ORIGINAL ARTICLE

Prevalence of Mental Health Problems Among University Students and Association With Body Mass Index (BMI) and Diet Quality

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ABSTRACT

Introduction: Numerous factors contributed to the susceptibility of university students to develop mental health issues. Objective: This study aimed to assess the prevalence of mental health problems among International Islamic University Malaysia (IIUM) students and their relationships with diet quality and body mass index (BMI). **Methods:** A cross-sectional study was conducted among 104 students. The Depression, Anxiety, and Stress Scale (DASS-21) was used to assess students' depression, anxiety, and stress levels. The Malaysian Healthy Eating Index (M-HEI) was used to assess diet quality. Spearman Rho was used to determine the relationships between variables. **Results:** Approximately 69.4% (n = 34), 71.4% (n = 35), and 48.9% (n = 34) of male students experienced moderate to extremely severe symptoms of depression, anxiety, and stress, respectively. In contrast, 85.4% (n = 47), 89.1% (n = 49), and 54.6% (n = 30) of female students had moderate to extremely severe symptoms of depression, anxiety, and stress, respectively. No correlations were found between diet quality and BMI with students' mental health problems. For male students, there were negative significant associations reported between fat-rich foods (r = -0.447, p-value = 0.001) and sugar-rich foods (r = -0.332, p-value = 0.020) intake with depression; a positive significant relationship between fruit intake and anxiety (r = 0.284, p-value = 0.048); a positive relationship between fruit intake and stress (r = 0.300, p-value = 0.036); and a negative relationship between fat-rich foods and stress (r = -0.293, p-value = 0.041). Female students only had a significant negative correlation between fish intake and anxiety (r = -0.376, p-value = 0.005). **Conclusion:** No associations were found between diet quality, BMI, and mental health problems. A more profound comprehension of the connections between risk factors and mental health could lead to new intervention strategies.
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Keywords: Mental Health, Depression, Anxiety, Stress, BMI, Diet Quality, Student

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INTRODUCTION

Recent years have seen a dramatic rise in the prevalence of mental health issues among university students (1, 2). In Malaysia, the prevalence of students who have had mental health issues has risen from 10% in 2011 to 20% in 2016 (1, 3). According to Hersi et al. (4), mental health is defined as "the successful performance of mental functions in terms of cognition, mood, and behaviour that results in productive activities, fulfilling relationships with others, and the ability to adapt, change, and cope with adversity." University students are a part of a society undergoing a crucial developmental stage between youth and adulthood (5). During this transitional stage, underlying mechanisms such as hormone surge, emotional turmoil, and identity construction can contribute to the development of psychopathology (3, 5). In addition, university students also face many challenges, including adjusting to a new environment, maintaining excellent grades, balancing classwork and personal responsibilities, and even negative experiences like bullying (5-7). Therefore, university students are more susceptible to experience depression, anxiety and stress (1, 8). Sex and age, family issues, parents' education level, support systems, history

of family mental health, financial struggles, achievement in academics, field and year of study have been discovered as the risk factors for mental health problems among students (5).

Recently, numerous studies have been conducted on the potential role of diet quality in the onset of mental health issues across nations and cultures (9). Most findings showed associations between a high-quality or healthy diet (frequent intake of fruits, vegetables, and whole-grains foods) and a lower risk for mental health problems. In contrast, a lower-quality diet (higher intakes of unhealthy foods such as processed meat, fat- and sugar-rich foods) is associated with a higher risk for mental health problems (9-12). For instance, Jacka et al. (13) analyzed data from 935 randomly selected, population-based participants aged 20 to 93 and found a link between higher fish consumption and fewer mental health problems, which was more potent in smokers. A prospective cohort study by Richard et al. (14) on 6734 persons aged 35 to 75 in an urban area of Switzerland also discovered a correlation between anxiety disorders and poorer diet quality. In addition, an increased risk for mental health problems has also been linked to a deficiency in vitamin B, omega-3 fats, and a lack of consumption of fruits and vegetables (15, 16). However, Meegan et al. (17) noted that inconsistent evidence exists about the relationships between diet quality and the likelihood of unfavourable mental health consequences. They observed no association between dietary parameters and anxiety or depression symptoms in a cross-sectional study of 2047 middle-aged adults (17). Other than diet quality, association between other risk factors such as BMI and mental health issues also have studied by previous studies. According to Noruzi et al. (18), unhealthy dietary patterns may contribute to the rising prevalence of obesity. Amin et al. (19) found a link between obesity (BMI ≥ 30) and poor mental health. In addition, Gomes et al. (20) showed that a rise in weight and obesity was associated with an increase in the risk of depression and anxiety.

