



Physical Activity and Its Relation to Academic Performance Among University Students

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Abstract. Correlation between physical activity and academic performance needs further investigation. Thus, this study aims to evaluate the association between those variables in university students. The data for this cross-sectional study were gathered from a convenience sample of students from Universitas Negeri Surabaya aged between 18 and 22 years. Socio-demographic characteristic (anthropometric, parental factor, health-related behaviour) was obtained using an online self-administered questionnaire. Physical activity levels were self-reported with the International Physical Activity Questionnaire (IPAQ), and academic performance was assessed using Grade Point Average (GPA) from the last final semester exam. The finding reveals that age ($p = 0.072$, $r = 0.142$), weight ($p = 0.840$, $r = -0.026$), height ($p = 0.799$, $r = 0.244$), and body mass index ($p = 0.154$, $r = -0.251$) do not significantly correlate with academic performance measured using GPA. The positive correlation is only found between physical activity and academic performance ($p = 0.032$, $r = 0.450$). Most of students in this study practiced physical activity in moderate level (600–3000 METs/min/week) and achieved good academic performance ($n = 124$, 64.6%). Further cross tabulation analysis using Chi Square shows that level of PA associates with academic performance in general ($p = 0.044$). This finding supports the previous literatures with evidence that regular physical activity may relate to academic performance in university students.

Keywords: academic performance · exercise · GPA · health-related behavior · physical activity · university · student

1 Introduction

Any movement produced by the contraction of skeletal muscles that causes an increase in energy expenditure beyond the basal level is referred to as physical activity (PA). (Muntaner-Mas et al., 2022; Pigglin, 2020). World Health Organization (WHO) (2020) recommends adults aged between 18 and 64 to participate in 75–150 min of moderate

to vigorous intensity of physical activity (MVPA) throughout the week. The duration of PA can be increased up to 300 and 150 min in a week for additional health benefits. On top of that, US Department of Health and Human Services (2018) adds that adults should also engage in any muscle-strengthening activities that involve major muscle groups for at least two or more days in their weekly repertoire. Previous studies have been documented the health benefits of physical activity over the life span (Muntaner-Mas et al., 2022), such as reducing risk for non-communicable diseases including type 2 diabetes, hypertension, dyslipidemia, metabolic syndrome, and some cancers (Asigbee et al., 2018; F. W. Booth et al., 2012; Elmagd, 2016). Additional health benefits of PA include maintaining healthy bodyweight (Chaput et al., 2011), boosting mood and mental health (Ai et al., 2021), as well as improving muscle and bone strength that prevent falls and improves ability to run daily life activities (Asigbee et al., 2018). Regular physical activity is also associated with a healthier and longer life, thus it could affect quality of life and increase life expectancy (Reimers et al., 2012).

With those all health benefits, promoting physical activity has been a global health priority (Vuori, 2018) as almost one-third of the world's population failed to meet the recommended physical activity (González et al., 2017). In Indonesia, about one in three people aged ten years or more are physically inactive (Sitohang & Ghani, 2021). These age groups include university or college students, who are prone to practice sedentarism and physical inactivity (Small et al., 2013). Recent survey showed that about 50% of the adults aged 18–24 including those who graduated from university failed to meet the WHO's physical activity guideline (Choi et al., 2021). Previous studies over the last two decades reported that one of three college students tend to become more physically inactive throughout their college years (Huang et al., 2003; Kolodinsky et al., 2007). Several reasons that might explain the findings are due to rapid technology development (Ráthonyi et al., 2021), lack of motivation (Eichorn et al., 2018), and academic pressures (Hakim et al., 2020). Students often do not have time to do physical activities or any kind of sport because they are busy with lectures and assignments (Supriyanto et al., 2021). This situation is worsen by the fact that many universities in Indonesia do not provide sport facilities or even sport courses to their students, unlike in school level where students can learn and get to play sport for 120 min every week (Sunadi et al., 2016). In addition to that, the transition from senior high school to university can be very stressful for many, and students' beliefs about their fate during this transition can become a source of stress.

