Navigating the New Normal: How Social Support Affects Mental Health Among International Postgraduate Students at the Faculty of Health Sciences, UKM
(Mengemudi Normal Baharu: Bagaimana Sokongan Sosial Mempengaruhi Kesihatan Mental Pelajar Pascasiswazah Antarabangsa di FSK, UKM)

AHMAD ROHI GHAZALI*, MAHMOUD M. DBOBA, AL SHANGEETI TAHANI MOSTAFA M, ISRAA ABDUL SATTAR ALI AL SAMMARRAIE, WANG LI, TAUFIK HIDAYAT, WONG YEE YAN & RAVEENA VAIDHESWARY MURALITHARAN

ABSTRACT

The COVID-19 pandemic has completely changed how we go about our daily lives. Such drastic changes may lead to psychological distress such as depression, anxiety and stress. This is especially challenging for international students, particularly the postgraduate students as they face additional difficulties in adapting to a new teaching and learning environment. Hence, as we transition to a new normal era, it is pertinent that we investigate how existing forms of social support play a role in helping international postgraduates cope with their depression, anxiety and stress. The research aimed to determine the relationship between social support, depression, anxiety and stress among international postgraduate students at the Faculty of Health Sciences (FSK), Universiti Kebangsaan Malaysia (UKM). The findings revealed that 27.8% of students exceeded the normal range for depression, 50% exceeded the normal range for anxiety, and 11.1% exceeded the normal range for stress. Next, there was no relationship between social support with depression, anxiety and stress. However, there were significantly strong positive relationships between depression, anxiety and stress. Then, there was no significant difference in depression, anxiety and stress between male and female international postgraduate students. Lastly, when social support was suggested (eight types) to be given, the students did not prefer a particular type of social support over others, but each type of social support suggested was still needed by the students.

Keywords: social support, depression, anxiety, stress, international

ABSTRAK

Pandemik COVID-19 telah mengubah sepenuhnya cara kita menjalani kehidupan seharian. Perubahan ketara sedemikian boleh membawa kepada distres psikologi seperti kemurungan, keresahan dan stres. Perkara ini amat mencabar bagi pelajar pascasiswazah antarabangsa, kerana mereka menghadapi kesukaran tambahan untuk menyesuaikan diri dalam persekitaran pengajaran dan pembelajaran baharu. Oleh itu, dalam peralihan ke era normal baharu, adalah penting untuk kita mengkaji bagaimana sokongan sosial sedia ada memainkan peranan dalam membantu pelajar pascasiswazah antarabangsa untuk mengatasi kemurungan, keresahan dan stres mereka. Kajian ini bertujuan untuk mengenalpasti hubungan antara sokongan sosial, kemurungan, keresahan dan tekanan dalam kalangan pelajar pascasiswazah antarabangsa di Fakulti Sains Kesihatan (FSK), Universiti Kebangsaan Malaysia (UKM). Hasil kajian ini menunjukkan bahawa 27.8% pelajar melebihi julat normal untuk kemurungan, 50% pelajar melebihi julat normal untuk keresahan dan 11.1% pelajar melebihi julat normal untuk stres. Seterusnya, tiada hubungan antara sokongan sosial dengan kemurungan, keresahan dan stres. Tetapi, terdapat hubungan positif yang kuat serta signifikan antara kemurungan, keresahan dan stres. Kemudian, tiada perbezaan yang signifikan antara kemurungan, keresahan dan stres dalam kalangan pelajar pascasiswazah antarabangsa lelaki dan perempuan. Akhir sekali, jika sokongan sosial dicadangkan untuk diberikan (lapan jenis), pelajar tidak memilih jenis sokongan sosial tertentu berbanding jenis yang lain, tetapi setiap jenis sokongan sosial masih lagi diperlukan oleh pelajar.

Kata kunci: sokongan sosial, kemurungan, keresahan, stres, antarabangsa

INTRODUCTION

The internationalization of higher education brings numerous benefits, such as the cultivation of budding talents, facilitation of international collaborations and cultural exchange as well as contributions to economic growth. Collectively, these benefits advance research and academic excellence that further boost the university rankings on a global scale. In the context of Malaysia, local universities including Universiti Kebangsaan Malaysia (UKM), are leveraging the prevailing trend, by actively welcoming international students. However, international students may find it challenging to adapt to a multilingual environment such as when they are in Malaysia where Malay is the national language, a potentially unfamiliar language for some. Other challenges include the adjustment and adaptation process to a new educational system, study habits, cultural values and social environment, which may lead to psychological distress such as anxiety, depression and stress (Li & Gasser, 2005; Sümer et al., 2008). These international students were also less likely to seek help from psychological services, which may worsen their mental health condition, further underscoring the need for robust social support (Alharbi & Smith, 2018; Brunsting et al., 2018).

