International Journal of
Disabilities Sports and Health Sciences
e-ISSN: 2645-9094

RESEARCH ARTICLE

Investigating Leisure-Time Physical Activity and Depression Among Military University Students

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Abstract
The demands of living as a university student have caused an increasing number of students to experience poor mental health. Failure to adequately address these demands might lead to students suffering from mental health issues including depression. Thus, exploring leisure-time physical activity (LTPA) may play a crucial role in understanding students' depression. The present study is designed to examine the association between LTPA and depression among National Defense University of Malaysia (UPNM) students. A cross-sectional research design was employed, and data was collected via a set of questionnaires among the sample of 381 UPNM students. Self-report questionnaires, consisting of Godin LTPA and patient health questionnaire (PHQ-9) were distributed to the students. Correlation analyses were performed to examine the association between LTPA and depression. The analysis demonstrated a statistically significant correlation between LTPA and depression ($r=0.104$, $p<0.05$). Further studies are warranted to categorize the diverse types of leisure activities prevalent among military university students. Such research could provide valuable. Insights, enabling more information and direction on the selection of leisure activities to mitigate depression. The LTPA is recommended to alleviate depressive levels among military university students. The university and management should offer a few interventions to enhance students' leisure-time physical activity.

Keywords
Leisure-Time Physical Activity (LTPA), Depression, University Student

INTRODUCTION

Physical activity (PA) refers to any bodily movement that leads to energy expenditure, typically measured in kilocalories (Dias et al., 2017). The caloric expenditure associated with PA is contingent upon its intensity, duration, and frequency. The Centers for Disease Control and Prevention (CDC) and the World Health Organization have commonly employed the week and day as time units to indicate calorie expenditure during PA (Piercy et al., 2018). PA can be categorized into various types, including activities performed during sleep, work, or leisure (Piyawat Katewongsa et al., 2021). Maintaining optimal health necessitates engaging in at least 150 minutes of moderate-intensity physical activity per week, or at least 75 minutes of vigorous-intensity physical activity per week, coupled with strength training exercises for major muscle groups at least twice weekly (Bull et al., 2020).

Leisure-time physical activity (LTPA) has been found to alleviate symptoms of loneliness and confer health benefits (Meyer et al., 2020; Özkılıç, & Demirel). Extensive evidence supports the positive impact of physical activity on mental health, including the reduction of depression and anxiety (Stuart et al., 2019). Nevertheless, mental

Received: 01 July 2024 ; **Revised** ; 28 July 2024 ; **Accepted:** 31 August 2024; **Published:** 25 September 2024

How to cite this article: Najib, N.H.M.N., Latif, R.A., Majeed, H.A., Hanief, Y.N., and Carsiwan, C. (2024). Investigating Leisure-Time Physical Activity and Depression Among Military University Students. *Int J Disabil Sports Health Sci*;7(5):1078-1087.https://doi.org/10.33438/ijdshs.1506758

health has often been overshadowed by a focus on physical well-being, even though it constitutes a critical aspect of overall well-being (Schwartz et al., 2021). Globally, mental health issues, particularly depressive symptoms, have emerged as significant public health concerns, and they are a vital component of sustainable development strategies for the year 2030 (Patel et al., 2018) and logical discussions in different disciplines.

The World Health Organization (WHO) (2019) defines mental health as a state of well-being, wherein individuals recognize their capacity to cope with life's demands, contribute to their communities, and effectively handle daily tasks and stressors. Mental health significantly influences individuals' interactions with others and their decision-making processes (Kazdin, 2018). The Ministry of Health of Malaysia further characterizes mental health as engaging with the environment, promoting subjective well-being and functioning, and employing cognitive, emotional, or relational skills to achieve individual and collective objectives aligned with justice (Hassan et al., 2018).

The global burden of disease and disability is exacerbated by mental health issues, significantly contributing to the overall burden of illness (Hassan et al., 2018). Mental health problems, including depression, anxiety, and stress, have become more prevalent among university students (Asif et al., 2020). Physical activity plays a pivotal role in promoting mental health and mitigating mental health problems (Hosker et al., 2019). Identifying factors that can reduce mental health issues is crucial, and physical activity is recognized as a key and beneficial behavior in enhancing mental well-being (Rodriguez-Ayllon et al., 2019).