Although various researchers have examined the correlation between diet quality and BMI with mental health issues among different populations, the relationship's causality remains unclear (19). Few studies have examined these associations among university students, and little information is available about this issue, particularly in Malaysia. University students usually consume a poor-quality diet characterized by a low intake of fruits and vegetables and a high intake of added sugars from sweets and sugar-sweetened beverages, which has led to an increase in the prevalence of overweight and obesity. Thus, this study aimed to assess the prevalence of mental health problems among International Islamic University Malaysia (IIUM) students and their relationships with diet quality and BMI. Evaluating the relationship between these factors on the mental health problems of university students in Malaysia is essential to designing effective health promotion programmes.

MATERIALS AND METHODS

Study design and participants

This cross-sectional study was conducted in November 2020 on the Kuantan campus of the International Islamic University of Malaysia (IIUM). A total of 104 students participated in this study, and due to the COVID-19 pandemic, fewer students lived on campus, resulting in a small sample size. On the IIUM Kuantan campus, there are a total of six different faculties, or kulliyyahs: the Kulliyyah of Allied Health Sciences (KAHS), the Kulliyyah of Dentistry (KOD), the Kulliyyah of Medicine (KOM), the Kulliyyah of Nursing (KON), the Kulliyyah of Pharmacy (KOP), and the Kulliyyah of Science (KOS). This study's inclusion criteria were Malaysian undergraduate students, and the exclusion criteria were international undergraduate and postgraduate students. The international students were omitted from this study because the questionnaire used to assess their nutritional intake was designed exclusively for the Malaysian population.

Data collection procedure and instrument

The data was collected using a self-administrated structure which contains three sections. First section contains questions related to socio-demographic information, second section is the Depression Anxiety Stress Scale-21 (DASS-21), and the third section is the Malaysian Healthy Eating Index Scoring (M-HEI). Participants in this study were weighted and measured using the TANITA digital weighted scales and the Seca vertical portable stadiometer, both of which were calibrated before using. The students' body mass index (BMI) was calculated by dividing their weight (kg) by their height (m2), and then the BMI value was classified in accordance with the WHO standard.

The DASS-21 is a self-reported questionnaire which developed to measure state of depression, anxiety, and stress symptoms using 21 items (21). The scores of each mental health problem are calculated by summing the scores and multiplying them by two. Table I shows the five categories of stress, anxiety and depression. The DASS-21 has gained worldwide appeal because of its durability, practicality, and ease of operation (1, 3, 8).

The quality of the student's diet was evaluated using the Malaysian Healthy Eating Index Scoring (M-HEI). The M-HEI consists of seven food groups and two nutrient components, as presented in Table II (22-24). The score for each component was derived by dividing the actual serving consumed based on diet recall by the recommended serving based on the Malaysian Dietary Guidelines (MDG) and multiplying the result by ten. The scores ranged from 0 (for noncompliance) to 10 (for full compliance). Then, the M-HEI score was calculated

Table I: Cut-off scores for the mental health level (12)

Subscale	Depression	Anxiety	Stress
Normal	0 – 9	0 – 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Moderate	14 – 20	10 – 14	19 – 25
Severe	21 – 27	15 – 19	26 – 33
Extremely severe	≥ 28	≥ 20	≥ 34

Table II: Criteria scoring of Malaysia Healthy Eating Index (M-HEI) components (14)

Components	Score range	Criteria for maximum score 0	Criteria for score 8	Criteria for maximum score 10
Grains and cereals	0 – 10	0 serving		4 – 8 servings[1)]
Vegetables	0 – 10	0 serving		3 servings[1)]
Fruits	0 – 10	0 serving		2 servings[1)]
Meat, poultry and eggs	0 – 10	0 serving		– 2 serving[1)]
Fish and sea-food	0 – 10	0 serving		1 serving[1)]
Legumes	0 – 10	0 serving		– 1 serving[1)]
Milk and dairy products	0 – 10	0 serving		1 – 3 servings[1)]
Total fat	0 – 10	≥ 35% energy from fat[2)]		≤ 30% energy from fat[1)]
Sodium	0 – 10	≥ 4200 mg[2)]	2400 mg[1)]	≤ 2000 mg[1)]

[1)] Based on Malaysian dietary guidelines (MDG) by National Coordinating Committee on Food and Nutrition (NCCFN, 2010)
[2)] Based on 85th percentile from Malaysian adult nutrition survey data (MANS, 2003)

by summing nine components and the percentage composite score was determined as follows: (total scores of nine components / 90 (maximum scores)) x 100%. Scores less than 51% indicate an unhealthy or low-quality diet; scores between 50% and 80% indicate a reasonably healthy or moderate-quality diet; scores greater than 80% indicate a high-quality diet (23).