When the COVID-19 pandemic occurred, it affected the worldwide economy and social interactions (Ozili & Arun, 2020; Xu et al., 2020) as well as physical and mental health (Brooks et al., 2020; Wahab & Othman, 2021). Unfortunately during the pandemic, international university students experienced multiple stressors and their mental health were easily overlooked (Ke et al., 2023; Xu, 2021). Studies have shown that increased anxiety and depression among international university students in various countries, such as Australia (Ke et al., 2023; Russell et al., 2023), China (Guo et al., 2021; Jamshaid et al., 2023; Z. Li et al., 2021; Xu, 2021) and United States of America (Song et al., 2021) during the pandemic. However, these mental health issues had predated the pandemic, exacerbated during the pandemic and were likely to continue way into post-pandemic (Ke et al., 2023; Russell et al., 2023).

Hence, social support is important to assist the international students to face their anxiety, depression and stress. Social support refers to "the family members, friends and others (neighbours and community members) that are available in times of need to give psychological, physical, financial or other support" (Amoah, 2019). Social support has been shown to buffer the effects of stress and severe traumatic events, which fosters recovery, thus promoting positive mental health outcomes (Hu et al., 2022; Prowse et al., 2021). However, when there is a lack of social support, it can lead to stress and depression (F. Li et al., 2021; Wang & Eccles, 2012). In fact, lower social support and deteriorating mental health have been experienced by international students in Australia, increasing the risk of depression, as opposed to local students (Russell et al., 2023). Hence, enhanced social support is important because it leads to the decreased likelihood of depression and anxiety (Ke et al., 2023). Social support also provides a feeling of better mental stability and allows people to function normally during the pandemic (Yang et al., 2022).

As we transition to the new normal era, it is essential to determine the levels of social support, depression, anxiety and stress of international university students, as unchecked mental health issues may pose grave threats to students' academic performance on campus and predict their professional development in the future (Tao et al., 2002; Wahed & Hassan, 2017). To date, studies on the post-COVID mental health of international university students (especially postgraduates) in Malaysia have yet to be studied. It is essential to have such information for higher education institutions to cater to international students' needs, ensuring a better journey in their education. Therefore, the study investigates the relationship between social support, depression, anxiety, and stress among international postgraduate students in the Faculty of Health Sciences (FSK), Universiti Kebangsaan Malaysia (UKM).

METHODOLOGY

Participants

The data of our cross-sectional study was collected from international postgraduate students in the Faculty of Health Sciences (FSK), Universiti Kebangsaan Malaysia (UKM), using a questionnaire distributed from May 2022 to June 2022. A total of 36 participants were recruited and chosen based on the following criteria, (i) an international postgraduate student studying in FSK, UKM; (ii) had access to internet services; (iii) able to read and comprehend English.

Sample size calculation

A post hoc power analysis was conducted using G*Power version 3.1.9.7 (Faul et al., 2007) to determine the minimum sample size required to test the study hypothesis. Results indicated the required

sample size to achieve 80% power for detecting a large effect, at a significance criterion of $\alpha = 0.05$, was N = 36 for Spearman's rho. Thus, the obtained sample size of N = 36 is adequate to test the relationship between social support, depression, anxiety, and stress among international postgraduate students in FSK, UKM.

Questionnaire

The questionnaire was set up using Google Forms, which included socio-demographic information, Perceived Social Support Scale (PSSS), Depression, Anxiety and Stress Scale-21 (DASS-21) and questions regarding the types of social support needed during the COVID-19 pandemic. A link to the online questionnaire, including the information sheet and consent form, was sent to prospective participants via email, Telegram, Microsoft Teams and WhatsApp.

