

RISK FACTORS, UNDERLYING COVARIATES AND INTERACTIONS WITH MAGNITUDE OF DEPRESSIVE SYMPTOMS DURING COVID-19 MOVEMENT CONTROL ORDER (MCO) AMONG THE TERTIARY EDUCATES IN MALAYSIA: A REVIEW

Muhamad Khairul Zakaria*¹
Mohd Radhi Abu Shahim²
Nurhuda binti Muhamad Nor³
Asma' Ali³

*Corresponding author: (email: muhamad.khairul@umt.edu.my)

Abstract

Amid the Covid-19 Movement Control Order (MCO) in Malaysia, university students faced significant lifestyle changes, with potential impacts on mental health. This review investigates the interrelationship between dietary quality, physical activity, and depressive symptoms among tertiary-educated individuals in Malaysia during this period. Our analysis classified diet quality based on gender, breakfast habits, snack consumption, and fast food intake. Results indicated female students generally had better diet quality than males. A significant number of students skipped breakfast and frequently consumed snacks and fast food. On the physical activity front, a majority were found to be physically inactive, with males being slightly more active than females. A substantial proportion exhibited depressive symptoms. Importantly, there was a significant association between diet quality, physical activity, and depressive symptoms. Addressing these factors is crucial to improving students' mental health, urging the need for preventive measures and interventions.

Keywords: diet quality; physical activity; depression; university student

Abstrak

Di tengah-tengah Perintah Kawalan Pergerakan (PKP) Covid-19 di Malaysia, pelajar universiti menghadapi perubahan gaya hidup yang ketara, dengan potensi kesan terhadap kesihatan mental. Kajian semula ini menyiasat perkaitan antara kualiti pemakanan, aktiviti fizikal dan gejala kemurungan dalam kalangan individu

¹ English Language Learning Center, Center for Foundation and Continuing Education (PPAL), Universiti Malaysia Terengganu

² Faculty of Business, Economics and Social Development, Universiti Malaysia Terengganu

³ Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu

berpendidikan tinggi di Malaysia dalam tempoh ini. Analisis kami mengklasifikasikan kualiti diet berdasarkan jantina, tabiat sarapan pagi, pengambilan makanan ringan dan pengambilan makanan segera. Keputusan menunjukkan pelajar perempuan secara amnya mempunyai kualiti diet yang lebih baik daripada lelaki. Sebilangan besar pelajar melangkaui sarapan pagi dan kerap mengambil makanan ringan dan makanan segera. Dari segi aktiviti fizikal, majoriti didapati tidak aktif secara fizikal, dengan lelaki lebih aktif sedikit daripada wanita. Sebilangan besar menunjukkan gejala kemurungan. Yang penting, terdapat perkaitan yang signifikan antara kualiti diet, aktiviti fizikal, dan gejala kemurungan. Menangani faktor-faktor ini adalah penting untuk meningkatkan kesihatan mental pelajar, menggesa keperluan untuk langkah pencegahan dan intervensi.

Kata Kunci: *kualiti diet; aktiviti fizikal; depresi; pelajar universiti*

Introduction

Covid-19 is an infection caused by the recently discovered strain of coronavirus, a type of virus known to cause human respiratory infections. Movement Control Order (MCO) refers to the preventive measure taken to contain the country's Covid-19 pandemic by the Federal Government of Malaysia. The order is commonly called "lock-down," or "partial lock-down," where mass gatherings in any location in the country were prohibited and many companies were stopped except for essential services (Kumar et al. 2020; Malaysia Prime Minister's Office, 2020; Tang 2020). Due to Covid-19 and MCO, sudden changes in the education system in online classrooms had affected more than 1 billion students across the globe from 129 countries (UNESCO, 2020; Sundarasan et al., 2020). China reported a significant impact on its mental health and high levels of anxiety among its university students (Cao et al., 2020; Wang et al., 2020; Bao et al., 2020). A similar study was carried out among students at universities in Malaysia, finding that age, gender, academia, and living conditions are closely related to higher levels of anxiety, with financial problems, online learning, uncertainty in education, graduation, and jobs (Sundarasan et al., 2020). University years can be a period of high stress and multiple changes for many students, especially during the MCO and often expressed in student food choices and eating habits that may imply poor diet quality, low physical activity, and high levels of stress. The combination of high stress, physical inactivity, low diet quality, and other unpredicted covariates may have a long-term detrimental effect on mental health over a lifetime.

