting for other covariates (with social support, acculturative stress, and COVID-19 stress as continuous variables), this correlation decreased slightly (B = -0.15; 95% CI = -0.19, -0.10; $p < 0.001$). The high acculturative stress group was also significantly negatively correlated with good mental health (B = -3.36; 95% CI = -4.34, -2.38; $p < 0.001$), with this effect decreasing slightly after adjusting for other covariates with social support, acculturative stress, and COVID-19 stress as categorical variables (B = -2.51; 95% CI = -3.52, -1.51; $p < 0.001$).

PSS-4 Linear Regression

Linear regression was conducted to study the correlation between perceived stress and variables (Table 5). There was a significant positive correlation between perceived stress and social support (B = 0.02; 95% CI = 0.00, 0.05; $p = 0.029$), which increased after continuous adjustment (B = 0.20; 95% CI = 0.15, 0.24; $p < 0.001$). Acculturative stress was also significantly correlated with perceived stress (B = 0.03; 95% CI = 0.01, 0.05; $p = 0.004$), but there was no significance after adjustment. COVID-19 stress was significantly correlated with perceived stress (B = 0.02; 95% CI = 0.01, 0.03; $p = 0.001$), but was not significant after adjustment. However, high COVID-19 stress showed significant correlation with perceived stress (B = 0.84; 95% CI = 0.40, 1.29; $p < 0.001$) and this effect decreased slightly after categorical adjustment (B = 0.63; 95% CI = 0.15, 1.10; $p = 0.010$).

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WHO-5 Logistic Regression

Logistic regression analysis was conducted to analyze risk of various groups for mental health (Table 6). Acculturative stress had a significant increased risk of poor mental health (OR = 1.06; 95% CI = 1.04, 1.08; $p < 0.001$), which held constant after continuous adjustment (OR = 1.06; 95% CI = 1.04, 1.09; $p < 0.001$). This effect is also seen in the high acculturative stress group (OR = 3.41; 95% CI = 2.26, 5.15; $p < 0.001$), with the risk decreasing slightly after categorical adjustment (OR = 3.34; 95% CI = 2.05, 5.45; $p < 0.001$). COVID-19 stress was significantly associated with increased risk of poor mental health (OR = 1.01; 95% CI = 1.00, 1.02; $p < 0.038$), but it was no longer significant after adjustment. However, those in the high COVID-19 stress group showed this significance (OR = 1.53; 95% CI = 1.04, 2.27; $p = 0.033$), even after categorical adjustment (OR = 0.97, 95% CI = 0.60, 1.56; $p < 0.001$).

Social support was the only variable to show a significantly reduced risk of poor mental health (OR = 0.93; 95% CI = 0.91, 0.95; $p < 0.001$), which still held after continuous adjustment (OR = 0.92; 95% CI = 0.89, 0.94; $p < 0.001$). Those with high social support showed the same effect (OR = 0.26, 95% CI = 0.17, 0.40; $p < 0.001$), which also remained significant after categorical adjustment (OR = 0.24; 95% CI = 0.15, 0.40; $p < 0.001$.

PHQ-2 Logistic Regression

The associated risk of possible depression with other variables was examined using logistic regression (Table 7). Social support was significantly associated with lowered depression risk (OR = 0.96; 95% CI = 0.94, 0.98; $p < 0.001$), which held true after continuous adjustment (OR = 0.96; 95% CI = 0.93, 0.98; $p < 0.001$). More specifically,

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those with high social support were at significantly lower risk (OR = 0.43; 95% CI = 0.27, 0.69; $p < 0.001$), even after categorical adjustment (OR = 0.48; 95% CI = 0.28, 0.83; $p = 0.009$).

Acculturative stress was significantly associated with increased risk of possible depression (OR = 1.07; 95% CI = 1.05, 1.10; $p < 0.001$), with the effect holding constant after continuous adjustment (OR = 1.05; 95% CI = 1.02, 1.08; $p < 0.001$). Those in the high acculturative stress also showed this effect (OR = 3.63; 95% CI = 2.24, 5.88; $p < 0.001$) as well as after categorical adjustment (OR = 2.89; 95% CI = 1.67, 5.03; $p < 0.001$). COVID-19 stress also showed this effect (OR = 1.02; 95% CI = 1.0, 1.03; $p < 0.001$), but was no longer significant after continuous adjustment. However, those with high COVID-19 stress showed this significance before (OR = 1.81; 95% CI = 1.16, 2.83; $p = 0.010$) and after categorical adjustment (OR = 1.35; 95% CI = 0.79, 2.31; $p = 0.009$).

GAD-2 Logistic Regression

The associated risk of possible anxiety with other variables was examined using logistic regression (Table 8). Social support was significantly associated with lowered risk (OR = 0.96; 95% CI = 0.94, 0.98; $p < 0.001$), with this effect holding constant after continuous adjustment (OR = 0.96; 95% CI = 0.93, 0.98; $p = 0.001$). More specifically, those in the high social support group had significantly lowered risk (OR = 0.40; 95% CI = 0.26, 0.60; $p < 0.001$), staying significant after categorical adjustment (OR = 0.47; 95% CI = 0.29, 0.77; $p = 0.002$).

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Acculturative stress show a significantly increased risk of possible anxiety (OR = 1.08; 95% CI = 1.06, 1.10; $p < 0.001$) and after continuous adjustment (OR = 1.07; 95% CI = 1.05, 1.10; $p < 0.001$). Those in the high acculturative stress group followed this trend (OR = 3.37; 95% CI = 2.23, 5.09; $p < 0.001$) and after categorical adjustment (OR = 3.08; 95% CI = 1.89, 5.02; $p < 0.001$). COVID-19 stress showed similar trends (OR = 1.03; 95% CI = 1.02, 1.04; $p < 0.001$) even after continuous adjustment (OR = 1.02; 95% CI = 1.01, 1.04; $p = 0.003$) with the same applying to those in the high COVID-19 stress group (OR = 2.46; 95% CI = 1.65, 3.68; $p < 0.001$) even after categorical adjustment (OR = 2.06; 95% CI = 1.26, 3.34; $p = 0.002$).

PSS-4 Logistic Regression

Logistic regression analysis was conducted to analyze risk of various groups for perceived stress (Table 9). COVID-19 stress was significantly associated with increased perceived stress risk (OR = 1.01; 95% CI = 1.00, 1.03; $p = 0.015$), even after continuous adjustment (OR = 1.02; 95% CI = 1.00, 1.03; $p = 0.029$).

Mental Health Resource Need and Help-Seeking

30.90% (n = 132) do not know of any mental health services; 43.10% (n = 184) are able to access mental health resources in a language they are fluent in; 39.10% (n = 167) have adequate information about mental health services; 39.10% (n = 167) have mental health services offered to them; 32.60% (n = 139) are able to access mental health services quickly; 42.40% (n = 181) feel that their school cares about their mental health; 39.30% (n = 168) feel that their school provides them with enough mental health services (Table 10). 72.40% (n = 309) would like face-to-face counseling, 54.10% (n = 231) want mental health promoting activities such as yoga and meditation, and 38.90%

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(n = 166) are interested in receiving reimbursements for off-campus mental health treatments (Table 11).

Open-Ended Questions

For open-ended question 1 that asked about other factors that contributed to stress, 35.54% (n = 156) of participants mentioned COVID-19, 22.10% (n = 94) brought up finances, 14.35% (n = 63) wrote about school-related factors, 12.76% (n = 56) brought up travel, 12.53% (n = 55) brought up isolation, and less than 10% mentioned other factors (Table 12). For open-ended question 2 that asked how their schools' mental health resources can be improved, 19.59% (n = 86) requested more information, 19.13% (n = 84) would like more services, 17.54% (n = 77) thought that no changes were necessary, 15.49% (n = 68) were unsure of what changes can be made, 13.21% (n = 58) wanted a wider variety of languages to be included, 11.16% (n = 49) would like more social events, and less than 10% mentioned other factors (Table 13).

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Discussion

Main findings

Overall, there were relatively high levels of poor mental health, possible depression and anxiety, and perceived stress in our sample of 427 international students in Taiwan. For example, 44% of the sample were found to have poor mental health according to the WHO-5. Acculturative stress was negatively correlated with mental health. High acculturative stress was a risk factor for poor mental health, possible depression and anxiety, and high perceived stress. High COVID-19 stress was positively correlated with perceived stress. Those with high COVID-19 stress were also at a higher risk of poor mental health, possible depression and anxiety, and high perceived stress. Social support was positively correlated with good mental health and perceived stress while negatively associated with poor mental health or possible depression and anxiety.

Males had better mental wellbeing than females, consistent with global trends (WHO, 2022). Those that were aged 31 years and older consistently showed better mental wellbeing across all outcomes. They had lower depression and anxiety scores as well as a lower risk of depressive disorders. Meanwhile, those aged 26-30 years old showed a higher prevalence of possible depressive disorders and those aged 21-25 years old showed a higher prevalence of possible anxiety disorders. The WHO report on mental health found similar results, with this age range showing some of the highest prevalence rates of mental disorders (WHO, 2022).

Those who underwent COVID-19 border control quarantine had better mental wellbeing and had lower depression and anxiety scores. Conversely, those who did not experience border control quarantine had a higher prevalence of possible depression and anxiety

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disorders. Based on the timing of this border control quarantine policy, it can be inferred that this population arrived in Taiwan recently, within the past 3 years. The timing of entry into Taiwan can also be inferred from the start date of their current academic program. Those who started within the past year had the best mental wellbeing and lowest stress levels. Moreover, those who started within the past 1-2 years had the highest prevalence of perceived stress, though this prevalence was similar to that of those who started 2 years or longer ago. This group also was at higher risk for possible depressive disorders and high perceived stress. While one may expect that those who had more time to assimilate into a new culture to have better mental health, the results shown here tell a different story. One possible explanation is that for the first two years of the pandemic, Taiwan had very few cases and low community spread, countering expectations that its close proximity to China would lead to an overwhelming number of cases. These numbers were extremely low, especially when compared to other countries. Thus, those who moved to Taiwan during the pandemic may have experienced an improvement in their living situation when compared to the pandemic situation in their country of origin. However, those who were already in Taiwan when the COVID-19 pandemic may have felt that their lives were severely negatively disrupted by public safety measures, even though community cases remained low. This context may explain why those who had only recently arrived to Taiwan had better mental wellbeing than those who had already been here for many years during the pandemic. Another possible explanation is the healthy immigrant effect, where recent immigrants to a new country actually have better health outcomes than locals, including better mental health, despite facing the stress of acculturation (Aldridge et al., 2018).

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Approximately 30% of international students did not know about any mental health services available to them. The students also reported needs for increased access to mental health services, specifically face-to-face counseling, mental health promoting activities (e.g., yoga and meditation), and reimbursements for mental health treatments off-campus.

Research Strengths and Limitations

This is one of the first studies of its kind to comprehensively study this issue in Asia outside of China in order to provide a fuller picture and context to this issue. Instead of only measuring mental health outcomes and merely identifying a problem, this survey also included questions about international students' perception of mental health resources and support in order to propose potential solutions.

However, this study also has its limitations. First, there was no comparison group. For example, it did not ask about mental health before the pandemic nor did it include comparable populations (i.e., local students or the general public). This study was also conducted in the specific context of Taiwan society so results may be difficult to generalize to other countries, especially those that have very different sociocultural compositions (e.g., Western countries).

Comparison with previous studies

The relatively high levels of poor mental health, depression, anxiety, and perceived stress seen in this study can also be seen on the global scale, especially with the increase of these prevalence rates after the start of the COVID-19 pandemic and its resulting effects on the mental health outcomes (Santomauro et al., 2021; Vindegaard & Benros,

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2020). A policy brief published by the United Nations (UN, 2020) found that multiple member countries reported higher-than-normal levels of distress, depression, and anxiety among its populations (UN, 2020). However, updated global prevalence levels of various mental health outcomes as a result of the COVID-19 pandemic have yet to be officially published.

The data in this study showed that acculturative stress was negatively correlated with mental health, which is consistent with past literature. George et al. (2015) found that various aspects of acculturative stress, especially acculturation to Western cultures, negatively influenced immigrants' mental health, specifically depressive symptoms, and also physical health (e.g., chronic illnesses) (George et al., 2015). Forbes-Mewett and Sawyer's (2016) results also reflect the negative effect that acculturation has on the increase in mental health problems (Forbes-Mewett & Sawyer, 2016). Specifically, acculturative stress also was significantly associated with stress (Smith & Khawaja, 2011) and depression (Liu et al., 2016).

The meta-analysis conducted by George et al. (2015) also found that lack of social support exacerbated poor mental health in immigrants (George et al., 2015). Moreover, once in their new country, it is difficult to find new sources of social support which was found to be necessary for the maintenance of good mental health (George et al., 2015). Huang et al. (2022) also found that social support was associated with a lower risk of poor mental health (Huang et al., 2022). Another study among adolescents showed that those with medium and low levels of social support had higher levels of mental health problems (Qi et al., 2020). In Taiwan specifically, Ahorsu et al. (2021) found that staying with family (a source of social support) and perceived support satisfaction were

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predictors of anxiety among international students; staying with family was also a predictor of suicidal ideation (Ahorsu et al., 2021). These combined findings regarding the positive relationship between mental health and social support are consistent with those found in the current study, where social support was positively associated with good mental health and negatively associated with poor mental health and possible depression and anxiety.

This study also found that high COVID-19 stress was positively correlated with perceived stress. Similar results are seen in a study conducted by Hu et al. (2022) where COVID-19 related stress was associated with anxiety, posttraumatic growth, and depression among people in China (Hu et al., 2022). This trend was also seen in Taiwan, where half of all participants reported one or more COVID-19 stressors, which was found to be significantly associated with suicidality, loneliness, and self-efficacy (Wu et al., 2022). Specifically, COVID-19 risk perception was also found to be positively correlated with perceived stress, anxiety, and depression levels (Li & Lyu, 2021).

Participants in this study expressed interest in receiving more services (e.g., face-to-face counseling, mental health promoting activities (e.g., yoga and meditation), and reimbursements for mental health treatments off-campus) and more social events. These requested counseling, mental health promoting activities, and peer interactions have been shown to have potential for improving mental health and decreasing depression, anxiety, and stress levels during the pandemic (Arenas et al., 2021; Charbonnier et al., 2022; González-García et al., 2021; Wasil et al., 2021).

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Implications

Findings from this study identify factors that impact the mental health of international students in Taiwan during the COVID-19 pandemic. This study found that those with acculturative stress, and social support are associated with mental health outcomes so these populations will also need a robust network of mental health services. Currently, psychologists and non-therapeutic psychiatric counseling are not covered under the National Health Insurance (NHI) so the Taiwanese government may consider adding this to help provide more comprehensive and preventative mental health support. More explicit information about mental health services and its coverage under NHI can be provided. The current NHI regulations (MOJ, 1995) from the DOJ do not mention mental health and the Mental Health Act and its amendments also does not mention NHI except to state who would be responsible for expenses not covered by NHI (MOJ, 1990).

Taiwanese universities can also provide mental health services. Participants in this survey highlighted the discrepancies between universities regarding mental health services. Some found that even if this support is offered, it was difficult to obtain appointments in a timely manner due to understaffing. Face-to-face counseling seems to be the most desired form of mental health support. The need for more services and events in more languages have also been highlighted. The government can also assist in this by passing regulations that require a specific level of mental health support that all universities would have to comply with. With this, each university would then offer a basic level of mental health services.

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Future Direction

Future research can use the results from the open-ended responses to inform questions included in the survey to design an even more comprehensive survey that explores the relationships between more variables. More acculturative stress items can also be included as in this survey, many items had to be excluded for length concerns. Mental health seeking behavior and resources can also be more comprehensively studied. A scale with high internal validity can be developed to better encompass this topic.

Comparison groups can also be included, whether that entails mental health before and after the pandemic, a local versus international student mental health group, or international student versus other foreigners in Taiwan (e.g., immigrants, migrant workers, foreign spouses, etc.). This will provide a better understanding of how the COVID-19 pandemic and student group status directly influence the mental health of international students. Finally, similar studies can be conducted in different countries and cultures to see if the same results are seen and if not, what sociocultural factors may be at play.

Conclusion

This study showed that acculturative stress contributed heavily to poor mental health, perceived stress levels, and possible depression and anxiety while social support was associated with good mental health outcomes. Face-to-face counseling as well as more services and events overall in more languages can be a good starting point for better mental health support for these populations.

