



Conducta sedentaria, actividad física y su asociación con la depresión en estudiantes universitarios de especialidades deportivas

Sedentary Behaviour, Physical Activity and Its Association with Depression among University Students Majoring in Sports

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Abstract

Introduction: Sports students are typically expected to practice an active life and follow healthy lifestyle; thus, they are less likely to experience depression. As a result, research on depressive symptom and its risk factors on this population is scarce.

Objective: This study aims to evaluate depression and its correlation with physical activity and sedentary lifestyle in university students.

Methodology: Undergraduates majoring in sports at a public university in Surabaya, Indonesia, participated in this cross-sectional survey. 124 students filled a self-reported questionnaire to assess sociodemographic information, sedentary behavior (Sedentary Behavior Questionnaire), physical activity (International Physical Activity Questionnaire-Short Form), and depression (The Depression, Anxiety and Stress Scale-42). Independent t-test and Pearson's correlation test were carried out to analyze the data, with significance level was set at $\alpha < 0.05$.

Results: The overall of total sedentary time was 7.66 hours/day (weekday) and 8.28 hours/day (weekend), and 26.61% of students were insufficiently active. The prevalence of depression was 41.94%, ranging from mild to severe. Significant association was found between SB, PA, and depression ($p < 0.05$).

Discussion: The findings of this study demonstrated that high levels of SB in addition to low levels of PA correlated with depressive symptoms, where the interaction between these factors could give negative effects on health

Conclusions: These results call for the establishment of prevention and intervention models in university health-promotion programs, with the facilitation of physical activity and the reduction of sedentary behavior in these particular population should be as essential components in order to maintain healthy body and mind.

Keywords

Depression; physical activity; sedentary behavior; sitting time; university students

Resumen

Introducción: Se espera que los estudiantes deportistas lleven un estilo de vida activo y saludable, lo que reduce su probabilidad de sufrir depresión. Por ello, hay poca investigación sobre los síntomas depresivos y sus factores de riesgo en esta población.

Objetivo: Este estudio evalúa la correlación entre la depresión, la actividad física y el sedentarismo en estudiantes universitarios.

Metodología: Estudiantes de pregrado en deportes de una universidad pública en Surabaya, Indonesia, participaron en esta encuesta transversal. 124 estudiantes completaron un cuestionario auto-reportado sobre datos sociodemográficos, comportamiento sedentario, actividad física y depresión. Se realizaron pruebas t independientes y correlaciones de Pearson para analizar los datos, con un nivel de significación de $\alpha < 0,05$.

Resultados: El tiempo total de sedentarismo fue de 7,66 horas/día en días laborables y 8,28 horas/día los fines de semana, con un 26,61% de estudiantes inactivos. La prevalencia de depresión fue del 41,94%, variando de leve a severa. Se encontró una asociación significativa entre sedentarismo, actividad física y depresión ($p < 0,05$).

Discusión: Los hallazgos de este estudio demostraron que niveles altos de SB además de niveles bajos de PA se correlacionaban con síntomas depresivos, donde la interacción entre estos factores podría dar efectos negativos sobre la salud.

Conclusiones: Estos resultados demandan crear modelos preventivos e intervinientes en programas universitarios de salud, enfocándose en facilitar la actividad física y reducir el sedentarismo para mantener cuerpos y mentes sanas.

Palabras clave

Actividad física; comportamiento sedentario; depresión; estudiantes universitarios; tiempo sentado;

Introduction

University offers a variety of potentially challenging transitions, which are here described as navigated period of change (Cage et al., 2021). Transitions starts even before a student experiences the university life, and involve adjusting to year-to-year changes, as well as preparing to pursue a career or postgraduate study. Navigating the change and transition can be very psychological demanding and stressful (Cage et al., 2021). As a result, some students may experience mental health issues. One of the most common mental health issues among university students is depression (Campbell et al., 2022; Dessauvagie et al., 2022; Roldán-Espínola et al., 2024). The prevalence of depression was relatively high in young adults, particularly among university students as vulnerable population (Luo et al., 2024; Yeo et al., 2024). Some studies have discovered the rising level of depression symptoms among individuals aged 18-25 years, making it public health issue (Bekova et al., 2021).