Despite the well-documented mental health benefits of physical activity, recent data indicate a concerning decline in leisure-time physical activity among young adults, including university students. According to the WHO, over 1.4 billion adults globally were not sufficiently active as of 2016, with 23% of men and 32% of women aged 18 and older failing to meet recommended activity levels (Lancet, 2018). This inactivity is particularly alarming among undergraduate students, who often face academic pressures and time constraints that limit their opportunities for exercise. The reduced physical activity in this demographic has been associated with increased rates of mental health issues, such as anxiety and depression, exacerbated by factors like excessive screen time and the challenges of balancing academic and social responsibilities (Ahmad et al., 2015; Nakshine et al., 2022; Othman & Rashid, 2018). Given the significant proportion of young adults experiencing mental health disorders—34.7% among adolescents aged 16-19 and 32.1% among those aged 20-29 (Ahmad et al., 2015)—there is an urgent need to address the gap in leisure-time physical activity among undergraduate students to mitigate the risk of depression and other psychological disorders. This study aims to explore the relationship between leisure-time physical activity and depression among Universiti Pertanan Nasional Malaysia (UPNM) students, highlighting the critical importance of integrating physical activity into daily routines to improve mental health outcomes.

Research Questions and Hypothesis

What is the current level of leisure-time physical activity among UPNM students?

What is the current state of depression among UPNM students?

Is there a relationship between leisure-time physical activity and depression among UPNM students?

A research hypothesis is

There is no significant relationship between leisure-time physical activity and depression among UPNM students.

MATERIALS AND METHODS

Descriptive research design is highly valued for its ability to provide a detailed and systematic portrayal of phenomena, making it a crucial method for understanding various subjects in depth. One of its key strengths is its capacity to offer a comprehensive snapshot of characteristics, behaviors, or conditions without manipulating variables, which is essential when exploring new or under-researched topics. Despite its limitations in establishing causal relationships, descriptive research remains a powerful tool for generating foundational knowledge and guiding subsequent investigations.

The research was conducted at UPNM and employed a correlational approach within the framework of descriptive research, specifically adopting a quantitative methodology. The data collection process involved the utilization of a survey questionnaire administered through an online platform, utilizing Google Forms as the medium.

This study followed ethical standards and received approval from the Faculty of Sports Science and Recreation, Universiti Teknologi MARA with reference number 100-KNS(PJI 9/19) 13 October 2021. Participant provided informed consent, with the volunteer form covering research details, risks, benefits, confidentiality, and participant rights. The research strictly adhered to the ethical principles of the Declaration of Helsinki, prioritizing participant's rights and well-being in design, procedures, and confidentiality measures.

Participant

The target population for this study was UPNM students, encompassing a total of 4,964 individuals, as indicated by higher education statistics. To calculate the proper sample size, the researchers followed the instructions proposed by Krejcie and Morgan Table (Bukhari, 2022), using their table, which advised a sample size of 428 after accounting for a 20% margin to adjust for unreturned or incomplete questionnaires. The sample strategy used in this study was simple random sampling.

Sample	Total	Krejcie & Morgan's sample size	Add 20%	Total
UPNM student	4,964	344	84	428

Procedure

In the conduct of the study, data collection procedures assumed paramount importance. Once the subjects were identified and access to the research sites was granted, the process of data collection encompassed five distinct and indispensable stages, each necessitating prior approval.

Foremost, the researcher sought the imprimatur of the research ethics committee at UiTM, ensuring that the study adhered to rigorous ethical standards and safeguarding the welfare of the participants. Subsequently, the researcher sought permission from the respective supervisor to proceed with the study, a step deemed crucial to ensuring the questionnaire's validity, benefiting from the supervisor's expert guidance and input.

Moving on, upon securing ethical approval, the researcher proceeded to conduct a pilot study to assess the reliability and validity outcomes of the questionnaire. This preliminary investigation allowed for the identification and rectification of any potential issues or ambiguities in the questionnaire, further bolstering the overall robustness of the study instrument.

Following the pilot study, the researcher approached the respondents at UPNM, acquainting them with the study's objectives and rationale. This process served to foster understanding and cooperation among the respondents, thereby enhancing the overall quality of the data obtained.

Furthermore, the researcher employed a combination of quantitative data collection methods. Additionally, efforts were made to minimize potential biases in data collection. The researcher adopted random sampling techniques to select participants, thereby reducing the risk of selection bias and enhancing the generalizability of the study's findings. Moreover, the researcher implemented standardized protocols and procedures during data collection to mitigate observer bias and ensure consistency across data collection points.

