ASSOCIATION BETWEEN WEEKEND WARRIOR PHYSICAL ACTIVITY PATTERN AND BMI WITH MENTAL HEALTH STATUS AMONG UTAR KAMPAR UNIVERSITY STUDENTS

By

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ABSTRACT

ASSOCIATION BETWEEN WEEKEND WARRIOR PHYSICAL ACTIVITY PATTERN AND BMI WITH MENTAL HEALTH STATUS AMONG UTAR KAMPAR UNIVERSITY STUDENTS

CHEAH XING LING

Nowadays, people including university students are busy with daily workloads or academic tasks and tend to engage in physical activity only during their leisure time. Thus, the term "weekend warrior" was best described as those who participate in physical activity for two sessions in a week and meet the requirements of $\geq$ 150 minutes of moderate-intensity or $\geq$ 75 minutes of vigorous-intensity activities. Additionally, mental health status also become one of the most concerning issues among university students. Several factors, particularly physical activity and body mass index (BMI) play a vital role in shaping individuals' mental well-being as they potentially exert significant influences on their overall emotional and psychological health. Therefore, this study aimed to investigate the association between weekend warriors and BMI with mental health status at Universiti Tunku Abdul Rahman (UTAR). A cross-sectional study was conducted with around 163 respondents recruited through the convenience sampling method. The physical activity patterns and mental health status of the respondents were accessed using the validated International

Physical Activity Questionnaire – Short Form (IPAQ-SF) and General Health Questionnaire (GHQ-12). The chi-square test was used to determine the association between variables whereas the Mann-Whitney test was used to examine the comparison. This study revealed that the prevalence of weekend warriors among UTAR students was low (7.4%) when compared to other physical activity patterns. There is no significant association between mental health status with physical activity patterns ($p=0.942$) and BMI ($p=0.333$), respectively. Lastly, there were also no significant differences in mental health status between weekend warriors and physically inactive groups ($p=0.96$). To conclude, weekend warriors among UTAR students were considered low. Insignificant findings could be due to confounding factors that weren't taken into consideration in this study, which might affect the accuracy of the relationship between the variables.

ACKNOWLEDGEMENTS

DECLARATION

I hereby declare that this final year project report is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

CHEAH XING LING

APPROVAL SHEET

This final year project report entitled "**ASSOCIATION BETWEEN WEEKEND WARRIOR PHYSICAL ACTIVITY PATTERN AND BMI WITH MENTAL HEALTH STATUS AMONG UTAR KAMPAR UNIVERSITY STUDENTS**" was prepared by CHEAH XING LING and submitted as partial fulfilment of the requirements for the degree of Bachelor of Science (Hons) Dietetics at Universiti Tunku Abdul Rahman.

Approved by:

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PERMISSION SHEET

It is hereby certified that <u>**CHEAH XING LING**</u> (ID No: <u>**19ADB03668**</u>) has completed this final year project report / dissertation / thesis* entitled "**ASSOCIATION BETWEEN WEEKEND WARRIOR PHYSICAL ACTIVITY PATTERN AND BMI WITH MENTAL HEALTH STATUS AMONG UTAR KAMPAR UNIVERSITY STUDENTS**" under the supervision of ENCIK MUHAMMAD ZULHUSNI BIN SUHAIMI from the Department of Allied Heath Sciences, Faculty of Science.

I hereby give permission to the University to upload the softcopy of my final year project report in pdf format into the UTAR Institutional Repository, which may be made accessible to the UTAR community and public.

Yours truly,

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(CHEAH XING LING)

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LIST OF ABBREVIATIONS

BMI   Body Mass Index

UTAR   Universiti Tunku Abdul Rahman

IPAQ-SF   International Physical Activity Questionnaire – Short Form

GHQ-12   General Health Questionnaire - 12

WHO   World Health Organization

NCDs   Non-Communicable Diseases

CDC   Centers for Disease Control

NHMS   National Health and Morbidity Survey

MCO   Movement Control Order

MVPA   Moderate-to-Vigorous Physical Activity

CVD   Cardiovascular Disease

HCWs   Frontline Healthcare Workers

SPSS   Statistical Package for the Social Sciences

ASEAN   Association of Southeast Asian Nations

NHANES   National Health and Nutrition Examination Survey

CHAPTER 1

INTRODUCTION

1.1   Research background

Physical inactivity is a major contributor to mortality and various non-communicable diseases (NCDs). In 2016, the global prevalence of physical inactivity among adults was 27.5%, a figure that has been steady since 2001 with women and older adults holding for higher percentages based on the survey done by The Lancet Global Health (Katzmarzyk, 2022). The Centers for Disease Control (CDC) also reported the prevalence of physical inactivity among US adults was 25.3%, which indicated there is a quarter of them are physically inactive (Ali, 2022). On the other hand, more than one-third of the adults are inadequately physically active in several Asia-Pacific countries (Annear, 2022). Also, 25.1% of Malaysians were found to be physically inactive according to the National Health and Morbidity Survey (NHMS) conducted in 2019 (Viven, Bin Kamaruddean, and Ahmed Kabbashi, 2022). Despite this evidence showing the prevalence of physical inactivity is quite high, most people are preoccupied with their jobs, and they spend less time doing physical activities in their spare time nowadays. As a result, the phrase "weekend warrior" is more appropriate to represent the degree of physical activity for the majority of individuals in the current scenario. "Weekend warrior" is not as what its name implies but any of the individuals who are involved in aerobic physical activity within one to two sessions per week (O'Donovan, Sarmiento, and Hamer, 2018). Some studies revealed that engaging in physical activity as a weekend warrior has benefits

such as a lower mortality rate when compared to sedentary or inactive individuals (O'Donovan et al., 2017; Shiroma et al., 2018; Santos et al., 2022). Furthermore, being involved in physical activity has also been proven to improve psychological disorders, which are also known as mental disorders such as depression and anxiety (Maugeri et al., 2020). However, the case of physical inactivity and poorer mental health status was getting worse to a greater extent after the COVID-19 pandemic.

In recent years, the whole world has suffered from the tragedy of COVID-19, starting in late 2019, and a series of measures have been implemented to control the outbreak. At the same time, the global media also disseminates extensively the therapeutic effects of physical activities and how they can enhance our body's immune system against the infection of COVID-19 (Ai et al., 2021). Nevertheless, a nationwide movement control order (MCO) was enforced by the Malaysian government as a strategy to restrain the spread of COVID-19. During this time, Malaysians were forced to comply with the policy by not leaving the house without performing any necessary activities, such as grocery shopping or seeking medical attention. Malaysians were only permitted to stay at home work and study from there. In this case, the measures of lockdown and quarantine further reduced the intensity of physical activity among the Malaysian population. As a result, this issue has increased the prevalence of negative emotions such as anxiety and fear among the population, as well as the prevalence of mental health problems or even disorders such as sleep disruption or depression (Yew et al., 2022). Some evidence is also available showing that the mental health status of an individual has a directly proportional relationship

with the intensity and frequency of physical activity levels (Ai et al., 2021). The psychological effects of COVID-19 at the time unexpectedly increased Malaysian interest in dealing with it. Although the current situation can be considered an endemic one, this tragedy has led the entire world population to increase their concern for their body health, whether physically or mentally, especially among university students.

According to Mansor (2022), the establishment of MCO during the pandemic has posed difficulties for the mental health of university students. This phenomenon is due to inactivity, which is one of the causes of mental distress among university students during the MCO period (Coakley et al., 2021). Additionally, university students also tend to be physically inactive, even though there are a variety of sports or clubs for them to take part in. This is because students usually believe themselves to be challenged by tremendous time constraints and extremely difficult academic schedules, which discourage them from seeking out extra time-consuming physical activities that allow them to live a moderately to highly physically active lifestyle throughout a typical university day or week, regardless of the pandemic's effect. Moreover, there is also evidence showing that approximately over half of the students do not satisfy the World Health Organization's (WHO's) exercise recommendations, according to a global survey mentioned by Herbert et al. (2020).

On top of that, university students also have to adapt to the stress of rapid transformation from physical learning into remote learning as a result of

COVID-19-related constraints (Coakley et al., 2021). In that sense, it aggravates the mental health of university students who already report a high degree of perceived stress and cognitive exertion toward their academics. Some findings also revealed that there was an increasing number of university students seeking counseling because they could not cope with their mental health status independently, which indicated the severity of the incident (Herbert et al., 2020).

As mentioned above, mental health status is related to the physical activity levels of an individual. Based on moderate-to-vigorous physical activity (MVPA) guidelines, an individual was suggested to conduct either 150 min/week of moderate-intensity exercise or 75 min/week of vigorous-intensity exercise; or, an equivalent combination of both. Some studies showed that individuals who performed MVPA or did not satisfy the guidelines but were active had a 39% improvement in monthly days of poor mental health and a 25% improvement in days of poor mental health, respectively (Coakley et al., 2021). These data recommended university students who actively or regularly participate in physical activity would have less possibility of experiencing poor mental health status. However, university students are mostly busy with their academics, so they might not have any additional time to become physically active. They may only use their spare time to conduct physical activities during their university life. This condition will eventually lead the students to have an extreme BMI. BMI status is also one of the factors that influence mental health and some studies have shown that extreme BMI will increase the risk of developing mental disorders (Ilias, Mohamed Fuad and Muhamad Zamani, 2021; Mohamad et al., 2021). Therefore, a prevalence investigation of

"weekend warriors" among university students will be our main focus instead of being physically active. Hence, the relationship between physical activity patterns and BMI with mental health status among UTAR Kampar University students will be the aim of this study.

1.2   Problem statement

Based on the research articles published, there was a limited study on Weekend Warrior itself. Besides, fewer articles specifically investigated the relationship between weekend warriors and mental health status. Most of the articles only found out there was a negative association between physical activity and mental health according to several studies investigated previously, Otherwise, the majority of them only relate weekend warriors to the prevalence of CVD or mortality rate. None of them or little to no study relate weekend warriors to mental health status. Moreover, numerous studies also reported some factors including sociodemographic factors, psychological factors, environmental factors, and health conditions status that could act as mediators, which influence the relationship between physical activity patterns and BMI with mental health status, respectively. Nevertheless, there is a lack of evidence to show the association of the confounding factors, especially age, gender, and faculty of university students on physical activity and BMI with mental health. Also, there were many contradictory findings on the relationship between BMI and mental health. Furthermore, many of the previous studies targeted the population from a young age (<21 years) to older adults (> 60 years). As a result, little or no research was conducted to determine the relationship between weekend

warriors and mental health, particularly among university students. Hence, this study aimed to determine the relationship between weekend warriors and BMI with mental health status among UTAR students.

1.3   Significance of study

This research can provide insight into the prevalence of weekend warriors among university students. Besides, most of the previous studies showed that physical activity had advantages over mental health, but the level of physical activity rarely included weekend warriors. In addition, many different findings were observed regarding the relationship between BMI and mental health. Therefore, it can address a literature gap on whether weekend warriors can exert a protective effect and whether extreme BMI will affect mental health by identifying the relationship between physical activity patterns and BMI and mental health status. It can even aid in the implementation of guidelines or intervention programs based on physical activity and BMI for enhancing the mental health status of Malaysian university students.

1.4   Study Objective

1.4.1   General objective

To determine the relationship between weekend warrior physical activity and BMI with mental health status among UTAR Kampar university students.