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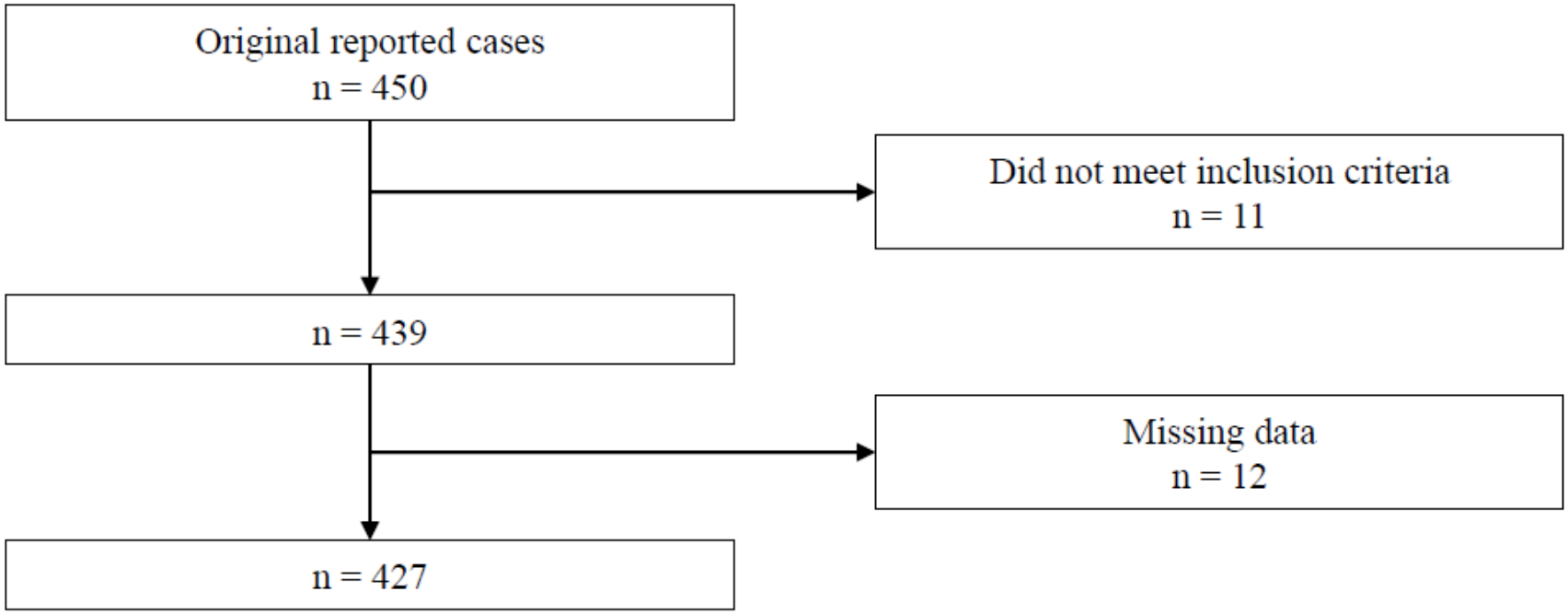
Figures

Figure 1. Flow chart of study sample inclusion.



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Tables

Table 1: Comparison of the study sample and all international students in Taiwan (2022).

	Study Sample (N = 427)		International Students in Taiwan in 2022[a] (N=104,011)	
Characteristics	n	(%)	n	(%)
Region of origin				
Asia	329	(77.05)	91,334	(87.81)
Europe	33	(7.73)	4,624	(4.45)
Americas	58	(13.58)	6,603	(6.35)
Africa	7	(1.64)	1,450	(1.39)
Country of origin				
Vietnam	38	(8.90)	23,932	(23.01)
Indonesia	64	(14.99)	16,640	(16.00)
Malaysia	49	(11.48)	12,473	(11.99)
Japan	8	(1.87)	6,540	(6.29)
Other	268	(62.76)	44,426	(42.71)
University location in Taiwan				
East	43	(10.07)	2701	(2.60)
North	107	(25.06)	61,619	(59.24)
South + Islands	264	(61.83)	21,539	(20.71)
Central	13	(3.04)	18,130	(17.43)
University: public vs. private vs. other				
Public	337	(78.92)	64,635	(62.14)
Private	90	(21.08)	38,216	(36.74)
Other	0	(0.00)	1,160	(1.12)
University: general vs. vocational vs. other				
General	393	(92.04)	68,100	(65.47)

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Vocational	34	(7.96)	34,875	(33.53)
Other	0	(0.00)	1,036	(1.00)

[a]Data from Taiwan Ministry of Education: https://data.gov.tw/dataset/6289 and https://ulist.moe.gov.tw/Query/Area

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Table 2. Mean scores of the World Health Organization Five-Item Well-Being Index Scale (WHO-5), Patient Health Questionnaire 2-Item Scale (PHQ-2), Generalized Anxiety Disorder 2-Item Scale (GAD-2), and Perceived Stress Scale 4-Item Scale (PSS-4) by student characteristic in 427 international students in Taiwan.

			WHO-5		T-test/ ANOVA	PHQ-2		T-test/ ANOVA	GAD-2		T-test/ ANOVA	PSS-4		T-test/ ANOVA
Variable	n	(%)	mean	(SD)	p	mean	(SD)	p	mean	(SD)	p	mean	(SD)	p
Sex					**0.021**			0.98			0.96			0.68
Male	172	(40.30)	14.35	(5.00)		2.34	(1.53)		2.25	(1.85)		8.08	(2.41)	
Female	255	(59.70)	13.82	(5.67)		2.41	(1.56)		2.33	(1.87)		7.98	(2.33)	
Age group (year)					0.14			**0.012**			**0.011**			0.21
18-20	45	(10.50)	13.56	(4.81)		2.60	(1.54)		2.11	(1.84)		7.42	(2.24)	
21-25	155	(36.30)	13.74	(5.40)		2.53	(1.60)		2.53	(1.86)		8.23	(2.36)	
26-30	122	(28.60)	13.66	(5.71)		2.48	(1.57)		2.48	(1.95)		7.90	(2.66)	
≥31	105	(24.60)	15.10	(5.24)		1.95	(1.38)		1.82	(1.69)		8.10	(1.99)	
Race					0.17			0.46			0.077			0.28
Non-Asian	107	(25.10)	13.58	(5.12)		13.58	(2.22)		2.44	(2.38)		0.49	(0.15)	
Asian	320	(74.90)	2.44	(5.51)		2.44	(2.38)		1.54	(1.89)		0.09	(0.11)	
Time in Taiwan					0.47			0.52			0.30			0.72
< 3 months	58	(13.60)	14.86	(5.15)		2.19	(1.55)		2.03	(1.78)		7.69	(8.06)	
4-12 months	89	(20.80)	14.38	(5.48)		2.26	(1.58)		2.08	(1.85)		8.06	(2.25)	
2-4 years	195	(45.70)	13.79	(5.45)		2.45	(1.56)		2.44	(1.84)		8.06	(2.34)	
≥ 5 years	85	(19.90)	13.65	(5.45)		2.49	(1.49)		2.38	(2.38)		8.11	(2.64)	
Quarantine														
None					0.48			1.00			0.40			0.86
No	351	(82.20)	14.12	(5.33)		2.38	(1.52)		2.26	(1.85)		8.03	(2.32)	
Yes	76	(17.80)	13.63	(5.82)		2.38	(1.66)		2.46	(1.89)		7.97	(2.56)	
Border control					**0.028**			**0.037**			**0.001**			0.43
No	112	(26.20)	13.07	(5.57)		2.64	(1.69)		2.78	(2.00)		8.17	(2.49)	

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Yes	315	(73.80)	14.37	(5.32)		2.29	(1.49)		2.13	(1.78)		7.97	(2.31)	
Close contact/confirmed case					0.15			0.083			0.49			0.43
No	339	(79.40)	14.22	(5.50)		2.32	(1.55)		2.27	(1.84)		8.06	(2.43)	
Yes	88	(20.60)	13.30	(5.01)		2.64	(1.51)		2.42	(1.94)		7.84	(2.08)	
Vaccination status					0.16			0.40			0.69			0.98
None	20	(4.70)	13.95	(6.57)		2.65	(1.73)		1.95	(2.06)		8.10	(3.24)	
1-2 doses	55	(12.90)	12.75	(5.56)		2.58	(1.65)		2.35	(1.82)		7.98	(2.45)	
≥3 doses	352	(82.40)	14.24	(5.31)		2.34	(1.52)		2.31	(1.86)		8.02	(2.30)	
Degree					0.31			0.25			0.49			0.051
Bachelor	119	(27.90)	13.43	(5.07)		2.56	(1.57)		2.47	(1.93)		7.66	(2.22)	
Master	187	(43.80)	14.13	(5.28)		2.26	(1.48)		2.23	(1.83)		7.99	(2.40)	
Ph.D.	121	(28.30)	14.47	(5.91)		2.39	(1.62)		2.23	(1.84)		8.41	(2.40)	
University location in Taiwan					0.73			0.062			0.54			0.59
East	43	(10.10)	14.84	(4.14)		2.53	(1.68)		2.49	(1.71)		8.12	(2.42)	
North	107	(25.10)	14.13	(5.72)		2.64	(1.64)		2.46	(1.82)		8.27	(2.63)	
South + Islands	264	(61.80)	13.85	(5.51)		2.23	(1.48)		2.19	(1.89)		7.91	(2.16)	
Central	13	(3.00)	14.31	(4.73)		2.85	(1.41)		2.46	(2.11)		7.92	(3.62)	
University: public vs. private					0.83			0.84			0.45			0.26
Public	337	(78.90)	14.06	(5.36)		2.37	(2.41)		2.33	(1.86)		8.09	(2.44)	
Private	90	(21.10)	13.92	(5.62)		2.41	(1.57)		2.17	(1.86)		7.77	(2.05)	
University: general vs. vocational					0.72			0.73			0.86			0.67
General	393	(92.00)	14.01	(5.47)		2.37	(1.57)		2.29	(1.87)		8.03	(2.37)	
Vocational	34	(8.00)	14.35	(4.78)		2.47	(1.57)		2.35	(1.79)		7.85	(2.34)	
Number of Roommates					0.079			0.17			0.41			0.46
None	141	(33.00)	13.38	(5.12)		2.55	(1.63)		2.45	(1.88)		8.29	(2.22)	
≥1	286	(67.00)	14.36	(5.53)		2.30	(1.50)		2.22	(1.85)		7.88	(2.42)	
Country of origin					0.15			0.059			0.32			0.86
Asia and Oceania	329	(77.00)	14.19	(5.60)		2.45	(1.53)		2.36	(1.89)		8.05	(2.45)	
Europe	33	(7.70)	15.00	(4.28)		1.94	(1.39)		1.88	(1.69)		8.06	(1.39)	
Americas	58	(13.60)	12.83	(4.54)		2.12	(1.58)		2.09	(1.75)		7.86	(2.16)	

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Africa	7	(1.60)	12.00	(6.93)		3.29	(2.14)		2.86	(2.12)		7.43	(3.36)	
County of residence					0.61			0.072			0.56			0.80
North	261	(61.10)	13.80	(5.46)		2.23	(1.49)		2.21	(1.89)		7.93	(2.13)	
East	43	(10.10)	14.91	(4.20)		2.63	(1.65)		2.51	(1.71)		8.14	(2.42)	
South + Offshore Islands	109	(25.50)	14.16	(5.73)		2.61	(1.63)		2.38	(1.85)		8.18	(2.67)	
Central	14	(3.30)	14.64	(5.42)		2.79	(1.25)		2.71	(1.82)		7.93	(3.58)	
Parent education					0.68			0.33			0.46			0.55
Below high school	44	(10.30)	13.75	(6.34)		2.73	(1.87)		2.55	(1.98)		7.55	(2.82)	
High school	106	(24.80)	14.18	(4.89)		2.23	(1.53)		2.09	(1.78)		8.14	(2.44)	
Bachelor or junior/community college	166	(38.90)	13.72	(5.65)		2.42	(1.49)		2.40	(1.81)		8.02	(2.29)	
Master or above	111	(26.00)	14.48	(5.17)		2.34	(1.49)		2.24	(1.96)		8.08	(2.20)	
Source of financial support					0.91			1.00			0.92			0.68
Self-funded	79	(18.50)	13.96	(5.88)		2.41	(1.64)		2.39	(2.00)		7.95	(2.62)	
Family and friends	119	(27.90)	14.33	(5.10)		2.40	(1.37)		2.29	(1.82)		7.91	(2.05)	
Scholarships	201	(47.10)	13.88	(5.46)		2.37	(5.46)		2.25	(1.85)		8.04	(2.36)	
Other	28	(6.60)	14.11	(5.26)		2.36	(1.85)		2.43	(1.77)		8.50	(2.83)	
Start date of current program					**0.045**			0.42			0.13			**<0.001**
Within past year	135	(31.60)	15.10	(5.30)		2.21	(1.48)		2.04	(1.73)		7.32	(2.64)	
Within 1-2 years	148	(34.70)	13.73	(5.49)		2.51	(1.64)		2.43	(1.96)		8.30	(2.00)	
Within 2-3 years	76	(17.80)	13.26	(5.41)		2.38	(1.52)		2.21	(1.80)		8.14	(2.20)	
≥ 4 years	68	(15.90)	13.44	(5.29)		2.46	(1.49)		2.63	(1.92)		8.66	(2.39)	
Mental health treatment					0.26			0.24			0.57			0.91
No	339	(79.40)	14.27	(5.45)		2.28	(1.51)		2.17	(1.84)		7.97	(2.37)	
Yes	88	(20.60)	13.10	(5.20)		2.78	(1.62)		2.80	(1.86)		8.19	(2.34)	
Previous degree					0.15			0.23			0.33			0.38
No	342	(80.10)	14.01	(5.30)		2.34	(1.52)		2.25	(1.84)		7.96	(2.29)	
Yes	85	(19.90)	14.13	(5.88)		2.54	(1.67)		2.51	(1.94)		8.26	(2.63)	
Language of instruction					0.79			0.27			0.85			0.19
Mandarin	163	(38.20)	14.12	(5.60)		2.28	(1.47)		2.28	(1.94)		7.83	(2.41)	

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English	264	(61.80)	13.98	(5.30)		2.45	(0.00)		2.31	(1.81)		8.14	(2.32)	
Mandarin fluency					0.70			0.34			0.43			0.72
None	89	(20.80)	13.87	(5.48)		2.62	(1.51)		2.30	(1.75)		7.79	(2.69)	
Beginner (A1, A2, B1)	166	(38.90)	13.78	(5.55)		2.31	(1.60)		2.31	(1.85)		8.04	(2.33)	
Intermediate (B2, C1, C2)	115	(26.90)	14.53	(5.41)		2.26	(1.51)		2.11	(1.96)		8.06	(2.21)	
Native	57	(13.30)	14.04	(4.96)		2.47	(1.50)		2.61	(1.86)		8.23	(2.24)	
Currently in quarantine					0.41			0.31			0.11			0.77
No	397	(93.00)	14.00	(5.42)		2.38	1.56)		2.30	(1.88)		8.01	(2.34)	
Yes	30	(7.00)	14.50	(5.38)		2.47	(1.38)		2.27	(1.66)		8.20	(2.71)	
Marital status					**0.006**			0.27			**0.008**			0.70
Single	363	(85.00)	13.83	(5.35)		2.41	(1.56)		2.40	(1.88)		8.04	(2.41)	
Married or co-habitated	57	(13.30)	15.79	(5.49)		2.14	(1.42)		1.60	(1.57)		7.98	(2.11)	
Separated or divorced	7	(1.60)	10.14	(5.01)		3.00	(1.63)		2.71	(2.21)		7.29	(1.98)	
Family in Taiwan					0.83			0.85			0.11			0.13
No	352	(82.40)	14.00	(5.43)		2.41	(1.54)		2.35	(1.88)		8.09	(2.28)	
Yes	75	(17.60)	14.17	(5.36)		2.23	(1.56)		2.05	(1.77)		7.68	(2.70)	
Major					0.82			**0.014**			0.17			0.43
Arts & Humanities	58	(13.60)	13.98	(5.24)		2.47	(1.60)		2.48	(2.09)		8.36	(2.60)	
Social Sciences	156	(36.50)	14.24	(5.36)		2.22	(1.55)		2.30	(1.85)		7.84	(2.23)	
Health Sciences	69	(16.20)	14.30	(5.62)		1.97	(1.44)		1.78	(1.61)		7.81	(1.82)	
Other Sciences	113	(26.50)	13.45	(5.29)		2.69	(1.47)		2.42	(1.86)		8.27	(2.54)	
Other	12	(2.80)	15.08	(4.83)		3.08	(1.83)		2.92	(2.15)		8.25	(2.73)	
Double majored	19	(4.40)	14.32	(6.93)		2.63	(1.57)		2.47	(1.68)		7.53	(2.99)	
Accommodation					**0.017**			0.60			0.12			0.67
Dorm	241	(56.40)	13.95	(5.47)		2.45	(1.55)		2.36	(1.90)		7.96	(2.51)	
Private room	162	(37.90)	13.70	(5.24)		2.29	(1.48)		2.32	(1.81)		8.14	(2.01)	
With family	24	(5.60)	17.04	(5.30)		2.33	(1.97)		1.54	(1.67)		7.79	(3.04)	

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Table 3: Number and percentage of poor mental health (World Health Organization Five-Item Well-Being Index Scale [WHO-5] score ≤ 13), possible depression (Patient Health Questionnaire 2-Item Scale [PHQ-2] score ≥ 3), possible anxiety (Generalized Anxiety Disorder 2-Item Scale [GAD-2] score ≥ 3), high stress level (Perceived Stress 4-Item Scale [PSS-4] score ≥ 16) in 427 international students in Taiwan.