Data processing and analysis

For data processing and analysis, IBM SPSS version 25.0 (IBM Corp., Armonk, New York, United States) was applied. The analysis of qualitative variables was presented in frequency and percentage. Correlation between the BMI and diet quality among students and depression, anxiety, and stress were examined using Spearman Rho correlation. Due to the non-normally distribution of the data, the Spearman Rho correlation was used, and significant level was set at $p < 0.05$.

Ethical approval and participation consent

The study protocol was approved by the IIUM Research Ethical Committee (IREC). Each student signed a consent form stating that they had read and understood the terms. Participation by students was completely voluntary. The collected data was kept strictly confidential and anonymous.

RESULTS

Socio-demographic characteristics of participants

Table III summarizes the socio-demographic characteristics of the students. The percentages of male and female students were 47.1% (n = 49) and 52.9% (n = 55), respectively. Most students (n = 56, or 53.9%) were between 22 and 24 years old. In terms of financial condition, approximately 30.8% (n = 32) of students were sponsored by the Jabatan Perkhidmatan Awam (JPA), 29.8% (n = 31) by the Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN), and just one student (1.0%) by the IIUM Undergraduate Ummatic scholarship (IIUM UG Ummatic). By educational level, 36.5% (n = 38) and 34.6% (n = 36) of third- and second-year students, respectively, participated in this survey. Most students (n = 36, 34.6%) reported from the KAHS and KOS. Over half of the students (60.6%) had a normal BMI (n = 63). Underweight and obesity categories have the same number of students (12.5%, n = 13).

Table III: Background characteristics of students and BMI category (n= 104)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	49	47.1
Female	55	52.9
Age		
19 – 21	42	40.4
22 – 24	56	53.9
25 – 27	6	5.8
Financial Status		
Jabatan Perkhidmatan Awam (JPA) scholaship	32	30.8
IIUM UG Ummatic scholarship	1	1.0
Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN)	31	29.8
Self-Sponsored	23	22.1
Others	17	16.3
Level of education (year)		
First	16	15.4
Second	36	34.6
Third	38	36.5
Fourth	11	10.6
Fifth	3	2.9
Faculty		
Kulliyyah of Allied Health Sciences (KAHS)	36	34.6
Kulliyyah of Science (KOS)	36	34.6
Kulliyyah of Pharmacy (KOP)	6	5.8
Kulliyyah of Medicine (KOM)	15	14.4
Kulliyyah of Nursing (KON)	6	5.8
Kulliyyah of Dentistry (KOD)	5	4.8
BMI Category		
Underweight (<18.5)	13	12.5
Normal (18.5 – 24.9)	63	60.6
Overweight (25.0 – 29.9)	15	14.4
Obese (30.0 – 34.9)	13	12.5

Prevalence of mental health problems

Table IV shows the results of the DASS-21 scale scores. The scores of depression, anxiety, and stress were

Table IV: Prevalence of depression, anxiety, and stress among students

Subscale	Male (n = 49)		Female (n = 55)		Total (n = 104)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Depression						
Normal	8	16.3	4	7.3	12	11.5
Mild	7	14.3	4	7.3	11	10.6
Moderate	10	20.4	7	12.7	17	16.3
Severe	8	16.3	11	20.0	19	18.3
Extremely severe	16	32.7	29	52.7	45	43.3
Anxiety						
Normal	8	16.3	3	5.5	11	10.6
Mild	6	12.2	3	5.5	9	8.7
Moderate	6	12.2	11	20.0	17	16.3
Severe	3	6.1	6	10.9	9	8.7
Extremely severe	26	53.1	32	58.2	58	55.8
Stress						
Normal	22	44.9	22	40.0	44	42.3
Mild	3	6.1	3	5.5	6	5.8
Moderate	5	10.2	11	20.0	16	15.4
Severe	11	22.4	9	16.4	20	19.2
Extremely severe	8	16.3	10	18.2	18	17.3