Diet quality is defined as a "diversified, balanced, and healthy diet, which provides energy and all essential nutrients for growth and healthy and active life" (International Atomic Energy Agency, 2020). World Health Organization (WHO) states that a healthy diet means a balance between energy intake (calories) and energy expenditure. Besides, it is recommended to limit sodium intake to less than 2 grams

per day (equivalent to 5 grams of salt), reduce free sugars to less than 10% (ideally 5%) of total energy intake, and shift fat intake away from industrial trans fats. Various studies have proven that students usually have a low-quality diet (Dalrymple, 2016; Alkazemi, 2019; Rajikan et al., 2019). An estimated 2 billion people worldwide lack access to healthy, nutritious, and adequate food (WHO, 2020). The prevalence of highly processed food, rapid unplanned urbanization, and shifting lifestyles have also made more people consume unhealthy diets high in calories, fats, free sugars, and salt (WHO, 2020). National Morbidity Health and Survey (NMHS) 2015 reported that 94.0% of Malaysian adults did not take adequate fruits and vegetables recommended by WHO.

Other than that, according to the WHO, physical activity is defined as "any bodily movement produced by skeletal muscles that require energy expenditure" (WHO, 2020). Meanwhile, Jaafar (2008) explained that physical inactivity refers to those who do not reach the required physical activity level. Moreover, WHO explained that physical activity intensity depends on the individual (WHO, 2020). According to Rajappan et al. (2015), physical activity declines from high school to college, and most university students report a drop in physical activity after graduation. The NMHS 2015 stated that the prevalence of physically inactive adults was 33.5%. Every one out of three adults did not meet the recommended level of physical activity, and females were significantly less active than males. The urban population reported a substantially lower level of physical activity compared to the rural population. It also stated that the physical activity level dropped considerably with increasing age, most evident in the elderly (NHMS, 2015).

Depression is described as a condition where a person experiences at least one major depressive episode with five or more symptoms during the same two-week period and represents a change from the previous personality (Truschel, 2020). It is one of the most common mental disorders in the world and has been increasing until now. According to the National Institute of Mental Health (NIMH), depression can be identified by looking at the symptoms presented for at least two weeks that affect the feeling, thinking, and daily activity such as sleeping, eating, and working (NIMH, 2020). According to WHO, depression often begins with adulthood, especially among university students, caused by genetic, biological, environmental, and psychological factors. Risk factors include personal or family history of depression, significant life changes, trauma or stress, and specific physical illnesses and medications (WHO, 2020). Besides, the signs that have been found to have depression include changes in appetite or weight, feeling sad or tired, having trouble focusing or sleeping, speaking more slowly, and losing interest in hobbies or sports (NIMH, 2020). A study conducted by NHMS 2015 shows the prevalence of adult mental health disorders in Malaysia grew from 10.7% in 1996 to 11.2% in 2006 to 29.2% in 2015. One out of ten individuals was registered among Malaysian students in 2011 and one in five in 2016. These results reveal a worsening state of mental health problems, especially among

students in Malaysia that must be addressed. Among Malaysian students, the prevalence of moderate depression was found 27.5%, and 9.7% found severe or too severe depression (Islam et al., 2018). NHMS 2017 indicated that every 1 out of 5 adolescents experienced depression, 2 out of 5 adolescents faced anxiety, and 1 out of 10 adolescents was stressed. This issue could be a significant concern in Malaysia, especially for students.

Thus, this review's primary purpose is to give a clear picture of the studies that have been conducted so far on diet quality, physical activity, and depressive symptoms among university students. Next, this review aims to evaluate and compare current research on university students' diet quality, physical activity and depressive symptoms and lastly, to fill these gaps to analyse the interrelationship between diet quality, physical activity level and depressive symptoms among university students.

Diet quality among university students

As for diet quality, this review will look at based on four aspects which are gender, skipping breakfast, snack consumption and fast-food consumption. Table 1 summarizes the students' diet quality based on gender, skipping breakfast, snack consumption and fast-food consumption. Each article was classified into several categories, which are as follows: author (year), location, study subject, and findings.