		WHO-5			PHQ-2			GAD-2			PSS-4		
Variable	N	n	(%)	p	n	(%)	p	n	(%)	p	n	(%)	p
Overall		209	(44.28)		105	(24.59)		161	(37.70)		342	(80.09)	
Sex				0.31			0.60			0.82			0.42
Male	172	61	(35.47)		40	(23.26)		106	(61.63)		31	(18.02)	
Female	255	103	(40.39)		65	(25.49)		160	(62.75)		54	(21.18)	
Age group (year)				0.29			**0.010**			**0.006**			0.45
18-20	45	19	(42.22)		13	(28.89)		16	(35.56)		32	(71.11)	
21-25	155	63	(40.65)		43	(27.74)		68	(43.87)		127	(81.94)	
26-30	122	50	(40.98)		36	(29.51)		52	(42.62)		98	(80.33)	
≥31	105	32	(30.48)		13	(12.38)		25	(23.81)		85	(80.95)	
Race				0.26			0.26			0.091			0.63
Non-Asian	107	46	(42.99)		22	(20.56)		33	(30.84)		84	(78.50)	
Asian	320	118	(36.88)		83	(25.94)		128	(40.00)		258	(80.63)	
Time in Taiwan				0.39			0.82			0.57			0.91
< 3 months	59	18	(30.51)		14	(23.73)		21	(35.59)		45	(76.27)	
4-12 months	90	32	(35.56)		20	(22.22)		29	(32.22)		73	(81.11)	
2-4 years	199	76	(38.19)		52	(26.13)		80	(40.20)		157	(78.89)	
≥ 5 years	82	38	(46.34)		19	(23.17)		31	(37.80)		67	(81.71)	
Quarantine													
None				0.64			0.93			0.73			0.72
No	351	31	(8.83)		86	(24.50)		131	(37.32)		280	(79.77)	
Yes	76	164	(215.79)		19	(25.00)		30	(39.47)		62	(81.58)	
Border control				0.11			**0.031**			**0.027**			0.36
No	112	50	(44.64)		36	(32.14)		52	(46.43)		93	(83.04)	
Yes	315	114	(36.19)		69	(21.90)		109	(34.60)		249	(79.05)	
Close contact/confirmed case				0.076			0.077			0.35			0.89
No	339	123	(36.28)		77	(22.71)		124	(36.58)		272	(80.24)	
Yes	88	41	(46.59)		28	(31.82)		37	(42.05)		70	(79.55)	
Vaccination status				0.34			0.70			0.91			0.19
None	20	8	(40.00)		5	(25.00)		7	(35.00)		13	(65.00)	
1-2 doses	55	26	(47.27)		16	(29.09)		22	(40.00)		46	(83.64)	
≥3 doses	352	130	(36.93)		84	(23.86)		132	(37.50)		283	(80.40)	

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Degree				0.27			0.53			0.083		0.057
Bachelor	119	53	(44.54)		32	(26.89)		53	(44.54)		87	(73.11)
Master	187	67	(35.83)		41	(21.93)		71	(37.97)		152	(81.28)
Ph.D.	121	44	(36.36)		32	(26.45)		37	(30.58)		103	(85.12)
University location in Taiwan				0.44			0.30			0.37		0.93
East	43	12	(27.91)		13	(30.23)		18	(41.86)		33	(76.74)
North	107	40	(37.38)		32	(29.91)		46	(42.99)		86	(80.37)
South + Islands	264	106	(40.15)		57	(21.59)		91	(34.47)		213	(80.68)
Central	13	6	(46.15)		3	(23.08)		6	(46.15)		10	(76.92)
University: public vs. private				0.40			0.61			0.79		0.23
Public	337	126	(37.39)		81	(24.04)		126	(37.39)		274	(81.31)
Private	90	38	(42.22)		24	(26.67)		35	(38.89)		68	(75.56)
University: general vs. vocational				0.48			0.16			0.24		0.73
General	393	149	(37.91)		100	(25.45)		145	(36.90)		314	(79.90)
Vocational	34	15	(44.12)		5	(14.71)		16	(47.06)		28	(82.35)
Number of Roommates				0.31			0.20			0.31		0.12
None	141	59	(41.84)		40	(28.37)		58	(41.13)		119	(84.40)
≥1	286	105	(36.71)		65	(22.73)		103	(36.01)		223	(77.97)
Country of origin				0.098			0.10			0.35		0.44
Asia and Oceania	329	122	(37.08)		84	(25.53)		129	(39.21)		264	(80.24)
Europe	33	9	(27.27)		5	(15.15)		10	(30.30)		29	(87.88)
Americas	58	29	(50.00)		12	(20.69)		18	(31.03)		43	(74.14)
Africa	7	4	(57.14)		4	(57.14)		4	(57.14)		6	(85.71)
County of residence				0.47			0.23			0.41		0.71
North	261	105	(40.23)		56	(21.46)		91	(34.87)		213	(81.61)
East	43	12	(27.91)		14	(32.56)		19	(44.19)		33	(76.74)
South + Offshore Islands	109	41	(37.61)		32	(29.36)		44	(40.37)		86	(78.90)
Central	14	6	(42.86)		3	(21.43)		7	(50.00)		10	(71.43)
Parent education				0.93			0.28			0.62		0.40
Below high school	44	15	(34.09)		16	(36.36)		17	(38.64)		31	(70.45)
High school	106	42	(39.62)		23	(21.70)		35	(33.02)		87	(82.08)
Bachelor or junior/community college	166	65	(39.16)		40	(24.10)		68	(40.96)		134	(80.72)
Master or above	111	42	(37.84)		26	(23.42)		41	(36.94)		90	(81.08)
Source of financial support				0.97			0.43			0.34		0.78
Self-funded	79	32	(40.51)		19	(24.05)		35	(44.30)		60	(75.95)
Family and friends	119	45	(37.82)		25	(21.01)		44	(36.97)		97	(81.51)
Scholarships	201	77	(38.31)		51	(25.37)		69	(34.33)		162	(80.60)

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Other	28	10	(35.71)		10	(35.71)		13	(46.43)		23	(82.14)	
Start date of current program				0.080			0.26			0.52			**0.014**
Within past year	135	41	(30.37)		26	(19.26)		46	(34.07)		96	(71.11)	
Within 1-2 years	148	61	(41.22)		43	(29.05)		58	(39.19)		127	(85.81)	
Within 2-3 years	76	36	(47.37)		18	(23.68)		27	(35.53)		62	(81.58)	
≥ 4 years	68	26	(38.24)		18	(26.47)		30	(44.12)		57	(83.82)	
Mental health treatment				0.076			**0.009**			**0.015**			0.29
No	339	123	(36.28)		74	(21.83)		118	(34.81)		268	(79.06)	
Yes	88	41	(46.59)		31	(35.23)		43	(48.86)		74	(84.09)	
Previous degree				0.56			0.38			0.81			0.38
No	342	129	(37.72)		81	(23.68)		128	(37.43)		271	(79.24)	
Yes	85	35	(41.18)		24	(28.24)		33	(38.82)		71	(83.53)	
Language of instruction				0.78			0.062			0.76			**0.033**
Mandarin	163	99	(60.74)		32	(19.63)		60	(36.81)		122	(74.85)	
English	264	164	(62.12)		73	(27.65)		101	(38.26)		220	(83.33)	
Mandarin fluency				0.68			0.26			0.32			0.21
None	89	36	(40.45)		29	(32.58)		37	(41.57)		67	(75.28)	
Beginner (A1, A2, B1)	166	63	(37.95)		39	(23.49)		63	(37.95)		133	(80.12)	
Intermediate (B2, C1, C2)	115	40	(34.78)		25	(21.74)		36	(31.30)		91	(79.13)	
Native	57	25	(43.86)		12	(21.05)		25	(43.86)		51	(89.47)	
Currently in quarantine				0.55			0.55			0.90			0.99
No	397	154	(38.79)		99	(24.94)		150	(37.78)		318	(80.10)	
Yes	30	10	(33.33)		6	(20.00)		11	(36.67)		24	(80.00)	
Marital status				0.17			0.25			**0.006**			0.25
Single	363	139	(38.29)		94	(25.90)		146	(40.22)		294	(80.99)	
Married or co-habitated	57	20	(35.09)		9	(15.79)		11	(19.30)		44	(77.19)	
Separated or divorced	7	5	(71.43)		2	(28.57)		4	(57.14)		4	(57.14)	
Family in Taiwan				0.76			0.76			0.17			0.20
No	352	134	(38.07)		218	(61.93)		138	(39.20)		286	(81.25)	
Yes	75	30	(40.00)		45	(60.00)		23	(30.67)		56	(74.67)	
Major				0.91			0.24			0.194			0.77
Arts & Humanities	58	20	(34.48)		15	(25.86)		25	(43.10)		48	(82.76)	
Social Sciences	156	59	(37.82)		33	(21.15)		60	(38.46)		126	(80.77)	
Health Sciences	69	25	(36.23)		13	(18.84)		17	(24.64)		57	(82.61)	
Other Sciences	113	48	(42.48)		35	(30.97)		44	(38.94)		89	(78.76)	
Other	12	4	(33.33)		5	(41.67)		6	(50.00)		8	(66.67)	
Double majored	19	8	(42.11)		4	(21.05)		9	(47.37)		14	(73.68)	
Accommodation				0.59			0.28			0.66			0.52
Dorm	241	92	(38.17)		65	(26.97)		93	(38.59)		190	(78.84)	

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Private room	162	65	(40.12)		33	(20.37)		61	(37.65)		134	(82.72)	
With family	24	7	(29.17)		7	(29.17)		7	(29.17)		18	(75.00)	
Social Support				**<0.001**			**<0.001**			**<0.001**			0.56
Low social support	224	118	(52.68)		71	(31.70)		107	(47.77)		177	(79.02)	
High social support	203	46	(22.66)		34	(16.75)		54	(26.60)		165	(81.28)	
Acculturative Stress				**<0.001**			**<0.001**			**<0.001**			0.33
Low acculturative stress	216	53	(24.54)		29	(13.43)		52	(24.07)		169	(78.24)	
High acculturative stress	211	111	(52.61)		76	(36.02)		109	(51.66)		173	(81.99)	
COVID-19 Related Stressors				0.21			**0.001**			**<0.001**			**0.004**
Low COVID-19 stress	217	77	(35.48)		42	(19.35)		61	(28.11)		162	(74.65)	
High COVID-19 stress	210	87	(41.43)		63	(30.00)		100	(47.62)		180	(85.71)	

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Table 4: Linear regression analysis of mental health (dependent variable: WHO-5 continuous score) in 427 international students in Taiwan.

	Unadjusted			Adjusted[a]			Adjusted[b]		
Variable	B	(95% CI)	p	B	(95% CI)	p	B	(95% CI)	p
Sex									
Male	Ref			Ref			Ref		
Female	-0.54	(-1.59 , 0.51)	0.31	-1.06	(-2.01 , -0.10)	**0.030**	-0.84	(-1.85 , 0.16)	0.10
Age group (year)									
18-20	Ref			Ref			Ref		
21-25	0.19	(-1.61 , 1.98)	0.84	0.40	(-1.43 , 2.23)	0.67	0.78	(-1.14 , 2.70)	0.43
26-30	0.10	(-1.75 , 1.95)	0.92	0.56	(-1.62 , 2.75)	0.61	0.67	(-1.64 , 2.97)	0.57
≥31	1.55	(-0.34 , 3.44)	0.11	1.31	(-1.08 , 3.70)	0.28	2.22	(-0.29 , 4.73)	0.082
Race									
Non-Asian	Ref			Ref			Ref		
Asian	0.61	(-0.58 , 1.79)	0.32	-0.19	(-1.93 , 1.56)	0.83	0.02	(-1.83 , 1.86)	0.99
Time in Taiwan									
< 3 months	Ref			Ref			Ref		
4-12 months	-0.48	(-2.28 , 1.32)	0.60	0.92	(-1.04 , 2.87)	0.36	0.99	(-1.06 , 3.05)	0.34
2-4 years	-1.07	(-2.66 , 0.53)	0.19	1.23	(-0.56 , 3.02)	0.18	1.35	(-0.54 , 3.23)	0.16
≥ 5 years	-1.22	(-3.03 , 0.60)	0.19	0.98	(-1.00 , 2.96)	0.33	1.01	(-1.08 , 3.10)	0.34
Border control quarantine									
No	Ref			Ref			Ref		
Yes	1.30	(0.14 , 2.47)	**0.028**	0.76	(-0.35 , 1.87)	0.18	0.66	(-0.51 , 1.83)	0.27
Degree									
Bachelor	Ref			Ref			Ref		
Master	0.71	(-0.54 , 1.95)	0.27	-0.28	(-1.83 , 1.26)	0.72	-0.23	(-1.85 , 1.39)	0.78
Ph.D.	1.04	(-0.33 , 2.42)	0.14	-0.06	(-1.99 , 1.87)	0.95	-0.21	(-2.24 , 1.82)	0.84
Number of roommates									
None	Ref			Ref			Ref		
≥1	0.98	(-0.11 , 2.07)	0.078	0.72	(-0.41 , 1.84)	0.21	1.04	(-0.13 , 2.21)	0.082
Country of origin									
Asia and Oceania	Ref			Ref			Ref		
Europe	0.81	(-1.13 , 2.75)	0.41	0.10	(-2.28 , 2.49)	0.93	0.38	(-2.13 , 2.90)	0.77
Americas	-1.36	(-2.88 , 0.15)	0.077	-1.83	(-3.79 , 0.13)	0.067	-1.72	(-3.78 , 0.34)	0.10
Africa	-2.19	(-6.25 , 1.86)	0.29	-1.35	(-5.19 , 2.48)	0.49	-1.52	(-5.56 , 2.51)	0.46
Parent education									
Below high school	Ref			Ref			Ref		