Perceived Social Support Scale (PSSS)

PSSS consisted of 12 items used to measure the level of social support from three sources: family, friends and significant others perceived by an individual. The 12-item PSSS had high stability ($\alpha = 0.85$), internal consistency ($\alpha = 0.88$), as well as moderate construct validity (Zimet et al., 1988). In PSSS, a seven-point Likert scale, with 1 = strongly disagree, and 7 = strongly agree, was used to measure the amount of support scale. The total score ranged from 12 to 84, with a lower score indicating lower perceived social support. Any mean scale score ranging from 1 to 2.9 was considered low support; a score of 3 to 5 was considered moderate support; a score from 5.1 to 7 was considered high support.

Depression, Anxiety and Stress Scale-21 (DASS-21)

DASS-21 consisted of 21 items divided into three subscales that were used to assess the level of depression (items 3, 5, 10, 13, 16, 17, 21), anxiety (items 2, 4, 7, 9, 15, 19, 20), and stress (item 1, 6, 8, 11, 12, 14, 18) in the past week. Each subscale consisted of 7 items. The DASS had a good internal consistency of $\alpha = 0.95$ overall (Jiang et al., 2020). For subscales, the DASS-21 had an internal consistency of $\alpha = 0.81$ for depression, $\alpha = 0.89$ for anxiety and $\alpha = 0.78$ for stress (Coker et al., 2018). Each item was scored from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time).

On the depression scale, a score of 0 to 9 means normal depression level; 10 to 13 means mild depression level; 14 to 20 means moderate depression level; 21 to 27 means severe depression level; and above 28 means extremely severe depression level. On the anxiety scale, the score for the items was interpreted as the following: 0 to 7 means normal anxiety, 8 to 9 means mild anxiety; 10 to 14 means moderate anxiety; 15 to 19 means severe anxiety and above 20 means extremely severe anxiety. Lastly, the score for the items under the stress scale was interpreted as the following: 0 to 14 means normal stress, 15 to 18 means mild stress; 19 to 25 means moderate stress; 26 to 33 means severe stress and above 34 means extremely severe stress.

Data analysis

The data were analysed using the Statistical Package for the Social Sciences (SPSS) software version 25.0. Descriptive analysis was used to describe the general data, expressed as frequency (n) and percentage (%). Next, Spearman's rho was used to investigate the relationship between social support with depression, anxiety and stress among FSK, UKM international postgraduate students. Then, Pearson's correlation coefficient was used to investigate the relationship between depression, anxiety and stress among FSK, UKM international postgraduate students. Furthermore, an independent samples t-test was used to investigate the effect of gender on depression, anxiety and stress, with results expressed as mean ± standard deviation (SD). Lastly, one-way ANOVA was used to examine the preferred type of social support for FSK, UKM international postgraduate students, with results expressed as mean ± standard deviation (SD). The significance level was set as $\alpha = 0.05$ (two-tailed) in all data analyses.

RESULTS

Descriptive analysis

The demographic characteristics of FSK, UKM international postgraduate students, are shown in Table 1. The majority of students were (i) aged 30 to 39 years old, 44.4%; (ii) married, 75%; (iii) from Iraq, 33.3%; (iv) taking their Doctor of Philosophy (PhD), 69.4%; (v) in research mode, 58.3%; (vi) undergoing online classes, 58.3%; (vii) studying abroad for the first time, 52.8%; (vii) currently staying in Malaysia, 52.8%; (viii) self-sponsored to pay their tuition fees and living expenses. For the 52.8% of students currently staying in Malaysia, the average duration of their stay is 18.21 ± 21.52 months.

TABLE 1. Demographic characteristics of FSK, UKM international postgraduate students

Characteristics	Frequency (n)	Percentage (%)
Age		
20 - 29 years old	7	19.4
30 - 39 years old	16	44.4
40 years old and above	13	36.1
Gender		
Male	21	58.3
Female	15	41.7
Marital status		
Single	7	19.4
Married	27	75
Divorced	2	5.6
Country		
Iraq	12	33.3
Indonesia	4	11.1
Saudi Arabia	4	11.1
Palestine	4	11.1
Pakistan	2	5.6
China	2	5.6
Others	8	22.2
Study level		
Masters	11	30.6
Doctor of Philosophy (PhD)	25	69.4
Study mode		
Research	31	86.1
Coursework	4	11.1
Mixed	1	2.8
Learning mode		
Online class	21	58.3
Physical class	3	8.3
Mixed	12	33.3
Is it your first time studying abroad?		
Yes	19	52.8
No	17	47.2
Are you staying in Malaysia currently?		
Yes	19	52.8
No	17	47.2
Sponsorship		
Self-sponsored	25	69.4
Scholarship	8	22.2
Others	3	8.3

The level of social support and mental health symptoms of FSK, UKM international postgraduate students are shown in Table 2. For social support, the majority, 44.4% students had moderate levels, while another 44.4% students had high levels of social support. Next, most of the students had normal levels of depression (72.2%), anxiety (50%), and stress (88.9%).