1.4.2   Specific objectives

i.   To determine the prevalence of weekend warrior, BMI and mental health status among UTAR university students.

ii. To determine the association between physical activity patterns and BMI with mental health status among UTAR university students.

iii. To compare the mental health status between weekend warrior and physically inactive group.

1.5   Research hypothesis

i.   The prevalence of weekend warrior is lower, BMI is normal and mental health status is poorer among UTAR Kampar university students.

ii. There is a significant association between physical activity patterns and BMI with mental health status among UTAR Kampar university students.

iii. There is a significant difference in mental health status between weekend warriors and physically inactive.

CHAPTER 2

LITERATURE REVIEW

2.1   Weekend warrior

In general, the level of physical activity can be classified as either vigorous, moderate, or inactive. Individuals aged 18 to 64 years old were recommended to engage in at least 150 minutes per week of moderate-intensity exercise and at least 75 minutes per week of vigorous-intensity activity, or comparable combinations, according to the WHO (O'Donovan et al., 2017). The level of physical activity is less frequently categorized as "weekend warrior." However, most of the population is busy with their workloads nowadays, and the time they spend on physical activity during their leisure time is less usual. Therefore, the term "weekend warrior" is more suitable to describe the level of physical activity for most people in the current situation. According to O'Donovan et al., (2017), "weekend warriors" are used to describe a person who participates in intense physical activity or exercises over the weekend in sports science (O'Donovan et al., 2017). Another definition most commonly used to refer to a "weekend warrior" is involving oneself in physical activities any two days per week and meeting the requirement of moderate- and vigorous-intensity as mentioned previously (Hamer, Biddle, and Stamatakis, 2017; O'Donovan et al., 2017; O'Donovan, Sarmiento, and Hamer, 2018).

Based on the previous studies, the prevalence of weekend warriors ranged from 1.91% to 11.2% in different countries. For instance, the prevalence of weekend

warriors among the British population was 11.2% (Hamer, Biddle, and Stamatakis, 2017). Then, two studies investigated US adults, and they showed different prevalences. In the research conducted by Chen et al. (2023), they found that there were 1.91% of weekend warriors among 21,125 US adults, whereas Liang et al. (2023) explored that there were 4.5% of weekend warriors among 23,258 US adults. Another study done in China showed approximately 7.6% of weekend warriors among Chinese rural adults (Xiao et al., 2018).

Although the term "weekend warrior" is rarely mentioned in most physical activity research, some studies specifically conducted research on it among various age groups of the population. These studies stated that weekend warriors who performed 1 to 2 days of MVPA had a reduction in mortality rate compared to inactive or sedentary individuals although they do not meet exercise's recommendations. For instance, O'Donovan et al. (2017) determined that weekend warriors and other physical activity levels may be effective in lowering all-cause, cardiovascular disease (CVD), and cancer mortality risks despite compliance with current physical activity standards with years of follow-up among adults with a mean age of 58.6 ± 11.9 (SD) years. Besides that, Shiroma et al. (2018) also proposed a study that is especially about the association between the physical activity patterns of a weekend warrior and the mortality rate among adults aged 40 years and above. This research concluded that physical activity is linked to a lower mortality rate, including for weekend warriors (Shiroma et al., 2018). Similarly, a recent study of participants with a mean age of 41.4 ± 15.2 years revealed that individuals who engage in the recommended amounts of physical activity throughout the week may benefit

equally, whether they are weekend warriors or regularly active. These data manifest that those who have a lower frequency of physical activity can obtain health benefits once there is sufficient energy expended (Santos et al., 2022).

In contrast, there are still some studies that included young adults as participants, although most of the articles that were stated previously only determined the prevalence of or the association of weekend warriors with other variables among older adults. For example, several studies investigated the topic of weekend warriors among participants aged 18-74 and discovered that engaging in physical activity regardless of intensity may help 'weekend warriors' control metabolic syndrome. Even though these studies included young adults as participants, there is little to no research focusing specifically on university students. Hence, this limitation could be one of the main focuses of this research study (Xiao et al., 2018; Jang et al., 2022).

2.2   Weekend warrior among university students

In the midst of abundant research studies, there is a limited study exploring weekend warriors among university students, most of the research articles investigated the physical activity levels. In university students, physical inactivity and sedentary behavior are two of the leading risk factors for an unhealthy lifestyle, especially since physical inactivity has been proven to be associated with an increased risk of mortality. Nevertheless, the majority of university students are more willing to spend their time on their academics instead of engaging in physical activity. It is also possible due to factors such as a lack of self-discipline and a lack of sports facilities for them. Even though they

engage in physical activity, they are most likely referred to as "weekend warriors," as they engage in physical activity on any two days per week. Based on the result shown by Chaabna et al. (2022), they found that the proportion of physically active students was 64.9% among the 370 students in their sample size by referring to the WHO's recommendation for physical activity of 150–300 minutes per week. Males and younger students were also shown to have a higher likelihood of being physically active than females and students over the age of 20. Among all the factors included in the study, including sociodemographics, lifestyle, obstacles, and facilitators, only age and gender were reported as having significant associations with physical activity in university students. This result is in line with the studies done by Stephen et al. (2021) and Anuar et al. (2021) which determined that male students engage in physical activity more compared to female students. Another study also found that 66.6% (n = 95) of undergraduate students had sedentary lifestyles based on pedometer measurements. This result was also alongside male students who took substantially more steps than female students and students aged between 18-20 years old had a higher mean average step count per day than those aged above 21 years old (Yusoff et al., 2018).

2.3   Factors that influence weekend warrior

In light of the fact that a "weekend warrior" can be defined as someone who engages in physical activity once or twice per week, there are some factors that could influence the level of physical activity. For instance, sociodemographic factors such as age, gender, marital status, occupation, and education level; psychosocial factors including the presence of anxiety, depression, or stress; and

others such as body health status. Most of the findings stated that older individuals tend to be less physically active than younger individuals. This may be due to the biological process of aging, which makes older individuals more likely to suffer from severe health issues that discourage them from participating in physical activity. In addition, women were also found to be more physically inactive than men. Generally, women devote more time to house chores than to physical activity during their leisure time, thus, this could be the reason for this outcome. Moreover, single individuals are more likely to embrace a physically active lifestyle than non-single individuals, as they do not have the obligations of caring for family members, hence, they possess more leisure time for physical activity. Besides that, occupations that earned a higher income were more likely to substitute working for leisure-time physical activities, resulting in a more sedentary lifestyle. However, those unemployed individuals were shown to be less physically active than employed individuals since they had fewer work commitments. Additionally, less-educated individuals tend to be more physically active than well-educated individuals, as well-educated individuals generally work in white-collar positions that require less physical exertion (Cheah, and Poh, 2014; Cai Lian et al., 2016; Tan, 2019).

Individuals with fewer mental health issues have demonstrated high levels of physical activity in terms of psychological factors. Exercise has been shown to reduce anxiety, stress, and depression symptoms. Last but not least, the status of the body's health can also influence the intensity of physical activity. For instance, obesity, hypertension, and smoking are the risk factors for physical inactivity according to the WHO (Kljajević et al., 2021). Some studies showed

people with hypercholesterolemia engage in more physical activity than those who do not. This is because individuals with diseases are more concerned about their health and hence more likely to engage in healthful physical activities. Nevertheless, the factor of health condition is indefinite, as patients with severe disease do not have sufficient energy to be physically active (Cheah, and Poh, 2014).

2.4 Body mass index (BMI)

Body mass index (BMI) is one of the tools that can be used to assess a person's nutritional status and health risk. It is defined as body weight in kg divided by height in m^2.

$$\text{BMI} = \frac{\text{Weight (kg)}}{Height\ (m^2)}$$

As shown in **Table 2.4**, the classification of BMI including underweight, normal, overweight, and several classes of obese was based on the guidelines by WHO (2010). According to WHO (2021), around 39% and 13% of the world's population adults are overweight and obese, respectively. In Malaysia, the statistics for overweight and obese are similar to the global, where it was observed to have 30.4% and 19.7%, respectively (World Obesity Federation Global Obesity Observatory, 2023). This result indicated there was a high prevalence of overweight among Malaysian adults.

For the indication of BMI, the risk of developing certain diseases or any health risk will increase when BMI increases. Most of the diseases were associated

with overweight and obesity. For example, individuals who are found to be categorized as either overweight or obese will have a greater risk of premature death, cardiovascular disease, hypertension or high blood pressure, osteoarthritis, certain cancers, and diabetes (WHO, 2021). Thus, it is recommended to lose weight approximately 5-10% of the current weight to reduce the risk of certain diseases related to obesity (National Heart, Lung, and Blood Institute, 2019).

Table 2.4: Categorization of BMI

Weight Status	BMI (kg/m^2)
Underweight	<18.5
Normal range	18.5 – 24.9
Overweight	25.0 – 29.9
Obese Class I	≥ 30
Obese Class II	35.0 – 34.9
Obese Class III	≥ 40

Source: WHO (2010)

2.5 BMI among university students

According to previous studies among Malaysian universities studies, most of the results found that university students had normal BMI. For instance, Abu Bakar et al. (2020) conducted a cross-sectional study in UMT and UniSA. The highest percentage of BMI was normal with 56.6%. This study is in line with the study done by You, Tan, and Mat Ludin (2020) in one of the public universities in Selangor, which investigated there was 52.9% of university students fall under normal BMI. Both of these findings even claimed that the percentage of normal BMI in female and male students was equally high when compared to other categories of BMI. Additionally, another cross-sectional

study at a private university in Malaysia observed that there was around 54.2% of the students had normal BMI (Kwan, Lee, and Cheng, 2021). When comparing across the educational level, the majority of the students also grouped into normal BMI for each bachelor, master, and Ph.D. student from UM, UPM, USM, UKM, and UTM (Wan Mohamed Radzi et al., 2019).

Based on the findings mentioned above, most of the results noticed there was a similar prevalence between overweight and underweight, and the lowest prevalence was among obese students (Abu Bakar et al., 2020; You, Tan, and Mat Ludin 2020; Kwan, Lee and Cheng, 2021). However, there is an exception case from Wan Mohamed Radzi et al. (2019), who investigated that students who were classified into the underweight category had the lowest percentage while overweight and obese had a similar percentage with each other.

2.6 Factors that influence BMI

Basically, the status of BMI can be affected by several factors including sociodemographic, environmental, and psychological. In terms of sociodemographics, ethnicity was one of the factors that can influence the BMI status such that Chinese had having lower risk of being overweight compared to Malay, Indian, and other Bumiputeras (Peltzer et al., 2014). For environmental, dietary habits, and physical activity patterns may affect the BMI status. Consumption of high-fat foods or calorie-dense foods increases the risk of overweight and obesity (Gerald and David, 2022). Besides, those who engage in vigorous-intensity physical activity levels, especially during muscle building

will have higher BMI due to the greater muscle mass instead of body fat (Valenzuela et al., 2020). Apart from that, Saleem and Shahzad (2019) mentioned that university students from lower socioeconomic status were found to have lower BMI. Last but not least, psychological issues like stress, depression, and anxiety also showed significant association with BMI (Sarwer and Polonsky, 2018). For instance, individuals who suffer from mental issues tend to alter their eating behaviors like under- or over-eating, which in turn will increase or decrease their BMI (Romero, 2022). Eating behaviours can also alter the mood because to gut is responsible for producing certain "happy" hormones that will boost the mood. For example, approximately 95% of total serotonin in the body was observed to be released by the gut, and foods high in tryptophan will induce the production (Appleton, 2018). In that sense, individuals are more likely to increase food intake to enhance their mood.