Table 1: Studies on Diet Quality among University Students

Study	Location	Subjects	Findings
Fokeena et al. (2016)	Malaysia	320 students	The consistency of the diet was higher for females (19.0) than for males (18.0) (p=0.006)
Dalrymple (2016)	Trinidad	196 students	<ul style="list-style-type: none"> - Less than half of the students (41.3%) reported getting breakfast daily, however (66.8%) and (65.8%) had lunch and dinner daily. - 42.9% (n= 84), 45.6% (n= 89) and 30.8% (n= 60) identified frequent snacks during breakfast and lunch, lunch and evening meals, and after dinner. - Most students in the study (91.8%) consumed fast- food daily, once a week, twice a week, and other specified periods such as once and twice a month; with only a small number of students (8.2%) not consuming fast food.

Table 1 (continues)

Study	Location	Subjects	Findings
Unal et al. (2017)	Turkey	365 students	<ul style="list-style-type: none"> - In females, diet consistency ratings were substantially greater than in males ($p < 0.05$). - The average diet quality scores of male and female students are 4.87 ± 2.83 and 3.96 ± 2.67, respectively. - Students consumed an average of 3.02 ± 0.85 meals per day and breakfast was the most skipped meal with a rate of 30.1%. - 23.8% of students skip breakfast because of insufficient time
Mahmoud & Taha (2017)	Egypt	125 second-year nursing students.	<ul style="list-style-type: none"> - Over half of the students did not eat breakfast every day consistently. - Most students never ate breakfast regularly and rarely and seldom (12%, 16.8% & and 26.4%). <p>The majority of the students ate snacks between meals.</p> <ul style="list-style-type: none"> - Majority of students regularly eat fast food. - Most of the students ate fat and almost half of them frequently consumed fried food.
Kabir et al. (2018).	Bangladesh	25 participants, aged 17-25 years old	Female students are more likely than male students to have a high consumption of fruits, milk, fish, and fibre.
Mohanty et al. (2018)	Bhubaneswar, India	278 medical student	<p>The majority of male (46.1%) and female (73%) students were taking less than 3 meals daily.</p> <ul style="list-style-type: none"> - Most of the males (82.9%) and females (92.1%) take snacks less than 3 times a day. - Most males (64.5%) consume vegetables more than 3 times per week, while most females (49.2%) consume vegetables less than 3 times per week. - Most males (82.9%) and females (92.1%) consume snacks less than three times a day. - Fried food is more common in men (42.1%) than women (30.1%)

Table 1 (continues)

Study	Location	Subjects	Findings
Nurul Najwa & Appukutty (2018)	Shah Alam, Malaysia	165 female students	More than half of the participants reported skipping breakfast (54.6%; n = 90), while the others (45.5%; n = 75) reported skipping breakfast, with an average breakfast consumption of 1.45 times a week (SD = 0.50)
Alkezemi (2019)	Kuwait University	615 students	<ul style="list-style-type: none"> - Poor eating habits tend to be fairly common to both sexes. - Women students prefer to eat salty snacks, such as chips and full-bodied popcorn, and sweet snacks, such as cakes and cookies. - Male students ate a high amount of animal protein, soda and sugar drinks relative to female students. - Over one-third (35%) of students frequently identified breakfast skips.
Ahmad et al. (2019)	Malaysia	515 students	<ul style="list-style-type: none"> - Among all of the students, 40.6% eat fast food more than once a week.
Cheng & Liu (2019)	Beijing, China	631 students	<ul style="list-style-type: none"> - Males ate considerably more bread, meat eggs, and soft drinks than females. - Women's students favour more vegetables and fruit than men's students.
Rajikan et al. (2019)	Selangor, Malaysia	108 low-income students	<ul style="list-style-type: none"> - 69.4% of food insecurity prevalence and higher food insecurity in male students than in female students is recorded. - Most men and women students do not fulfil the energy demands of the RNI.
Díaz-Torrente & Quintiliano-Scarpelli (2020).	Santiago, Chile	200 students	<ul style="list-style-type: none"> - Most people (53%) eat breakfast each day, which is more prevalent in women (60.2% vs. 43.7%), p<0.05 - Only 17.5% of the participants had a decent breakfast quality, with no gender distinction.
Seedat & Pillay (2020)	Westville campus	353 students	<ul style="list-style-type: none"> - 80.5% ate breakfast; however, it was consumed daily by just 50.7%. 17.6% did not eat breakfast at all. - Breakfast was eaten regularly by participants who stayed at home and whose parents or families purchased groceries, while more third-year students skipped breakfast.