Universities should be concerned about the increase number of students showing depressive symptoms for several reasons. First of all, there are several health problems associated with depression. Depression symptoms that developed at this age could be a predictor of another depression episode later in life (Zeyen et al., 2024). Along with other health problems, depression is also linked to obesity (Fu et al., 2023), diabetes complications (de Groot, 2023), and CVD (Krittanawong et al., 2023). In addition, students who suffer from depression may find it more difficult to perform in school as it can also negatively affect their academic achievement, as well as hinder their long-term development and future success (Gao et al., 2020).

A number of health-related behaviours have been linked to an increased risk of depression among university students, which previous studies have revealed that the increased of physical inactivity and sedentary behaviour and are among the most prevalent ones (Barbosa et al., 2024; Casanova et al., 2023; Guo et al., 2024). Sedentary behaviour (SB) is defined as any activities that require little energy expenditure or fewer than 1.5 metabolic equivalents (METs) (Maulana et al., 2021; Zhou et al., 2021). Recent study reported that university students engage in sedentary behaviour for 7.29 hours per day (Castro et al., 2020), and some of them even spend more time in sedentary activity compared to desk-based workers (Moulin & Irwin, 2017). Meanwhile, people who engage in insufficient quantities of moderate-to-vigorous physical activity (MVPA)—which equivalents to doing less than 150 minutes of moderate intensity or 75 minutes of vigorous intensity aerobic physical activity throughout the week—have been referred to as inactive (WHO, 2010). Following the definitions, it becomes clear that sedentary behaviour (SB) and physical inactivity are two different constructs (van der Ploeg & Hillsdon, 2017), but these two are found to be associated with the risks of depression.

University students majored in sports are expected to have an active lifestyle compared to other majors as they habitually engage in higher levels of physical activity (PA) and learn about health-related courses during class (Zhou et al., 2021; Zubiaur et al., 2021). In addition to that, people believed that high level of physical activity practiced everyday by sport students might bring a positive self-concept and a decrease in mental health issues including anxiety and depression. As a result, few studies have been done on SB, PA and their relationship to depression specifically on this population, which mostly done on adult or worker population instead. While some studies have explored the mental health implications of PA and SB separately, few have examined their combined effects on depression among university students, leaving a significant void in understanding how these factors interact within this population. Additionally, previous investigations have often focused on general university populations without isolating sports students, which may overlook unique factors influencing their mental health outcomes. Therefore, this study aims to fill these gaps by investigating the association between sedentary behaviour, physical activity, and depression among university students.

Method

Study Design

It was descriptive quantitative study using cross sectional design. The study was done in February – March 2024. The participants were recruited using purposive sampling with inclusion criteria as follows: (1) registered as an active undergraduate student of Universitas Negeri Surabaya; (2) majored



in sports (sport science / physical education / sport coaching); (3) 18 – 22 years old. Senior students who spend more than four years in university were excluded from the study because they had not led a typical university life and it was hard to invite them to participate in this study, as most of them were away from university to focus on their career outside. A total of 124 students participated in this study. Before the study began, all participants were given a detail information about the nature of the research, including the potential risks and benefits following the involvement on this study. Afterward, a written informed consent was obtained from each participant. All study protocol was conducted according to Declaration of Helsinki's guideline.

Data Collection

Data was collected using a self-administered questionnaire via an online-based platform. The questionnaire consisted of four parts which assessed socio-demographic information, sedentary behaviour, physical activity, and depression symptoms. Sociodemographic characteristic consisted of age, sex, height, bodyweight, year in university, living arrangement, place of origin, parent educational attainment, and parent's occupation.

Sedentary behaviour was measured using Sedentary Behaviour Questionnaire (SBQ) that is developed by Rosenberg et al (2010). It consisted of self-reported of time spent on eight types of sedentary activities during weekday and weekend. The reported time was then converted into hours (a 15-minute response is recoded as 0.25, and a 30-minute response is recoded as 0.5.), and the average duration was calculated.

Next section of the questionnaire was aimed to measure physical activity using International Physical Activity Questionnaire-Short Form (IPAQ-SF) that was translated into Indonesian. The translated questionnaire has been tested for validation and reliability, which demonstrated high internal consistency (Cronbach's alpha coefficient was 0.85) and strong reliability (correlation coefficient was 0.85). The respondents were asked to compute how much time they had spent on various level of physical intensity (walking, moderate, vigorous, and sitting/leisure activity) over the previous seven days, expressed in days per week and minutes per day. The metabolic equivalent tasks (METs), which are measured in minutes per week, were used to rate the total amount of physical activity. Then, the MET min/week was calculated as the sum of the total minutes spent in the last seven days, multiplied by 8.0 (vigorous), 4.0 (moderate), and 3.3 (walking), and 1.0 (sitting) (P. H. Lee et al., 2011).