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High school	0.43	(-1.48	, 2.34)	0.66	-0.77	(-2.47	, 0.92)	0.37	-0.54	(-2.33	, 1.24)	0.55
Bachelor or junior/community college	-0.03	(-1.84	, 1.77)	0.97	-0.97	(-2.58	, 0.63)	0.23	-1.25	(-2.95	, 0.44)	0.15
Master or above	0.73	(-1.17	, 2.63)	0.45	-0.55	(-2.26	, 1.17)	0.53	-0.77	(-2.58	, 1.05)	0.41
Source of financial support												
Self-funded	Ref				Ref				Ref			
Family and friends	0.37	(-1.18	, 1.91)	0.64	-0.26	(-1.70	, 1.19)	0.73	0.16	(-1.36	, 1.68)	0.84
Scholarships	-0.09	(-1.50	, 1.33)	0.91	-0.07	(-1.47	, 1.33)	0.92	-0.01	(-1.48	, 1.46)	0.99
Other	0.15	(-2.20	, 2.49)	0.90	-0.06	(-2.13	, 2.02)	0.96	0.21	(-1.98	, 2.39)	0.85
Start date of current program												
Within past year	Ref				Ref				Ref			
Within 1-2 years	-1.37	(-2.63	, -0.11)	**0.033**	-1.49	(-2.85	, -0.12)	**0.033**	-1.74	(-3.17	, -0.32)	**0.017**
Within 2-3 years	-1.83	(-3.35	, -0.32)	**0.018**	-1.89	(-3.45	, -0.33)	**0.017**	-1.93	(-3.57	, -0.30)	**0.020**
≥ 4 years	-1.66	(-3.23	, -0.08)	**0.039**	-1.91	(-3.64	, -0.18)	**0.031**	-1.98	(-3.78	, -0.18)	**0.032**
Mental health treatment												
No	Ref				Ref				Ref			
Yes	-1.17	(-2.44	, 0.10)	0.070	-0.07	(-1.23	, 1.10)	0.91	-0.36	(-1.58	, 0.86)	0.56
Language of instruction												
Mandarin	Ref				Ref				Ref			
English	-0.15	(-1.21	, 0.92)	0.79	0.02	(-1.10	, 1.13)	0.98	0.09	(-1.08	, 1.27)	0.88
Marital status												
Single	Ref				Ref				Ref			
Married or co-habitated	1.96	(0.46	, 3.46)	**0.011**	0.60	(-0.89	, 2.09)	0.43	0.52	(-1.06	, 2.08)	0.52
Separated or divorced	-3.69	(-7.71	, 0.33)	0.072	-2.31	(-5.97	, 1.34)	0.21	-2.99	(-6.82	, 0.85)	0.13
Accommodation												
Dorm	Ref				Ref				Ref			
Private room	-0.25	(-1.32	, 0.82)	0.65	-0.44	(-1.55	, 0.68)	0.44	-0.32	(-1.49	, 0.86)	0.60
With family	3.09	(0.83	, 5.35)	**0.008**	1.80	(-0.31	, 3.92)	0.10	1.77	(-0.46	, 4.00)	0.12
Social Support	0.21	(0.17	, 0.26)	**<0.001**	0.20	(0.15	, 0.24)	**<0.001**				
Acculturative Stress	-0.18	(-0.23	, -0.14)	**<0.001**	-0.15	(-0.19	, -0.10)	**<0.001**				
COVID-19 Related Stressors	-0.03	(-0.05	, 0.00)	**0.033**	0.01	(-0.01	, 0.04)	0.40				
Social Support												
Low social support	Ref								Ref			
High social support	3.89	(2.93	, 4.85)	**<0.001**					3.45	(2.46	, 4.44)	**<0.001**
Acculturative Stress												
Low acculturative stress	Ref								Ref			
High acculturative stress	-3.36	(-4.34	, -2.38)	**<0.001**					-2.51	(-3.52	, -1.51)	**<0.001**

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COVID-19 Related Stressors										
Low COVID-19 stress	Ref					Ref				
High COVID-19 stress	-0.86	(-1.89	,	0.17)	0.1	-0.02	(-1.01	,	0.98)	0.97

[a]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, continuous variables (social support, acculturative stress, COVID-19 stress)

[b]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, categorical variables (social support, acculturative stress, COVID-19 stress)

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Table 5. Linear regression analysis of perceived stress (dependent variable: PSS-4 continuous score) in 427 international students in Taiwan.

	Unadjusted			Adjusted[a]			Adjusted[b]		
Variable	B	(95% CI)	p	B	(95% CI)	p	B	(95% CI)	p
Sex									
Male	Ref			Ref			Ref		
Female	-0.11	(-0.56 , 0.35)	0.65	0.02	(0.00 , 0.05)	**0.043**	-0.06	(-0.53 , 0.42)	0.82
Age group (year)									
18-20	Ref			Ref			Ref		
21-25	0.80	(0.02 , 1.59)	0.045	0.28	(-0.64 , 1.20)	0.55	0.23	(-0.69 , 1.14)	0.63
26-30	0.48	(-0.33 , 1.29)	0.24	-0.42	(-1.52 , 0.68)	0.45	-0.51	(-1.60 , 0.59)	0.37
≥31	0.68	(-0.14 , 1.51)	0.11	-0.41	(-1.61 , 0.79)	0.50	-0.56	(-1.75 , 0.64)	0.36
Race									
Non-Asian	Ref			Ref			Ref		
Asian	0.18	(-0.34 , 0.69)	0.51	0.10	(-0.78 , 0.98)	0.82	0.12	(-0.76 , 1.00)	0.79
Time in Taiwan									
< 3 months	Ref			Ref			Ref		
4-12 months	0.37	(-0.42 , 1.15)	0.36	-0.47	(-1.45 , 0.51)	0.35	-0.49	(-1.47 , 0.49)	0.33
2-4 years	0.37	(-0.32 , 1.07)	0.29	-0.56	(-1.46 , 0.34)	0.22	-0.59	(-1.49 , 0.31)	0.20
≥ 5 years	0.42	(-0.38 , 1.21)	0.30	-0.44	(-1.44 , 0.55)	0.38	-0.43	(-1.43 , 0.57)	0.40
Border control quarantine									
No	Ref			Ref			Ref		
Yes	-0.21	(-0.72 , 0.31)	0.43	-0.11	(-0.67 , 0.45)	0.70	-0.03	(-0.59 , 0.53)	0.93
Degree									
Bachelor	Ref			Ref			Ref		
Master	0.33	(-0.21 , 0.87)	0.23	0.65	(-0.13 , 1.43)	0.10	0.71	(-0.07 , 1.48)	0.074
Ph.D.	0.74	(0.15 , 1.34)	**0.015**	1.18	(0.21 , 2.15)	**0.017**	1.25	(0.28 , 2.21)	**0.012**
Number of roommates									
None	Ref			Ref			Ref		
≥1	-0.41	(-0.88 , 0.07)	0.095	-0.33	(-0.90 , 0.24)	0.25	-0.37	(-0.93 , 0.19)	0.19
Country of origin									
Asia and Oceania	Ref			Ref			Ref		
Europe	0.01	(-0.84 , 0.86)	0.99	-0.02	(-1.22 , 1.18)	0.97	-0.11	(-1.30 , 1.09)	0.86
Americas	-0.19	(-0.86 , 0.47)	0.57	-0.10	(-1.08 , 0.89)	0.85	0.02	(-0.97 , 1.00)	0.98
Africa	-0.63	(-2.40 , 1.15)	0.49	-0.17	(-2.10 , 1.76)	0.86	-0.06	(-1.98 , 1.87)	0.95
Parent education									
Below high school	Ref			Ref			Ref		

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High school	0.60	(-0.24	,	1.43)	0.16	0.62	(-0.24	,	1.47)	0.16	0.65	(-0.20	,	1.50)	0.14
Bachelor or junior/community college	0.48	(-0.31	,	1.27)	0.23	0.52	(-0.29	,	1.33)	0.21	0.53	(-0.28	,	1.33)	0.20
Master or above	0.54	(-0.29	,	1.36)	0.20	0.42	(-0.45	,	1.28)	0.34	0.43	(-0.44	,	1.29)	0.33
Source of financial support															
Self-funded	Ref					Ref					Ref				
Family and friends	-0.04	(-0.72	,	0.63)	0.90	-0.12	(-0.84	,	0.61)	0.75	-0.04	(-0.76	,	0.69)	0.92
Scholarships	0.10	(-0.52	,	0.71)	0.76	-0.52	(-1.22	,	0.19)	0.15	-0.51	(-1.22	,	0.19)	0.15
Other	0.55	(-0.47	,	1.57)	0.29	0.42	(-0.62	,	1.46)	0.43	0.45	(-0.60	,	1.49)	0.40
Start date of current program															
Within past year	Ref					Ref					Ref				
Within 1-2 years	0.98	(0.44	,	1.52)	**<0.001**	1.23	(0.55	,	1.92)	**<0.001**	1.28	(0.59	,	1.96)	**<0.001**
Within 2-3 years	0.83	(0.17	,	1.48)	**0.013**	1.01	(0.23	,	1.80)	**0.011**	1.04	(0.26	,	1.82)	**0.009**
≥ 4 years	1.34	(0.67	,	2.02)	**<0.001**	1.33	(0.46	,	2.20)	**0.003**	1.44	(0.58	,	2.30)	**0.001**
Mental health treatment															
No	Ref					Ref					Ref				
Yes	0.22	(-0.34	,	0.78)	0.44	0.14	(-0.44	,	0.73)	0.63	0.07	(-0.51	,	0.65)	0.81
Language of instruction															
Mandarin	Ref					Ref					Ref				
English	0.31	(-0.15	,	0.77)	0.19	0.21	(-0.35	,	0.77)	0.47	0.20	(-0.36	,	0.76)	0.47
Marital status															
Single	Ref					Ref					Ref				
Married or co-habitated	-0.06	(-0.72	,	0.61)	0.87	-0.01	(-0.76	,	0.74)	0.97	-0.06	(-0.81	,	0.69)	0.88
Separated or divorced	-0.75	(-2.53	,	1.02)	0.40	-0.08	(-1.92	,	1.76)	0.93	-0.27	(-2.10	,	1.56)	0.77
Accommodation															
Dorm	Ref					Ref					Ref				
Private room	0.18	(-0.29	,	0.66)	0.45	-0.09	(-0.65	,	0.48)	0.76	-0.03	(-0.59	,	0.54)	0.93
With family	-0.17	(-1.16	,	0.83)	0.74	-0.26	(-1.32	,	0.81)	0.63	-0.14	(-1.20	,	0.93)	0.80
Social Support	0.02	(0.00	,	0.05)	**0.029**	0.20	(0.15	,	0.24)	**<0.001**					
Acculturative Stress	0.03	(0.01	,	0.05)	**0.004**	0.02	(-0.01	,	0.04)	0.14					
COVID-19 Related Stressors	0.02	(0.01	,	0.03)	**0.001**	0.01	(0.00	,	0.02)	0.10					
Social Support															
Low social support	Ref										Ref				
High social support	0.21	(-0.24	,	0.66)	0.36						0.26	(-0.22	,	0.73)	0.29
Acculturative Stress															
Low acculturative stress	Ref										Ref				
High acculturative stress	0.54	(0.10	,	0.99)	**0.017**						0.38	(-0.10	,	0.86)	0.11

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COVID-19 Related Stressors										
Low COVID-19 stress	Ref					Ref				
High COVID-19 stress	0.84	(0.40	,	1.29)	**<0.001**	0.63	(0.15	,	1.10)	**0.010**

[a]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, continuous variables (social support, acculturative stress, COVID-19 stress)

[b]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, categorical variables (social support, acculturative stress, COVID-19 stress)

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Table 6: Logistic regression analysis of poor mental health (WHO-5 score ≤ 13) in 427 international students in Taiwan.

	Unadjusted			Adjusted[a]			Adjusted[b]		
Variable	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p
Sex									
Male	Ref			Ref			Ref		
Female	0.55	(0.83 , 1.84)	0.31	1.58	(0.95 , 2.61)	0.078	1.39	(0.85 , 2.26)	0.19
Age group (year)									
18-20	Ref			Ref			Ref		
21-25	0.94	(0.48 , 1.84)	0.85	1.05	(0.41 , 2.69)	0.92	0.95	(0.38 , 2.40)	0.91
26-30	0.95	(0.48 , 1.90)	0.89	0.85	(0.28 , 2.62)	0.78	0.87	(0.29 , 2.62)	0.80
≥31	0.60	(0.29 , 1.24)	0.17	0.54	(0.15 , 1.88)	0.33	0.40	(0.12 , 1.36)	0.14
Race									
Non-Asian	Ref			Ref			Ref		
Asian	0.78	(0.50 , 1.21)	0.26	0.84	(0.34 , 2.04)	0.70	0.81	(0.35 , 1.92)	0.64
Time in Taiwan									
< 3 months	Ref			Ref			Ref		
4-12 months	1.25	(0.62 , 2.53)	0.54	0.54	(0.19 , 1.54)	0.25	0.60	(0.22 , 1.68)	0.33
2-4 years	1.42	(0.76 , 2.66)	0.27	0.46	(0.17 , 1.22)	0.12	0.50	(0.19 , 1.28)	0.15
≥ 5 years	1.80	(0.89 , 3.62)	0.10	0.70	(0.24 , 2.02)	0.51	0.77	(0.27 , 2.17)	0.62
Border control quarantine									
No	Ref			Ref			Ref		
Yes	0.70	(0.45 , 1.09)	0.12	0.80	(0.45 , 1.42)	0.45	0.84	(0.48 , 1.48)	0.55
Degree									
Bachelor	Ref			Ref			Ref		
Master	0.70	(0.44 , 1.11)	0.13	0.84	(0.38 , 1.88)	0.68	0.82	(0.38 , 1.77)	0.61
Ph.D.	0.71	(0.42 , 1.19)	0.20	1.06	(0.39 , 2.89)	0.92	1.11	(0.42 , 2.94)	0.84
Number of roommates									
None	Ref			Ref			Ref		
≥1	0.81	(0.53 , 1.22)	0.31	0.69	(0.39 , 1.23)	0.21	0.65	(0.37 , 1.15)	0.14
Country of origin									
Asia and Oceania	Ref			Ref			Ref		
Europe	0.64	(0.29 , 1.41)	0.27	0.51	(0.14 , 1.83)	0.30	0.48	(0.14 , 1.65)	0.24
Americas	1.70	(0.97 , 2.97)	0.065	2.09	(0.77 , 5.62)	0.15	2.00	(0.77 , 5.23)	0.16
Africa	2.26	(0.50 , 10.28)	0.29	2.21	(0.26 , 18.42)	0.47	2.79	(0.37 , 20.95)	0.32
Parent education									
Below high school	Ref			Ref			Ref		
High school	1.27	(0.61 , 2.65)	0.53	3.13	(1.24 , 7.90)	**0.016**	2.84	(1.11 , 7.22)	**0.029**

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Bachelor or junior/community college	1.24	(0.62	2.50)	0.54	2.58	(1.09	6.14)	**0.032**	2.89	(1.19	6.99)	**0.019**
Master or above	1.18	(0.57	2.45)	0.66	2.97	(1.16	7.55)	**0.023**	3.20	(1.25	8.17)	**0.015**
Source of financial support												
Self-funded	Ref				Ref				Ref			
Family and friends	0.89	(0.50	1.60)	0.70	1.09	(0.51	2.34)	0.82	0.92	(0.44	1.94)	0.83
Scholarships	0.91	(0.54	1.55)	0.73	0.84	(0.40	1.77)	0.65	0.84	(0.41	1.72)	0.64
Other	0.82	(0.33	2.00)	0.66	0.75	(0.25	2.27)	0.61	0.68	(0.23	2.05)	0.49
Start date of current program												
Within past year	Ref				Ref				Ref			
Within 1-2 years	1.64	(1.00	2.69)	0.051	2.30	(1.10	4.83)	**0.028**	2.29	(1.11	4.69)	**0.024**
Within 2-3 years	2.18	(1.22	3.87)	**0.008**	2.97	(1.27	6.94)	**0.012**	2.68	(1.18	6.08)	**0.018**
≥ 4 years	1.46	(0.79	2.69)	0.23	1.62	(0.63	4.19)	0.321	1.49	(0.60	3.69)	0.39
Mental health treatment												
No	Ref				Ref				Ref			
Yes	1.53	(0.95	2.46)	0.078	0.95	(0.52	1.73)	0.86	1.06	(0.58	1.91)	0.86
Language of instruction												
Mandarin	Ref				Ref				Ref			
English	0.94	(0.63	1.41)	0.78	0.91	(0.50	1.64)	0.75	0.87	(0.49	1.54)	0.64
Marital status												
Single	Ref				Ref				Ref			
Married or co-habitated	0.87	(0.49	1.56)	0.64	1.55	(0.70	3.45)	0.28	1.62	(0.74	3.54)	0.23
Separated or divorced	4.03	(0.77	21.05)	0.10	7.18	(0.80	64.24)	0.078	7.02	(0.89	55.49)	0.065
Accommodation												
Dorm	Ref				Ref				Ref			
Private room	1.09	(0.72	1.63)	0.69	1.20	(0.54	2.16)	0.54	1.15	(0.65	2.04)	0.64
With family	0.67	(0.27	1.67)	0.39	0.64	(0.47	2.15)	0.47	0.68	(0.22	2.15)	0.51
Social Support	0.93	(0.91	0.95)	**<0.001**	0.92	(0.89	0.94)	**<0.001**				
Acculturative Stress	1.06	(1.04	1.08)	**<0.001**	1.06	(1.04	1.09)	**<0.001**				
COVID-19 Related Stressors	1.01	(1.00	1.02)	**0.038**	1.00	(0.99	1.01)	0.85				
Social Support												
Low social support	Ref								Ref			
High social support	0.26	(0.17	0.40)	**<0.001**					0.24	(0.15	0.40)	**<0.001**
Acculturative Stress												
Low acculturative stress	Ref								Ref			
High acculturative stress	3.41	(2.26	5.15)	**<0.001**					3.34	(2.05	5.45)	**<0.001**
COVID-19 Related Stressors												

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Low COVID-19 stress	Ref						Ref			
High COVID-19 stress	1.53	(1.04	,	2.27)	**0.033**		0.97	(0.60	,	1.56)	**<0.001**

[a]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, continuous variables (social support, acculturative stress, COVID-19 stress)

[b]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, categorical variables (social support, acculturative stress, COVID-19 stress)

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Table 7. Logistic regression analysis of possible depression (PHQ-2 score ≥ 3) in 427 international students in Taiwan.