In summary, the procedures for data collection encompassed rigorous ethical considerations, validation of the questionnaire through pilot testing, and thoughtful engagement with the participants. By adhering to these systematic and meticulous steps, the study aimed to yield reliable, valid, and comprehensive data, ultimately contributing to the advancement of knowledge in the respective field of research.

Data Collection Tools

Instruments

The questionnaire used for this study is divided into three distinct sections to gather comprehensive data on participants' demographics, physical activity levels, and mental health status. Each section is designed to capture specific aspects of the participants' lives. In the first section of the questionnaire, respondents are required to furnish their demographic information, encompassing gender, age, level of education, student status, marital status, and racial background.

Leisure-Time Physical Activity (LTPA)

In Section B of the questionnaire, focuses on evaluating LTPA, a key factor influencing overall health and well-being. To achieve this, adapted questions from the widely recognized Godin Leisure-Time Exercise Questionnaire (Godin, 2011). This tool has shown commendable reliability, with a Cronbach's alpha coefficient of 0.69, reflecting its effectiveness in capturing

accurate exercise data (Muhammad Awais et al., 2021).

Participants are asked to report the frequency of their engagement in various levels of physical activity—strenuous, moderate, and mild—each lasting at least 15 minutes per session throughout a typical week. This approach allows us to calculate a comprehensive leisure-time exercise score for each respondent. The calculation involves multiplying the number of exercise bouts in each category by their respective metabolic equivalents—3 for mild, 5 for moderate, and 9 for strenuous activities—and then summing these values. The resulting score provides a quantitative measure of an individual's level of leisure-time exercise. Based on this score, respondents are categorized into two groups: those with a score of 24 or higher are classified as "active," while those with a score of 23 or lower are considered "insufficiently active." This classification helps us understand the extent of physical activity among participants and its potential impact on their overall health.

Patient Health Questionnaire-9 (PHQ-9)

The Patient Health Questionnaire-9 (PHQ-9) (PHQ-9 depression scale.pdf (nih.gov) is the questionnaire used in section C. The PHQ-9 showed a good degree of dependability with a 0.88 Cronbach's alpha coefficient (Currier et al., 2020). It is intended to be used as a self-report tool, asking respondents to rate the severity of their depression using nine items. Every item is assigned a number between 0 and 3, where 0 means "not at all" and 3 means "nearly every day." The total values of these nine items are added up to determine each respondent's final score, which yields a numerical assessment of the degree of depression the person is experiencing.

Statistical Analysis

The primary aim of this study was to ascertain the degree of LTPA among UPNM students. Descriptive analysis was employed to examine the collected data. Descriptive analysis was employed in the study to achieve the second goal, which was to determine the degree of depression among UPNM students. The third goal of the study was to investigate the link between UPNM students' leisure-time physical activity and their depression levels by analyzing the data using Pearson Correlation analysis.

RESULTS

In this research study, a total of 381 participants were involved, with 294 (77.2%) being male and 87 (22.8%) females. Among the respondents, 131 (34.4%) were cadets, while 250 (65.6%) were civilians. The participants' ages were categorized into three groups: 18-20 years old, constituting 217 (57.0%) of the students; 21-24 years old, comprising 163 (42.8%) of the students; and only 1 respondent (0.3%) was 25 years old and above.

Regarding the respondents' educational levels, 71 (18.6%) held degrees, 309 (81.1%) had diplomas, and there was 1 (0.3%) respondent with a master's degree. The majority of students were Malay, with 355 (93.2%) participants. Indian respondents constituted 3.1% (12 individuals), followed by 2.1% (8 individuals) from other racial backgrounds, and Chinese respondents accounted for 1.6% (6 individuals).

Table 1. Demographic variables for UPNM students

		Frequency (n)	Percent (%)
Gender	Male	294	77.2
	Female	87	22.8
Students	Cadet	131	34.4
	Civilian	250	65.6
Age	18-20	217	57.0
	21-24	163	42.8
	>25	1	0.3
Education level	Master	1	0.3
	Degree	71	18.6
	Diploma	309	81.1
Races	Malay	355	93.2
	Chinesse	6	1.6
	Indian	12	3.1
	Others	8	2.1
Total		381	

The participants were categorized into three groups for LTPA. The data shows that most people in both the military and civilian groups are "Active," with a higher percentage in the military (88.5%) compared to civilians (79.2%). Only a small percentage of each group is "Moderately Active," with slightly more civilians (1.72%) than military personnel (0.1%). Very few people are "Insufficiently Active," with just 0.01% in the military and 0.04% in the civilian group. Overall, most people are active, indicating that both military and civilian populations generally participate in high levels of physical activity.