Unal et al. (2017) suggest that females have substantially higher diet content scores in terms of gender relative to males. Similarly, Fokeena et al. (2016) indicated that women had a better-quality diet than men. Rajikan et al. (2019), who wrote that food insecurity was higher in male students than female students, supports this view. Next, Kabir et al. (2018) reported that women students are more likely than male students to have a high intake of fruits, milk, fish, and fibre. Contrary to the previous study by Kabir, Mohanty et al. (2018) which claimed that vegetables are consumed more than three times a week by the majority of males (64.5%), while vegetables are consumed less than three times a week by the majority of females (49.2%). The statement was contradicted by Cheng and Liu (2019) that female students are more likely to consume more fruits and vegetables while male students consume more foods such as meats, eggs, and soft drinks. In the meantime, Alkazemi (2019) suggested that both sexes have a low-quality diet. Female students prefer to eat salty snacks, such as chips, and full-fat popcorn, and sugar snacks, such as cakes and candy. While, relative to female students, male students consumed a high amount of animal protein, soda and sugar drinks, which is the same as research by Cheng and Liu (2019). Overall, these findings indicate that most male students typically have a lower standard of diet than females.

Commenting on skipping breakfast, Mahmoud and Taha (2017) point out that more than half of the students did not regularly eat breakfast. This statement, supported by Nurul Najwa and Appukutty (2018), said that most students skipped breakfast. In the same vein, Dalrymple (2016) notes that 41.3%, less than half of the students, reported having breakfast daily. Unal et al. (2017) have highlighted that the most common reason to skip breakfast is lack of time. Next, Alkazemi (2019) stated in his research that more than 35% of the respondents often skip breakfast, while Díaz-Torrente and Quintiliano-Scarpelli (2020) reported that 53% of the students did consume breakfast every day. Meanwhile, Seedat and Pillay point out that 80.5% of students finished breakfast, but only 50.7% consumed it daily. Overall, some data seems to be sufficient to suggest that students are more likely to miss their breakfast.

Mahmoud & Taha (2017) found that most students consume snacks between meals in an investigation of consuming snacks. Mohanty et al. (2018) support this argument, which states that most males (82.9 per cent) and females (92.1 per cent) take snacks fewer than three times a day. Similarly, Dalrymple (2016) notes that a total of 233 respondents, 84 of whom reported eating snacks every day between breakfast and lunch, 89 of 233 respondents eating snacks between lunch and evening meals, and 60 more eating snacks after evening meals. Considering all these findings, students are more likely to eat snacks after their main meals.

Aside from snacks, Mahmoud & Taha (2017) also suggested that most students consume fast food daily, and Ahmad et al. (2019) stated that 40.6 percent of students ate fast food more than once a week. This opinion, endorsed by Dalrymple (2016),

suggests that most students (91.8%) eat fast food and that only a limited number of students (8.2%) do not eat fast food at all. Almost all students consumed fat in a follow-up survey, and nearly half of them consumed fried food daily (Mahmoud & Taha 2017). However, in terms of gender, Mohanty et al. (2018) observed that males were more likely than females to enjoy fried food. In general, these studies provide valuable insights into the consistency of the diet among students.

Physical activity among university students

Table 2 summarizes the students' physical activity in the selected studies. Each article was classified into several categories, which are as follows: author (year), location, study subject, and findings. All studies included were conducted in Malaysia.

Table 2: Studies on Physical Activity among University Students

Study	Location	Subjects	Findings
Al-Asousi & El-Sabban (2016)	University Malaya, Kuala Lumpur.	Medical students. 150 men and 100 women	<ul style="list-style-type: none"> - 76% of students exercise daily and 63% choose to exercise in groups. - The key reason for them to exercise is to have good health (53%), followed by physical fitness (29%), and just 12% to have fun. - The lack of time (62%) and laziness (38%) were given as explanations by students who did not exercise.
Abdullah et al. (2018)	Selangor, Malaysia.	400 students	<ul style="list-style-type: none"> - Gender does not affect UKM students' participation. ($t = -4.20$ and $p > 0.05$) - Intrinsic motivation for physical activity dependent on body influences ($t = -6.51$, $p < 0.05$). - Extrinsic influence on family factors to do physical activity ($t = -6.98$, $p < 0.05$).
Muhsin & Ibrahim (2018)	Selangor, Malaysia.	22 females aged between 19 to 23	<ul style="list-style-type: none"> - Just 9 participants (40.9%) were classified as physically active. - 59.1% of the respondents were physically inactive. - Increased level of low physical activity was not associated with screen time.