	Unadjusted			Adjusted[a]			Adjusted[b]		
Variable	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p
Sex									
Male	Ref			Ref			Ref		
Female	1.13	(0.72 , 1.77)	0.60	1.24	(0.70 , 2.21)	0.46	1.16	(0.66 , 2.02)	0.61
Age group (year)									
18-20	Ref			Ref			Ref		
21-25	0.95	(0.45 , 1.97)	0.88	0.70	(0.24 , 2.00)	0.50	0.65	(0.23 , 1.82)	0.42
26-30	1.03	(0.49 , 2.19)	0.94	0.45	(0.12 , 1.64)	0.23	0.48	(0.14 , 1.69)	0.26
≥31	0.35	(0.15 , 0.83)	**0.017**	0.12	(0.03 , 0.53)	**0.005**	0.10	(0.03 , 0.44)	**0.002**
Race									
Non-Asian	Ref			Ref			Ref		
Asian	1.35	(0.80 , 2.30)	0.27	1.68	(0.59 , 4.79)	0.33	1.77	(0.63 , 4.94)	0.28
Time in Taiwan									
< 3 months	Ref			Ref			Ref		
4-12 months	0.91	(0.42 , 1.99)	0.82	0.25	(0.07 , 0.92)	0.037	0.28	(0.08 , 0.97)	**0.044**
2-4 years	1.14	(0.58 , 2.26)	0.70	0.51	(0.16 , 1.64)	0.26	0.57	(0.19 , 1.74)	0.32
≥ 5 years	0.91	(0.41 , 1.99)	0.80	0.29	(0.08 , 1.07)	0.063	0.36	(0.10 , 1.23)	0.10
Border control quarantine									
No	Ref			Ref			Ref		
Yes	0.59	(0.37 , 0.96)	**0.032**	0.74	(0.39 , 1.39)	0.35	0.80	(0.43 , 1.49)	0.48
Degree									
Bachelor	Ref			Ref			Ref		
Master	0.76	(0.45 , 1.30)	0.32	1.23	(0.49 , 3.06)	0.66	1.24	(0.51 , 2.99)	0.63
Ph.D.	0.98	(0.55 , 1.73)	0.94	2.19	(0.70 , 6.85)	0.18	2.28	(0.76 , 6.89)	0.14
Number of roommates									
None	Ref			Ref			Ref		
≥1	0.74	(0.47 , 1.18)	0.20	0.55	(0.28 , 1.10)	0.092	0.55	(0.28 , 1.07)	0.079
Country of origin									
Asia and Oceania	Ref			Ref			Ref		
Europe	0.52	(0.20 , 1.39)	0.19	0.78	(0.17 , 3.50)	0.74	0.72	(0.16 , 3.11)	0.65
Americas	0.76	(0.39 , 1.51)	0.43	0.97	(0.30 , 3.10)	0.95	1.06	(0.34 , 3.30)	0.93
Africa	3.89	(0.85 , 17.73)	0.079	8.79	(0.76 , 101.20)	0.081	9.85	(0.93 , 103.85)	0.057
Parent education									
Below high school	Ref			Ref			Ref		
High school	0.49	(0.23 , 1.05)	0.065	0.55	(0.21 , 1.43)	0.22	0.53	(0.21 , 1.35)	0.18

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Bachelor or junior/community college	0.56	(0.27	1.13)	0.11	0.67	(0.27	1.66)	0.39	0.74	(0.30	1.79)	0.50
Master or above	0.54	(0.25	1.14)	0.11	0.67	(0.25	1.80)	0.42	0.79	(0.30	2.07)	0.64
Source of financial support												
Self-funded	Ref				Ref				Ref			
Family and friends	0.84	(0.43	1.66)	0.61	0.56	(0.23	1.36)	0.20	0.54	(0.23	1.28)	0.16
Scholarships	1.07	(0.59	1.97)	0.82	0.52	(0.22	1.22)	0.13	0.55	(0.24	1.25)	0.15
Other	1.75	(0.69	4.44)	0.24	1.44	(0.43	4.84)	0.55	1.32	(0.40	4.39)	0.65
Start date of current program												
Within past year	Ref				Ref				Ref			
Within 1-2 years	1.70	(0.97	2.97)	0.062	3.91	(1.48	10.34)	**0.006**	3.78	(1.51	9.47)	**0.005**
Within 2-3 years	1.14	(0.58	2.23)	0.71	1.62	(0.56	4.68)	0.370	1.42	(0.52	3.86)	0.49
≥ 4 years	1.43	(0.72	2.84)	0.31	2.63	(0.84	8.29)	0.098	2.57	(0.87	7.58)	0.087
Mental health treatment												
No	Ref				Ref				Ref			
Yes	1.95	(1.17	3.24)	**0.010**	1.67	(0.88	3.19)	0.12	1.82	(0.96	3.44)	0.066
Language of instruction												
Mandarin	Ref				Ref				Ref			
English	1.57	(0.98	2.51)	0.063	2.12	(1.07	4.19)	**0.030**	1.90	(0.98	3.68)	0.058
Marital status												
Single	Ref				Ref				Ref			
Married or co-habitated	0.54	(0.25	1.14)	0.10	0.66	(0.23	1.86)	0.43	0.70	(0.25	1.95)	0.49
Separated or divorced	1.15	(0.22	6.00)	0.87	1.35	(0.19	9.64)	0.76	1.20	(0.17	8.74)	0.86
Accommodation												
Dorm	Ref				Ref				Ref			
Private room	0.69	(0.43	1.12)	0.13	0.60	(0.16	1.21)	0.16	0.60	(0.30	1.20)	0.15
With family	1.12	(0.44	2.81)	0.82	2.59	(0.16	9.80)	0.16	2.55	(0.71	9.19)	0.15
Social Support	0.96	(0.94	0.98)	**<0.001**	0.95	(0.93	0.98)	**0.001**				
Acculturative Stress	1.07	(1.05	1.10)	**<0.001**	1.05	(1.02	1.08)	**<0.001**				
COVID-19 Related Stressors	1.02	(1.01	1.03)	**<0.001**	1.01	(1.00	1.03)	0.073				
Social Support												
Low social support	Ref								Ref			
High social support	0.43	(0.27	0.69)	**<0.001**					0.47	(0.27	0.82)	**0.008**
Acculturative Stress												
Low acculturative stress	Ref								Ref			
High acculturative stress	3.63	(2.24	5.88)	**<0.001**					2.96	(1.69	5.16)	**<0.001**
COVID-19 Related Stressors												

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Low COVID-19 stress	Ref				Ref			
High COVID-19 stress	1.79	(1.14	, 2.79)	**0.011**	1.36	(0.79	, 2.34)	**0.008**

[a]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, continuous variables (social support, acculturative stress, COVID-19 stress)

[b]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, categorical variables (social support, acculturative stress, COVID-19 stress)

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Table 8: Logistic regression analysis of possible anxiety (GAD-2 score ≥ 3) in 427 international students in Taiwan.

	Unadjusted			Adjusted[a]			Adjusted[b]		
Variable	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p
Sex									
Male	Ref			Ref			Ref		
Female	0.95	(0.64 , 1.42)	0.82	0.88	(0.53 , 1.47)	0.63	0.82	(0.50 , 1.34)	0.42
Age group (year)									
18-20	Ref			Ref			Ref		
21-25	1.42	(0.71 , 2.82)	0.32	1.64	(0.63 , 4.30)	0.31	1.37	(0.54 , 3.46)	0.50
26-30	1.35	(0.66 , 2.73)	0.41	1.80	(0.57 , 5.70)	0.32	1.65	(0.55 , 4.95)	0.37
≥31	0.57	(0.27 , 1.21)	0.14	0.78	(0.22 , 2.77)	0.70	0.53	(0.16 , 1.77)	0.30
Race									
Non-Asian	Ref			Ref			Ref		
Asian	1.50	(0.94 , 2.39)	0.092	1.90	(0.75 , 4.82)	0.18	1.92	(0.79 , 4.67)	0.15
Time in Taiwan									
< 3 months	Ref			Ref			Ref		
4-12 months	0.85	(0.43 , 1.71)	0.65	0.47	(0.16 , 1.41)	0.18	0.48	(0.17 , 1.37)	0.17
2-4 years	1.23	(0.67 , 2.25)	0.51	0.66	(0.25 , 1.75)	0.40	0.67	(0.26 , 1.70)	0.40
≥ 5 years	1.01	(0.51 , 2.03)	0.97	0.41	(0.14 , 1.21)	0.11	0.47	(0.17 , 1.33)	0.15
Border control quarantine									
No	Ref			Ref			Ref		
Yes	0.61	(0.39 , 0.95)	**0.027**	0.68	(0.38 , 1.21)	0.19	0.77	(0.44 , 1.36)	0.37
Degree									
Bachelor	Ref			Ref			Ref		
Master	0.76	(0.48 , 1.22)	0.25	0.81	(0.36 , 1.81)	0.61	0.81	(0.38 , 1.75)	0.60
Ph.D.	0.55	(0.32 , 0.93)	**0.026**	0.54	(0.20 , 1.48)	0.23	0.58	(0.22 , 1.50)	0.26
Number of roommates									
None	Ref			Ref			Ref		
≥1	0.81	(0.53 , 1.22)	0.31	0.72	(0.39 , 1.32)	0.29	0.68	(0.38 , 1.23)	0.20
Country of origin									
Asia and Oceania	Ref			Ref			Ref		
Europe	0.67	(0.31 , 1.46)	0.32	1.13	(0.31 , 4.11)	0.85	0.90	(0.26 , 3.10)	0.86
Americas	0.70	(0.38 , 1.27)	0.24	0.87	(0.31 , 2.43)	0.80	0.97	(0.36 , 2.60)	0.95
Africa	2.07	(0.46 , 9.39)	0.35	3.34	(0.40 , 27.93)	0.27	4.50	(0.57 , 35.55)	0.15
Parent education									
Below high school	Ref			Ref			Ref		
High school	0.78	(0.38 , 1.62)	0.51	0.91	(0.36 , 2.30)	0.85	0.84	(0.34 , 2.04)	0.69

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Bachelor or junior/community college	1.10	(0.56	,	2.18)	0.78	1.57	(0.65	,	3.80)	0.32	1.58	(0.67	,	3.68)	0.29
Master or above	0.93	(0.45	,	1.91)	0.84	1.55	(0.60	,	3.99)	0.36	1.61	(0.65	,	3.98)	0.31
Source of financial support															
Self-funded	Ref					Ref					Ref				
Family and friends	0.74	(0.41	,	1.32)	0.30	0.65	(0.30	,	1.39)	0.26	0.61	(0.29	,	1.28)	0.19
Scholarships	0.66	(0.39	,	1.12)	0.121	0.45	(0.21	,	0.96)	**0.039**	0.49	(0.24	,	1.01)	0.052
Other	1.09	(0.46	,	2.59)	0.85	0.96	(0.32	,	2.94)	0.95	0.87	(0.29	,	2.60)	0.81
Start date of current program															
Within past year	Ref					Ref					Ref				
Within 1-2 years	1.25	(0.77	,	2.03)	0.37	1.78	(0.83	,	3.86)	0.14	1.91	(0.91	,	3.97)	0.085
Within 2-3 years	1.07	(0.59	,	1.92)	0.83	0.97	(0.41	,	2.31)	0.95	1.00	(0.44	,	2.30)	1.00
≥ 4 years	1.53	(0.84	,	2.77)	0.16	1.78	(0.67	,	4.71)	0.24	2.02	(0.81	,	5.08)	0.13
Mental health treatment															
No	Ref					Ref					Ref				
Yes	1.79	(1.11	,	2.88)	**0.016**	1.70	(0.93	,	3.10)	0.087	1.81	(1.01	,	3.25)	**0.047**
Language of instruction															
Mandarin	Ref					Ref					Ref				
English	1.06	(0.71	,	1.59)	0.76	1.33	(0.73	,	2.40)	0.35	1.33	(0.75	,	2.35)	0.34
Marital status															
Single	Ref					Ref					Ref				
Married or co-habitated	0.36	(0.18	,	0.71)	**0.003**	0.36	(0.14	,	0.91)	**0.031**	0.41	(0.17	,	1.00)	**0.049**
Separated or divorced	1.98	(0.44	,	8.99)	0.375	2.91	(0.48	,	17.57)	0.25	2.56	(0.44	,	14.84)	0.30
Accommodation															
Dorm	Ref					Ref					Ref				
Private room	0.96	(0.64	,	1.45)	0.85	1.09	(0.79	,	1.98)	0.79	1.07	(0.60	,	1.93)	0.82
With family	0.66	(0.26	,	1.64)	0.37	1.32	(0.67	,	4.57)	0.67	1.50	(0.46	,	4.88)	0.50
Social Support	0.96	(0.94	,	0.98)	**<0.001**	0.96	(0.93	,	0.98)	**0.001**					
Acculturative Stress	1.08	(1.06	,	1.10)	**<0.001**	1.07	(1.05	,	1.10)	**<0.001**					
COVID-19 Related Stressors	1.03	(1.02	,	1.04)	**<0.001**	1.02	(1.01	,	1.04)	**0.003**					
Social Support															
Low social support	Ref										Ref				
High social support	0.40	(0.26	,	0.60)	**<0.001**						0.47	(0.29	,	0.77)	**0.002**
Acculturative Stress															
Low acculturative stress	Ref										Ref				
High acculturative stress	3.37	(2.23	,	5.09)	**<0.001**						3.08	(1.89	,	5.02)	**<0.001**
COVID-19 Related Stressors															

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Low COVID-19 stress	Ref					Ref			
High COVID-19 stress	2.46	(1.65	,	3.68)	**<0.001**	2.06	(1.26	, 3.34)	**0.002**

[a]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, continuous variables (social support, acculturative stress, COVID-19 stress)

[b]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, categorical variables (social support, acculturative stress, COVID-19 stress)

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Table 9: Logistic regression analysis of high stress level (PSS-4 score ≥ 16) in 427 international students in Taiwan.