Table 2. Level of Leisure-Time Physical Activity (LTPA) among UPNM students

		Total		Military		Civilian	
		Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Level	• Active	314	82.4	116	88.5	198	79.2
	• Moderately Active	56	14.7	13	0.1	43	1.72
	• Insufficiently Active	11	2.9	2	0.01	9	0.04
		381		131		250	

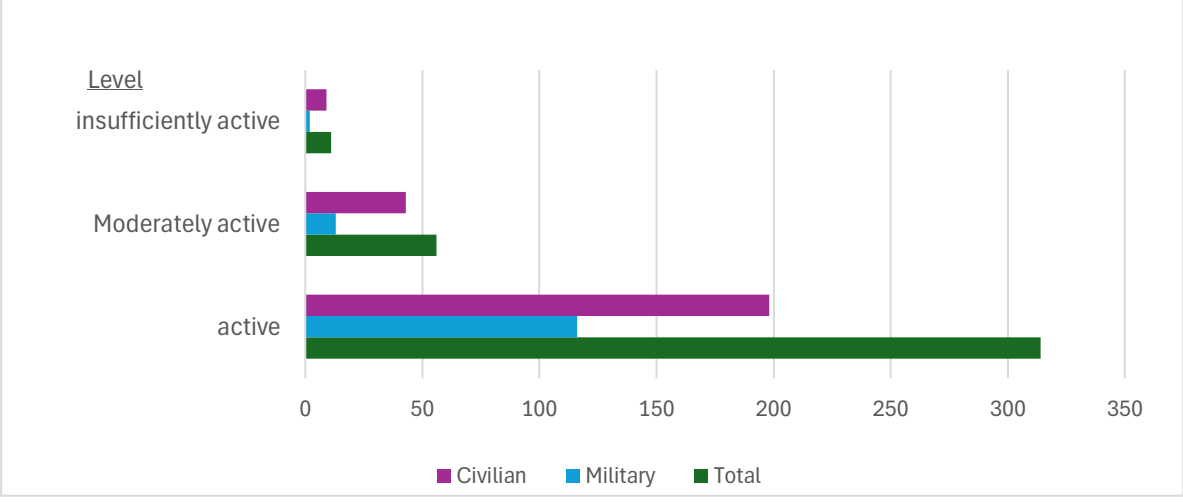

Figure 1. Level of LTPA

Table 3. Depression among UPNM students

		Total		Military		Civilian	
		Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Level	• None	72	18.9	6	4.6	66	26.4
	• Mild	142	37.3	86	65.6	56	42.7
	• Moderate	106	27.8	29	22.2	77	30.8
	• Moderately Severe	48	12.6	8	6.1	40	16.0
	• Severe	13	3.4	2	1.5	11	4.4
		381		131		250	

The data shows how often and how severe a particular condition is among the military, and civilian populations. Overall, 18.9% of people don't show any symptoms, with a much lower rate in the military (4.6%) compared to civilians (26.4%). The "Mild" condition is the most common, affecting 37.3% of people, with a significantly higher percentage in the military (65.6%) than in civilians (42.7%). The "Moderate" category makes up 27.8% of the total, with 22.2% in the military and 30.8%

among civilians. The "Moderately Severe" level affects 12.6% of the population, with more civilians (16.0%) than military members (6.1%) experiencing this moderately severe. Lastly, the "Severe" category is the least common, found in only 3.4% of cases, with low representation in both military (1.5%) and civilian (4.4%) groups. This data suggests that mild conditions are more prevalent in the military, while civilians experience a wider range of severity levels, especially at the extremes of having no symptoms or severe symptoms.

Table 4. Correlations between LTPA and depression among UPNM students

		LTPA	Depression
LTPA	Pearson correlation	1	0.104*
	Sig. (2-tailed)		
	N	381	

*Sig. at the 0.05 level (2-tailed)

The study examined the link between LTPA and depression levels among UPNM students using Pearson's correlation analysis. The findings demonstrated a noteworthy correlation, with the r-value of 0.104. As per Guildford's Rule of Thumb, a correlation coefficient of 0.104 suggests a moderate positive link (cited in Aswegen & Engelbrecht, 2009). This indicates that although there is a statistically significant correlation between LTPA and depression, the magnitude of this association is very low.