Table 2 (continues)

Study	Location	Subjects	Findings
Saleem et al. (2018)	Penang, Malaysia.	480 students	<ul style="list-style-type: none"> - 184 (38.3%) of the students accepted that, because of their busy days at work, they cannot include physical exercise in their daily schedule. - 199 (41.5%) of respondents reported exhaustion and fatigue as a major reason for physical inactivity. - Lack of motivation (n=259, 54.0%) as an obstacle to physical activity.
Jamani et al. (2019)	Kuantan, Malaysia.	Late adolescents aged 17 to 19 (230 male, 249 female)	<ul style="list-style-type: none"> - Males are 2.46 times active compared with females (aOR 2.46, 95% CI 1.55-3.92). - 37.6% of participants had high physical activity, while 29.0% had low physical activity. - No significant correlation was found between BMI participants with their physical activity level. - Smokers were 60% less involved than non-smokers in physical activity (aOR 0.39, 95% CI 0.19-0.78).
Shetty et al. (2019)	Terengganu, Malaysia	238 respondents	<ul style="list-style-type: none"> - 109 students (45.8%) did the vigorous activity. More than half of the students (59.2%) did the moderate activity and 97 students (40.8%) did not. - For walking at least 10 minutes per day, 224 walked and 14 did not. - No difference in time spent walking between genders. - Female students showed more physical activity than males.

Shetty et al. (2019) showed substantial differences in males' and females' physical activity in vigorous, mild, walking, and sitting. One hundred nine students (45.8%) exercised vigorously. About half of the students (59.2%) did a moderate activity, and 97 students (40.8%) did not. Meanwhile, 224 walked for at least 10 minutes a day, and 14 didn't. Women were more likely than men to report aerobic participation and moderate activities such as walking. When measured by days spent each week participating in aerobic exercise and strength training, male students were incredibly more physically active than their female counterparts. Male students also reported significantly higher full-screen and TV viewing. In contrast, female students reported significantly higher time spent on homework. According to Jamani et al. (2019), males have a higher degree of physical activity than females. Meanwhile, Abdullah

et al. (2019) reported gender does not affect student participation in physical activity effect. Overall, these findings highlight a significant disparity between physical activity and gender as men appear to be more active than women.

Research by Abdullah et al. (2018) explores intrinsic and extrinsic factors that affect students' participation in physical activity. The result showed a substantial difference in the inherent involvement of boys and girls in health and fitness. Female students are more motivated and influenced by health and fitness. They are more concerned with their physical appearance and well-being. Next, there were major variations in family influences between male and female students. Women students are more affected and inspired by physical exercise. The family influences them on the value of encouragement and early exposure to physical activity than males. According to Al-Asousi & El-Sabban (2016), non-exercising students cited lack of time (62%) and laziness (38%) as factors. Meanwhile, Saleem et al. (2018) claimed that 38% of students were physically inactive due to their busy university days, and 41.5% reported tiredness and fatigue as essential reasons for physical inactivity.

Based on Jamani et al. (2019), there's no substantial difference in race-related physical activity. Next, there is no substantial correlation between family socioeconomic status and physical activity level. Moreover, participants' BMI had no clear correlation with their degree of physical activity. Lastly, it says smokers were 60% less physically involved than non-smokers. Al-Asousi & El-Sabban (2016) clarified physical activity factors among University of Malaya, Malaysia medical students. The result showed 76 per cent of daily students and 63 per cent favoured group exercise. It shows no impact on student age or physical activity levels. No correlation existed between physical activity level and ethnic background. Approximately 90% of participants came from the peninsular Malaysia provinces. Those participants were the highest number in all physical activity level classes. The student's role in his/her family and the number of siblings had no impact on physical activity and no substantial effect of the parent's job status on physical activity. Students with at least one physically- active parent were greatly influenced by exercise.

Besides, dietary supplements showed no substantial difference between the levels of physical activity of participants. Having different BMI types showed no substantial difference in physical activity levels. However, much of this research revealed similar limitations: prejudices can arise using a self-reported questionnaire. Besides, much of the study was performed only in one location, covering only one university course. It did not represent all university students and was limited to one place only. The analysis should be extensive by conducting at other universities and other courses so that data can be used for further studies.