For depression, 27.8% of students exceeded the normal range (8.3% had mild depression, and 19.4% had moderate depression). The most noteworthy mental health symptom was anxiety, with 50% of students exceeding the normal range (13.9% had mild anxiety, 27,8% had moderate anxiety, 5.6% had severe anxiety, and 2.8% had extremely severe anxiety). The next mental health symptom was followed by stress, whereby 11.1% of students exceeded the normal range (11.1% had mild stress).

TABLE 2. Level of social support and mental health symptoms of FSK, UKM international postgraduate students

Items	Frequency (n)	Percentage (%)
Level of social support		
Low	4	11.1
Moderate	16	44.4
High	16	44.4
Level of depression		
Normal	26	72.2
Mild	3	8.3
Moderate	7	19.4
Level of anxiety		
Normal	18	50
Mild	5	13.9
Moderate	10	27.8
Severe	2	5.6
Extremely severe	1	2.8
Level of stress		
Normal	32	88.9
Mild	4	11.1

Relationship between social support, depression, anxiety and stress among FSK, UKM international postgraduate students

A Spearman's rho was calculated to investigate the relationship between social support with depression, anxiety and stress among FSK, UKM international postgraduate students. The coefficient was calculated due to the violation of linearity between each variable. As shown in Table 3, Spearman's rho indicated a non-significant weak negative relationship between (i) social support and depression levels, $r_s = -0.175$, p = 0.308; (ii) social support and anxiety levels, $r_s = -0.147$, p = 0.394; (iii) social support and stress levels, $r_s = -0.155$, p = 0.367.

Next, a bivariate Pearson's correlation coefficient (r) was calculated to investigate the relationship between depression, anxiety and stress among FSK, UKM international postgraduate students. Before calculating r, the assumptions of normality, linearity and homoscedasticity were assessed and found to be supported. In Table 3, the bivariate correlation between (i) depression and stress levels was positive and strong, $r(34) = 0.886$, p < .001; (ii) depression and anxiety levels were positive and very strong, $r(34) = 0.953$, p < .001; (iii) anxiety and stress levels were positive and strong, $r(34) = 0.897$, p < .001.

TABLE 3. Relationship between social support, depression, anxiety and stress among FSK, UKM international postgraduate students

Variables		Depression	Anxiety	Stress
Social support	Spearman's rho	- 0.175	- 0.147	- 0.155
	Sig. (2-tailed)	0.308	0.394	0.367
Depression	Pearson's correlation		0.953	0.886
	Sig. (2-tailed)		< .001***	< .001***
Anxiety	Pearson's correlation	0.953		0.897
	Sig. (2-tailed)	< .001***		< .001***
Stress	Pearson's correlation	0.886	0.897	
	Sig. (2-tailed)	< .001***	< .001***	

*** correlation is significant at the 0.001 level (2-tailed)

Depression, anxiety and stress among FSK, UKM male and female international postgraduate students

An independent samples t-test was used to compare the average depression, anxiety and stress levels between male and female students. The data were distributed normally. Levene's test was significant for depression and anxiety levels; hence equal variances were not assumed. However, Levene's test was not significant for stress levels; hence equal variances could be assumed. As shown in Table 4, the t test was not statistically significant for (i) depression, $t(23.65) = - 0.039$, p = 0.969; (ii) anxiety, $t(23.41) = - 0.154$, p = 0.879; (iii) stress, $t(34) = 0.865$, p = 0.393.