DISCUSSION

In this study, the research findings reveal a notable difference in respondents between female and male students at UPNM. Specifically, the sample comprised n=294 (77.2%) male respondents and n=87 (22.8%) female respondents, with a substantially higher number of males participating in the study. This discrepancy can be attributed to the overall gender distribution at UPNM, where there are more male students than females.

Furthermore, the data indicate a higher proportion of civilian students, n=250 (65.6%), participating in the study compared to cadet students, n=131 (34.4%). As a military university, UPNM primarily consists of cadet officers; however, it also admits a smaller number of territorial and civilian students. The inclusion of mandatory military training in each program can present challenges in obtaining research participation from the students due to their busy schedules (Haque et al., 2019).

Regarding age distribution, the majority of respondents fell within the 18 to 20 years age group, constituting n=217 (57.0%), while those aged 21 to 24 years comprised n=163 (42.8%), and those 25 years old and above constituted only n=1 (0.3%). It is evident that the younger age group (18-20 years old) showed greater willingness and interest in participating in the study compared to the other age groups.

In terms of educational level, diploma students represented a higher number, n=309 (81.1%), compared to degree students, n=71 (18.6%). This observation is consistent with UPNM's role as an institution focused on providing bachelor's degree courses and enhancing the knowledge and academic standing of armed forces personnel. Regarding, the race of the respondents, the majority identifying as Malay in race, with n=355 (93.2%), as opposed to Chinese, Indian, or other ethnicities.

The level of LTPA among university students of UPNM; the number of respondents in the active level category was n=314 (82.4%), the moderately active level category was n=56 (14.7%) respondents, and the insufficiently active level category was n=11 (2.9%) respondents. The current study's findings showed that UPNM, a military university, had a high degree of LTPA among its students. This result is consistent with the nature of the academic setting, which encourages students to lead active lifestyles. According to Sitoayu et al., (2020), a university culture like this gives students the best foundational experience possible throughout their formative years and empowers them to maintain a healthy lifestyle over time.

It is imperative that these students engage in physical exercise during their leisure time, as it not only enables them to meet health recommendations but also aids in the development of social relationships and the adaptation to the social expectations of their university experience. Ma et al., (2020) have found that adolescents' mental well-

being is positively impacted by engaging in physical activity during their leisure time. In order to preserve optimal health, Bull et al., (2020) recommend that adults aged 18 to 64 engage in a minimum of 150 minutes of moderate-intensity aerobic physical activity (PA) or 75 minutes of vigorous-intensity aerobic PA per week, or a combination of both, as recommended by the WHO. This guideline is particularly relevant to college students, who frequently fall within this age cohort and experience a variety of stressors related to their academic and social lives.

The study reveals that the degree of mental health depression among university students of UPNM is categorised as mild. The mild level group had a total of 142 respondents, which accounts for 37.3% of the total. This is greater than the moderate level category, which had 106 respondents, accounting for 27.8%. Talapko et al., (2021) discovered that the COVID-19 outbreak harmed students' mental and physical health due to the difficult living conditions it enforced. They found that poor psychological well-being causes greater stress, which is a known risk factor for developing anxiety and depression disorders. Similarly, Singh et al., (2018) noted that academic stress and lifestyle changes put young people, particularly students, at risk for mental health difficulties. Many students struggle to balance the demands of their academic programs, which can exacerbate psychological issues, endangering their well-being and negatively impacting their academic performance and future employment prospects (Talapko et al., 2021; Singh et al., 2018).

The WHO estimates that approximately 20% of young people are affected by mental health issues, including depression (Singh et al., 2018). This period of youth is pivotal, marked by significant physical, physiological, psychological, and behavioral changes that can create substantial stress and disrupt relationships with peers and adults. Research by Marc-André Bélair et al., (2018) reveals a troubling link between increased screen time and deteriorating mental health among adolescents. Furthermore, a study by Gabal et al., (2022) found that students frequently experience mild to moderate depression, a finding that aligns with our research. Additionally, Talapko et al., (2021) highlighted that the second partial lockdown during the COVID-19 pandemic exacerbated anxiety, depression, and stress among students in health-related fields, underlining the severe impact of such crises on mental well-being.

Although UPNM students engage in significant levels of physical activity, the challenging military setting and the impact of the COVID-19 pandemic exacerbate persistent mental health difficulties. Recent research have found that even engaging in high amounts of physical activity may not completely mitigate the negative effects on mental health caused by stressors (Schuch et al., 2019; Kaya & Demirci, 2024). Although engaging in physical activity offers many advantages, it is not a comprehensive remedy for the mental health challenges experienced by students in these exceptional situations.