2.7   Mental health status

According to the Malaysian Ministry of Health's most recent epidemiological statistics conducted in 2017, the prevalence of mental illnesses among Malaysian adults was 29%, a threefold rise over the 10% prevalence rate discovered in 1996. This dramatic increase is indicative of low awareness of mental health among Malaysians and inconsistent with the rapid transitioning of Malaysia from a middle-income country into a high-income country, as well as changes in culture and lifestyle. In turn, these aspects gradually raised perceived stress levels among Malaysians. Based on the research findings by the NHMS of 2017, it has been observed that the prevalence of suicidal thoughts among youths has increased fivefold (6.9%), while only 1.7% reported suicidal

ideation in 2011. These findings even revealed that adolescents aged 13 years old have the most suicidal behavior. In addition, the incidence of mental health disorders among those aged 16 and above was 29.2%, with nearly 4.2 million people affected (Raaj et al., 2021). Nevertheless, this phenomenon is not considered the worst because the mental health status of Malaysians was predicted to exacerbate after the implementation of the lockdown during the COVID-19 pandemic. Malaysian lockdowns have contributed to a "two-fold rise" in mental health concerns and even became the second-most severe health issue impacting Malaysians behind heart disease by 2020 (Koh, 2022). In that sense, Malaysians should be aware of mental health conditions and seek help from a professional psychologist or psychiatrist if in doubt. Unfortunately, most of Malaysians do not have the consciousness and neglect that mental health disorders can be a severe disease, particularly in terms of common mental disorders, causes, and potential effects, and diagnosing early indicators of significant mental difficulties among Malaysians (School of Graduates Studies, 2022).

In reality, mental illness is a medical problem and a prevalent disease that has an impact on one's thinking, emotions, and behavior (School of Graduates Studies, 2022). The WHO defines mental health as "a condition of well-being in which every individual fulfills his/her potential, can cope with the usual demands of life, can work successfully and fruitfully, and can contribute to his/her community." Besides that, the WHO also defines health as "a condition of complete physical, mental, and social well-being, not only the absence of sickness or infirmity" (Behera, Paluri, and Mishra, 2021).

Mental health disorders can manifest in a variety of ways, with the most chronic and prominent being schizophrenia, major depressive disorder, and bipolar disorder. For further understanding, schizophrenia is a psychological disorder that causes hallucinations and delusions, where hallucinations occur in the absence of stimuli, and delusions are mistaken and persistent beliefs. Major depressive disorder, which is widely known as depression, is directly tied to feelings of melancholy, worthlessness, or guilt, which can cause someone to lose interest in their usual tasks. Depression can also cause changes in appetite and sleeping patterns, as well as feeling lethargic, sluggish in thought or movement, and losing concentration. In this case, failing to manage the sickness may lead to thoughts of suicide attempts. Moreover, bipolar disorder refers to someone suffering from high emotional states, resulting in extraordinary variations in mood, energy, activity levels, and capacity to carry out daily chores (School of Graduates Studies, 2022).

2.8   Mental health status among university students

Based on the prevalence of mental health disorders among various groups of the population, university students may be one of the groups with a high prevalence of mental health disorders. Behera, Paluri, and Mishra (2021) stated that 34.7% (n=502) of professional college students were determined to have normal mental health; 135 were found to have mild mental issues, whereas 116 and 77 were found to have moderate and severe mental disease, respectively. The findings also revealed that nursing students had a considerably greater rate of depression and non-psychotic mental disorders than dentistry, engineering, and medical students. Surprisingly, medical students, who were expected to have

the highest degree of stress in their academic performance, were found to have the lowest prevalence of depression among non-medical professional students. However, this result was contradictory to the findings done by Chang et al. (2021), which stated that 31.9%, 32.9%, and 14.6% of China's medical students (n=4115) were significantly suffering from depression, anxiety, and stress, respectively. Similarly, another study also discovered that 28.5% (n=163) of Japan's medical students completed the Kessler Psychological Discomfort Scale (K-6), suggesting a considerable level of psychological distress (Arima et al., 2020). Other than that, the research proposed by Chen and Lucock (2022) observed more than 50% (n = 1173 university students) reporting significant levels of anxiety and depression that exceeded clinical cut-offs. Females even have a higher rating than males, and this outcome was opposed to the result showed by Behera, Paluri, and Mishra (2021), where the male students were discovered to have a greater frequency of mental disorders (Behera, Paluri, and Mishra, 2021; Chen and Lucock, 2022).

Furthermore, Kotera, Ting, and Neary (2020) found that Malaysian students scored higher than UK students on mental health difficulties and negative mental health attitudes, but lower on self-compassion and resilience. They also mentioned that the rate of Malaysian students with mental health difficulties has increased in less than a decade, from 10% in 2011 to 20% in 2016 (Kotera, Ting, and Neary, 2020). Although Malaysian university students have higher rates of mental health problems compared to UK university students, other studies have discovered that university students exhibited higher levels of depression literacy

as well as lower levels of self-stigma and negative perceptions about mental illness when compared to secondary students (Ibrahim et al., 2019).

2.9   Factors that influence mental health status

Prevention is always preferable to cure. The medication does not outright treat mental disorders, but it does have effective treatments that can improve or manage the symptoms. Therefore, it is essential to be aware of the factors that can influence the mental health status of someone, especially after the outbreak of COVID-19. In the present COVID-19 epidemic, frontline healthcare workers (HCWs) can be considered one of the populations suffering from the most mental health issues. According to Alshekaili et al. (2020), a total of 32.3%, 34.1%, 23.8%, and 18.5% among 1139 HCWs reported experiencing depression, anxiety, stress, or insomnia while working throughout the pandemic period, respectively. Compared to those in the non-frontline group, HCWs in the frontline group had 1.5 times the likelihood of reporting anxiety, stress, and insomnia. Some of the concerns affecting HCWs include the fear of contracting a deadly virus and passing it on to the rest of their social network, a lack of evidence-based prevention and intervention, a lack of necessary protective equipment, and the need for extended shifts with a high volume of patients who have varying degrees of pathology and severity. This would imply that HCWs are now engaged in a particularly risky line of work and are consequently susceptible to stress and discomfort (Alshekaili et al., 2020). Other studies also determined that gender, grade, length of schooling, family environment, online learning environment, self-efficacy, and self-esteem were associated with depression, anxiety, and stress among medical students during the epidemic

period (Arima et al., 2020; Chang et al., 2021). Additionally, heavy coursework, economic pressures, and family troubles were among the major reasons for Malaysian students' mental health problems (Kotera, Ting, and Neary, 2020). Besides, there are also other factors influencing mental health status. From the study by Wu et al. (2020), 6.1% and 4.0% of parents (n=1840) had signs of depression or anxiety, respectively. According to the findings of the regression analysis, several factors had a significant impact on parents' anxiety and depression, including perceived stress, social support, marital satisfaction, family conflicts, the child's developmental stage, and parents' history of mental illness. A good marital relationship, social support, family harmony, and parents with no history of mental illness may be protective factors for parents' mental health. In contrast, perceived stress and a kid in middle or high school are risk factors for anxiety and depression among parents (Wu et al., 2020).

2.10 Relationship between physical activity patterns and mental health status

Globally, mental health issues have become one of the major community concerns, and statistics have shown that the prevalence of mental health disorders among Malaysians is growing from time to time. Thus, containment action should be taken to ensure the mental health of an individual. In essence, physical activity is one of the most effective precautionary measures for developing mental disorders. Physical activity may improve psychological health by increasing self-esteem and resistance to stress, as well as decreasing the chance of depression and anxiety (Maugeri et al., 2020). Additionally, exercise, which is a subcategory of physical activity, was shown to improve

mood and reduce anxiety shortly after exercise. For instance, the feelings of agitation, confusion, depression, and tension considerably decreased after exercising. Besides that, the productivity rate of a person doing any task can also be enhanced along with the sensation of improved energy through exercise (Cooper, 2020).

Several pieces of evidence also support the preventative or improving effect of physical activity on mental health. According to Hamer, Biddle, and Stamatakis (2017), weekend warriors who exercise one to two times a week have a 40% lower incidence of depression. Although there is little to no evidence related to weekend warriors and mental health status, abundant studies have investigated the relationship between physical activity and mental health. Based on the research studies conducted by Chen and Lucock (2022) and Dev et al., (2016), the association between physical activity and mental health is in line with research suggesting physical activity can boost mental health and prevent the development of depression. A higher degree of physical activity has been observed to reduce negative mental health symptoms such as somatic symptoms, anxiety or insomnia, social dysfunction, and severe depression (Chen and Lucock, 2022; Dev et al., 2016). Pieh, Budimir, and Probst (2020) further indicated that the greater the duration and intensity of physical activity, the lower the prevalence of depression. This finding was discovered in adults, children, and adolescents. Another study also revealed there is a negative impact on mental health status among all age categories due to the quarantine period during COVID-19, which eventually reduces the total weekly physical activity energy expenditure (Maugeri et al., 2020). This result was consistent with the

research done by Jacob et al. (2020), who stated there is a negative relationship between moderate-to-vigorous physical exercise in hours per day and poor mental health, and those who are physically active have improved overall mental health during social distancing owing to COVID-19.

2.11 Relationship between BMI and mental health status

As mentioned earlier, BMI somehow was significantly linked with mental health status, and several evidences were observed. Based on the study done by Mohamad et al. (2021), there was a positive correlation between BMI and mental health, particularly anxiety. They even stated that dietary intake was the primary factor that affected BMI, such that an increase in dietary intake will increase BMI as well. Meanwhile, some findings explored the relationship between emotional eating with anxiety or stress. The underlying mechanism could be due appetite was temporarily suppressed by stress and this will eventually reduce the dietary intake. Nevertheless, hunger will be induced once there is continuous perceived stress through the release of the cortisol hormone. In this case, the dietary intake will increase (Harvard Health Publishing, 2021). Another study conducted in UiTM Shah Alam among university students aged 20-25 years old also showed a weak positive correlation between BMI and mental health (Ilias, Mohamed Fuad, and Muhamad Zamani, 2021). This result was matched with research that proposed BMI was greatly influenced by mental health (Wan Mohamed Radzi et al., 2019).

In contrast, many researchers observed no significant relationship between BMI and mental health among Malaysian university students. According to Azhar et al. (2023), BMI does not have an association with mental health status. Similarly, another study that investigated the associated factors of mental issues like depression, anxiety, and stress observed there was no relationship between BMI and mental health (Hamzah et al., 2019). Furthermore, Tanius et al. (2022) also stated that mental health status was found no association with overweight and obesity among university students from different local and private universities.

CHAPTER 3

MATERIALS AND METHODS

3.1 Study design

In this study, a cross-sectional study using a questionnaire was conducted to investigate the relationship between weekend warrior physical activity patterns and BMI with mental health status. The questionnaire and the anthropometric measurements were done physically in the UTAR Kampar campus. A quantitative approach was used in this study as it could complete the data collection for a wider population within a shorter period of time due to limited time.

3.2 Study location

The study location was conducted physically at University Tunku Abdul Rahman (UTAR), Kampar branch and it started from 3rd March 2023 to 8th March 2023.