TABLE 4. Gender differences in depression, anxiety and stress levels among FSK, UKM international postgraduate students

Variables	Gender	Frequency (n)	Mean	Standard deviation (SD)	df	t	Sig. (2-tailed)
Depression	Males	21	7.14	4.62	23.65	- 0.039	0.969
	Females	15	7.07	6.54			
Anxiety	Males	21	7.38	4.75	23.41	- 0.154	0.879
	Females	15	7.07	6.82			
Stress	Males	21	7.86	4.61	34	0.865	0.393
	Females	15	9.4	6.10			

Social support preferences of FSK, UKM international postgraduate students

A one-way analysis of variance (ANOVA) was used to compare the ratings of eight types of social support among 36 students. The data were distributed normally, and the homogeneity of variances was supported. However, Mauchly's test indicated that the assumption of sphericity was violated, p < 0.001. Table 5 shows the mean and standard deviation values of each type of social support. The ANOVA results were non-significant, F (3.87, 135.39) = 1.665, p = 0.164, η^2 = 0.045, with a small effect size. Hence, the students did not need any type of social support more than others, but the students still needed each type of social support.

TABLE 5. Mean and standard deviation for the different types of social support

Type of social support	Mean	Standard deviation (SD)
Emotional support	4.69	2.82
Help with household tasks	4.97	2.68
Financial support	5.42	2.81
Financial advice from the university	5.11	2.95
Education advice	5.64	2.82
Mentor-mentee session	5.50	2.70
Interaction day	5.28	2.80
Physical activity	5.44	3.03

DISCUSSION

Firstly, the descriptive analysis showed that (i) 27.8% of students exceeded the normal range of depression; (ii) 50% of students exceeded the normal range of anxiety; and (iii) 11.1% of students exceeded the normal range of stress. These findings were supported by previous studies that showed a 30 − 50% prevalence of depression and an average of 68% anxiety among medical students (Ibrahim et al., 2013; Iqbal et al., 2015). As for several other studies, it was found that university students experienced a high level of stress and impaired mental health, such as depressive symptoms with a prevalence of nearly 1 in 3 - 6 people (Elias et al., 2011; Kreß et al., 2015; Saleh et al., 2017; Xu et al., 2020). In comparison, college students in the southeastern United States of America during the pandemic lockdown reported needing mental health support due to anxiety (34%), stress (32.9%), and depression (27.7%) (Chenneville et al., 2023). Taking the results together, our study showed a higher level of anxiety in a new normal era.

Next, our study also indicated a non-significant weak negative relationship between (i) social support and depression levels, (ii) social support and anxiety levels, and (iii) social support and stress levels, suggesting that social support does not play a significant role in decreasing levels of depression, anxiety, and stress among FSK, UKM international postgraduate students. These findings were similar to a study done by Azwin and Muin (2020). However, in contrast, other studies revealed that social support was negatively associated with depression and anxiety (Hu et al., 2022; Ke et al., 2023; Tham et al., 2020), as well as social support improving mental health in stressful situations (Wang & Eccles, 2012). In fact, depression symptoms are influenced by social support (Yang et al., 2022).

Besides, our study found strong and positive relationships between (i) depression and stress levels; (ii) anxiety and stress levels; and (iii) depression and anxiety levels. This finding echoed a study by Kessler et al. (2015) that showed 45.7% of individuals with lifetime major depressive disorder had a history of one or more anxiety disorders. Wada et al. (2013) also found a relationship between the stress reaction and the onset of depression. Another study by Onieva-Zafra et al. (2020) among nursing students showed a significant correlation between perceived stress with state and trait anxiety. Hence, it can be concluded that if students are found to have depression symptoms, they are more likely to have anxiety and stress. Such findings suggest routine checks on students' overall psychological status from time to time.

Furthermore, there was no significant difference in depression, anxiety and stress levels between male and female international postgraduate students in FSK, UKM. This means that all male and female students in the study had similar depression, anxiety and stress levels. Other studies either showed that there was no significant difference between genders (Jamshaid et al., 2023; Tjia et al., 2005) which is per our findings, or there was a significant difference between genders. Some studies showed female students having increased depression, anxiety and stress associated with the pandemic, as opposed to males (Chenneville et al., 2023; Prowse et al., 2021). On the other hand, some studies noted female students having specifically higher anxiety levels during the pandemic (Branquinho et al., 2022) and post-pandemic (Basheti et al., 2023). As for male students, Guo et al. (2021) showed that male undergraduate students had higher depression, anxiety and stress symptoms than females, which was attributed to the low social support received by male students compared to female students in the study. Moreover, Jordan male university students

selected responses in a depression questionnaire indicative of more pronounced depressive feelings, in a post-COVID time (Basheti et al., 2023). These mixed findings suggest that both male and female students are just as susceptible to depression, anxiety and/or stress depending on the circumstances.