Depressive symptoms among university students

Table 3 summarizes the students’ depressive symptoms in the selected studies. Each article was classified into several categories, which are as follows: author (year), location, study subject, and findings. All studies included were conducted in Malaysia.

Table 3: Studies on Depressive Symptoms among University Students

Study	Location	Subjects	Findings
Gan & Hui (2019)	University Malaya, Kuala Lumpur	149 students	- Anxiety and depression prevalence rates were 33% and 11%. - 11% of the students had depression symptoms and only 3.4% had severe depressive symptoms.
Hamzah et al. (2019)	University of Malaya, Malaysia.	1602 students	- The prevalence of depression, is normal (64.3%), mild (14.4%), moderate (14.9%), severe (3.4%), and extremely severe (2.9%). - Students who stayed with non-family members were more likely than those living with family members to experience depression (OR: 1.846, CI: 1.266- 2.693), anxiety (OR: 1.529, 95% CI: 1.024-2.284), and stress (OR: 1.655, 95% CI: 1.110-2.468).
Nahas et al. (2019)	International Islamic University Malaysia (IIUM), Selangor.	425 students	The participants reported mostly severe depression (38.6%), followed by moderate depression (26.0%).
Perveen et al. (2019)	Sultan Idris Education University, Perak, Malaysia.	240 students	26.3% of students reported normal scores, 15.4% borderline depression and 58.3% severe depression or depressive symptoms.

Perveen et al. (2019) found that university students have a high prevalence of self-prescribed medicine, which may be attributed to undiagnosed depressive symptoms. Besides, females reported greater self-medication prevalence than males. This study also mentions that unhealthy diet patterns among students may increase depression levels. A significant cause of depression among university students has been smartphone use, shopping behaviour and financial stress.

Students living with non-family members were more likely to experience depression, anxiety, and stress; Hamzah et al. (2019) points out. Interestingly, less likely to experience depression were students from the Southern region and Sabah and

Sarawak. Other than that, Gan and Hui (2019) stated that anxiety and depression prevalence rates were 33% and 11% and 11% of the students had depression symptoms. Only 3.4% had severe depressive symptoms while Nahas et al. (2019) point out students mostly have severe depression (38.6%), followed by moderate depression (26.0%). Overall, all of these studies indicate that university students have depressive symptoms during their university life.

The prevalence of depression among university students in Malaysia has shown a dynamic trend over the years, as observed in various studies (see Figure 1). The study by Latiff et al. (2014) highlighted a prevalence of 27.3%, indicating that slightly over a quarter of the sampled university students were grappling with depression. This figure, even by itself, was already a cause for concern, emphasizing the need for mental health support in tertiary educational institutions. A notable rise was observed by Manap et al. in 2016, with the prevalence almost doubling to 54.9%. This sharp increase could potentially be attributed to a myriad of factors, including academic pressures, changing socio-economic conditions, or even evolving methods of data collection and criteria for a depression diagnosis. The upward trajectory continued with Suleiman et al. (2017) reporting a prevalence of 58.9%. The consistent rise over these years paints a grim picture of the mental well-being of students. Surprisingly, Islam et al. (2018) recorded a decline of 29.4%. While this might appear as a positive reprieve, the drastic dip, compared to the previous years, warrants scrutiny. It could be beneficial to investigate the methodologies employed or the specific cohorts surveyed to understand this anomaly. Minhat et al. (2019) observation of 31.1% aligns more closely with the 2018 figure, suggesting a period of relative stability or a plateau in depression rates. Alarmingly, Ishak et al. (2020) documented a staggering 72.6% prevalence. This rate suggests that nearly three-quarters of the surveyed students were experiencing depressive symptoms. Such a sudden and significant jump necessitates urgent attention and in-depth examination. The most recent data from Fauzi et al. (2021), indicating a rate of 51.4%, is still distressingly high, reinforcing the urgency of this issue. In light of these figures, it's evident that the mental health scenario among university students in Malaysia is volatile. The fluctuations in prevalence might be reflective of the changing landscapes of academic pressures, socio-economic challenges, or even shifts in societal awareness and recognition of mental health issues. However, the consistently high rates, especially in the latter half of the period surveyed, undeniably emphasize a pressing need for targeted interventions, robust support systems, and a comprehensive approach to mental health in educational institutions.