Lastly, depression symptoms were measured using The Depression, Anxiety and Stress Scale-42 (DASS-42) which has been translated into Indonesian. The questionnaire has been shown to be well-validated tool for measuring perceived depression, anxiety, and stress symptoms, each consists of 14 questions. Respondents were asked to rate 14 depression-specific questions only (from 0 to 3), based on how frequently they had experienced each statement. The score was then summed up and categorised with the cut off to determine if respondents experienced depression. The levels were classified as no symptoms (0-9), mild (10-13), moderate (14-20), severe (21-27), and very severe (>28)—were then determined using the final composite score (Herdyanto et al., 2020).

Statistical Analysis

SPSS 21 for Mac was used to analyse the data. Descriptive analysis was used to summarize the demographic characteristics, providing a clear overview of the participants' socio-demographic variable. Independent T-test was used to compare the sedentary time reported by students during weekday and weekend, allowing for a comparison analysis on sedentary behaviour across two different occasions. Pearson correlation test was applied to investigate the association between sedentary behaviour, physical activity, and depression. All data measurements were reported descriptively as frequency, percentage (%), mean, and standard deviation ($\bar{x} \pm SD$). The significance level was set at $\alpha < 0.05$, and all tests were two-tailed.

Results

This study investigated the association between sedentary behaviour, physical activity, and depression among university students. A total of 124 sport students (64.52% male and 35.48% female) participated in this study. The average of age was 20.29 ± 1.85 year, while the average of height, bodyweight, and BMI were 163.42 ± 6.70 cm, 60.35 ± 9.15 kg, and 21.84 ± 3.01 kg/m², respectively. Most of the



participants were second year students (47.77%), living with parent (50.81%), and were from urban area (52.42%). Majority of the students' parent went to college or university (39.52%) and now working as entrepreneur (51.61%). In term of physical activity, more than half of the participants (58.06%) was moderately active. The average value of PA was 2610.45 ± 782.20 MET-minutes/week.

Table 1. Socio-demographic Characteristic of Participants

Socio-demographic Variable	n (%)	Mean \pm SD*
Age (years)	-	20.29 \pm 1.85
Height (cm)	-	163.42 \pm 6.70
Weight (kg)	-	60.35 \pm 9.15
Body mass index (kg/m ²)	-	21.84 \pm 3.01
Gender		
Male	80 (64.52%)	
Female	44 (35.48%)	
Year in university		
Freshmen / first year	32 (25.81%)	
Sophomore / second year	58 (46.77%)	
Third year	34 (27.42%)	
Living arrangement		
Living alone	20 (16.13%)	
Dormitory or boarding house	41 (33.06%)	
Living with parent	63 (50.81%)	
Place of origin		
Urban	65 (52.42%)	
Rural	59 (47.58%)	
Parent educational attainment		
Uneducated	8 (6.45%)	
Primary school	14 (11.29%)	
Middle school	25 (20.16%)	
High school	28 (22.58%)	
University	49 (39.52%)	
Parent's occupation		
Unemployed	7 (5.65%)	
Entrepreneur	64 (51.61%)	
Government officer	25 (20.16%)	
Private-owned employee official	28 (22.58%)	
Physical activity (MET-minutes/week)	-	2610.45 \pm 782.20
Level of physical activity		
Low (< 600 MET-minutes/week)	33 (26.61%)	
Moderate (\geq 600 MET-minutes/week)	72 (58.07%)	
High (\geq 3000 MET-minutes/week)	19 (15.32%)	

*Data given as mean \pm SD

In detail, the overall time spent by students doing sedentary activities during weekday and weekend are summarized in Table 2. Students spent most of their time to do paperwork or computer work during weekday (2.26 ± 0.74 hours), while on the weekend, they mostly played computer or video games (2.08 ± 0.42 hours). Meanwhile, the activities that takes the least time for students to do was doing artwork or crafts (Table 2). Independent t-test revealed that 4 out of 9 types of sedentary activities were different statistically ($p < 0.05$). Those are watching television ($p = 0.024$), playing computer or video games ($p = 0.005$), sitting and talking on the phone ($p = 0.040$), and doing paperwork or computer work ($p = 0.000$).