Finally, the types of social support were not significant when tested using one way ANOVA. Our results demonstrated that the international postgraduate students involved in our study did not prefer one type of social support over the other, but all types of social support were utilised according to their preferences. According to Hu et al. (2022), social support could serve to protect individuals from the detrimental anxiety and depression due to the COVID-19 pandemic, thus enabling individuals to develop positive changes in hard times. However, there is still a dire need to determine effective ways to build upon international student social support (Russell et al., 2023). As evidenced by our results, it could suggest that the listed types of social support (as shown in Table 5) need to be revamped to produce a better psychological outcome for international postgraduate students.

Based on our findings in combination with other studies, we suggest the following ways to improve the social support of international postgraduate students, thus improving their mental health in the process as we transition to a new normal era. Firstly, we suggest that universities should reinforce social support centres for international students by finding new approaches to assist these students. Next, Tu et al. (2023) suggest using post-traumatic growth (PTG) as an indicator of graduate students coping with the pandemic, because it is crucial to determine if students faced any positive psychological changes during their pandemic struggles. These results could further shape student support programs at the universities. Prowse et al. (2021) also suggest that developing systems to manage potential deterioration in well-being would be important as the pandemic evolves. Besides, screening of mental health services could be provided to identify mental health issues and provide adequate treatments (Hu et al., 2022).

Collectively, there are several limitations to our study: (i) cross-sectional studies could not determine causality between the variables; (ii) response bias could exist as participants may be prone to under-reporting or over-reporting their conditions due to data collection being carried out online; (iii) small sample size is not representative of a larger population. Therefore, it is recommended that future studies involve a larger sample size to obtain a homogenous sample and increase the statistical power of the results.

CONCLUSION

All of the international postgraduate students sampled experienced depression, anxiety and stress exceeding the normal range but the percentage was 27.8%, 50% and 11.1% respectively. There was a non-significant weak negative relationship between social support with depression, anxiety and stress but, there were significant strong positive relationships between (i) depression and stress, (ii) depression and anxiety levels, and (iii) anxiety and stress levels. In addition, there was no significant difference in depression, anxiety and stress between male and female international postgraduate students. Finally, the international postgraduate students from FSK, UKM did not prefer any particular type of social support over others (eight types), but each type of social support was still needed by the students. Hence, future research is needed to identify the contributing factors to the levels of social support, depression, anxiety, and stress among international postgraduate students.

REFERENCES

Alharbi, E., & Smith, A. (2018). A review of the literature on stress and wellbeing among international students in English-speaking countries. *International Education Studies, 11*(5), 22-44.

Amoah, P. A. (2019). The relationship between functional health literacy, self-rated health, and social support between younger and older adults in Ghana. *International Journal of Environmental Research and Public Health, 16*(17), 3188.

Azwin, K., & Muin, M. F. (2020). Cultural influence and social support towards the depression, anxiety, and stress levels (case study). *Journal of Humanities and Social Studies, 4*(1), 14-20.

Basheti, I. A., Assaraira, T. Y., Obeidat, N. M., Al-Abed Al-haq, F., & Refai, M. (2023). Assessing Anxiety and Depression Among Students Post-COVID-19: Exploring Associating Factors. *Psychology Research and Behavior Management*, 1797-1810.

Branquinho, C., Guedes, F. B., Cerqueira, A., Marques-Pinto, A., Branco, A., Galvão, C., Sousa, J., Goulão, L. F., Bronze, M. R., & Viegas, W. (2022). COVID-19 and lockdown, as lived and felt by university students. *International Journal of Environmental Research and Public Health, 19*(20), 13454.

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The lancet, 395*(10227), 912-920.

Brunsting, N. C., Zachry, C., & Takeuchi, R. (2018). Predictors of undergraduate international student psychosocial adjustment to US universities: A systematic review from 2009-2018. *International*

journal of intercultural relations, 66, 22-33.

Chenneville, T., Gabbidon, K., Zharima, C., Hornschuh, S., & Dietrich, J. J. (2023). Factors affecting COVID-19's mental health impact on college students in the southeastern United States. *Frontiers in Public Health, 11*.

Coker, A., Coker, O., & Sanni, D. (2018). Psychometric properties of the 21-item depression anxiety stress scale (DASS-21). *African Research Review, 12*(2), 135-142.