classified into two categories based on their prevalence: those with "normal" to "mild" scores had no mental health problems, while those with "moderate," "severe," and "extremely severe" scores had mental health problems. For depression among male students, 20.4% (n = 10), 16.3% (n = 8) and 32.7% (n = 16) had moderate, severe and extremely severe symptoms, respectively. For female students, 12.7% (n = 7), 20.0% (n = 11) and 52.7% (n = 29) had moderate, severe and extremely severe depression symptoms, respectively. For anxiety, male students reported that 12.2 % (n = 6), 6.1 % (n = 3) and 53.1 % (n = 26) had moderate, severe and extremely severe anxiety symptoms, respectively. Meanwhile anxiety among female students recorded 20.0 % (n = 11) had moderate, 10.9% (n = 6) had severe, and 58.2 % (n = 32) had extremely severe anxiety symptoms. For stress, male students had moderate, severe, and extremely severe stress symptoms were 10.2% (n = 5), 22.4% (n = 11), and 16.3% (n = 8), respectively. Female students showed that 20.0% (n = 11), 16.4% (n = 9) and 18.2% (n = 10) had moderate, severe and extremely severe symptoms of stress.

Association between diet quality scores and mental health problems

The association between students' diet quality scores and their levels of depression, anxiety, and stress is illustrated in Table V. The result shows there is no statistically significant association between diet quality scores and mental health problems among students in the current study.

Table V: Associations between diet quality and depression, anxiety, and stress

Gender	Mental health problem	Correlation coefficient, r	*p*-value
Male	Depression	0.102	0.486
	Anxiety	0.140	0.338
	Stress	0.164	0.260
Female	Depression	-0.138	0.316
	Anxiety	-0.140	0.310
	Stress	-0.092	0.502

Association between a specific group of foods and mental health problems

Table VI shows the associations between the consumption of specific food groups and depression, anxiety, and stress among university students. For male students, there were negative significant associations reported between fat-rich foods (r = -0.447, p-value = 0.001) and sugar-rich foods (r = -0.332, p-value = 0.020) intake with depression; a positive significant relationship between fruit intake and anxiety (r = 0.284, p-value = 0.048); a positive relationship between fruit intake and stress (r = 0.300, p-value = 0.036); and a negative relationship between fat-rich foods and stress (r = -0.293, p-value = 0.041). Female students only had a significant negative correlation between fish intake and anxiety with r = -0.376 (p-value = 0.005).

Association between body mass index (BMI) and mental health problems

Table VII illustrates the relationship between BMI and

Table VI: Associations between specific group of foods and depression, anxiety, and stress

Gender	Mental health problems	Correlation	Fruits	Vegetables	Fish	Fat-rich foods	Sugar-rich foods
Male	Depression	Correlation Coefficient, r	0.178	0.147	0.047	-0.447	-0.332
		p-value	0.222	0.313	0.747	0.001*	0.020*
	Anxiety	Correlation Coefficient, r	0.284	0.095	0.110	-0.216	-0.202
		p-value	0.048*	0.518	0.454	0.070	0.163
	Stress	Correlation Coefficient, r	0.300	0.072	0.158	-0.293	-0.233
		p-value	0.036*	0.624	0.280	0.041*	0.107
Female	Depression	Correlation Coefficient, r	-0.075	-0.246	-0.160	0.050	-0.014
		p-value	0.588	0.070	0.243	0.715	0.917
	Anxiety	Correlation Coefficient, r	-0.214	-0.080	-0.376	-0.087	-0.131
		p-value	0.116	0.561	0.005*	0.529	0.342
	Stress	Correlation Coefficient, r	-0.072	-0.102	-0.217	-0.074	-0.127
		p-value	0.601	0.458	0.112	0.589	0.357

*Significant level at $p < 0.05$

Table VII: Correlation between body mass index (BMI) and depression, anxiety, and stress

Gender	Mental health problems	Correlation coefficient, r	*p*-value
Male	Depression	-0.033	0.820
	Anxiety	-0.066	0.653
	Stress	0.164	0.260
Female	Depression	-0.010	0.944
	Anxiety	0.068	0.623
	Stress	-0.108	0.653

mental health issues among university students. There were no statistically significant connections between BMI and depression, anxiety, and stress among male and female students.