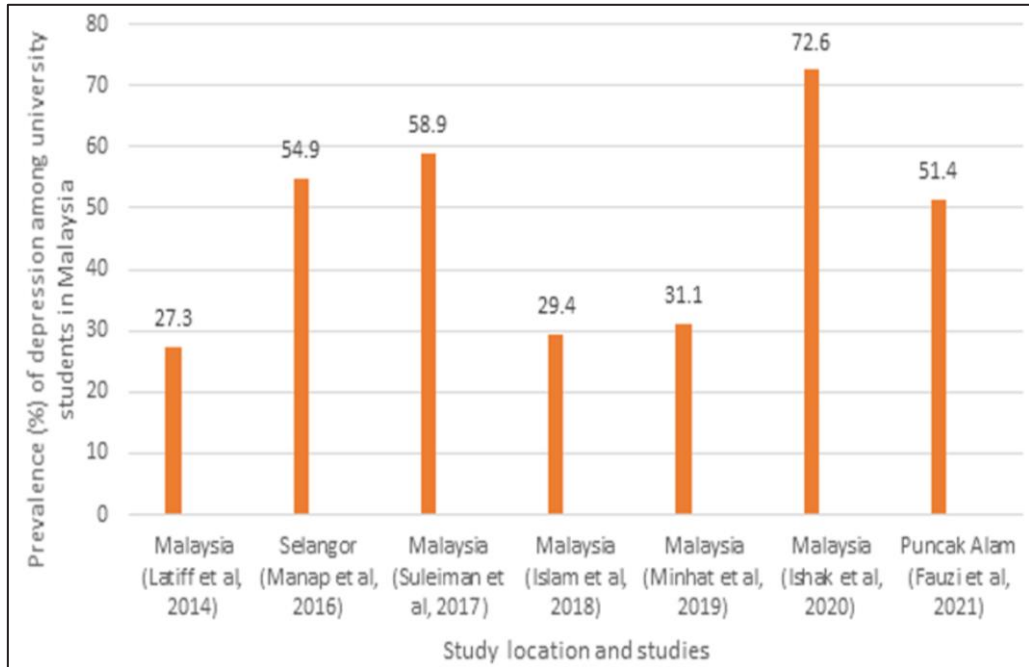


Figure 1: Prevalence (%) of depression among university students in Malaysia

Association between diet quality, physical activity and depressive symptoms among university students.

Table 4 summarizes the association between diet quality, physical activity and depressive symptoms among university students of the selected studies. Each article was classified into several categories, which are as follows: author (year), location, study subject, and findings.

Table 4: Studies on the Association Between Diet Quality, Physical Activity, and Depressive Symptoms among University Students

Study	Location	Subjects	Findings
Xu et al. (2016)	Guangzhou, China.	907 Southern Chinese college students	The higher CES-D depression score was significantly correlated with less physical and outdoor activities and eating breakfast less often.
Dalton (2017)	University of California, Los Angeles	127 students	A higher amount of disordered health behaviour involvement is predicted by higher levels of depressive symptoms.

Table 4 (continues)

Study	Location	Subjects	Findings
Ngin et al.(2018)	Cambodia	1359 students	<ul style="list-style-type: none"> - Depressed students were more likely to have poor physical activity. - Students with depressive symptoms, tended to report poor academic performance and higher consumption of unhealthy food.
Nurul Najwa & Appukutty, (2018)	Shah Alam, Malaysia	165 female students	The intake of breakfast was not substantially correlated with a low, moderate or intense physical activity level.
Perveen et al. (2018)	Perak, Malaysia	350 students	<ul style="list-style-type: none"> - There is an association between skipping breakfast, physical activity and depression among students. - Results indicate that skipping breakfast and lack of physical activity can predict depression.
Paans et al. (2019)	Netherlands	1442 participants	The severity of depression and the current diagnosis of depression are associated with unhealthy food intake and poor food quality, higher intake of sweets and snacks/snacks and lower Mediterranean diet score (MDS).
Perveen et al. (2019)	Perak, Malaysia	240 students	<ul style="list-style-type: none"> - Unhealthy diet patterns can increase the level of depression among students. - Physical exercise can reduce depression among university students. - Students actively who exercise show lower levels of depressive symptoms. - Consumption of healthy foods, such as vegetables, fruits, fresh juices and timely meals can improve the quality of life and positive emotions.