Elias, H., Ping, W. S., & Abdullah, M. C. (2011). Stress and academic achievement among undergraduate students in Universiti Putra Malaysia. *Procedia-Social and Behavioral Sciences, 29*, 646-655.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods, 39*(2), 175-191.

Guo, K., Zhang, X., Bai, S., Minhat, H. S., Nazan, A. I. N. M., Feng, J., Li, X., Luo, G., Zhang, X., & Feng, J. (2021). Assessing social support impact on depression, anxiety, and stress among undergraduate students in Shaanxi province during the COVID-19 pandemic of China. *PLoS One, 16*(7), e0253891.

Hu, J., Huang, Y., Liu, J., Zheng, Z., Xu, X., Zhou, Y., & Wang, J. (2022). COVID-19 related stress and mental health outcomes 1 year after the peak of the pandemic outbreak in china: the mediating effect of resilience and social support. *Frontiers in Psychiatry, 13*, 828379.

Ibrahim, N., Dania, A.-K., Lamis, E.-K., Ahd, A.-H., & Asali, D. (2013). Prevalence and predictors of anxiety and depression among female medical students in King Abdulaziz University, Jeddah, Saudi Arabia. *Iranian journal of public health, 42*(7), 726.

Iqbal, S., Gupta, S., & Venkatarao, E. (2015). Stress, anxiety & depression among medical undergraduate students & their socio-demographic correlates. *The Indian journal of medical research, 141*(3), 354.

Jamshaid, S., Bahadar, N., Jamshed, K., Rashid, M., Imran Afzal, M., Tian, L., Umar, M., Feng, X., Khan, I., & Zong, M. (2023). Pre-and Post-Pandemic (COVID-19) Mental Health of International Students: Data from a Longitudinal Study. *Psychology Research and Behavior Management*, 431-446.

Jiang, L.-c., Yan, Y.-j., Jin, Z.-S., Hu, M.-L., Wang, L., Song, Y., Li, N.-N., Su, J., Wu, D.-X., & Xiao, T. (2020). The depression anxiety stress Scale-21 in Chinese hospital workers: reliability, latent structure, and measurement invariance across genders. *Frontiers in Psychology, 11*, 247.

Ke, T., Li, W., Sanci, L., Reavley, N., Williams, I., & Russell, M. A. (2023). The mental health of international university students from China during the COVID-19 pandemic and the protective effect of social support: A longitudinal study. *Journal of affective disorders, 328*, 13-21.

Kessler, R. C., Sampson, N. A., Berglund, P., Gruber, M., Al-Hamzawi, A., Andrade, L., Bunting, B., Demyttenaere, K., Florescu, S., & De Girolamo, G. (2015). Anxious and non-anxious major depressive disorder in the World Health Organization World Mental Health Surveys. *Epidemiology and psychiatric sciences, 24*(3), 210-226.

Kreß, V., Sperth, M., Hofmann, F.-H., & Holm-Hadulla, R. M. (2015). Psychological complaints of students: A comparison of field samples with clients of a counseling service at a typical German University. *Mental Health & Prevention, 3*(1-2), 41-47.

Li, A., & Gasser, M. B. (2005). Predicting Asian international students' sociocultural adjustment: A test of two mediation models. *International journal of intercultural relations, 29*(5), 561-576.

Li, F., Luo, S., Mu, W., Li, Y., Ye, L., Zheng, X., Xu, B., Ding, Y., Ling, P., & Zhou, M. (2021). Effects of sources of social support and resilience on the mental health of different age groups during the COVID-19 pandemic. *BMC psychiatry, 21*, 1-14.

Li, Z., Yi, X., Zhong, M., Li, Z., Xiang, W., Wu, S., & Xiong, Z. (2021). Psychological distress, social support, coping style, and perceived stress among medical staff and medical students in the early stages of the COVID-19 epidemic in China. *Frontiers in Psychiatry, 12*, 664808.

Onieva-Zafra, M. D., Fernández-Muñoz, J. J., Fernández-Martínez, E., García-Sánchez, F. J., Abreu-Sánchez, A., & Parra-Fernández, M. L. (2020). Anxiety, perceived stress and coping strategies in nursing students: a cross-sectional, correlational, descriptive study. *BMC Medical Education, 20*(1), 1-9.