According to Ijaz et al., (2020), stress and depression are also more common among those who served in the military. This demographic is prone to these issues because of academic pressure, obstacles encountered during military training, and lifestyle changes. The result contradicts Schuch et al., (2018) study that higher levels of physical exercise are consistently connected with a decreased risk of getting depression in the future. Physical activity had a protective effect on people of any age or gender, and it was significant in all places. Moreover, the result from Jo et al., (2021) also contradicted where the authors' found the amount of physical activity conducted during leisure time; it could significantly reduce depressive symptoms. As a preventive approach to prevent the symptoms of depression, it may be helpful to do appropriate physical exercise during leisure time.

Conclusion

This study conducted at the National Defence University of Malaysia (UPNM) provides significant findings about the levels of leisure-time physical activity (LTPA) and depression among students. The data emphasise that UPNM students generally lead an active lifestyle, with most male respondents and a larger proportion of civilian students. Nevertheless, even when students engage in substantial physical activity, they still encounter mild to moderate depression, mostly impacted by the distinct stresses of military training and the ongoing COVID-19 pandemic.

The research reveals a modest although noteworthy positive correlation between LTPA (Leisure-Time Physical Activity) and mental health. This suggests that engaging in physical activity has a favourable impact on mental well-being. However, it is important to note that physical

exercise alone does not completely alleviate the difficulties faced by students in this demanding setting. This highlights the necessity of having complete mental health assistance in addition to physical training regimens. Further investigation is warranted to delve into these dynamics to enhance the support for student well-being in military and high-pressure educational environments.

Recommendations

Universities can establish a setting that promotes both physical and mental health using technology, specialised support, group activities, awareness-raising, organised sports programs, and facility access. These initiatives can improve students' performance in the classroom and on the battlefield by assisting them in managing stress, lowering their rates of depression, and leading more balanced, satisfying lives.

The National Defence University of Malaysia (UPNM) study's findings suggest that future investigations should concentrate on a number of crucial areas to improve student wellbeing in military and high-pressure learning environments. To find the best combinations of interventions, comparative studies could look at the efficacy of different mental health support programs, like counselling and stress management workshops, in addition to physical activity programs. Studies that follow participants over time can see how consistent levels of LTPA affect mental health, particularly during times of high stress such as military training and major world crises. Qualitative study may also explore the particular stressors that military and civilian students encounter, offering a deeper comprehension of their distinct difficulties and coping strategies.

More investigation into the responses of distinct groups—such as male and female students or military versus civilian students—to various physical and mental health therapies may result in the development of more specialised support networks. A thorough investigation into the incorporation of holistic wellness programs that integrate tactics for physical, mental, and emotional well-being, such as mindfulness and nutrition, may offer comprehensive help. Furthermore, researching how the COVID-19 epidemic has affected stress and mental health may shed light on how social interaction, instructional strategies, and physical activity levels have an influence on students in high-stress settings. By focussing on student well-being, these study directions hope to improve students' mental health and the frequency of their leisure-time physical activity.

Conflict Of Interest

No conflict of interest is declared by the aouthors. In addition, no fanancial support was received

Ethical Statement

This study followed ethical standards and received approval from the Faculty of Sports Science and Recreation, Universiti Teknologi MARA with reference number 100-KNS(PJI 9/19) 13 October 2021.

Author Contributions

Study design: NHMN, RAL, HAM, YNH, CC; Data collection: NHMN, RAL, HAM; Statistical analysis: NHMN, YNH, CC; Data interpretation: NHMN, RAL, HAM; Literature search: NHMN, RAL, HAM, YNH, CC. All authors have read and approved the published version of the manuscript.

REFERENCES

Ahmad, N., Razak, M., Naidu, B., Awaluddin, S., Chan, Y., Kasim, N., & Ibrahim, N. (2015). Mental health problems of adults. Institute for Public Health (Ed.), *National Health and Morbidity Survey*, 2, 185-189.