3.3 Study population

The target population for this study was specifically selected university students who study at UTAR Kampar, regardless of the faculty.

3.4   Sampling method

A convenience sampling design was used in this study to randomly collect the data whoever meet the inclusion criteria. This kind of sampling method was preferred for the study as it is straightforward and cost-effective, allowing for faster data collection from the eligible respondents.

3.5   Subject inclusion criteria

The respondents for this study were aged between 18 and 26 years old. The respondents were Malaysian university students who studied at Kampar UTAR either as the foundation, or undergraduate students.

3.6   Subject exclusion criteria

Individuals who are postgraduate student, pregnant women, physical disability, have severe psychological disorders, and have a medical history of chronic diseases such as cancer, heart disease, stroke, diabetes, and arthritis were excluded from this study, as these parameters would affect the reliability and validity of the outcome.

3.7   Sample size

According to Cochran (1963), the formula below is the sample size estimation of finite population.

$$n = \frac{\dfrac{z^2 \times p(1-p)}{e^2}}{1 + \left(\dfrac{z^2 \times p(1-p)}{e^2\,N}\right)}$$

z = z-score

N = Population size

e = margin of error

p = population proportion

The value of 0.076 was used for the expected population proportion (p) based on the previous study conducted by (Xiao, et al., 2018) stated that 7.6% of the participants were found to be weekend warrior. Besides that, other variables were set at z = 1.96 (5% type I error, p<0.05), N = 10000, and e = 0.05 (5% margin error).

$$n = \frac{\dfrac{1.96^2 \times 0.076(1-0.076)}{0.05^2}}{1 + \left(\dfrac{1.96^2 \times 0.076(1-0.076)}{0.05^2\,10000}\right)}$$

$= 106.60/1.01$

$= 106 + 10\%$ non-response rate

$= 116.6\ (\approx 117)$

Hence, the number of students required was at least 117 for the minimum sample size of 106. After the data collection, 163 respondents were recruited and 100% of them completed the questionnaires given to them correctly since the questionnaire was checked to ensure they answered in the right way before they left.

3.8   Data collection

A questionnaire form was distributed to respondents physically on the campus of the university. This questionnaire method was used due to its advantages of being cost-effective and convenient, which enables the data to be collected in a shorter period. The overall of the online questionnaire consists of 3 sections:

Section A: Sociodemographic information

Section B: International Physical Activity Questionnaire - Short Form (IPAQ - SF)

Section C: General Health Questionnaire (GHQ-12)

3.8.1   Sociodemographic information

The focuses of sociodemographic data including age, gender, weight, height and faculty and the data collected was self-administered. Weight and height were used to calculate BMI as mentioned previously.

3.8.2   International Physical Activity Questionnaire - Short Form (IPAQ-SF)

A short form of the IPAQ was used to determine the physical activity category of the respondents. IPAQ has been proven reliable and valid as an instrument to identify the intensity of the physical activity and sitting time that individuals perform in their everyday lives in order to determine the overall physical

activity in MET-min/week and sitting time. This brief IPAQ was self-administered and appropriate for adults aged 15 to 69 years (Youthrex, 2002). It consists 7 items of open-ended questions that required respondents to recall the frequency (days per week) and duration (time per day) of their last seven days of physical activity (IPAQ, 2004). Respondents were required to opt for the most relevant answer for each of the questions in the IPAQ, and the respondents were categorized into different categories, including physical active, weekend warrior, insufficient active, and physically inactive as shown in **Table 3.1**.

Table 3.1: Categories of physical activity.

Physical activity category	Requirements
Physical active	Sessions: ≥ 3 / week Intensity: Moderate physical activity Duration: ≥ 150 minutes/week Intensity: Vigorous physical activity Duration: ≥ 75 minutes/week
Weekend warrior	Sessions: 1-2 / week Intensity: Moderate physical activity Duration: ≥ 150 minutes/week Intensity: Vigorous physical activity Duration: ≥ 75 minutes/week
Insufficiently active	Intensity: Moderate physical activity Duration: ≤ 150 minutes/week Intensity: Vigorous physical activity Duration: ≤ 75 minutes/week
Physically inactive	Not reporting any moderate- or vigorous-intensity physical activities

Source: Hamer, Biddle, and Stamatakis (2017)

3.8.3   General Health Questionnaire (GHQ-12)

The General Health Questionnaire (GHQ-12) were self-administered; hence, it was employed in the research survey to determine the current mental health status of respondents. This GHQ-12 was validated and proved to be reliable (Yusoff et al., 2009). It can detect whether any of the respondents were experiencing or at risk of developing common, non-psychotic mental health issues such as depression, anxiety, somatic complaints, and social dysfunction. It encompasses multiple categories related to an individuals' psychological well-being, including six positive items and six negative items that require respondents to describe their past few weeks' lives (Nurse Key, 2017). For instance, "Been able to concentrate on what you are doing?" or "Lost much sleep over worry?" (Yusoff et al., 2009). Respondents are required to answer the positive items using a likert scale of "better than usual," "same as usual," "less than usual," and "much less than usual," whereas negative items will be answered using a likert scale of "not at all," "no more than usual," "rather more than usual," and "much more than usual." Scores were assigned on a 4-point ordinal scale (0–3), with higher scores indicating greater distress (Nurse Key, 2017). As shown in **Table 3.2**, a total score range of 0-36 will have different categories for each range boundary.

Table 3.2: Categories of mental health status.

Scores	Mental health Status
0-15	Normal
16-24	Mild distress
≥25	Severe distress

Source: (Obradovic et al., 2017)

3.9   Data entry and Statistical analysis

In this research study, the collected data was analyzed using the IBM Statistical Package for the Social Sciences (SPSS) Statistic Software Version 27. The data were displayed in the form of frequency, percentage, median, and interquartile range (IQR). A p-value less than 0.05 is considered statistically significant. Besides, the physical activity level and mental health status reflected by IPAQ score and GHQ-12 score, respectively, and BMI index values were presented by descriptive analysis that included frequency and percentage, which can be seen in the histogram.

3.9.1   Chi-square test

Chi-square test is a non-parametric test, which used to discover the association between two categorical data. All the variables should be either nominal or ordinal and should not be normally distributed after checking through normality test. Since the study fulfilled the criteria, this test was then used to determine the association between weekend warrior physical activity level and BMI with mental health status among UTAR university students.

3.9.2   Mann-whitney test

Mann-whitney test is a non-parametric test that used to determine the presence of significant difference between the median of two independent groups. This test will only be used when the continuous or ordinal dependent variables was not normally distibuted. In this study, the variables were not normally

distributed, thus, it was used to compare the median mental health status between weekend warriors and physically inactive groups.

3.10 Approval by Research and Ethic Committee

The ethical approval of this study had been approved by UTAR Scientific and Ethical Review Committee, in short, SERC in 2023.

4.1 Sociodemographic information

4.1.1 Age group

The age group of all the 163 respondents was displayed in **Table 4.1** and **Figure 4.1**. From **Table 4.1**, majority of the respondents were aged between 21-23 by occupying 61.3% (n=100) among all the respondents. Then, followed by respondents who aged 18-20 that hold for 36.8% (n=60) while the rest who aged 24-26 exhibit the lowest frequency at 1.8% (n=3).

Table 4.1: Frequency and percentage analysis for age group of respondents

Age group	Number of responses (n)	Percentage (%)
18-20	60	36.8
21-23	100	61.3
24-26	3	1.8
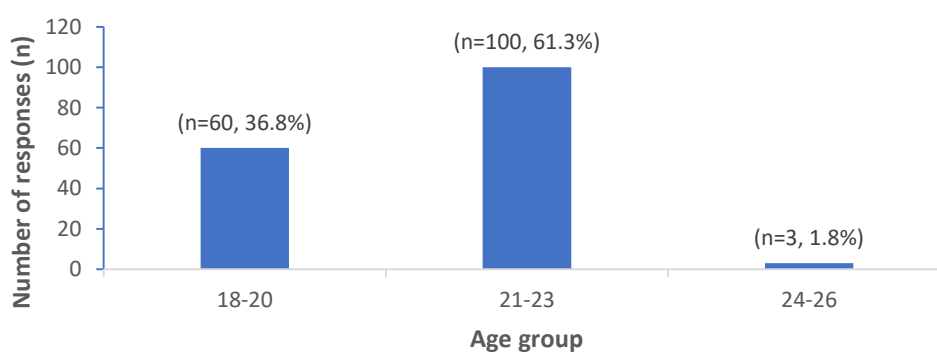
Figure 4.1: Number of respondents according to age group

4.1.2 Gender

Table 4.2 showed that the number of male respondents were 53 (32.5%) whereas the number of female respondents were 110 (67.5%). This result manifest that most of the respondents being involved in this study was female. **Figure 4.2** below showed the number of respondents with percentages between male students and female students in terms of the bar chart.

Table 4.2: Frequency and percentage analysis for gender of respondents

Gender	Number of responses (n)	Percentage (%)
Male	53	32.5
Female	110	67.5
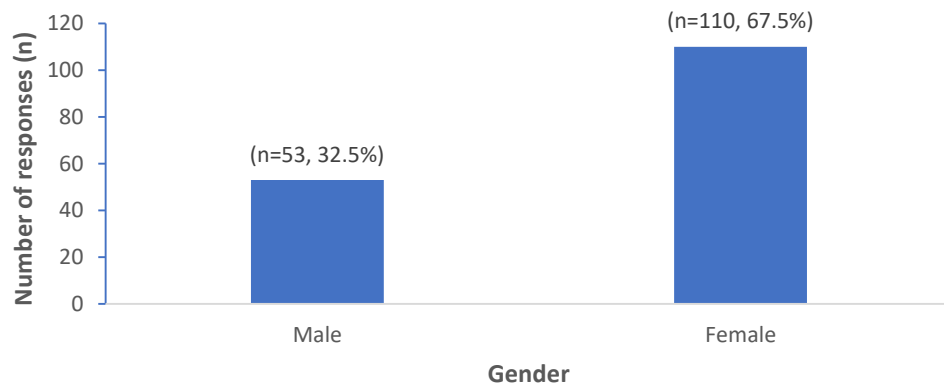
Figure 4.2: Number of respondents according to gender

4.1.3 Faculty

Among 163 respondents, 96 (58.9%) of them were come from science background whereas 67 of them were come from non-science background, and was displayed clearly in **Table 4.3** and **Figure 4.3**.