Ozili, P. K., & Arun, T. (2020). Spillover of COVID-19: Impact on the global economy (SSRN Scholarly Paper ID 3562570). *Social Science Research Network. https://doi.org/10.2139/ssrn, 3562570*.

Prowse, R., Sherratt, F., Abizaid, A., Gabrys, R. L., Hellemans, K. G., Patterson, Z. R., & McQuaid, R. J. (2021). Coping with the COVID-19 pandemic: examining gender differences in stress and mental health among university students. *Frontiers in Psychiatry, 12*, 650759.

Russell, M. A., Reavley, N., Williams, I., Li, W., Tarzia, L., Chondros, P., & Sanci, L. (2023). Changes in mental health across the COVID-19 pandemic for local and international university students in Australia: a cohort study. *BMC psychology, 11*(1), 55.

Saleh, A., Potter, G. G., McQuoid, D. R., Boyd, B., Turner, R., MacFall, J. R., & Taylor, W. D. (2017). Effects of early life stress on depression, cognitive performance and brain morphology. *Psychological medicine, 47*(1), 171-181.

Song, B., Zhao, Y., & Zhu, J. (2021). COVID-19-related traumatic effects and psychological reactions among international students. *Journal of Epidemiology and Global Health, 11*(1), 117.

Sümer, S., Poyrazli, S., & Grahame, K. (2008). Predictors of depression and anxiety among international students. *Journal of counseling & development, 86*(4), 429-437.

Tao, C., Yongyi, B., Zongfu, M., Rappe, P., Edwards, G. D., & Shinfuku, N. (2002). Identifying factors influencing mental health development of college students in China. *Social Behavior and Personality: an international journal, 30*(6), 547-559.

Tham, S. M., Ellithorpe, M. E., & Meshi, D. (2020). Real-world social support but not in-game social support is related to reduced depression and anxiety associated with problematic gaming. *Addictive behaviors, 106*, 106377.

Tjia, J., Givens, J. L., & Shea, J. A. (2005). Factors associated with undertreatment of medical student depression. *Journal of American college health, 53*(5), 219-224.

Tu, A. K., Haney, J. R., O'Neill, K., Swaminathan, A., Choi, K. W., Lee, H., Smoller, J. W., Patel, V., Barreira, P. J., & Liu, C. H. (2023). Post-traumatic growth in PhD students during the COVID-19 pandemic. *Psychiatry Research Communications, 3*(1), 100104.

Wada, K., Sairenchi, T., Haruyama, Y., Taneichi, H., Ishikawa, Y., & Muto, T. (2013). Relationship between the onset of depression and stress response measured by the Brief Job Stress Questionnaire among Japanese employees: a cohort study. *PLoS One, 8*(2), e56319.

Wahab, M. Z. H., & Othman, K. (2021). Impact of COVID-19 on Student's Emotional and Financial Aspects in the Higher Learning Institutions. *SEISENSE Journal of Management, 4*(4), 1-15.

Wahed, W. Y. A., & Hassan, S. K. (2017). Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. *Alexandria Journal of medicine, 53*(1), 77-84.

Wang, M. T., & Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child development, 83*(3), 877-895.

Xu, T. (2021). Psychological distress of international students during the COVID-19 pandemic in China: Multidimensional effects of external environment, individuals' behavior, and their values. *International Journal of Environmental Research and Public Health, 18*(18), 9758.

Xu, X., Zhang, L., Chen, L., & Wei, F. (2020). Does COVID-2019 have an impact on the purchase intention of commercial long-term care insurance among the elderly in China? Healthcare,

Yang, C., Gao, H., Li, Y., Wang, E., Wang, N., & Wang, Q. (2022). Analyzing the role of family support, coping strategies and social support in improving the mental health of students: Evidence from post COVID-19. *Frontiers in Psychology, 13*, 1064898.

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of personality assessment, 52*(1), 30-41.

Ahmad Rohi Ghazali*, Mahmoud M. Dboba, Alshangeeti Tahani Mostafa M, Israa Abdul Sattar Ali Al Sammarraie, Wang Li, Taufik Hidayat, Wong Yee Yan & Raveena Vaidheswary Muralitharan
Center for Toxicology & Health Risk Studies (CORE),
Faculty of Health Sciences,
Universiti Kebangsaan Malaysia,
50300 Kuala Lumpur, Malaysia.

*Corresponding author: rohi@ukm.edu.my