Table 2. Differences of Sedentary Activities during Weekday and Weekend (in hours per day)

No.	Self-Reported Sedentary Activity	Duration		p value
		Weekday	Weekend	
1	Watching TV (including videos on VCR/DVD)	0.60 \pm 0.11	1.25 \pm 0.25	0.024*
2	Playing computer or video games	1.25 \pm 0.54	2.08 \pm 0.42	0.005*
3	Sitting listening to music on the radio, tapes, smartphones, or CDs	0.74 \pm 0.09	0.86 \pm 0.13	0.350
4	Sitting and talking on the phone	0.34 \pm 0.25	0.66 \pm 0.19	0.040*
5	Doing paperwork or computer work (office work, emails, paying bills, etc)	2.26 \pm 0.74	0.82 \pm 0.64	0.000*
6	Sitting reading a book or magazine	0.57 \pm 0.25	0.45 \pm 0.04	0.400
7	Playing a musical instrument	0.30 \pm 0.29	0.45 \pm 0.12	0.180
8	Doing artwork or crafts	0.20 \pm 0.09	0.38 \pm 0.16	0.125
9	Sitting and driving in a car, bus, or train	1.12 \pm 0.45	1.20 \pm 0.30	0.500
	Total	7.66 \pm 1.33	8.28 \pm 1.92	

*Significant difference using independent t-test ($p < 0.05$)



Table 3 summarizes the frequency of depression, anxiety, and stress experienced by students. Overall, the frequency of the respondents who had no depression was 72 (58.06%), while the rest of students (41.94%) had depression with different level ranging from mild to very severe. Mild depression was most likely experienced by the students (32.26%), with the average score was 11.53 ± 3.72 .

Table 3. Descriptive Analysis of Depression among Students

Level of Depression	f	%	Mean Score	SD
Normal	72	58.06	5.49	2.08
Mild	40	32.26	11.53	3.72
Moderate	10	8.06	16.87	5.63
Severe	2	1.61	22.71	5.38
Very Severe	0	0	0	0

The following analysis presents the correlation between sedentary behaviour, physical activity, and depression. Pearson correlation suggested a weak negative correlation between depression and physical activity ($p = 0.040$, $r = -0.415$). However, positive correlation was found between depression and sedentary behaviour ($p = 0.009$, $r = 0.780$).

Table 4. Correlation between Sedentary Behaviour, Physical Activity, and Depression

Measured Variable	Depression (score)		Sedentary behaviour (hours)		Physical activity (METs score)	
	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>	<i>p</i> -value	<i>r</i>
Depression (score)	-	-	0.009*	0.780	0.040*	-0.415
Sedentary behaviour (hours)	0.009*	0.780	-	-	0.125	-0.198
Physical activity (METs score)	0.040*	-0.415	0.125	-0.198	-	-

Significant difference at $p < 0.05$

Discussion

In the context of a university-based health promotion program, we evaluate sedentary behaviour and physical activity of sport students enrolled in Universitas Negeri Surabaya. Present study discovers that the most sedentary activity done by students are doing computer-related tasks and playing video games, which these two belong to screen-based activity. The findings of this study show that the average duration spent by students in doing sedentary activity were 7.66 ± 1.33 hours/day during weekday and 8.28 ± 1.92 hours/day during weekend. These findings are higher than previous study done among Chinese university students which found that the median duration of sedentary activity was 7.29 hours/day. Furthermore, recent meta-analysis and systematic review reported that a large population of university students in UK spend more time in prolonged sitting compared to young adult in general, with computer-use posed significantly higher prevalence over other type of sedentary activity (Castro et al., 2020). Given previous researches showing similar results, we assume that it is likely a high proportion of Indonesian students spend more time in prolonged sitting, reflecting trends in general population (Maulana et al., 2021). The Australian Government Department of Health and Aged Care or AGDHAC (2021) recommends < 2 hours/day of doing screen-based activity for teenagers, and less duration is more favourable for younger children (WHO, 2020). However, a clinical and public health guideline for sedentary behaviour in adults is not yet established (E. Lee & Kim, 2019). Nonetheless, some researches agreed that long sitting hours would have negative effects on health (Buffey et al., 2022; Fernström et al., 2023; Kallings et al., 2021).