Table 4.3: Frequency and percentage analysis for faculty of respondents

Faculty	Number of responses (n)	Percentage (%)
Science	96	58.9
Non-science	67	41.1
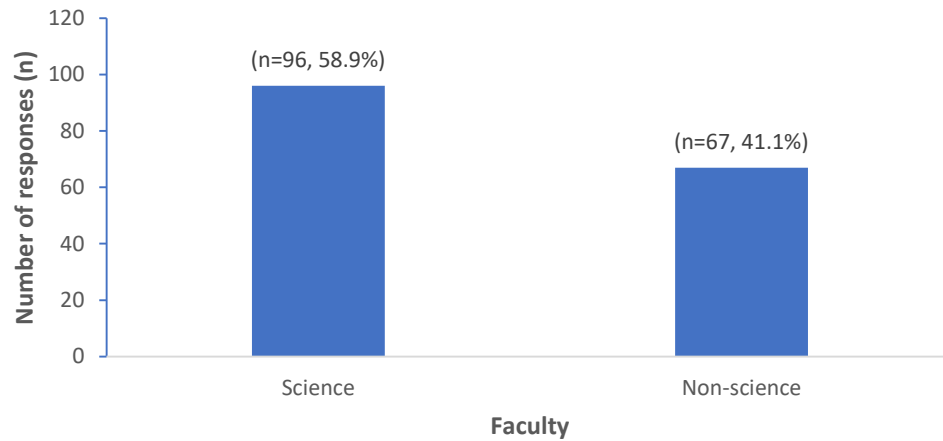
Figure 4.3: Number of respondents according to faculty

4.2 Physical activity patterns

Table 4.4 and **Figure 4.4** demonstrated the physical activity pattern was classified into four main groups, which are regular active (n=69, 42.3%), weekend warrior (n=12, 7.4%), insufficient active (n=39, 23.9%), and physical inactive (n=43, 26.4%) groups based on the days and minutes they spent on physical activity. The frequency and percentage analysis for physical activity pattern of female respondents and male respondents was illustrated separately in the form of table and bar chart.

Table 4.4: Frequency and percentage analysis for physical activity pattern of respondents

Phsyical activity pattern	Number of responses (n)	Percentage (%)
Regular active	69	42.3
Weekend warrior	12	7.4
Insufficient active	39	23.9
Physical inactive	43	26.4
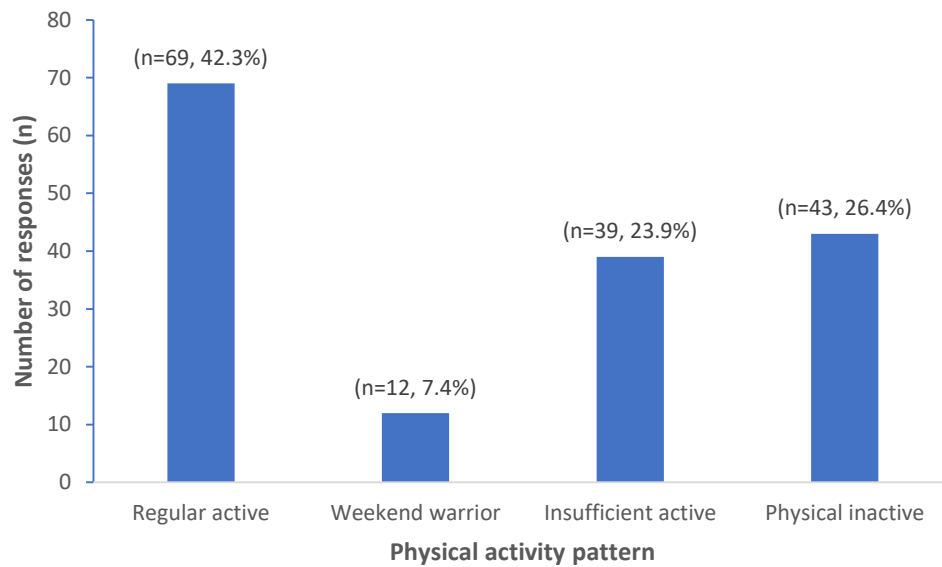
Figure 4.4: Frequency and percentage analysis for physical activity pattern of respondents

4.2.1 Physical activity patterns among female students

Table 4.5 and **Figure 4.5** demonstrated the data of physical activity pattern among female respondents. Most of the female students were physical inactive by holding for 35.5% (n=39) out of 110 female respondents, followed by regular active and insufficient active, which is 29.1% (n=32) and 27.3% (n=30), respectively. Then, minority of female respondents were weekend warrior with only 8.2% (n=9) of them.

Table 4.5: Frequency and percentage analysis for physical activity pattern of respondents (female)

Phsyical activity pattern	Number of responses (n)	Percentage (%)
Regular active	32	29.1
Weekend warrior	9	8.2
Insufficient active	30	27.3
Physical inactive	39	35.5
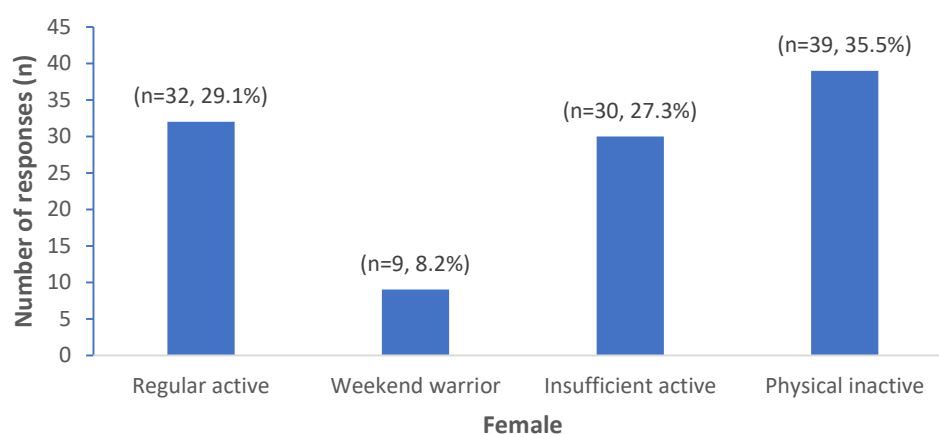
Figure 4.5: Frequency and percentage analysis for physical activity pattern of respondents (female)

4.2.2 Physical activity patterns among male students

In contrast with female respondents, **Table 4.6** showed that majority of male respondents were regular active with 37 out of 53 of them (69.8%). The rest of the male respondents with 9 of them (17%) were insufficient active and 4 of them (7.5%) were physical inactive. Similar to female respondents, weekend warrior among male respondents occupy the least number with only 3 of them (5.7%). The bar chart for physical activity of male respondents also displayed in **Figure 4.6**.

Table 4.6: Frequency and percentage analysis for physical activity pattern of respondents (male)

| Phsyical activity pattern	Number of responses (n)	Percentage (%)
Regular active	37	69.8
Weekend warrior	3	5.7
Insufficient active	9	17.0
Physical inactive	4	7.5
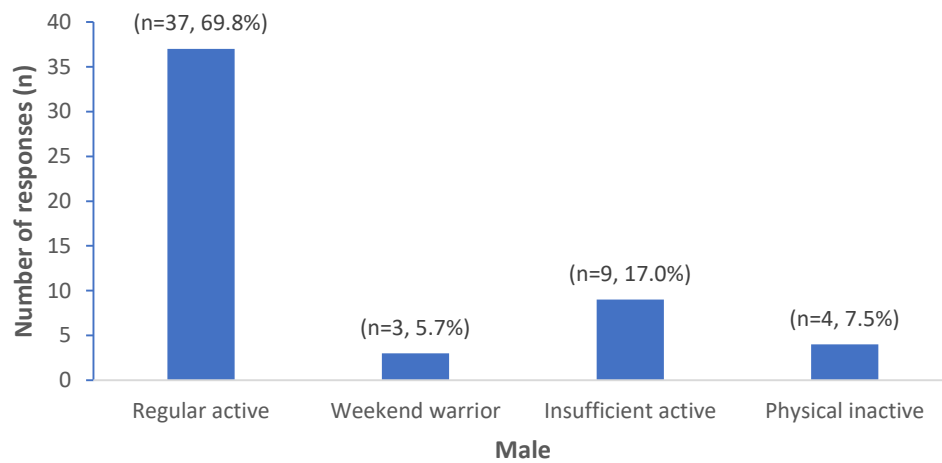
Figure 4.6: Frequency and percentage analysis for physical activity pattern of respondents (male)

4.3   Body mass index (BMI)

According to **Table 4.7** and **Figure 4.7**, the BMI status of all the respondents were categorized into five groups. By referring to the result showed below, more than half of the respondents (n=105, 64.4%) were having normal weight. However, there is 39 of the respondents (23.9%) fall in underweight category. In the case of pre-obesity, there were 12 of the respondents (7.4%) fall in this category, then followed by obesity class I (n=4, 2.5%) and obersity class II (n=3, 1.8%).

Table 4.7: Frequency and percentage analysis for BMI of respondents

BMI	Number of responses (n)	Percentage (%)
Underweight	39	23.9
Normal weight	105	64.4
Pre-obesity	12	7.4
Obesity class I	4	2.5
Obesity class II	3	1.8
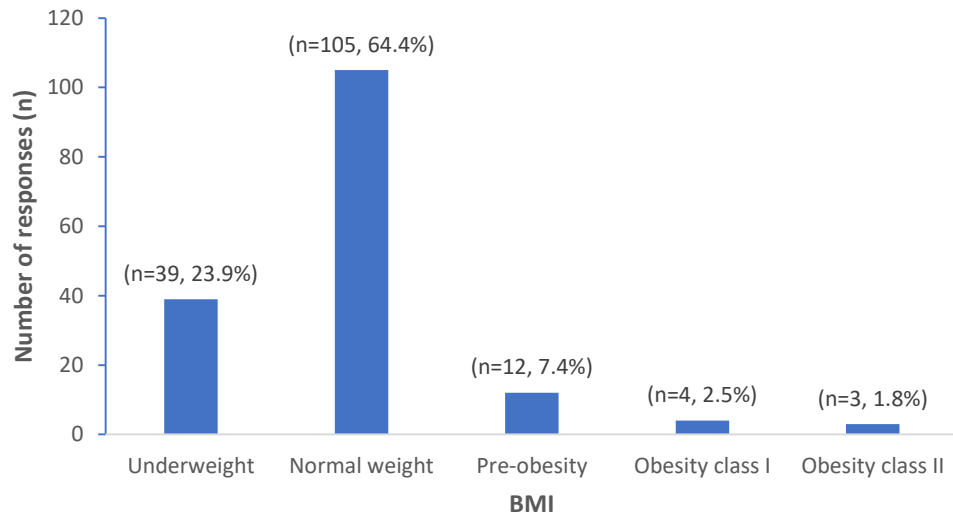
Figure 4.7: Frequency and percentage analysis for BMI of respondents

4.4 Mental health status

Based on **Table 4.8** and **Figure 4.8**, the mental health status of respondents is divided into three categories. Among all 163 respondents, 66.9% of the respondents (n=109) were shown to have normal mental status while 30.1% (n=49) and 3.1% (n=5) of them were having mild distress and severe distress, respectively.

Table 4.8: Frequency and percentage analysis for mental health status of respondents

Mental health status	Number of responses (n)	Percentage (%)
Normal	109	66.9
Mild distress	49	30.1
Severe distress	5	3.1
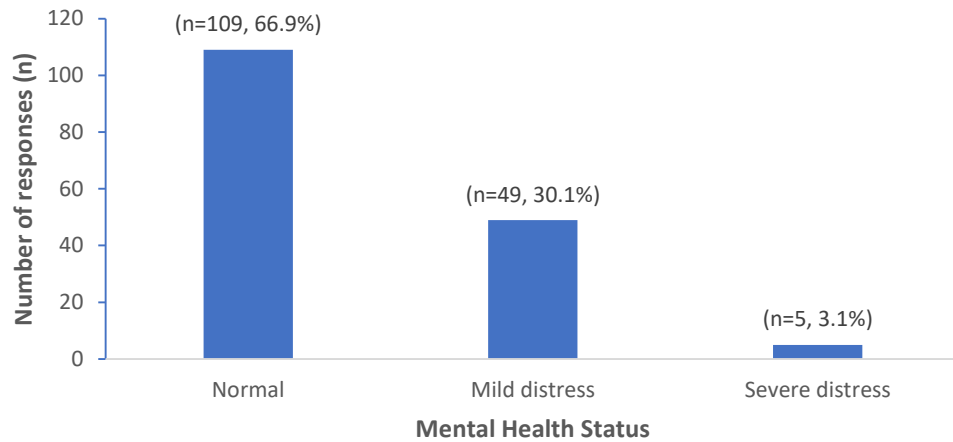
Figure 4.8: Frequency and percentage analysis for mental health status of respondents

4.5 Association between physical activity patterns and mental health status

According to **Table 4.9**, the *p*-value of the Chi-square test was 0.942, which is higher than the 0.05. This result showed that there is no significant association between physical activity pattern and mental health status.