	Unadjusted			Adjusted[a]			Adjusted[b]		
Variable	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p	Odds ratio	(95% CI)	p
Sex									
Male	Ref			Ref			Ref		
Female	0.82	(0.50 , 1.34)	0.42	0.94	(0.54 , 1.65)	0.83	0.93	(0.53 , 1.63)	0.79
Age group (year)									
18-20	Ref			Ref			Ref		
21-25	1.84	(0.86 , 3.95)	0.12	1.35	(0.51 , 3.60)	0.54	1.37	(0.52 , 3.61)	0.52
26-30	1.66	(0.76 , 3.63)	0.21	0.94	(0.29 , 3.10)	0.92	0.96	(0.30 , 3.09)	0.94
≥31	1.73	(0.77 , 3.87)	0.19	0.96	(0.25 , 3.64)	0.95	0.96	(0.26 , 3.60)	0.96
Race									
Non-Asian	Ref			Ref			Ref		
Asian	1.14	(0.67 , 1.95)	0.64	1.42	(0.52 , 3.92)	0.50	1.49	(0.54 , 4.13)	0.44
Time in Taiwan									
< 3 months	Ref			Ref			Ref		
4-12 months	1.32	(0.58 , 3.00)	0.51	0.74	(0.26 , 2.13)	0.58	0.78	(0.27 , 2.23)	0.64
2-4 years	1.19	(0.59 , 2.43)	0.63	0.58	(0.22 , 1.49)	0.25	0.57	(0.22 , 1.48)	0.25
≥ 5 years	1.08	(0.48 , 2.41)	0.86	0.59	(0.21 , 1.69)	0.33	0.61	(0.21 , 1.73)	0.35
Border control quarantine									
No	Ref			Ref			Ref		
Yes	0.77	(0.44 , 1.35)	0.37	0.67	(0.34 , 1.31)	0.24	0.70	(0.36 , 1.37)	0.30
Degree									
Bachelor	Ref			Ref			Ref		
Master	1.60	(0.92 , 2.76)	0.093	1.99	(0.82 , 4.83)	0.13	2.00	(0.83 , 4.83)	0.12
Ph.D.	2.11	(1.11 , 4.01)	**0.024**	3.04	(0.96 , 9.63)	0.059	2.98	(0.95 , 9.38)	0.063
Number of roommates									
None	Ref			Ref			Ref		
≥1	0.65	(0.38 , 1.12)	0.120	0.73	(0.36 , 1.47)	0.37	0.75	(0.37 , 1.51)	0.42
Country of origin									
Asia and Oceania	Ref			Ref			Ref		
Europe	1.79	(0.61 , 5.26)	0.29	2.47	(0.55 , 11.22)	0.24	2.39	(0.52 , 10.92)	0.26
Americas	0.71	(0.37 , 1.35)	0.29	0.93	(0.30 , 2.85)	0.89	0.97	(0.31 , 2.99)	0.95
Africa	1.48	(0.18 , 12.49)	0.72	2.98	(0.26 , 34.28)	0.38	2.82	(0.25 , 31.33)	0.40
Parent education									
Below high school	Ref			Ref			Ref		
High school	1.92	(0.85 , 4.34)	0.12	2.03	(0.80 , 5.14)	0.13	2.06	(0.81 , 5.21)	0.13

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Bachelor or junior/community college	1.76	(0.83	,	3.73)	0.14	1.92	(0.82	,	4.49)	0.13	1.93	(0.82	,	4.55)	0.13
Master or above	1.80	(0.81	,	4.01)	0.15	1.54	(0.61	,	3.89)	0.36	1.60	(0.64	,	4.06)	0.32
Source of financial support															
Self-funded	Ref					Ref					Ref				
Family and friends	1.40	(0.70	,	2.79)	0.35	1.67	(0.71	,	3.89)	0.24	1.79	(0.77	,	4.14)	0.18
Scholarships	1.32	(0.71	,	2.45)	0.39	0.74	(0.33	,	1.64)	0.45	0.74	(0.33	,	1.64)	0.45
Other	1.46	(0.49	,	4.36)	0.50	1.36	(0.40	,	4.66)	0.63	1.32	(0.39	,	4.52)	0.66
Start date of current program															
Within past year	Ref					Ref					Ref				
Within 1-2 years	2.46	(1.36	,	4.45)	**0.003**	3.51	(1.64	,	7.51)	**0.001**	3.45	(1.63	,	7.32)	**0.001**
Within 2-3 years	1.80	(0.90	,	3.58)	0.10	2.62	(1.10	,	6.22)	**0.029**	2.56	(1.08	,	6.07)	**0.034**
≥ 4 years	2.11	(1.00	,	4.44)	0.050	2.43	(0.90	,	6.52)	0.079	2.48	(0.94	,	6.58)	0.067
Mental health treatment															
No	Ref					Ref					Ref				
Yes	1.40	(0.75	,	2.63)	0.29	1.30	(0.63	,	2.68)	0.48	1.27	(0.62	,	2.59)	0.52
Language of instruction															
Mandarin	Ref					Ref					Ref				
English	1.68	(1.04	,	2.71)	**0.034**	1.71	(0.91	,	3.24)	0.10	1.69	(0.89	,	3.19)	0.11
Marital status															
Single	Ref					Ref					Ref				
Married or co-habitated	0.79	(0.41	,	1.56)	0.50	0.59	(0.25	,	1.37)	0.22	0.59	(0.26	,	1.37)	0.22
Separated or divorced	0.31	(0.07	,	1.43)	0.13	0.40	(0.07	,	2.45)	0.32	0.34	(0.06	,	1.97)	0.23
Accommodation															
Dorm	Ref					Ref					Ref				
Private room	1.29	(0.77	,	2.14)	0.34	1.06	(0.86	,	2.10)	0.86	1.15	(0.58	,	2.26)	0.69
With family	0.81	(0.30	,	2.13)	0.66	0.76	(0.64	,	2.38)	0.64	0.82	(0.26	,	2.55)	0.73
Social Support	1.02	(1.00	,	1.04)	0.12	1.01	(0.99	,	1.04)	0.34					
Acculturative Stress	1.01	(0.99	,	1.03)	0.36	0.99	(0.97	,	1.02)	0.56					
COVID-19 Related Stressors	1.01	(1.00	,	1.03)	**0.015**	1.02	(1.00	,	1.03)	**0.029**					
Social Support															
Low social support	Ref										Ref				
High social support	1.15	(0.72	,	1.86)	0.56						1.12	(0.64	,	1.95)	0.69
Acculturative Stress															
Low acculturative stress	Ref										Ref				
High acculturative stress	1.27	(0.79	,	2.04)	0.33						1.09	(0.62	,	1.90)	0.77
COVID-19 Related Stressors															

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Low COVID-19 stress	Ref					Ref			
High COVID-19 stress	1.48	(0.91	,	2.39)	0.11	1.90	(1.09	,	3.34)	0.69

[a]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, continuous variables (social support, acculturative stress, COVID-19 stress)

[b]adjusted analysis controlling for sex, age, race, time spent in Taiwan, border control quarantine, degree level, number of roommates, country of origin, parent education, source of financial support, start date of current program, mental health baseline, class language, marital status, major, accommodation, categorical variables (social support, acculturative stress, COVID-19 stress)

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Table 10: Perceived access to mental health resources in 427 international students in Taiwan.

	Disagree		Agree	
Variable	n	(%)	n	(%)
Perceived access				
I do not know of any mental health services.	295	(69.1)	132	(30.9)
There are mental health resources available to me in a language I am fluent in.	243	(56.9)	184	(40.3)
I am able to easily access information about mental health services.	260	(60.9)	167	(39.1)
There are mental health services readily available to me.	260	(60.9)	167	(39.1)
I am able to receive help for mental health services in a timely manner.	288	(67.4)	139	(32.6)
My institution cares about my mental health.	246	(57.6)	181	(42.4)
My institution provides sufficient mental health resources.	259	(60.7)	168	(39.3)

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Table 11: Desired mental health support in 427 international students in Taiwan.

Variable	n	(%)
Desired Mental Health Support		
Face-to-face counseling	309	(72.4)
Mental health promoting activities (e.g., yoga, meditation)	231	(54.1)
Off-campus mental health treatment reimbursement	166	(38.9)
Virtual/phone counseling	124	(29.0)
Information sessions	113	(26.5)
Emergency hotline	89	(20.8)
Group counseling	81	(19.0)

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Table 12: Themes of international students' responses to the open-ended question (n=427): What other factors contribute to your stress during the COVID-19 pandemic?

Theme	n	(%)
COVID-19	156	(35.54)
Finances	94	(22.10)
School	63	(14.35)
Travel	56	(12.76)
Isolation	55	(12.53)
None	54	(12.30)
Other	34	(7.74)
Mental health	15	(3.42)
Language/culture	16	(3.64)
Future	13	(2.96)
Physical health	10	(2.28)
Treatment	12	(2.73)

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Table 13: Themes of international students' responses to the open-ended question (n=427): How do you think your institution's international student mental health information and resources can be improved?

Theme	n	(%)
More info	86	(19.59)
More services	84	(19.13)
None	77	(17.54)
Not sure	68	(15.49)
More languages	58	(13.21)
More events	49	(11.16)
Other	22	(5.01)
School factors	17	(3.87)
Better covid support	10	(2.28)

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Appendix

Item A. Theme definitions.

Variable	Definition
None[a, b]	Field left blank or response is none
Not sure[b]	Response is not sure or don't know
Other[a]	Unable to be categorized into any of the themes
COVID-19[a]	Reasons directly related to the COVID-19 pandemic, or as a direct result of it
Finances[a]	Money or current financial status
School[a]	Academics, dorms, peers and professors
Isolation[a]	Not being able to have contact with other people for an extended period of time
Travel[a]	Unable to travel to other places in the country or internationally
Mental health[a]	Emotional, psychological, and social wellbeing
Language/culture[a]	Navigating a language and culture different from their own
Future[a]	Plans about how to graduate, graduation, and what will happen after graduation
Physical health[a]	Functioning and wellbeing of the physical body
Treatment[a]	How other people treat them and how they perceive they are being treated
More information[b]	More information about available services
More services[b]	More counselors, more available time slots for counseling, more counseling options, etc.
More languages[b]	More counseling appointments that are made available in a language other than Mandarin
More events[b]	More mental health-promoting and social activities (e.g., yoga, international student events)
School factors[b]	Academics, peer and professors, dorms
Better covid support[b]	More services relating to the COVID-19 pandemic (e.g., testing, quarantine, reimbursement)

[a]Pertains to open-ended question #1: What other factors contribute to your stress during the COVID-19 pandemic?

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[b]Pertains to open-ended question #2: How do you think your institution's international student mental health information and resources can be improved?

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Item B. Data collection poster.

RESEARCH PARTICIPANTS WANTED

Factors That Impact the Mental Health of International Students in Taiwan During the COVID-19 Pandemic

My name is Claire Su and I am a Master's student in the Global Health Program at National Taiwan University.

We invite those who meet the following criteria to take our survey:
- 18 years or older
- Non-Taiwanese citizenship
- At least part-time and degree-seeking student
- Currently studying at a Taiwanese university and living in Taiwan

This is a completely anonymous survey and your data will be kept confidential. The survey will take around 10-20 minutes. You are eligible for a $50NTD evoucher as compensation for your time.

If you have any questions, you may contact me at R10853004@ntu.edu.tw.

Survey Link:
https://intm01.mc.ntu.edu.tw/coph/surveys/?s=A9LM7XMLXWDRDKYA

SURVEY QR CODE

doi:10.6342/NTU202300799

Item C. Email to Taiwan university international student offices for data collection.

您好，

我是 Claire Su，中文名字是蘇念柔， 目前就讀台大全球衛生學程碩士班一年級。

我的研究『在台之國際學生於新冠肺炎大流行病期間心理健康的影響因素』由台大公衛學院張書森教授指導，已通過台灣大學的 IRB 審核（號碼：202206HM019）。

這是一個網路匿名問卷調查，對象為在台就讀大學或以上學位的非本國籍、18 歲以上國際學生。懇請您協助將這封電子郵件和傳單轉發給貴校的國際學生，謝謝您！ 填答約需 10-20 分鐘，每位填答的同學可以獲得 50 元台幣禮卷。

我會在 2 週後發送後續提醒郵件。

如果有任何問題，歡迎直接與我聯繫，您可直接回覆此郵件。

非常感謝您的時間和幫助！

蘇念柔上

RESEARCH PARTICIPANTS WANTED
Factors That Impact the Mental Health of International Students in Taiwan During the COVID-19 Pandemic

My name is Claire Su and I am a master's student in the Global Health Program at National Taiwan University.

We invite those who meet the following criteria to take our survey:
- 18 years or older
- Non-Taiwanese citizenship
- At least part-time and degree-seeking student
- Currently studying at a Taiwanese university and living in Taiwan

This is a completely anonymous survey and your data will be kept confidential. The survey will take around 10-20 minutes. You are eligible for a $50NTD evoucher as compensation for your time.

If you have any questions, you may contact me at R10853004@ntu.edu.tw.

Survey link: https://intm01.mc.ntu.edu.tw/coph/surveys/?s=A9LM7XMLXWDRDKYA

Survey QR Code:

doi:10.6342/NTU202300799

Item D. Social media post for data collection.

Hi everyone! My name is Claire Su and I am a master's student in the Global Health Program at National Taiwan University. I've posted before but am in need of more participants for my thesis research, titled "Factors That Impact the Mental Health of International Students in Taiwan During the COVID-19 Pandemic". It has been approved by the NTU IRB.

We invite those who meet the following criteria to take our survey:
- 18 years or older
- Non-Taiwanese citizenship
- At least part-time and degree-seeking student
- Currently studying at a Taiwanese university and living in Taiwan

This is a completely anonymous survey and your data will be kept confidential. The survey will take around 10-20 minutes. You are eligible for a $50NTD evoucher as compensation for your time. Thank you!

If you have any questions, you may contact me at R10853004@ntu.edu.tw.

Survey link: https://intm01.mc.ntu.edu.tw/coph/surveys/?s=A9LM7XMLXWDRDKYA

大家好，我是 Claire ， 目前就讀台大全球衛生學程碩士班。我之前有 po 過，可是目前還需要更多的參與者！

我的論文研究『在台之國際學生於新冠肺炎大流行病期間心理健康的影響因素』目前還需要更多參與者，想請大家幫忙轉發給你們認識的國際學生。先謝謝大家！

這是一個網路匿名問卷調查，對象為在台就讀大學或以上學位的非本國籍、18 歲以上國際學生。填答問卷約需 10-20 分鐘，每位填答的同學可以獲得 50 元台幣禮卷。

如果有任何問題，歡迎直接聯絡我 （R10853004@ntu.edu.tw)。謝謝！

Survey link: https://intm01.mc.ntu.edu.tw/coph/surveys/?s=A9LM7XMLXWDRDKYA

doi:10.6342/NTU202300799

Item E. List of Taiwanese university international student offices' emails used for promotion.

學校名稱	English name	Email
國立東華大學	National Dong Hwa University	oia@gms.ndhu.edu.tw
國立臺東大學	National Taitung University	coia@nttu.edu.tw
國立宜蘭大學	National Ilan University	oia@niu.edu.tw
慈濟大學	Tzu Chi University	tcuoia@gms.tcu.edu.tw
佛光大學	Fo Guang University	oica@mail.fgu.edu.tw
慈濟科技大學	Tzu Chi University of Science and Technology	ibie11@ems.tcust.edu.tw
國立中興大學	National Chung Hsing University	oia@nchu.edu.tw
國立彰化師範大學	National Changhua University of Education Jin De Campus	internationaloffice1234@gmail.com
國立暨南國際大學	National Chi Nan University	oia@ncnu.edu.tw
國立臺中教育大學	National Taichung University of Education	ics@gm.ntcu.edu.tw
國立虎尾科技大學	National Formosa University	oia@nfu.edu.tw
國立勤益科技大學	National Chin-Yi University of Technology	oia@ncut.edu.tw
國立臺中科技大學	National Taichung University of Science and Technology	oia@nutc.edu.tw
國立雲林科技大學	National Yunlin University of Science and Technology	tlhsieh@yuntech.edu.tw
東海大學	Tunghai University	oir@thu.edu.tw
逢甲大學	Feng Chia University	oia@fcu.edu.tw
靜宜大學	Providence University	411ifamily@gmail.com
大葉大學	Dayeh University	iao@mail.dyu.edu.tw
中山醫學大學	Chung Shan Medical University	cs1133@csmu.edu.tw
中國醫藥大學	China Medical University	cmucia@mail.cmu.edu.tw
明道大學	Mingdao University	ypshiao@mdu.edu.tw
朝陽科技大學	Chaoyang University of Technology	icsc@cyut.edu.tw
弘光科技大學	Hungkuang University	csc@web.hk.edu.tw
建國科技大學	Chienkuo Technology University	oia@ctu.edu.tw
嶺東科技大學	Ling Tung University	ltuoia@teamail.ltu.edu.tw
中臺科技大學	Central Taiwan University of Science and Technology	ychuaug1974@ctust.edu.tw
南開科技大學	Nan Kai University of Technology	lan263@nkut.edu.tw