Perveen et al. (2019), based on Table 4, show that unhealthy diet habits among students can increase the degree of depression. Depression among university students can be minimized by improved sleep quality, study habits, physical activity, and social support. Students who were regularly interested in exercise reported lower levels of signs of depression. The quality of life and optimistic feelings can be improved by balanced dietary consumption, such as vegetables, fruits, fresh juices and timely meals. Perveen et al. (2018) endorsed this assertion that students who frequently do physical activity and exercise are more likely to have low levels of depression. Those who rarely or often ate breakfast were more likely than those who

always had breakfast to have depressive symptoms. Nurul Najwa and Appukutty (2019) point out that breakfast consumption was not significantly associated with a mild, moderate or extreme level of physical activity. The drawback of all this research was only performed at one institution, so the study's findings cannot be generalized. This study also required limited knowledge among students on the correlation between lifestyle behaviours and mental health problems.

Besides, Ngin et al. (2018) stated that depressed students were more likely to have insufficient physical activity in terms of the relationship between depressive symptoms, quality of diet and physical activity. Students with depressive symptoms have tended to show low academic performance and increased unhealthy food consumption. Overall, these findings demonstrate that diet and physical activity consistency among university students are likely to affect depressive symptoms. In this analysis, some drawbacks were first explored by students at only two public universities. Therefore, at the national level, its results cannot be generalized.

Secondly, the cross-sectional design did not make it possible to establish the causal linkages between depressive symptoms and associated causes. Third, this research used self-reported results, which may have been subject to over-reporting and under-reporting triggered by depression-related negative cognitive biases as well as potential memory bias. Future research should aim to use more objective evidence to improve the information's validity. Finally, other studies have changed the key outcome measure and have not validated it in the Cambodian climate. The analysis of the findings must, therefore, be carried out with caution.

Xu et al. (2016) found that the higher CES-D depression score among Chinese college students was significantly correlated with less physical activities and outdoor activities and consuming breakfast less often. Paans et al. (2019) also conclude that the severity of depression and the current diagnosis of depression correlate with unhealthy dietary consumption including inadequate dietary consistency, higher sweet food intake and fast-food/savoury snacks, respectively lower Mediterranean diet score (MDS). Paans's study, however, was not directly regarding university students. Finally, Dalton (2017) recorded that a greater degree of maladaptive health behaviour involvement predicts higher depressive symptoms. Overall, there seems to be some evidence to suggest that the quality of diet, physical activity and depressive symptoms among university students are positively correlated.

Conclusion and Future Direction

This review documents university students have poorer diet quality. Female students tend to have a better diet quality than male students. Most of the students are likely to skip their breakfast, consuming snacks and fast food. In terms of physical activity, male students tend to be more active in physical activity than female students. Next,

students are more likely to have depressive symptoms during university life. In terms of the interrelationship between diet quality, physical activity, and depressive symptoms among university students, there was a negative correlation between physical activity and depression. Active students are more likely to have a low level of depression. Diet quality also shows a negative correlation with depressive symptoms. Students who are in better diet quality tend to have low depressive symptoms. The improvement of diet quality can lead to the advancement of mental health improvement.

This review holds paramount significance for several sectors. The health industry can gain insights into the mental health challenges faced by university students, enabling them to design targeted intervention programs. For the government, understanding the magnitude and specifics of this issue can inform policy-making, particularly in the education and health sectors. Business operators, especially those in the tertiary education and mental health domains, can tailor their services to better cater to this demographic. Lastly, the general community, including families of students, can be more informed and equipped to offer support. The findings of this review are particularly impactful for policymakers in the education sector, mental health professionals, and university administrations. Understanding the intricate relationship between diet, physical activity, and depression can lead to better support systems for students, ultimately aiming for a healthier, happier student community.

In the future, it is recommended to do research that examines the interrelationship between diet quality, physical activity, and depressive symptoms among university students in Malaysia and other countries. Because they're still a lack of studies that analyse the association between these three to help alleviate university students' depression, the study must also include the causes of their diet quality, physical activity, and depressive symptoms. It requires therapy intervention programs so that society, parents, and lecturers can alert them and not underestimate these symptoms and try to help and deal with this problem, such as getting help from experts for a better lifestyle.

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