The aforementioned situation is very unfortunate, as a growing finding states that physical activity has been positively affected academic and cognitive performance (Álvarez-Bueno et al., 2017). The benefits of physical activity in increasing cognitive function and learning indicate the potential effect of PA to improve academic achievement in children and adolescents (Bueno et al., 2021). Previous observational studies that investigated the association between moderate-to-vigorous physical activity (MVPA) and academic performance in adolescents have found various results, range from positive (Maher et al., 2016), null (Domazet et al., 2016; Syväoja et al., 2018), and even inverse associations (Dijk et al., 2014) between the two.

Many literatures investigate the relationship between physical activities and cognitive function or academic performance among populations such as adolescents, adults, and older groups (Langford et al., 2014). Studies conducted on youth and adolescents are extensive, although they may not be extrapolated to the college population. Despite a large number of evidences during other life stages, there is limited research examining how PA and academic performance relate to each other during college years. On top of that, study about physical activity of university students is quite interesting, as previously mentioned that physical education is no longer a compulsory course at tertiary level as it is in primary or secondary school in Indonesia. Thus, we conduct this study to investigate the association between physical activity and academic performance in university students.

2 Research Method

It was a descriptive study with cross-sectional design. Participants of this study were undergraduate students in year one to four, recruited using convenient sample method. Participants who belong to specific age range (between 18 and 22 years) were invited to participate in this study by completing an online self-administered questionnaire. The survey was distributed after they finished final semester exam. Each participant was provided with a brief written explanation about the detailed nature of this study before filling the survey. They were also assured of the confidentiality of their responses. A total of 377 respondents were completing self-reported survey.

The first part of the survey was a questionnaire that assessed baseline characteristic. The baseline information we gathered including age, gender, year in university, place of origin, living arrangement, financial education source, parent's education and educational status, sleep duration, screen time, and frequency of exercise.

The validated International Physical Activity Questionnaire's condensed version was used to measure the amount of physical activity (IPAQ-SF). Without any changes, the questionnaire was translated into Indonesian. The next step was to ask respondents to estimate how much time (in days per week and minutes per day) they had spent over the previous seven days engaging in various kinds of physical activity (walking, moderate, vigorous, and sitting/leisure activities). The total amount of physical activity was measured using metabolic equivalent tasks (METs), which were measured in weekly minutes. The MET-min/week is the sum of minutes spent on activities at different levels of walking, moderate, vigorous, and sitting within the last 7 days that is multiplied by 8.0, 4.0, and 3.3, 1.0, respectively.

This study's dependent variable was academic achievement. The previous semester's Grade Point Average (GPA) was used to evaluate it. The faculty's academic office provided the weighted averages of the course grades for this particular semester, which were used to calculate GPA. The GPA was calculated using a 4.00 scale, with each study course receiving a grade value between 0 and 4 based on the grade given for the subject. Each grade was multiplied by the number of credits in each course, and the resulting figures were then added together. The total number of credit points each student earned over the semester was divided by the sum of the values.

All variables were presented using descriptive statistics in terms of mean, standard deviation, frequency, and percentages. In addition to descriptive statistics, follow-up

studies were carried out to examine any significant differences between groups using independent t-tests, Mann-Whitney tests, and one-way ANOVA. The correlation between the measured variables was examined using the Pearson Correlation, Spearman Rank test, and Chi-Square. A P-value of 0.05 or less was regarded as statistically significant. SPSS 26 for Windows was used for all statistical analysis.