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僑光科技大學	Overseas Chinese University	bf825438@ocu.edu.tw
環球科技大學	TransWorld University	cia@twu.edu.tw
中州科技大學	Chung Chou University of Science and Technology	cie.ccut@gmail.com
修平科技大學	Hsiuping University of Science and Technology	crystal6@hust.edu.tw
國立政治大學	National Chengchi University	oic@nccu.edu.tw
國立聯合大學	National United University	chienchien36@nuu.edu.tw
國立清華大學	National Tsing Hua University	oga@my.nthu.edu.tw
國立臺灣大學	National Taiwan University	oia@ntu.edu.tw
臺北市立大學	University of Taipei	foreign@utaipei.edu.tw
國立臺灣師範大學	National Taiwan Normal University	oia@deps.ntnu.edu.tw
國立陽明交通大學	National Yang Ming Chiao Tung University	oia@ym.edu.tw
國立體育大學	National Taiwan Sport University	international@ntsu.edu.tw
國立臺北藝術大學	Taipei National University of the Arts	info@iec.tnua.edu.tw
國立臺灣藝術大學	National Taiwan University of Arts	international@ntua.edu.tw
國立中央大學	National Central University	cathychang0603@ncu.edu.tw
國立臺灣海洋大學	National Taiwan Ocean University	oia@mail.ntou.edu.tw
國立臺北大學	National Taipei University	violeta22@gm.ntpu.edu.tw
國立臺灣科技大學	National Taiwan University of Science and Technology	oia@mail.ntust.edu.tw
國立臺北護理健康大學	National Taipei University of Nursing and Health Sciences	overseas@ncnu.edu.tw
國立臺北商業大學	National Taipei University of Business	tinatsai@ntub.edu.tw
國立臺北科技大學	National Taipei University of Technology	intstudy@ntut.edu.tw
國立空中大學	National Open University	nouossc@mail.nou.edu.tw
康寧大學	University of Kang Ning	ins@ukn.edu.tw
輔仁大學	Fu Jen Catholic University	isc@mail.fju.edu.tw
東吳大學	Soochow University	scujennyyu@gmail.com
中原大學	Chung Yuan Christian University	oia@cycu.edu.tw
淡江大學	Tamkang University	lucychen@mail.tku.edu.tw
中國文化大學	Chinese Culture University	cufoa@dep.pccu.edu.tw
長庚大學	Chang Gung University	oia@mail.cgu.edu.tw

doi:10.6342/NTU202300799

元智大學	Yuan Ze University	iadept@saturn.yzu.edu.tw
中華大學	Chung Hua University	pudding0329@g.chu.edu.tw
華梵大學	Huafan University	ica@gm.hfu.edu.tw
世新大學	Shih Hsin University	global@mail.shu.edu.tw
銘傳大學	Ming Chuan University	wpliao@mail.mcu.edu.tw
實踐大學	Shih Chien University	104208@g2.usc.edu.tw
真理大學	Aletheia University	au3133@mail.au.edu.tw
大同大學	Tatung University	cllin@gm.ttu.edu.tw
臺北醫學大學	Taipei Medical University	oge@tmu.edu.tw
法鼓文理學院	Dharma Drum Institute of Liberal Arts	luyouru@dila.edu.tw
玄奘大學	Hsuan Chuang University	hcuicsac@hcu.edu.tw
開南大學	Kainan University	yulichi@mail.knu.edu.tw
明新科技大學	Minghsin University of Science and Technology	oicsa@must.edu.tw
健行科技大學	Chien Hsin University of Science and Technology	ico@uch.edu.tw
萬能科技大學	Vanung University	alice16@mail.vnu.edu.tw
明志科技大學	Ming Chi University of Technology	oia@mail.mcut.edu.tw
中國科技大學	China University of Technology	hannah@cute.edu.tw
元培醫事科技大學	Yuanpei University of Medical Technology	international@mail.ypu.edu.tw
景文科技大學	Jinwen University of Science and Technology	rdie@just.edu.tw
東南科技大學	Tungnan University	yjchen@mail.tnu.edu.tw
中華科技大學	China University of Science and Technology	kentsun@cc.cust.edu.tw
育達科技大學	Yu Da University of Science and Technology	chuanmel@ydu.edu.tw
長庚科技大學	Chang Gung University of Science and Technology	yjshiao@mail.cgust.edu.tw
臺北城市科技大學	Taipei City University of Science and Technology	ihtsai@tpcu.edu.tw
醒吾科技大學	Hsing Wu University	h110@mail.hwu.edu.tw
致理科技大學	Chihlee University of Technology	yuhui@mail.chihlee.edu.tw
宏國德霖科技大學	Hungkuo Delin University of Technology	Yoho3299@gmail.com
崇右影藝科技大學	Chungyu University of Film and Arts	national@cufa.edu.tw
亞東科技大學	Asia Eastern University of Science and Technology	cil0226@mail.aeust.edu.tw

doi:10.6342/NTU202300799

黎明技術學院	Lee-Ming Institute of Technology	mgr3@mail.lit.edu.tw
經國管理暨健康學院	Ching Kuo Institute of Management and Health	international@ems.cku.edu.tw
國立成功大學	National Cheng Kung University	em50950@email.ncku.edu.tw
國立中山大學	National Sun Yat-sen University	yuchuan@mail.nsysu.edu.tw
國立中正大學	National Chung Cheng University	admstc@ccu.edu.tw
國立高雄師範大學	National Kaohsiung Normal University	oia@mail.nknu.edu.tw
國立嘉義大學	National Chiayi University	oia@mail.ncyu.edu.tw
國立高雄大學	National University of Kaohsiung	dia@nuk.edu.tw
國立臺南藝術大學	Tainan National University of the Arts	oia@mail.tnnua.edu.tw
國立臺南大學	National University of Tainan	oia-1@pubmail.nutn.edu.tw
國立屏東大學	National Pingtung University	oiais@mail.nptu.edu.tw
國立屏東科技大學	National Pingtung University of Science and Technology	international@mail.npust.edu.tw
國立高雄餐旅大學	National Kaohsiung University of Hospitality and Tourism	linhsinyi@mail.nkuht.edu.tw
國立高雄科技大學	National Kaohsiung University of Science and Technology	amanda04@nkust.edu.tw
義守大學	I-Shou University	oia@isu.edu.tw
高雄醫學大學	Kaohsiung Medical University	ciae@kmu.edu.tw
樹德科技大學	Shu-Te University	oica@stu.edu.tw
南華大學	Nanhua University	nhu.oica@nhu.edu.tw
長榮大學	Chang Jung Christian University	intl@mail.cjcu.edu.tw
中信金融管理學院	CTBC Business School	vichang@ctbc.edu.tw
台灣首府大學	Taiwan Shoufu University	oicsa@tsu.edu.tw
南臺科技大學	Southern Taiwan University of Science and Technology	meiling@stust.edu.tw
崑山科技大學	Kun Shan University	oiadep@mail.ksu.edu.tw
嘉南藥理大學	Chia Nan Univiersity of Pharmacy and Science	box1039@mail.cnu.edu.tw
輔英科技大學	Fooyin University	oia@fy.edu.tw
正修科技大學	Cheng Shiu University	oia@gcloud.csu.edu.tw
高苑科技大學	Kao Yuan University	oia@cc.kyu.edu.tw
台南應用科技大學	Tainan University of Technology	emoiss@gm.tut.edu.tw
遠東科技大學	Far East University	tangho1991@mail.feu.edu.tw

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中華醫事科技大學	Chung hwa Medical Unviersity	international@mail.hwai.edu.tw
美和科技大學	Meiho University	x00010676@meiho.edu.tw
吳鳳科技大學	WuFeng University	kimiko@wfu.edu.tw
文藻外語大學	Wenzao Ursuline University of Languages	overseas.student@mail.wzu.edu.tw
東方設計大學	Tung Fang Design Institute	chihyen0115@gmail.com
國立金門大學	National Quemoy University	oica@nqu.edu.tw

doi:10.6342/NTU202300799

Item F. Online survey used for data collection.

Factors That Impact the Mental Health of International Students in Taiwan During the COVID-19 Pandemic

Factors That Impact the Mental Health of International Students in Taiwan During the COVID-19 Pandemic

You are invited to participate in this web-based survey that investigates what potential factors may influence the mental health of international students in Taiwan during the COVID-19 pandemic.

This is a research project being conducted by Nien-Jou Claire Su, a master of Global Health student at National Taiwan University.

Study Information

This study has been approved by the National Taiwan University Office of Research and Development.

Participation

Your participation in this survey is completely voluntary. You may refuse to take part in this research. You may also choose to leave any question blank or exit the survey at any point. The survey will take 10-20 minutes to complete.

Confidential

This is a completely anonymous survey and will not ask for any personal and/ or identifying information. Your data will be kept confidential. All collected data will be kept in REDCap and can only be accessed by the PI and co-PI.

Compensation

There will be a field at the end of the survey for you to enter your email if you would like to be compensated for your time (NTD $50 e-voucher). If you choose to provide your email, your survey responses may no longer be anonymous to the researcher. However, your responses will still remain confidential and no identifying information will be used in publications/ presentations about this data.

Risks

There will be questions asking you to reflect on your mental health which may lead to mild discomfort. Information about mental health resources will be provided at the end of the survey.

Inclusion Criteria

You must meet the following criteria to be eligible to take this survey.

- 18 years or older
- Non-Taiwanese citizenship
- At least part-time and degree-seeking student
- Studying at a Taiwanese university and living in Taiwan

Contact

If you have any questions, you may contact the researcher, Nien-Jou Claire Su, at R1083004@ntu.edu.tw, or the research supervisor, Dr. Shu-Sen Chang, at shusenchang@ntu.edu.tw.

If you feel that your rights as a participant have been infringed upon, or you have questions you wish to ask someone other than the investigator, you may contact the NTU Research Ethics Center: ordre@ntu.edu.tw.

doi:10.6342/NTU202300799

版本: 2022/06/22

Please select your choice below. By clicking "Yes", you acknowledge that you have read the above information, you voluntarily agree to participate, and you meet the inclusion criteria.

○ Yes
○ No

doi:10.6342/NTU202300799

Age and Sex

What is your birth year?

Age: _____

What is your sex?

- ○ Male
- ○ Female
- ○ Other: _____

doi:10.6342/NTU202300799

MENTAL HEALTH

For the past two weeks, please indicate which is closest to how you have been feeling.

	0 (at no time)	1 (some of the time)	2 (less than half of the time)	3 (more than half of the time)	4 (most of the time)	5 (all the time)
I have felt cheerful and in good spirits.	○	○	○	○	○	○
I have felt calm and relaxed.	○	○	○	○	○	○
I have felt active and rigorous.	○	○	○	○	○	○
I woke up feeling fresh and rested.	○	○	○	○	○	○
My daily life has been filled with things that interest me.	○	○	○	○	○	○

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	0 (not at all)	1 (several days)	2 (more than half of the days)	3 (nearly every day)
Little interest or pleasure in doing things	○	○	○	○
Feeling down, depressed, or hopeless	○	○	○	○
Trouble falling or staying asleep, or sleeping too much	○	○	○	○
Not being able to stop or control worrying	○	○	○	○
Feeling nervous, anxious or on edge	○	○	○	○

In the past month, how often have you felt the following?

	0 (never)	1 (almost never)	2 (sometimes)	3 (fairly often)	4 (very often)
You were unable to control the important things in your life.	○	○	○	○	○
Confident about your ability to handle your personal problems.	○	○	○	○	○
Things were going your way.	○	○	○	○	○
Difficulties were piling up so high that you could not overcome them.	○	○	○	○	○

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COVID-19 Related Factors

Have you experienced/ been...

Risk of becoming infected _____
Self-monitoring of symptoms _____
Risk of loved ones becoming infected _____
Risk of unintentionally infecting other people _____
Read about or heard others talking about the severity and contagiousness of COVID-19 _____
Stigma, shame, discrimination, or social exile related to quarantine or working in a high-risk area (e.g., others shunning you because you work in health care) _____
Stigma, shame or discrimination related to being in a certain age-group (e.g., negative statements about Millennials or Generation Z) _____
Uncertainty about how long quarantine and/ or social distancing requirements will last _____
Changes to daily personal care routines (e.g., cooking, cleaning, exercise/ relaxation, hobbies) _____
Changes to daily work routines (e.g., unable to earn money, attend full- or part-time work schedule) _____
Changes to daily education routines (e.g., online instruction) _____
Changes to social routines (e.g., spending free time with friends/ loved ones) _____
Changed responsibilities to care for dependents (e.g., childcare, eldercare) _____
Cancellation of planned or scheduled celebrations, entertainment, vacations or trips (e.g., graduations, birthdays, concerts) _____
Increased contact with close others or loved ones (e.g., increased conflict, co-worrying) _____
Pressure to "make the most of" COVID-19 or "find a silver lining" while quarantining (e.g., social media fitness challenges, encouragement to increase productivity) _____
Loss of current job security or income (e.g., inability to earn money) _____
Loss of current job training opportunities or education benchmarks (e.g., certification, apprenticeship, internship or degree completion) _____
Potential changes to the national or global economy (e.g., future job prospects, loss of investments) _____
Difficulty accessing important resources for daily life (e.g., health care, food, clothes, water, housing, medical supplies or prescriptions) _____
Inadequate access to reliable information about COVID-19 (including your personal risk of illness) _____
Receiving treatment, testing, vaccines, and/ or PPE for COVID-19 _____
Testing positive for COVID-19 _____
Having to quarantine as a result of close contact or having COVID-19 _____

The items you responded to with "Yes" in the previous question are listed below. How stressful were the following?

	1 (not at all stressful)	2 (a little bit stressful)	3 (somewhat stressful)	4 (pretty stressful)	5 (extremely stressful)
Risk of becoming infected	○	○	○	○	○
Self-monitoring of symptoms	○	○	○	○	○
Risk of loved ones becoming infected	○	○	○	○	○
Risk of unintentionally infecting other people	○	○	○	○	○
Read about or heard others talking about the severity and contagiousness of COVID-19	○	○	○	○	○
Stigma, shame, discrimination, or social exile related to quarantine or working in a high-risk area (e.g., others shunning you because you work in health care)	○	○	○	○	○

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Stigma, shame or discrimination related to being in a certain age-group (e.g., negative statements about Millennials or Generation Z)	○	○	○	○	○
Uncertainty about how long quarantine and/ or social distancing requirements will last	○	○	○	○	○
Changes to daily personal care routines (e.g., cooking, cleaning, exercise/ relaxation, hobbies)	○	○	○	○	○
Changes to daily work routines (e.g., unable to earn money, attend full- or part-time work schedule)	○	○	○	○	○
Changes to daily education routines (e.g., online instruction)	○	○	○	○	○
Changes to social routines (e.g., spending free time with friends/ loved ones)	○	○	○	○	○
Changed responsibilities to care for dependents (e.g., childcare, eldercare)	○	○	○	○	○
Cancellation of planned or scheduled celebrations, entertainment, vacations or trips (e.g., graduations, birthdays, concerts)	○	○	○	○	○
Increased contact with close others or loved ones (e.g., increased conflict, co-worrying)	○	○	○	○	○
Pressure to "make the most of" COVID-19 or "find a silver lining" while quarantining (e.g., social media fitness challenges, encouragement to increase productivity)	○	○	○	○	○
Loss of current job security or income (e.g., inability to earn money)	○	○	○	○	○
Loss of current job training opportunities or education benchmarks (e.g., certification, apprenticeship, internship or degree completion)	○	○	○	○	○
Potential changes to the national or global economy (e.g., future job prospects, loss of investments)	○	○	○	○	○
Difficulty accessing important resources for daily life (e.g., health care, food, clothes, water, housing, medical supplies or prescriptions)	○	○	○	○	○

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Inadequate access to reliable information about COVID-19 (including your personal risk of illness	○	○	○	○	○
Receiving treatment, testing, vaccines, and/ or PPE for COVID-19	○	○	○	○	○
Testing positive for COVID-19	○	○	○	○	○
Having to quarantine as a result of close contact or having COVID-19	○	○	○	○	○

doi:10.6342/NTU202300799

Acculturative Stress

Please indicate how much you agree with the following statements.

	1 (strongly disagree)	2 (disagree)	3 (neither agree nor disagree)	4 (agree)	5 (strongly agree)
Homesickness bothers me.	○	○	○	○	○
I feel nervous to communicate in Mandarin.	○	○	○	○	○
I feel sad living in unfamiliar surroundings.	○	○	○	○	○
I feel guilty to leave my family and friends behind.	○	○	○	○	○
Many opportunities are denied to me.	○	○	○	○	○
Multiple pressures are placed upon me after migration.	○	○	○	○	○
I feel that I receive unequal treatment.	○	○	○	○	○
It hurts when people don't understand my cultural values.	○	○	○	○	○
I feel uncomfortable to adjust to new cultural values.	○	○	○	○	○
I feel that my people are discriminated against.	○	○	○	○	○
I am treated differently because of my race.	○	○	○	○	○
I don't feel a sense of belonging (community) here.	○	○	○	○	○
I worry about my future for not being able to decide whether to stay here or to go back.	○	○	○	○	○
I felt overwhelmed when navigating the migration process to enter Taiwan.	○	○	○	○	○
I feel that language is a big barrier in accessing COVID-19 information, tests, vaccines, and care.	○	○	○	○	○

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Social Support

Please rate how much you agree with the following statements.