Asif, S., Mudassar, A., Shahzad, T.Z., Raouf, M. & Pervaiz, T. (2020). Frequency of depression, anxiety and stress among university students. *Pakistan Journal of Medical Sciences*, 36(5), 971-976. [CrossRef]

Aswegen, A.S.V.,& Engelbrecht, A.S.(2009). The relationship between transformational leadership, integrity and an ethical climate in organisations. *S A Journal of Human Resource Management*, 7(1), 1-9. [CrossRef]

Awais, M., Chaudhery, M.M., Shahzeb Khan, M., Butt, A., Malik, A.R., Shahzeb Khan, M., et al., (2021). Factors contributing to distress among school and college-going adolescents during COVID-19 Lockdown: A cross-sectional study conducted in Sibi Balochistan, Pakistan. *Journal of Education and Health Promotion*, 10(1), 317–317. [PubMed]

Bélair, M.A., Kohen, D., Kingsbury, M., & Colman, I. (2018). Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: evidence from a population-based sample of Canadian adolescents. *BMJ Open*, 8(10), e021119–e021119. [PubMed]

Bélair, M.A., Kohen, D.A, Kingsbury, M., Colman, I. (2018). Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: evidence from a population-based sample of Canadian adolescents. *BMJ Open*, 8 (10), e02119. [PubMed]

Bukhari, S.A.R. (2021). Sample Size Determination Using Krejcie and Morgan Table. [CrossRef]

Bull, F., Al-Ansari, S. S., Stuart, Katja Borodulin, Buman, M. P., Cardon, G., Carty, C., Chaput, J.-P., Sebastien, Chou, R., et al. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, 54(24, 1451-1462. [CrossRef]

Currier, D., Lindner, R., Spittal, M. J., Cvetkovski, S., Pirkis, J., & English, D. R. (2020). Physical activity and depression in men: Increased activity duration and intensity associated with lower likelihood of current depression. *Journal of Affective Disorder*, 260, 426–431. [PubMed]

Dias, G., Oancea, S.C., Nucci, L.B., & Vogeltanz-Holm, N. (2017). The association between physical activity and depression among individuals residing in Brazil. *Social Psychiatry and Psychiatric Epidemiology*, 53(4), 373–383. [PubMed]

Gabal, A., Wahdan, M. A., & Gamal Eldin A. (2022). Prevalence Of Anxiety, Depression and Stress Among Medical Students, And Associated Factors. *Egyptian Journal of Occupational Medicine*, 46(1), 55–74. [CrossRef]

Godin, G. (2011). The Godin-Shephard leisure-time physical activity questionnaire. *The Health & Fitness Journal of Canada*, 4(1), 18-22. [CrossRef]

Haque, M., Rahman, N.A.A., McKimm, J., Kibria, G.M., Majumder, A.M.A., Haque, S.Z., et al., (2019). Self-medication of antibiotics: investigating practice among university students at the Malaysian National Defence University. *Infection and Drug Resistance*, 12, 1333–1351. [PubMed]

Hassan, M.F., Hassan, N.M., Kassim, E.S., & Hamzah, M.I. (2018). Issues and Challenges of Mental Health in Malaysia. International *Journal of Academic Research in Business and Social Sciences*, 8(12), 1685–1696. [CrossRef]

Hosker, D. K., Elkins, R.M., & Potter, M. P. (2019). Promoting Mental Health and Wellness in Youth Through Physical Activity, Nutrition, and Sleep. *Child and Adolescent Psychiatric Clinics of North America*, 28(2), 171–193. [PubMed]

Ijaz, F., Razaq, Y., Rana Khurram Aftab, Ambreen Tauseef, Ijaz, M., & Razaq, J. (2020). Relationship of physical activity and depression among military and non-military medical students. *Pakistan Journal of Physiology*, 16(1), 28–30.

Jo, H., Lee, J.-H., Lee, S., Lee, H., Ahn, Y.S., & Koh, S.B. (2021). The longitudinal effect of leisure time physical activity on reduced depressive symptoms: The ARIRANG Study. *Journal of Affective Disorder*, 282, 1220–1225. [PubMed]

Katewongsa, P., Widyastari, D.A., Saonuam, P., Haemathulin, N., & Wongsingha, N. (2021). The effects of the COVID-19 pandemic on the physical activity of the Thai population: Evidence from Thailand's Surveillance on Physical Activity 2020. *Journal of Sports and Health Science*, 10(3), 341–348. [PubMed]

Kaya, A., & Demirci, N. (2024). Examination of Changes in Sitting Time, Screen Exposure and Physical Activity Behavioral Profile in University Students Participating in Distance Education During the COVID-19 Pandemic. *Int. J. Act. Health Aging*, 2(1),30-37. [CrossRef]

Kazdin, A.E. (2018). Annual Research Review: Expanding mental health services through novel models of intervention delivery. *Journal of Child Psychology and Psychiatry*, 60(4), 455-472. [PubMed]

Lancet (2018). Retrieved from Globally, 1.4 billion adults at risk of disease from not doing enough physical activity (medicalxpress.com) in 23 January 2023.