DISCUSSION

This study examined the prevalence of mental health problems such as depression, anxiety, and stress in university students and their relationships with diet quality and BMI. The data revealed a high prevalence of mental health problems among IIUM students, of which 77.9%, 80.8% and 51.9% experienced moderate to extremely severe symptoms of depression, anxiety and stress, respectively. A study by Shamsuddin et al. (8) showed a much lower prevalence of depression, anxiety, and stress symptoms among 506 students from four universities in Klang Valley, with 37.2%, 63.0%, and 23.7% for moderate to extremely severe symptoms of depression, anxiety and stress, respectively. Meanwhile, Mohammed et al. (25) showed that 32.1%, 64.6%, and 29.2% of 675 student's Universiti Putra Malaysia (UPM), Serdang had depression, anxiety, and stress symptoms, respectively. The high prevalence of mental health problems reported by the current study may be attributable to the small sample size of 104 respondents compared to other studies.

There are many variables to consider regarding mental health issues among university students. University students are particularly vulnerable to mental health problems due to the pressure to perform well in class, their parents' high expectations, unfamiliar educational environments, and required lifestyle changes (1, 3). As Hamzah et al. (1) stated, public university students, face more pressures than their private university counterparts to work harder and compete fiercely. Additionally, the mental health problems among students are also exacerbated by the courses they take. In the current study, the majority of participants are enrolled in health sciences and science courses at the KAHS and KOS. Previous studies have shown that students pursuing a career in medical and health sciences are more prone to develop a mental illness due to the higher demands, teaching methods, and evaluation and grading systems (3, 26, 27). They are also exposed to high-stress computerized work situations, including tremendous workloads, tight deadlines, and comprehensive trainings (3).

Gender differences in mental health problems were more pronounced among female students than male students. According to Shamsuddin et al. (8), female students are more susceptible to mental health problems. They may experience deterioration in mental health due to social pressure, environmental influences, and physiological changes. Moreover, females, who typically have higher levels of both self-esteem and feelings of inadequacy, are more likely than males to show signs of stress when confronted with adversity (8). According to Bahrami and Yousefi (28), female anxiety is associated with the metacognitive assumption that one cannot regulate their thoughts. This view is associated with Type II (or meta) concern, characterized by negative thoughts that produce an uncontrollable and detrimental perception of the worry process (28). Ghaedi and Koonin (29) also discovered that females were more prone than males to experience depression and stress in their study. Researchers concluded that female students are more intellectually competitive, leading them to study harder and get higher grades. Higher expectations for themselves can lead to an increase in stress levels. The hormonal and physiological variations between the genders also impact mental health (3).

The current study showed that depression, anxiety and

stress were not significantly correlated with male and female students' diet quality scores. This finding is in line with Oftedal et al. (30) which found no statistical significant correlation between depression symptoms and diet quality. In a study of 12,008 people from the general population by Schweren et al. (11), no correlation between poor diet quality and depression risk also was reported. They concluded that the whole-diet intervention's prevention of depression/anxiety development is unlikely to be linked to food intake (11). According to Meegan et al. (17), genetic factors also influence mental health problem vulnerability. Therefore, it is plausible to hypothesize that unalterable hereditary variables predisposing individuals to mental health problems could explain the lack of association between diet quality and symptoms of mental health problems in the present study (17). In contrast, according to Sьmen and Evgin (31), an increase in dietary quality has positive effects, including a reduction in obesity indicators, a boost in cognitive abilities, and an improvement in the emotional well-being of adolescents. Some researchers also hypothesized that the efficacy of antidepressants could be improved by consuming foods rich in prebiotics, probiotics, antioxidants, and other essential nutrients (30). However, according to Oftedal et al. (30), the association between diet quality and mental health problems is complicated for several reasons. First, it is difficult to determine how nutrient substitution would affect the complex way nutrients work together in a healthy diet. Second, chronic diseases such as cardiovascular disease and type 2 diabetes are associated with mental health problems, and people with these long-term conditions report having more symptoms of mental health problems than the general population (30).

This study also found significant inverse relationships between high-fat and high-sugar food intake and depression and stress symptoms in male students. The findings of this study contradict those of Vermeulen et al. (12), who discovered that a diet high in sugar and saturated fat exacerbates depression symptoms. Andre et al. (32) discovered that consuming sweetened meals and beverages, refined carbs, sausages, and whole milk was linked to mental health problems such as depression and anxiety and reduced life satisfaction. According to Vermeulen et al. (33), it is difficult to discern between a sugar and a saturated fat dietary pattern because individuals ingest complex mixtures of closely linked nutrients that interact with one another. It is challenging to assess diet-health problem correlations by evaluating the effect of single nutrients (33). In addition, individual behaviour has been influenced by variations in emotional arousal, including happiness, anger, stress, anxiety, and depression (34). Individuals who were stressed were more prone to consume sweets, chocolate, cake cookies, and salty meals (34).