In regard of PA, present study reveals a prevalence of 26.61% of insufficiently active or low level of physical activity in students—who do not meet the PA recommendation by WHO (2020). This number is surprisingly higher than the average medical students in other provinces in Indonesia (22.30%) (Halim et al., 2023) and undergraduate students in Malaysia (25.9%) (Stephen et al., 2021), but still lower than global prevalence (27.50%) (Guthold et al., 2018). Some possible explanations regarding many sport students are found insufficiently active are due to lack of time and low participation in sport as they have done it during class. Results from previous study reported that the biggest perceived barrier to physical activity among students was time constraint, lack of motivation, as well as lack of accessible places (Silva et al., 2022), which is relevant to present study. Furthermore, many factors may also play a role in these behaviours. The increasing reliance on technology for both academic and recreational purposes can lead to a lifestyle where physical activity is deprioritized. Moreover,



environmental aspects such as limited access to recreational spaces or organized physical activities may exacerbate this issue (Tuasikal et al., 2023)

Limited research has been done on sedentary behaviour and physical activity, especially in university setting. This population is of interest because it comprises a significant proportion of the general population and because of the contextual circumstances and transitions that students go through that may have an impact on behaviours and lifestyles related to health (Hariyanto et al., 2023). Studying this topic is crucial since late adolescence is a critical time to establish and shape health-related habits, which frequently carry over into adulthood (Roberts et al., 2024). Sedentary behaviour and physical inactivity in adults are linked to poor health outcomes such as all-cause mortality, as well as the incidence of cardiovascular disease (CVDs), cancer, and type 2 diabetes (WHO, 2020). The findings of some studies discovered that the risk of diabetes and obesity rises by 7% and 5%, respectively, for every two hours spent sitting and inactive (Daneshmandi et al., 2017). More sitting time coupled with lower physical activity levels, affecting cardiovascular health and increasing vulnerability to heart disease and stroke (Dunstan et al., 2021). These physical diseases not only affect overall health, but they can also cause mental health issues such as bad mood and depression (Herdyanto et al., 2020).

Present study indicates that the proportion of depression among students was 41.94%, which is higher than the prevalence of depression in Iran's undergraduate students (26.6%), especially in non-athlete students (Ghaedi & Kosnin, 2014). Another study found higher prevalence than ours which 61.20% of Portuguese college students reported mild to severe depressive symptoms (Amaro et al., 2024). Similar results were found in other countries especially during Covid-19 pandemic, where depression became global public health problem, affecting students' mental health and overall well-being (Li et al., 2021). Our study identifies a positive correlation between prolonged sitting, low physical activity, and high depression score. It is in line with recent meta-analysis conducted on general population which found that SB was associated with an increased risk of depression, however the individual study results were varied (Zhai et al., 2015). Apart from the theory that sedentary behaviour may substitute physical activity which has been demonstrated to give negative effects to mental health, the underlying explanation includes that high sedentary time may hinder people from engaging in social communication and interactions, hence increase their risk to develop depression (Zhou et al., 2021). Furthermore, previous research done in sport students revealed that SB is a risk factor for depression that is independent of vigorous PA level, which is in line with other studies that considered depression to be a health outcome (Zhai et al., 2015). The mortality risk connected to SB could be lowered by actively engage in PA at higher levels than the recommendation.

Conclusions

In conclusion, the findings from this study highlight a concerning trend of prolonged sedentary behavior and insufficient physical activity among sport students at Universitas Negeri Surabaya, with average sedentary durations significantly exceeding recommended guidelines. The high prevalence of depression observed in this population, along with its correlation to sedentary behavior and low physical activity levels, underscores the urgent need for targeted health promotion interventions. Addressing these issues is critical not only for improving physical health outcomes but also for enhancing mental well-being among students, thereby fostering a healthier and more active campus environment.

There are some limitations to the current study that should be considered. One of the primary limitations of this study is its cross-sectional design, which inherently restricts the ability to infer causality. While the study may identify correlations between SB, PA, and depression, it cannot definitively determine whether one variable causes change in another. However future researches on longitudinal design may help to investigate and validate these findings by tracking changes over time and providing insight into causal mechanism. Moreover, the results of measured SB and PA were derived from the self-reports of participants rather than objective measurements, so it is possible that participants might report more or less sitting time and physical activity to present themselves in a more favorable light. Given these limitations, future studies should aim to incorporate objective measures of SB and PA alongside self-reports to enhance the accuracy of data collection. Furthermore, prospective research should be conducted to identify potential barriers of PA and potential causes for high levels of



SB in university students in order to develop and implement appropriate prevention and intervention programs.

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