Table 4.9: Association between physical activity pattern and mental health status

Variable	Mental health status, n (%)			X^2 (df)	*p* value*
	Normal	**Mild distress**	**Severe distress**		
Physical activity pattern				1.932 (6)	0.942
Regular active	48 (44.0)	18 (36.7)	3 (60.0)		
Weekend warrior	9 (8.3)	3 (6.1)	0 (0)		
Insufficient active	25(22.9)	13 (26.5)	1 (20.0)		
Physical inactive	27(24.8)	15 (30.6)	1 (20.0)		

* Chi square test, *p*<0.05

4.6 Association between BMI and mental health status

As shown in **Table 4.10**, there is no significant association between BMI and mental health status. This can be seen through the *p*-value of Chi-square test is 0.333, which is greater than 0.05 that representing no association between the variables being investigated.

Table 4.10: Association between BMI and mental health status

Variable	Mental health status, n (%)			X^2 (df)	*p* value*
	Normal	**Mild distress**	**Severe distress**		
BMI				8.780 (8)	0.333
Underweight	22 (20.2)	15 (30.6)	2 (40.0)		
Normal weight	75 (68.8)	28 (57.1)	2 (40.0)		
Pre-obesity	6 (5.5)	5 (10.2)	1 (20.0)		
Obesity I	3 (2.8)	1 (2.0)	0 (0)		
Obesity II	3 (2.8)	0 (0)	0 (0)		

*Chi square test, *p*<0.05

4.7   Comparison in mental health status between weekend warrior and physical inactive group

Since Mann Whitney test was used, the difference in median and interquatile range (IQR) between weekend warrior and physical inactive were displayed in **Table 4.11.** By referring to the *p*-value of mental health status, which is 0.96 that shown in **Table 4.11**, it indicated there is no siginificant difference between weekend warrior and physical inactive since it is higher than 0.05.

Table 4.11: Comparison in mental health status between weekend warrior and physical inactive

Variables	Median (IQR)		Z statistics	*p* value*
	Weekend warrior	Physical inactive		
Mental health status	13 (5.0)	12 (10.0)	-0.051	0.96

*Mann Whitney test, *p*<0.05

CHAPTER 5

DISCUSSION

5.1   Weekend warrior

In this study, the weekend warrior was classified based on the frequency and duration of the physical activity reported by the respondents using IPAQ-SF. Students who claimed that they were having 2 sessions of physical activity in a week and met the requirements of the guideline such as undergoing physical activity for more than 150 minutes of moderate-intensity and more than 75 minutes of vigorous-intensity was considered a weekend warrior. From the result mentioned above, there were 7.4% of weekend warriors among 163 UTAR university students. The remaining prevalence of physical activity patterns was 42.3% of the regular active group, 23.9% of the insufficiently active group, and 26.4% of the physically inactive group. However, there is a difference in terms of the prevalence between males and females. The prevalence of regularly active, weekend warrior, insufficiently active, and physically inactive between males and females is as follows. For males, it was 69.8%, 5.7%, 17.0%, and 7.5% while for females, it was 29.1%, 8.2%, 27.3%, and 35.5%, respectively.

Since there is a limit to no for the prevalence of weekend warriors, the range of the prevalence from previous studies was collected. Based on the previous research, the prevalence of weekend warrior ranged from 1.91 to 11.2%, and the current finding, which is 7.4% indicate it is aligned with other studies

(Hamer, Biddle and Stamatakis, 2017; O'Donovan et al., 2017; Xiao et al., 2018; Chen et al., 2023; Liang et al., 2023). When compared between genders, female students had a higher prevalence of weekend warriors than male students in this study. This result is in contrast with other studies. According to Xiao et al. (2018) and Liang et al. (2023), their findings showed that weekend warrior was found to be higher in male respondents than female respondents.

The prevalence of weekend warrior is lower compared to other physical activity pattern could be due to the most of the students in UTAR Kampar was observed to be engaged in high–intensity and moderate-intensity physical activity (Tan, 2022). Besides that, time constraints during weekends may be experienced by the students due to personal responsibilities, tasks, and social engagement, which in turn reduces the amount of physical activity. One study proposed that physical activity levels will lower when there is limited leisure time for them to spend on (Ferreira Silva et al., 2022). There is another possibility, which is students busy with academics will find it hard to meet the requirement of the weekend warrior in two sessions, and they might separate the physical activity into several sessions. In another way, peer influence is also a key contributing to this finding due to social norms. If a group of friends is physically active, there is a likelihood for the individuals to adopt similar patterns to fit in with their social circle. This is supported by Haidar, et al. (2019) who found that social support by peers was associated with positive physical activity behaviors. The availability of sports facilities on university campuses also affects participation in physical activity. In UTAR, there are many sports facilities provided in the gym and sports complex. The charges for these facilities are

lower than the general market price. This will subsequently increase the physical activity level of the students. The result observed by Lee et al. (2016) showed that there is a positive relationship between the accessibility of sports facilities with physical activity level. Apart from that, psychological factors could also lead to a lower prevalence of weekend warriors. Meyer and Larson (2018) mentioned that the academic stress due to the immense burden of weekend workloads ultimately reduced physical activity.

Moreover, the possibility of the prevalence of weekend warriors between genders in this study being different from other studies could be due to the number of female students being higher than male students. Most of the male students were shown to have higher physical activity levels, thus they were grouped into regular active groups rather than weekend warriors. This statement is evidenced by McCarthy and Warne (2022), who found out physical activity level among males was higher than female.

In brief, the prevalence of weekend warriors is lower than the other physical activity patterns and females have a higher prevalence than males in this study. This condition is attributed to several factors such as time constraints, peer influence, accessibility of sports facilities in the university, and psychological factors.

5.2   Body mass index (BMI)

The BMI of the respondents in this study was calculated through their weight in kg and height in m. By observing BMI, it can provide information regarding the obesity risk among university students. The prevalence of BMI among UTAR Kampar University students was the majority of them had normal BMI (64.4%), followed by 23.0% were underweight and the rest such as those pre-diabetes, obesity class I, and obesity class II were 7.4%, 2.5%, and 1.8%, respectively. By comparing with the global prevalence of obesity and overweight announced by WHO (2021), the global statistics analyzed that the adults aged 18 and above, who are overweight were 39% and obese was 13%. Also, the latest update on the prevalence of overweight and obesity among the Malaysian population was 30.40% and 19.70%, respectively based on the data analysis from the global obesity observatory (World Obesity Federation Global Obesity Observatory, 2023). The prevalence distribution of overweight and obese globally and in Malaysia was much higher than the current result of this study as they showed a higher percentage of overweight and obesity.

To be specific, there are few studies conducted among Malaysian university students. According to the studies, the BMI of university students across several public and private universities varied from each other. The prevalence of BMI ranged from 15.9-21.4% for underweight, 52.9-58.6% for normal, 17.5-21.4% for overweight, and 4.3-8.0% for obesity (Abu Bakar et al., 2020; You, Tan, and Mat Ludin, 2020; Kwan, Lee and Cheng, 2021; Mohamad et al., 2021). Interestingly, the result of the current study does not tally for certain BMI levels.

For instance, the prevalence of underweight in this study was lower than the range while the prevalence of normal and overweight were higher than the range. Meanwhile, obesity was at the borderline of the range. This difference could be due to reasons such as sociodemographic factors, environmental factors, and psychological factors. However, the findings by all of the studies mentioned explored that the majority of the university students were categorized as having normal BMI when looking in general and this result was compatible with the current finding.

In terms of sociodemographic factors such as ethnicity. Malaysia is known to be multiracial and the respondents in this study also come from different ethnicities such as Chinese and Indian. However, the majority of the respondents were Chinese but this factor was not included in this study. Based on Peltzer et al. (2014), the study observed that Malays, Indians, and other Bumiputeras had a higher risk of being overweight than Chinese. Moreover, environmental factors include physical activity patterns. The physically inactive group has a higher chance of getting overweight due to a lack of energy expenditure which causes an imbalance of energy (Kedir et al., 2022). In addition, dietary pattern also has a certain effect on BMI. Several studies showed that the consumption of unhealthy food such as fast foods and calorie-dense foods was significantly associated with an increased risk of overweight or obesity among university students (Wan Mohamed Radzi et al., 2019; Boukrim et al., 2021). Last but not least, a psychological factor also contributes to BMI, where sleeping quality and duration could subsequently reduce physical activity, energy expenditure, and possible changes in appetite, food choice, and

calorie intake. The association between BMI with sleeping quality and duration was significantly reported (Krističević, Štefan, and Sporiš, 2018).

In essence, the BMI status of UTAR Kampar University students was normal in the majority, followed by underweight. Therefore, being underweight should be a concern to avoid further malnutrition among the students. Nevertheless, the findings of the study are incompatible with most of the findings done by others and the underlying cause could be due to sociodemographic factors, environmental factors, and psychological factors.

5.3   Mental health status

The mental health status of UTAR Kampar University students was accessed through a reliable and validated GHQ-12 questionnaire. According to the result, 66.9% of the students had normal mental health whereas 30.1% of them had mild distress and only 3.1% of the students were under severe distress category. This result pointed out that most of the students were mentally healthy and few of them were having severe mental problems. However, 30.1% of the students were under mild psychological distress and they have the potential of moving towards severe mental distress. In the current study, the prevalence of severe distress (3.1%) is certainly lower than the prevalence of mental disorders among the Malaysian population (29.1%) reported by the Malaysia Ministry of Health in 2015 (Raaj et al., 2021). Similarly, it is also lower than the percentage of mental illness globally, which is 10.7% (En, Ling, and Fern, 2023).

In comparison with other local studies, some investigations had similar or contradictory findings. For instance, a study conducted among faculties at a university revealed that most of the students had appropriate mental health (Suleiman et al., 2017). Conversely, another study found out the prevalence of psychological disorders among university students is higher than the current study such that the prevalence of depression, anxiety, and stress were 53.9%, 66.2%, and 44.6%, respectively (Wong et al., 2023). Apart from that, in a systematic review among university students in 6 Association of Southeast Asian Nations (ASEAN) countries, the median point prevalence of depression, anxiety, and stress was 29.4%, 42.4%, and 16.4%, respectively. This indicates there is a high prevalence of mental health problems among multinational ASEAN university students (Dessauvagie et al., 2021).