Ma, L., Hagquist, C., & Kleppang, A.L. (2020). Leisure time physical activity and depressive symptoms among adolescents in Sweden. *BMC Public Health*, 20(1), 997. [PubMed]

Meyer, J.D., McDowell, C., Lansing, J., Brower, C., Smith, L., Tully, M.A., & Herring, M.P. (2020). Changes in Physical Activity and Sedentary Behavior in Response to COVID-19 and Their Associations with Mental Health in 3052 US Adults. *International Journal of Environmental Research and Public Health*, 17(18), 6469–6469. [PubMed]

Nakshine, V.S., Thute, P., Khatib, M.N. & Sarkar, B. (2022). Increased Screen Time as a Cause of Declining Physical, Psychological Health, and Sleep Patterns: A Literary Review. *Cureus*, 14(10), e30051. [PubMed]

Othman, M. N. A., & Rashid, M. A. A. (2018). Stress and Mental Health of Undergradute Students at a Private Higher Learning Institution in Malaysia. *Journal of Social Sciences*, 4(2), 453-465. [CrossRef]

Özkılıç, S., & Demirel, M. (2022). Perception of Compassion in Individuals Who Do Pilates and Fitness As Serious Leisure Time Activity. Turkish Journal of Sports Sciences, 7(1), 1-17. [CrossRef]

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., et al., (2018). *The Lancet Commission on global mental health and sustainable development*. 392(10157), 1553–1598. [PubMed]

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., et al., (2018). The Lancet Commission on global mental health and sustainable development. *Lancet*, 392(10157),1553-1598. [PubMed]

Piercy, K. L., Troiano, R. P., Ballard, R. M., Carlson, S. A., Fulton, J. E., Galuska, D. A., George, S. M., & Olson, R. K. (2018). The Physical Activity Guidelines for Americans. *JAMA*, 320(19), 2020–2028. [PubMed]

Rodriguez-Ayllon, M., Cadenas-Sánchez, C., Estévez- López, F., Muñoz, N., Mora-Gonzalez, J., Migueles, J. H., et al., (2019). Role of Physical Activity and Sedentary Behavior in the Mental Health of Preschoolers, Children and Adolescents: A Systematic Review and Meta-Analysis. *Sports Medicine*, 49(9), 1383–1410. [PubMed]

Schuch, F.B., Vancampfort, D., Firth, J., Rosenbaum, S., Ward, P.B., Silva, E.S., et al., (2018). Physical Activity and Incident Depression: A Meta-Analysis of Prospective Cohort Studies. *The American Journal of Psychiatry*, 175(7), 631–648. [PubMed]

Schwartz, K.D., Exner-Cortens, D., McMorris, C.A., Makarenko, E., Arnold, P., Bavel, M.V., Williams, S., & Canfield, R. (2021). COVID-19 and Student Well-Being: Stress and Mental Health during Return-to-School. *Canadian Journal of School Psychology*, 36(2), 166–185. [PubMed]

Singh, M., Sharma, P., Raj, D., Sharma, S., Kaushal, A., & Raina, S. K. (2018). Leisure Time Physical Activity and Risk of Developing Depression among the Youth of Kangra District, Himachal Pradesh, India. *Indian Journal of Psychological Medicine*, 40(5), 426–432. [PubMed]

Sitoayu, L., Choirunnisa, S., Pakpahan, T. H., & Rosdyaningrum, S. (2020). Nutritional Knowledge, Dietary Assessment, Physical Activity, Body Fat Percentage, and Nutritional Status of Police Officers. *Journal of Health Education*, 5(1), 39-48. [CrossRef]

Stuart, Ciaccioni, S., Thomas, G., & Ineke Vergeer. (2019). Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. 42, 146–155. [CrossRef]

Talapko, J., Perić, I., Vulić, P., Pustijanac, E., Jukić, M., Bekić, S., Meštrović, T., & Škrlec, I. (2021). Mental Health and Physical Activity in Health-Related University Students during the COVID-19 Pandemic. *Healthcare*, 9(7), 801–801. [PubMed]

World Health Organization (WHO). (2019, December 19). Mental health. Who.int; World Health Organization: WHO. https://www.who.int/health-topics/mental-health.