	1 (very strongly disagree)	2 (strongly disagree)	3 (mildly disagree)	4 (neutral)	5 (mildly agree)	6 (strongly agree)	7 (very strongly agree)
My family really tries to help me.	○	○	○	○	○	○	○
I get the emotional help and support I need from my family.	○	○	○	○	○	○	○
My friends really try to help me	○	○	○	○	○	○	○
I can count on my friends when things go wrong.	○	○	○	○	○	○	○
I can talk about my problems with my family.	○	○	○	○	○	○	○
I have friends with whom I can share my joys and sorrows.	○	○	○	○	○	○	○
My family is willing to help me make decisions.	○	○	○	○	○	○	○
I can talk about my problems with my friends.	○	○	○	○	○	○	○
There is someone in Taiwan that I can turn to when I need help.	○	○	○	○	○	○	○

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Mental Health Resources

Please rate how much you agree with each statement.

	1 (strongly disagree)	2 (disagree)	3 (neutral)	4 (agree)	5 (strongly agree)
I do not know of any mental health services.	○	○	○	○	○
There are mental health resources available to me in a language I am fluent in.	○	○	○	○	○
I am able to easily access information about mental health services.	○	○	○	○	○
There are mental health services readily available to me.	○	○	○	○	○
I am able to receive help for mental health services in a timely manner.	○	○	○	○	○
My institution cares about my mental health.	○	○	○	○	○
My institution provides sufficient mental health resources.	○	○	○	○	○

What mental health support or services would you like to receive?
may select more than 1 option

- ☐ Face-to-face counseling
- ☐ Virtual/ phone counseling
- ☐ Group counseling
- ☐ Information sessions
- ☐ Mental health promoting activities (e.g., yoga, meditation)
- ☐ Off-campus mental health treatment reimbursement
- ☐ Emergency hotline
- ☐ Other _____

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Miscellaneous	
What other factors contribute to your stress during the COVID-19 pandemic?	_____
How do you think your institution's international student mental health information and resources can be improved?	_____

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Demographic Information

What is your race?
may select more than 1 option

- ☐ Hispanic, Latino, or Spanish
- ☐ Asian
- ☐ Black
- ☐ Pacific Islander
- ☐ White
- ☐ Mixed
- ☐ Other _____

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What is your country of origin?

- ○ Afghanistan
- ○ Albania
- ○ Algeria
- ○ Andorra
- ○ Angola
- ○ Antigua and Barbuda
- ○ Argentina
- ○ Armenia
- ○ Australia
- ○ Austria
- ○ Azerbaijan
- ○ Bahamas
- ○ Bahrain
- ○ Bangladesh
- ○ Barbados
- ○ Belarus
- ○ Belgium
- ○ Belize
- ○ Benin
- ○ Bhutan
- ○ Bolivia
- ○ Bosnia and Herzegovina
- ○ Botswana
- ○ Brazil
- ○ Brunei
- ○ Bulgaria
- ○ Burkina Faso
- ○ Burundi
- ○ Cabo Verde
- ○ Cambodia
- ○ Cameroon
- ○ Canada
- ○ Central African Republic (CAR)
- ○ Chad
- ○ Chile
- ○ China
- ○ Colombia
- ○ Comoros
- ○ Congo, Democratic Republic of the
- ○ Congo, Republic of the
- ○ Costa Rica
- ○ Cote d'Ivoire
- ○ Croatia
- ○ Cuba
- ○ Cyprus
- ○ Czechia
- ○ Denmark
- ○ Djibouti
- ○ Dominica
- ○ Dominican Republic
- ○ Ecuador
- ○ Egypt
- ○ El Salvador
- ○ Equatorial Guinea
- ○ Eritrea
- ○ Estonia
- ○ Eswatini
- ○ Ethiopia
- ○ Fiji
- ○ Finland
- ○ France
- ○ Gabon
- ○ Gambia
- ○ Georgia
- ○ Germany
- ○ Ghana
- ○ Greece
- ○ Grenada
- ○ Guatemala

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- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Honduras
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Israel
- Italy
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kenya
- Kiribati
- Kosovo
- Kuwait
- Kyrgyzstan
- Laos
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libya
- Liechtenstein
- Lithuania
- Luxembourg
- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Malta
- Marshall Islands
- Mauritania
- Mauritius
- Mexico
- Micronesia
- Moldova
- Monaco
- Mongolia
- Montenegro
- Morocco
- Mozambique
- Myanmar
- Namibia
- Nauru
- Nepal
- Netherlands
- New Zealand
- Nicaragua
- Niger
- Nigeria
- North Korea
- North Macedonia
- Norway
- Oman
- Pakistan
- Palau
- Palestine
- Panama
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Poland

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- ○ Portugal
- ○ Qatar
- ○ Romania
- ○ Russia
- ○ Rwanda
- ○ Saint Kitts and Nevis
- ○ Saint Lucia
- ○ Saint Vincent and the Grenadines
- ○ Samoa
- ○ San Marino
- ○ Sao Tome and Principe
- ○ Saudi Arabia
- ○ Senegal
- ○ Serbia
- ○ Seychelles
- ○ Sierra Leone
- ○ Singapore
- ○ Slovakia
- ○ Slovenia
- ○ Solomon Islands
- ○ Somalia
- ○ South Africa
- ○ South Korea
- ○ South Sudan
- ○ Spain
- ○ Sri Lanka
- ○ Sudan
- ○ Suriname
- ○ Sweden
- ○ Switzerland
- ○ Syria
- ○ Taiwan
- ○ Tajikistan
- ○ Tanzania
- ○ Thailand
- ○ Timor-Leste
- ○ Togo
- ○ Tonga
- ○ Trinidad and Tobago
- ○ Tunisia
- ○ Turkey
- ○ Turkmenistan
- ○ Tuvalu
- ○ Uganda
- ○ Ukraine
- ○ United Arab Emirates (UAE)
- ○ United Kingdom (UK)
- ○ United States of America (USA)
- ○ Uruguay
- ○ Uzbekistan
- ○ Vanuatu
- ○ Vatican City (Holy See)
- ○ Venezuela
- ○ Vietnam
- ○ Yemen
- ○ Zambia
- ○ Zimbabwe
- ○ Other

Other: Country Name _____

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What level of degree are you pursuing?	○ Bachelor's ○ Master's ○ Ph.D. ○ Other _____
Before your current program of study, have you received any other degree(s) from a Taiwanese university?	○ Yes ○ No
Are you double-majoring?	○ Yes ○ No
What are your areas of study? *may select more than 1 option*	☐ Arts and Humanities ☐ Life Sciences ☐ Physical Sciences ☐ Social Sciences ☐ Behavioral Sciences (e.g., psychology, sociology, anthropology) ☐ Math ☐ Engineering ☐ Health Sciences ☐ Other _____
What is your area of study?	○ Arts and Humanities ○ Life Sciences ○ Physical Sciences ○ Social Sciences ○ Behavioral Sciences (e.g., psychology, sociology, anthropology) ○ Math ○ Engineering ○ Health Sciences ○ Other _____
What is the language that the majority of your classes are taught in?	○ Mandarin ○ English ○ Other
Other: Primary Language of Instruction	_____
What is your mandarin fluency?	○ None ○ Beginner (Levels A1, A2, B1) ○ Intermediate (Levels B2, C1, C2) ○ Native
Have you received/ are receiving treatment for any mental health issues?	○ Yes ○ No
How many roommates are you living with?	_____
What type of accommodation are you currently living in?	○ Dorm ○ Private room ○ With family ○ Other _____

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What university do you attend?

- ○ Academy of Preparatory Programs for Overseas Chinese Students
- ○ Aletheia University
- ○ Asia Eastern University of Science and Technology
- ○ Asia University
- ○ Cardinal Tien College of Healthcare and Management
- ○ Central Taiwan University of Science and Technology
- ○ Chang Gung University
- ○ Chang Gung University of Science and Technology
- ○ Chang Jung Christian University
- ○ Chaoyang University of Technology
- ○ Cheng Shiu University
- ○ Chia Nan Univiersity of Pharmacy and Science
- ○ Chien Hsin University of Science and Technology
- ○ Chienkuo Technology University
- ○ Chihlee University of Technology
- ○ China Evangelical Seminary
- ○ China Medical University
- ○ China University of Science and Technology
- ○ China University of Technology
- ○ Chinese Culture University
- ○ Ching Kuo Institute of Management and Health
- ○ Chong-De School
- ○ Christ's College Taipei
- ○ Chung Chou University of Science and Technology
- ○ Chung Hua University
- ○ Chung hwa Medical Unviersity
- ○ Chung Jen Junior College of Nursing, Health Science and Management
- ○ Chung Shan Medical University
- ○ Chung Yuan Christian University
- ○ Chungyu University of Film and Arts
- ○ CTBC Business School
- ○ Dahan Institute of Technology
- ○ Dayeh University
- ○ Dharma Drum Institute of Liberal Arts
- ○ English name
- ○ Far East University
- ○ Feng Chia University
- ○ Fo Guang University
- ○ Fooyin University
- ○ Fortune Institute of Technology
- ○ Fu Jen Catholic University
- ○ Hsin Sheng College of Medical Care and Management
- ○ Hsing Wu University
- ○ Hsiuping University of Science and Technology
- ○ Hsuan Chuang University
- ○ Huafan University
- ○ Hungkuang University
- ○ Hungkuo Delin University of Technology
- ○ Hwa Hsia University of Technology
- ○ I-Kuan Tao College
- ○ I-Shou University
- ○ Jenteh Junior College of Medicine, Nursing and Management
- ○ Jinwen University of Science and Technology
- ○ Kainan University
- ○ Kao Yuan University
- ○ Kaohsiung Medical University
- ○ Kun Shan University
- ○ Lan Yang Institute of Technology
- ○ Lee-Ming Institute of Technology
- ○ Ling Tung University
- ○ Lunghwa University of Science and Technology
- ○ Mackay Junior College of Medicine, Nursing and Management

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d Management
- Mackay Medical College
- Meiho University
- Min-Hwei College of Health Care Management
- Ming Chi University of Technology
- Ming Chuan University
- Mingdao University
- Minghsin University of Science and Technology
- Nan Kai University of Technology
- Nanhua University
- Nanya Institute of Technology
- National Central University
- National Changhua University of Education Jin D e Campus
- National Cheng Kung University
- National Chengchi University
- National Chi Nan University
- National Chiayi University
- National Chin-Yi University of Technology
- National Chung Cheng University
- National Chung Hsing University
- National Defense Medical Center
- National Dong Hwa University
- National Formosa University
- National Ilan University
- National Kaohsiung Normal University
- National Kaohsiung University of Hospitality an d Tourism
- National Kaohsiung University of Science and Te chnology
- National Open University
- National Penghu University of Science & Technol ogy
- National Pingtung University
- National Pingtung University of Science and Tec hnology
- National Quemoy University
- National Sun Yat-sen University
- National Taichung University of Education
- National Taichung University of Science and Tec hnology
- National Tainan Junior College of Nursing
- National Taipei University
- National Taipei University of Business
- National Taipei University of Education
- National Taipei University of Nursing and Healt h Sciences
- National Taipei University of Technology
- National Taitung Junior College
- National Taitung University
- National Taiwan College of Performing Arts
- National Taiwan Normal University
- National Taiwan Ocean University
- National Taiwan Sport University
- National Taiwan University
- National Taiwan University of Arts
- National Taiwan University of Science and Techn ology
- National Taiwan University of Sport
- National Tsing Hua University
- National United University
- National University of Kaohsiung
- National University of Tainan
- National Yang Ming Chiao Tung University
- National Yunlin University of Science and Techn ology
- Open University of Kaohsiung
- Overseas Chinese University
- Providence University
- Shih Chien University
- Shih Hsin University

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- ○ Shu-Te University
- ○ Shu-Zen Junior College of Medicine and Management
- ○ Soochow University
- ○ Southern Taiwan University of Science and Technology
- ○ St. John's University
- ○ St. Mary's Junior College of Medicine, Nursing and Management
- ○ Ta Hwa University of Science and Technology
- ○ Tainan National University of the Arts
- ○ Tainan Theological College
- ○ Tainan University of Technology
- ○ Taipei City University of Science and Technology
- ○ Taipei Medical University
- ○ Taipei National University of the Arts
- ○ Taipei University of Marine Technology
- ○ Taiwan Baptist Theological Seminary
- ○ Taiwan Shoufu University
- ○ Taiwan Theological College and Seminary
- ○ Tajen University
- ○ Takming University of Science and Technology
- ○ Tamkang University
- ○ Tatung Institute of Commerce and Technology
- ○ Tatung University
- ○ TransWorld University
- ○ Tung Fang Design Institute
- ○ Tunghai University
- ○ Tungnan University
- ○ Tzu Chi University
- ○ Tzu Chi University of Science and Technology
- ○ Tzu Hui Institute of Technology
- ○ University of Kang Ning
- ○ University of Taipei
- ○ Vanung University
- ○ Weixin Shengjiao College
- ○ Wenzao Ursuline University of Languages
- ○ WuFeng University
- ○ Yu Da University of Science and Technology
- ○ Yuan Ze University
- ○ Yuanpei University of Medical Technology
- ○ Yuanpei University of Medical Technology
- ○ Yuh-Ing Junior College of Health Care and Management
- ○ Other

Other: University	_____
How many units did you take during the 110-2 (spring 2022) semester?	_____
Of these units (during the 110-2 (spring 2022) semester), how many were/ became online?	_____
What is your COVID-19 vaccination status?	○ None ○ 1 dose ○ 2 doses ○ 3 doses ○ 4 doses or more

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What is the highest education level of your parent(s)?	○ Below high school ○ High school ○ Junior/ community college ○ Bachelor ○ Master ○ PhD ○ Professional degree (e.g., M.D., J.D.)
What is your main source of financial support?	○ Self-funded ○ Family ○ Friends ○ Scholarships ○ Job ○ Government ○ Loans ○ Other _____
What is your household monthly income in NTD?	○ None ○ $1-$4,999 ○ $5,000-$9,999 ○ $10,000-$14,999 ○ $15,000-$19,999 ○ $20,000-$39,999 ○ $40,000-$59,999 ○ $60,000-$79,999 ○ $80,000-$99,999 ○ above $100,000)
Are you currently employed (including Teaching Assistant/ Research Assistant positions)?	○ Yes ○ No
What is your monthly income (in NTD)?	○ None ○ $1-$4,999 ○ $5,000-$9,999 ○ $10,000-$14,999 ○ $15,000-$19,999 ○ $20,000-$39,999 ○ $40,000-$59,999 ○ $60,000-$79,999 ○ $80,000-$99,999 ○ above $100,000
How many hours a week do you work?	_____
Have you ever had to undergo isolation/ quarantine as a result of the following? *may select more than 1 option*	☐ Did not ever have to isolate/ quarantine ☐ Entering Taiwan (border control measures) ☐ Close contact of a confirmed case ☐ Confirmed case
What is your most recent quarantine start date (MM-DD-YY)?	_____
Are you currently in isolation/ quarantine (NOT including self-health monitoring) because of exposure to COVID-19?	○ Yes ○ No

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What is your marital status?	◯ Single ◯ Married or Co-habitated ◯ Separated ◯ Divorced ◯ Widowed
Do you have family in Taiwan (up to and including grandparents, aunts/ uncles, cousins, in-laws)?	◯ Yes ◯ No
What was the start date of your current program of study?	_____

What is the total amount of time you have spent in Taiwan, combining all previous and current visits to Taiwan? For example, if you were in Taiwan from 2010-2015, left, then came back in 2021, you would have spent 5 + 1 = 6 years and 7 months total (July 2022) in Taiwan.

_____ year(s), _____ month(s)

What area in Taiwan is your primary residence?	◯ Hsinchu County ◯ Miaoli County ◯ Changhua County ◯ Nantou County ◯ Yunlin County ◯ Chiayi County ◯ Pingtung County ◯ Yilan County ◯ Hualien County ◯ Taitung County ◯ Penghu County ◯ Kinmen County ◯ Lienchiang County ◯ Keelung County ◯ Hsinchu City ◯ Chiayi City ◯ Taipei City Municipality ◯ New Taipei City Municipality ◯ Taoyuan City Municipality ◯ Taichung City Municipality ◯ Tianan City Municipality ◯ Kaohsiung City Municipality ◯ Kinmen County

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Compensation	
If you would like to be compensated for your time (NTD $50 e-voucher), please leave your email. We will be sending these out every 2 weeks. Thank you for your patience!	_____

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