In this case, the differences in the findings could be attributable to several determinants of mental health. For example, physical activity level is one of the factors that can lead to differences in the outcome. UTAR university students were reported to have a higher level of physical activity in this study and a lower physical inactive group. Based on Kebede, Anbessie, and Ayano (2019), mentioned that engaging in physical activity tends to exert an antidepressant effect as an alternative treatment for depression. Besides, the previous study also showed that the physically inactive group was associated with the presence of depression symptoms (Ma, Hagquist, and Kleppang, 2020). Another factor could be the screen time. Increasing screening time with electronic devices such as smartphones, tablets, or laptops can eventually affect mental health. This phenomenon is because the blue light with short wavelengths emitted by

electronic devices can be sensed by our body's suprachiasmatic nucleus that responsible for regulating our circadian rhythm. The circadian rhythm will be affected once the production of melatonin, which is a hormone that impacts sleeping quality is introduced. As a result, it will cause poor sleeping quality and to a greater extent such as insomnia, which in turn influences mental health negatively (Wong et al., 2023). Wong et al. (2023), also stated that gender is one of the contributors that may affect mental health. Many researches observed females had a higher tendency to experience stress, depression, and anxiety when compared to males (Wong et al., 2023). In this study, the female students are much higher than male students and this could be the underlying factor that results in differences prevalence of mental health status with other studies.

In a word, the current study found out the majority of UTAR Kampar students had good mental health status only a lower number of students had mild distress, and very least of them were severely distressed. However, the findings were contradictory with many studies, where most of them reported that higher mental problem was found among university students. The reasons that lead to differences in the outcome could be due to physical activity level, gender, and screen time.

5.4 Association between physical activity patterns and mental health status

The relationship between physical activity pattern and mental health status was investigated in this study and there is no significant association (p=0.942). This

finding was in line with the paper published by Mansor and Ahmad (2022) which observed no significant association between physical activity with depression, anxiety, and stress. The authors mentioned the insignificant result could be due to the small sample size as they only recruited 243 undergraduate students from the IIUM Kuantan Campus (Mansor and Ahmad, 2022). Furthermore, the current findings were also supported by Omar and Kudin (2023), who declared that physical activity was insignificant to either depression, anxiety, or stress among university students of UPM. Another study also showed evidence of the unassociated relationship between physical activity with depression, anxiety, and stress among the Malaysian population aged 18 years and older (Kyaw et al., 2022).

Nevertheless, some articles were opposite with current findings. According to Dev et al. (2016), they were using similar methods of accessing the physical activity level (IPAQ-SF) and mental health distress (GHQ-28) among 266 university students from one Malaysian public university. Their result showed that mental health can be improved by physical activity, and emotional intelligence as the partial mediators of the association between these two variables can also be advantageous for mental health.

Chen et al. (2023) investigated the findings from the National Health and Nutrition Examination Survey (NHANES) 2007-2018 revealed that physical activity patterns including weekend warrior were significantly associated with depression among 21,125 US adults, aged 20 years and above. This study was similar to the research done by Liang et al. (2023), who stated that there is an

inverse correlation with depression symptoms regardless of the fewer or regular bouts that adhere to physical activity requirements. There is also another study that found a parallel outcome, where physical activity patterns such as regular active, weekend warrior, insufficient activity, and physical inactive have an inverse association with psychological distress among 108,011 of British adults population (Hamer, Biddle and Stamatakis, 2017).

These contradictory findings can be accounted for several reasons such as gender, measurement and assessment tools, and so on. For instance, the number of female students is greater than male students in this study and the physical activity pattern of females is higher in inactive compared to male. Hence, inequality between genders could affect the association between these two variables. Apart from that, misunderstanding of the assessment questions could be one of the reasons to get differences in outcomes in terms of the association between physical activity and mental health since the survey was self-administered. In addition, was study that explored individuals who had having higher consumption of alcohol and were physically inactive was associated with a higher risk of psychological distress (Silvia et al., 2023). Besides, smoking could also be one of the factors that reduced physical activity levels due to smoking will reduce oxygen supplied during exercise and in turn increase mental problems (Jackson et al., 2023). Other than that, a significant association between weekend warriors and depression risk in terms of educational level and economic status, especially among higher education and higher income rates was reported (Chen et al., 2023). This finding can be explained by the personal resources like coping ability, self-esteem, and self-control that may act as

protective factors against depression induced by stress. In this case, individuals with higher educational levels and economic status had a higher potential of acquiring such resources that could alleviate the presentation of depression due to stress (Chen et al., 2023). Moreover, marital status could also affect the association. According to Chen, et al. (2023), individuals with healthy and stable relationships will surrounded with a comfortable and better emotional well-being due to a lower frequency of conflict and stress that could trigger the presence of depression. In that sense, individuals who are not engaging in a healthy relationship and getting emotional support from their partner will potentially be hindered them obtaining benefits from Weekend Warrior.

In short, physical activity and mental health were not associated in this study and reasons that lead to contradictory results could be due to sociodemographics, underlying illness, misunderstanding of assessment tools by respondents, and environmental factors. Thus, future studies can allow for the inclusion of these variables for more precise results in the investigation of the relationship between physical activity and mental health.

5.5   Association between BMI and mental health status

Based on the result, the association between BMI and mental health status that was investigated in this study was shown not significant (p=0.333). This result was similar to several findings. For instance, the study done by Hamzah et al. (2019) found that there is no significant association between BMI and mental health problems like depression, anxiety, and stress among first-year undergraduate students at the University of Malaya (UM). Besides that, Azhar

et al. (2023) also revealed that BMI does not have a significant relationship with mental health problems between male students and female students on the Kuantuan campus of the International Islamic Universiti of Malaysia (IIUM). In addition, a study conducted among 12 private and public universities in Malaysia showed that the BMI status of overweight and obese does not have a direct effect on mental health status (Tanius et al., 2022).

Inconsistent with the current findings, some articles found that BMI does have a significant association with mental health status. According to Ilias, Mohamed Fuad, and Muhamad Zamani (2021), they reported there is a weak positive correlation between BMI and stress level among undergraduate students from the Faculty of Sport Science and Recreation, UiTM Shah Alam. There is a weak positive linear correlation shown in both males and females. Apart from that, a national cross-sectional study carried out across universities in Malaysia exposed that BMI was significantly linked to the risk of anxiety, which is part of mental health problems (Mohamad et al., 2021). Other than that, another research study discovered and emphasized that stress plays a role in contributing to overweight and obesity based on BMI among several Malaysian university students such as UM, Universiti Putra Malaysia (UPM), Universiti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), and Universiti Teknologi Malaysia (UTM) (Wan Mohamed Radzi et al., 2019).

The reasons that cause contradictory findings in terms of the association between BMI and mental health status could be due to several factors sociodemographic factors, environmental and other underlying causes.

According to Valenzuela et al. (2020), BMI not only represents the body fat content but also takes into consideration muscle mass, where individuals with higher muscle mass tend to have higher BMI. In this study, science students were much higher than non-science students. Emotional distress due to examination can affect eating behavior and science students are expected to have higher academic stress compared to non-science students (Chokshi et al., 2021). Ilias, Mohamed Fuad, and Muhamad Zamani (2021) mentioned that continuous stress will result in a rise in body weight as it induces the "comfort eating phase", where people opt to rely on food for comfort to deal with challenging situations and tough feelings. Similar to the study done by Romero (2022), the author observed stress could change eating behaviors by causing one to under or over-eating. In this case, it is possible that science students tend to have a higher effect on eating behavior and cause them to increase or decrease food intake, which eventually influences their BMI status. Also, the number between males and females was imbalanced, where females were higher than males. Several studies reported that female students have a higher tendency to experience stress and anxiety and are more emotional when coping with stress than male students, who are more rational and non-emotional in dealing with stress (Yikealo et al., 2018; Gao, Ping, & Liu, 2019). Another study even found out female who perceived themselves as overweight or obese due to higher BMI was related to higher depression symptoms (Darimont et al., 2020).

Overall, BMI showed no significant association with mental health status in this study. These conflicting findings could be due to gender differences and the type of faculty among university students may affect the perceived stress, which

could lead to abnormal eating behavior that causes weight increase. Therefore, further investigation in detail including intermediate variables that could affect the outcome of the result is required to gain a more accurate association between BMI and mental health status. In addition, a correlation test is better to understand how the relationship between both of the variables is linked positively or negatively.

5.6 Comparison in mental health status between weekend warrior and physical inactive groups

Based on the Mann-Whitney test, the median differences between weekend warrior and physically inactive groups in terms of mental health status were observed to have no significance (p=0.96). Both of the weekend warriors and physically inactive had normal mental health status. However, the weekend warrior had a smaller IQR (5), which means there is less variability in mental health status compared to the larger IQR (10) found in physically inactive groups. Unfortunately, there are little to no research studies that show no significant differences between weekend warriors and physically inactive groups in terms of mental health status.

In contrast, most of the previous findings had resulted in opposing outcomes, whereby weekend warriors had better or improved mental health status. For example, the psychological distress of weekend warriors was lower than that of the physically inactive reference group among the British population (Hamer, Biddle, and Stamatakis, 2017). Another study also explored that weekend

warriors had a 57% reduction in depression risk compared to inactive groups among US adults by using multivariate logistic regression models (Chen et al., 2023). This result was supported by Liang et al. (2023), whose study also revealed that the risk of depression symptoms was reduced by 21% when compared to the physically inactive group.

In that sense, the low prevalence of weekend warriors could be the reason for the insignificant findings between weekend warriors and physically inactive groups in terms of mental health status. The contributing factors towards different findings could also be due to weekend warriors being those who engage in physical activity with two sessions per week, and meet the intensity and duration requirements, whereas the physically inactive group is those who are not involved in physical activity. In that sense, weekend warriors have a better impact on mood and stress as being involved in physical activity will exert certain benefits towards mental health. For example, the release of stress hormones such as cortisol will decrease, and conversely the release of endorphins that are responsible for mood boosters will increase through engaging in physical activity. The release of "good chemicals" will in turn boost self-esteem, increase concentration, and coping capabilities, and improve sleeping quality (Budde et al., 2015). Also, pro-inflammatory cytokine TNF- α levels that could trigger depression were reduced with moderate physical activity and were not reduced in the physically inactive group (Paolucci et al., 2018). Besides that, physical activity could aid in relieving stress and minimize the fear and worry of panic disorder. According to Li et al. (2022), physically inactive individuals experience poor mental health. It is evidenced by several

studies have that found individuals who work from home during the COVID-19 pandemic reported having a rise in unpleasant feelings due to limited space for physical activity and eventually reduced frequency (Li et al., 2022). There was one study composed that poor sleeping quality was linked with poor mental health (Zhai, Gao, and Wang, 2018). Additionally, the degree of resilience could also affect mental health status such that those with a higher degree will decrease mental problems since resilience acts as a protective factor against the development of mental disorders (Shrivastava, and Desousa, 2016).

In a nutshell, the outcome of this study found out there are no significant differences between weekend warriors and physically inactive groups in mental health status. This finding was opposed to most of the studies, where engaging in physical activity will provide benefits to mental health status.

5.7   Strength and limitation

Throughout the study, there are several significant strengths that support the contribution to the knowledge of the weekend warrior physical activity pattern, BMI, and mental health status of UTAR university students. Investigating the relationship between weekend warriors with mental health status could give an insight into how they interact, especially between weekend warriors and physically inactive in terms of mental health status. This is due to the lack of evidence or related articles being explored among Malaysians. Hence, this study provides new perspectives and fills the gap in the existing literature by investigating a unique region, where only a few researches have been undertaken. One of the strengths of this study is the questionnaires being used

for data collection of physical activity pattern and mental health status was reliable and validated, which further increased the credibility of the study. Also, a physical booth was operated on the UTAR Kampar campus to get accurate and precise measurements on anthropometric assessments such as weight, height, and BMI rather than self-reporting through an online survey. This study utilized quantitative data collection rather than qualitative data, and statistical analyses for precise measurement and analysis on the association between weekend warrior and BMI with mental health status. This methodology strategy offers more impartial perceptions of the relationship.