3 Results and Discussion

Many factors are considered as contributors to the academic performance of students, such as gender, living setting during university life, social environment, family income level, time spent for studying, etc. However, there are currently few studies on the factors that influence students' GPA in Indonesia, therefore this study is anticipated to close the knowledge gap in this field. The results of the current study show a correlation between university students' academic success and socio-demographic characteristics and health-related behaviors. We discovered that male students typically have lower GPAs than their female counterparts. The previous studies conducted in US found similar findings where gender was correlated with students' achievement, in which female students mostly obtained higher GPA score than male students (Deliens et al., 2013; Richardson et al., 2012). It is partly could be explained by the fact that females had higher motivation and more likely to pay attention in class, work with other classmates, and more organize. In contrast, males more often have discipline problems in class, as well as score lower in motivation to learn (Severiens & ten Dam, 2012). In fact, concentration, motivation, and discipline play important role in supporting students to perform well during college years. According to certain studies, gender achievement discrepancies are also caused by disparities in competence, as determined by standardized performance tests. However, other studies have challenged these findings, demonstrating that even when students were equally competent, female students still received greater grades than male students (Workman & Heyder, 2020) GPA difference is also found in year spent in university, where students in their third year presented higher GPA than their counterparts.

The impact of parental factors on students' GPA is another important study finding. According to the current study, living arrangements and academic achievement are related; students who lived with their parents tended to have higher GPAs. This is related to the parents' role, where previous researches about the involvements of parent in monitoring the learning process mentioned that it will have an impact on student academic achievement (Bakouei et al., 2019). Barrera et al. (2001) also emphasize the significance of the parental role, noting that the lack of parental supervision will lead to an increase in students' unhealthy behavior and lower academic achievement, particularly for students who live in dorms or boarding houses. This study was done during the Covid-19 epidemic, a time when most students were forced to learn at home. As a result, the majority of them lived with their parents and had them supervise their academic progress (Tan et al., 2022). In addition to the living arrangement, a higher average GPA was also found in students having higher-income parents and higher educated mothers. This can be explained by the fact that fathers and mothers with higher education will be more motivated to devote more time, effort, and resources to fostering their children's cognitive development since they will be more conscious of the value of education (Abuya et al., 2018).

According to the study's findings, a student's academic success is correlated with their amount of physical exercise. This concurs with recent research on Belgian university students (Deliens et al., 2013), but it also runs counter to a prior systematic review by Singh et al. (2012) that discovered a robust beneficial relationship between physical exercise and academic achievement in children and adolescents. According to the study, regular PA enhanced kids' studying focus and classroom demeanor (Singh et al., 2012). This finding was supported by Hillman et al (2008). 's further investigation, implying that regular physical activity is associated with an increase in brain function related to cognitive aspects, where this can then positively affect academic performance. Previous literatures in children and adolescents explained that more physically active students show better academic performance (Howie & Pate, 2012; Wunsch et al., 2021). According to Gomez-Pinilla and Hillman (2013), physical activity and exercise have a significant impact on brain health, which enhances memory, learning, and academic performance. Additionally, college students that regularly participate in PA are said to have better moods, mental health, and to be more content personally (Arslan & Akkas, 2013), as well as more successful than their peers who are less physically active (Slavinsky et al., 2021).

Despite the fact that research on PA and academic achievement has advanced greatly over the past five years, there is still much to be done. Most studies related to PA and GPA in university students continue to be cross-sectionals, not many observational or longitudinal studies have been conducted during the last decade. With so many observational studies, it is important to highlight that causal inferences cannot be made from cross-sectional correlations (Howie & Pate, 2012). Therefore, more observational studies using cohort design need to be carried out in the future. And to get more accurate results, the assessment of physical activity can be measured objectively using tools such as accelerometers.

4 Conclusion

This cross-sectional study demonstrates a link between academic achievement and physical exercise among university students. To examine confounding factors of socio-demographic traits including gender, age, parental circumstances, and health-related behavior, larger sample sizes across different majors or universities are required. Future longitudinal analyzes could investigate with greater precision whether increased physical activity could really improve cognition and academic performance of students.

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