The results of this study also showed the associations between the intake of fruits with anxiety and stress symptoms among male students. However, our findings contradict the findings of population-based cohort study of 9965 people by Sangsefidi et al. (35), which found an inverse connection between fruit consumption and depression (OR: 0.63, CI: 0.46–0.86), anxiety (OR: 0.70, CI: 0.54–0.90), and stress (OR: 0.59, CI: 0.42–0.83). According to their study, higher consumption of fruits may be associated with a decreased incidence of depression, anxiety, and stress. The nutrients found in fruits, such as vitamins, folate, antioxidants, phytochemicals, and minerals, may protect against psychiatric diseases. In addition, fruit carbohydrates affect insulin secretion, which increases the creation of neurotransmitters like serotonin by allowing tryptophan to reach the brain (35). Inconsistent associations between fruit consumption and mental health issues found between our findings and those of other studies can be attributed to differences in demographic characteristics, eating habits, and the instruments used to assess mental health. According to Gabska et al. (36), experimental investigation is needed to demonstrate the associations between intake of fruits and mental health.

There was also a negative correlation between fish consumption and anxiety symptoms among female students. Our results are consistent with previous studies. Jacka et al. (13) found that decreased fish diet, a key source of n-3 polyunsaturated fatty acids (PUFAs), was associated with higher anxiety in 935 women aged 20 to 93. In a cross-sectional study, Fatemi et al. (37) demonstrated a negative connection between n-3:n-6 PUFAs and anxiety. Several physiological variables, including alterations in dopaminergic function, increased cerebral blood flow, and increased serotonergic neurotransmission, can explain the effect of fatty acids on psychiatric disorders (37). Fatty acids also influence receptor activation, signal transmission, and neurotransmitter reuptake (37-39). Taking fish oil supplements has been shown to reduce the adverse effects of acute stress (38). However, Sanchez-Villegas et al. (39) discovered that reduced n-3 PUFA intake was not connected with an increased risk of developing anxiety disorders. The inconsistent results can be attributed to differences in study techniques, sample sizes, participant profiles, and geographic locations.

In both male and female students, there is no association between BMI and mental health symptoms. This finding is congruent with that of Amin et al. (19), who discovered that BMI had no statistically significant effect on young people's mental health. However, they discovered that a 5 kg/m2 rise in BMI (the difference between overweight and obese) increased the CES-D (Center for Epidemiologic Studies Depression Scale) score by 20% and the chance of depression by 29% in older people (19). The evidence for a bidirectional association between obesity and poor mental health is equivocal (17). Obese people, according to Ejike (40),

may experience anxiety as a result of obesity-related health issues such as sleeplessness, neuroendocrine dysfunction, and increased blood cytokines. In addition, functional impairment, body image dissatisfaction, poor self-reported health, and stigma also impact the links between BMI and obesity and mental health concerns (19).

The findings of this study advocate the implementation of university-based interventions for students with mental health issues. Monthly online evaluations and planning mindful activities can aid students in coping with mental health issues (3). The contradictory results demonstrated that the interrelationships between diet quality, BMI, and mental health are extraordinarily complex. Future prospective cohort studies exploring these interactions are necessary to establish further the direction of the link and underlying processes (17). Future research should consider demographic, biobehavioral, genetic, environmental, and sociocultural variables that may influence the relationship between diet quality, BMI, and mental health problems.

This study has a few limitations. Since this is a cross-sectional study, it is impossible to conclude the relationships between the variables. Second, the small sample size may provide poor statistical results, resulting in inconsistent findings compared to other research. Thirdly, the self-reported nature of the DASS-21 and M-HEI makes the information obtained contingent on the candour of respondents, resulting in a propensity towards report bias. In addition, recall errors may induce under- or overestimating respondents' dietary consumption.

CONCLUSION

In conclusion, our study showed no significant correlations between mental health problems, diet quality and BMI. Only several food groups showed relationships with mental health problems among university students. In male students, there were inverse relationships between fat- and sugar-rich foods intake and depression and positive associations between fruit intake and anxiety and stress. In contrast, female students only reported an inverse association between fish consumption and anxiety symptoms.

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