Nevertheless, some limitations should also be acknowledged in this study. The sample size of this study is considered relatively small and insufficient to provide precise and accurate result, which limit the generalizability of the findings to wider populations. Since convenience sampling was used instead of simple random sampling, the validity of the data collection might have decreased due to selection bias and it also may not be fully representative of the entire population. The imbalance of gender distribution within the sample can reduce the accuracy of the result, where females tend to have lower physical activity levels than males. Next, the questionnaire to assess physical activity level was self-reported by the respondents and this will cause bias in memory recall and inaccurate reporting. This will influence the accuracy of the data collected. Lastly, the length to complete the questionnaire may be challenging and could potentially affect the quality of the responses due to fatigue and impatience among the respondents.

5.8 Future study

Although this study provides valuable insights into the association between weekend warriors and BMI with mental health status, there are still certain interesting areas for future research to further advance the understanding in this domain. Firstly, a larger sample size from several universities in Malaysia should be included in the investigation to provide greater precision and better representation. The gender distribution of both male respondents and female respondents is suggested to be as balanced and lower variance as possible. Next, a longitudinal study would be better and it is also recommended to assess the relationship between weekend warrior and BMI with mental health status using causation statistical test. This methodology enables to study of the causal relationship between two variables over time in order to have a more comprehensive understanding. This kind of research would make it possible to monitor the changes in physical activity patterns, BMI, and mental health status, thereby identifying underlying temporal patterns and potential causal relationships. Apart from that, exploring the influence of sociodemographic and behavioral variables such as ethnicity, socioeconomic status, marital status, and dietary pattern should be taken into account on how these contexts shaped the association observed. In addition, it is better to ensure equal gender distribution to reduce imbalance bias. Lastly, incorporating measurable devices such as accelerometers or any wearable device enables the tracking of the physical activity of the samples would further enhance the accuracy of the activity data and avoid the potential biases associated with self-reporting.

CHAPTER 6

CONCLUSION

In conclusion, the prevalence of weekend warriors among university students of UTAR Kampar is 7.4%, which is similar to most of the findings done by others. However, the prevalence of weekend warriors was much lower than the other physical activity patterns in this study. The association between physical activity pattern with mental health status showed no significant finding. The current finding also observed that BMI was not associated with mental health status among students. Apart from that, there were no significant differences between weekend warriors and physically inactive groups regarding mental health status as reported through this investigation. However, these insignificant findings were predicted could be influenced by small sample size, low prevalence of weekend warriors, and other underlying variables that indirectly influence the relationship of weekend warriors and another physical activity pattern, as well as BMI with mental health status. In summary, this study provides insights of the prevalence of weekend warriors and its relationship with mental health status among university students, which has not been proposed by any previous studies in Malaysia.

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Investigation on the Association Between 'Weekend Warrior' with Health-Related Markers, Immune Status and Mental Health Status among UTAR Kampar University Students

Dear participants,

Good Day~ You are invited to participate in a research conducted by Cheah Xing Ling, Ng Yee Yin, and Teo Shu En, Year 3 Trimester 2 student, currently pursuing a Bachelor of Dietetics (Hons) in Universiti Tunku Abdul Rahman, Kampar Campus.

Objective: To investigate the 'Weekend Warrior' with Health-Related Markers, Immune Status, and Mental Health Status among UTAR Kampar University Students

Target population (Criteria):
- Students from UTAR Kampar campus
- Aged 18 to 28
- Healthy with no / no history of non-communicable diseases
- Should not have a regular intake of long-term medication
- Pregnant women
- Non-smokers
- No physical disability
- Not a professional athletes

The overall questionnaire consists of 5 sections:
Section A: Sociodemographic Data
Section B: International Physical Activity Questionnaire (IPAQ)
Section C: Immune Status Questionnaire (ISQ)
Section D: General Health Questionnaire (GHQ-12)
Section E: Health Screen Measurements

Estimated time for completion: 5-10 minutes

NOTICE: Kindly be reminded that all the information and data collected in this research will be kept confidential at all times. Your participation in this research study is truly appreciated.

If you have any inquiries regarding this research study, feel free to contact us through WhatsApp:
- 011-58987819 (Xing Ling)
- 012-5920890 (Shu En)
- 017-9437298 (Yee Yin)

Email*:_____

Acknowledgement of notice*

[   ] I have been notified by you and that I hereby understood, consented, and agreed to participate in this study.

[   ] I disagree to participate in this study.

Section A: Sociodemographic Data

Age (e.g. 21)

_____

Gender

[   ]   Male
[   ]   Female

Year of study (e.g. Y3T1)

_____

Faculty

[   ]   CEE
[   ]   CFS - Arts
[   ]   CFS - Science
[   ]   FAM
[   ]   FAS
[   ]   FBF
[   ]   FCI
[   ]   FEGT
[   ]   FICT
[   ]   FMHS
[   ]   FSc
[   ]   ICS
[   ]   LKC FES

Section B: International Physical Activity Questionnaire (IPAQ)

The purpose of using the International Physical Activity Questionnaire (IPAQ) is to measure health-related physical activity (PA) in populations.

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the **time you spent being physically active in the last 7 days.**

Directions: Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Vigorous Physical Activities

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time

1. During the last 7 days, on **how many days** did you do vigorous physical activities like *heavy lifting, digging, hiking uphill, aerobics, running, fast bicycling, etc.?*

_____ **days per week** (* if no please write '0')

2. **How much time** did you usually spend doing **vigorous physical activities** on one of those days?

_____ **minutes per day**

(* if you have answered '0' for Question 1, please write '0' for this question)

Moderate Activities

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities like *carrying light loads, bicycling at a regular pace, yoga, badminton, doubles tennis,* etc.? Do not include walking.

_____ days per week (* if no please write '0')

4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ minutes per day

(* if you have answered '0' for Question 3, please write '0' for this question)

Walking

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

_____ days per week (* if no please write '0')

6. How much time did you usually spend walking on one of those days?

_____ minutes per day

(* if you have answered '0' for Question 5, please write '0' for this question)

Sitting

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the last 7 days, how much time did you spend sitting on a weekday?

_____ minutes per day (* if no please write '0')

Section D: General Health Questionnaire (GHQ-12)

It encompasses multiple categories related to an individual's psychological well-being including six positive items and six negative items, which require you to describe your past few weeks' life.

The Likert scale for the following questions is as below:

0- Better than usual

1- Same than usual

2- Less as usual

3– Much less than usual

Please tick (/) at the score that best describes you.

Positive items				
	0	1	2	3
1 . Been able to concentrate on what you are doing?				
2 . Felt that you are playing useful part in things?				
3 . Been able to face up to your problem?				
4 . Felt capable of making decisions about things?				
5. Been feeling reasonably happy, all things considered?				
6. Been able to enjoy your normal day to day activities?				

The Likert scale for the following questions is as below:

0 - Not at all

1– No more than usual

2– Rather more as usual

3– Much more than usual

Negative items				
	0	1	2	3
1. Lost much sleep over worry?				
2 . Felt constantly under strain?				
3 . Felt you could not overcome your difficulties?				
4. Been feeling unhappy or depressed?				
5 . Been losing confidence in yourself?				
6 . Been thinking of yourself as a worthless person?				

Section E: Health Screen Measurements

Height (e.g. 1.60 m)

_____

Weight (e.g. 50.0 kg)

_____

Table A. 1: Test of Normality

	Kolmogorov-Smirnov[a]
	Sig.
Physical activity levels	0.000
Body mass index (BMI)	0.000
Mental Health Status	0.016

[a] Lilliefor Significance Correction, * $p > 0.05$

APPENDIX C

1% match (Internet from 20-Feb-2023)
https://www.researchgate.net/publication/332587850_The_Relationship_of_Physical_Activity_to_Mental_Health_A_2015_Behavioral_Risk_Facto

1% match (Internet from 18-Jan-2023)
https://worldwidescience.org/topicpages/h/health+questionnaire+ghq-28.html

1% match (Internet from 19-Nov-2020)
https://www.medrxiv.org/content/10.1101/2020.06.23.20138032v1.full.pdf

< 1% match (Internet from 26-Jan-2023)
https://www.researchgate.net/publication/367396291_Individuals'_Coping_Styles_and_Levels_of_Depression_Anxiety_and_Stress_During_the_19_Pandemic_in_Turkey_A_Web-Based_Cross-Sectional_Study

< 1% match (Internet from 13-Apr-2023)
https://www.researchgate.net/publication/282382274_Prevalence_of_psychological_stress_among_undergraduate_students_attending_a_healtl

< 1% match (Internet from 28-Nov-2022)
https://www.researchgate.net/publication/327628079_Associations_between_negative_life_events_and_anxiety_depressive_and_stress_sympto_sectional_study_among_Chinese_male_senior_college_students

< 1% match (Internet from 23-May-2023)
https://www.researchgate.net/publication/336864939_The_Effects_of_Teacher_Candidates'_Physical_Activity_Levels_on_Health-Related_Quality_of_Life

< 1% match (Internet from 04-Nov-2022)
https://www.researchgate.net/publication/338808656_Psychosocial_Work-Related_Hazards_and_Their_Relationship_to_the_Quality_of_Life_of_Nurses-A_Cross-Sectional_Study

< 1% match (Internet from 30-Dec-2022)
https://www.researchgate.net/publication/357162092_Universite_Ogrencilerinin_Yasadigi_Sorunlar_ve_Sorun_Alanlarinin_Depresyon_Anksiyeto

APPENDIX D

Universiti Tunku Abdul Rahman
Form Title : Supervisor's Comments on Originality Report Generated by Turnitin for Submission of Final Year Project Report (for Undergraduate Programmes)

Form Number: FM-IAD-005	Rev No.: 1	Effective Date: 3/10/2019	Page No.: 1of 1

FACULTY OF SCIENCE_____

Full Name(s) of Candidate(s)	Cheah Xing Ling
ID Number(s)	19ADB03668
Programme / Course	Bachelor of Science (HONS) Dietetics
Title of Final Year Project	Association between weekend warrior physical activity pattern and BMI with mental health status among UTAR Kampar university students

Similarity	**Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)**
Overall similarity index: ____11____ **%** **Similarity by source** Internet Sources: __9__ % Publications:____5____% Student Papers:___3___%	
Number of individual sources listed of more than 3% similarity: NA	

Parameters of originality required and limits approved by UTAR are asfollows:
  (i) **Overall similarity index is 20% and below, and**
  (ii) **Matching of individual sources listed must be less than 3% each,and**
  (iii) **Matching texts in continuous block must not exceed 8 words**
Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are less than 8 words.

Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above result, I hereby declare that I am satisfied with the originality of the Final Year Report submitted by my student(s) as named above.

_____   _____

Signature of Supervisor   Signature of Co-Supervisor

Name: Encik Muhammad Zulhusni Bin Suhaimi   Name: _____

Date: __15/9/2023_____   Date: _____