Physical Activity Levels Among Students, Vietnam

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HOW TO CITE:
Truong Dương Ngoc, Son Quang Nguyen, Vinh Quang Nguyen (2026). Physical Activity Levels Among Students, Vietnam. International Journal of Special Education, 41(12s), 624-632

ABSTRACT:
Physical activity (PA) is an important indicator of health, yet evidence regarding PA among Vietnamese university students remains limited. This study aimed to investigate PA levels and sedentary behavior among 120 first-year students at Saigon University, Vietnam. Data were collected using a questionnaire and analyzed according to the World Health Organization (WHO) recommendations. The results showed that 55.83% of students met the recommended PA level, with a higher proportion among males (69.23%) than females (45.59%). Students accumulated an average of 1.82±2.15 days/week of vigorous-intensity PA and 4.25±2.55 days/week of moderate-intensity PA. All participants engaged in transportation-related PA. Mean sedentary time was 13.25±1.73 hours/day, with females reporting longer sedentary time than males. Significant gender differences were observed in PA indicators. Overall, 44.17% of students did not achieve the WHO-recommended PA level. These findings provide evidence for developing strategies to promote physical activity and reduce sedentary behavior among university students.

Keywords: physical activity, sedentary behavior, university students, WHO recommendations, Vietnam..

1. Introduction

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that requires energy expenditure and encompasses activities performed during work, transportation, household tasks, leisure, and sports (World Health Organization, 2018, 2020, 2024; Piercy et al., 2018; Powell et al., 2018). Regular participation in PA is recognized as a key determinant of health and contributes to the prevention of cardiovascular diseases, obesity, diabetes, metabolic disorders, and premature mortality (Lee et al., 2012; Warburton et al., 2021; Dhuli et al., 2022). Accordingly, the World Health Organization (WHO) recommends that adults aged 18–64 years accumulate at least 150 minutes of moderate-intensity PA, 75 minutes of vigorous-intensity PA, or an equivalent combination corresponding to a minimum of 600 MET-minutes per week (World Health Organization, 2011, 2020).

Despite these well-established benefits, physical inactivity remains a major public health concern worldwide. Recent evidence indicates that a substantial proportion of the global population fails to achieve the recommended PA levels, particularly among adolescents and young adults (Guthold et al., 2018, 2019; World Health Organization, 2024). In addition, prolonged sedentary behavior has emerged as an independent health risk factor associated with obesity, cardiovascular diseases, metabolic disorders, and increased mortality (Ekelund et al., 2019; Katzmarzyk et al., 2019). The coexistence of insufficient PA and excessive sedentary behavior has therefore become an important issue for public health promotion.

University students represent a population of particular interest because lifestyle habits established during this period are likely to persist into adulthood. Previous studies have shown that students who regularly engage in PA demonstrate better physical fitness and health outcomes than their inactive peers (Ainsworth et al., 2011). However, several studies conducted in different countries have reported that many university students do not meet international PA recommendations (Pengpid et al., 2015; Tinazci et al., 2019; Kljajević et al., 2022). Furthermore, gender differences in PA participation have been consistently observed, with male students generally reporting higher activity levels than females (Guthold et al., 2020; Kljajević et al., 2022).

In Vietnam, studies investigating PA among university students remain relatively limited (Dang, 2018; Duc et al., 2022; Ngan et al., 2023; Phuong, 2023). Existing evidence suggests that physical inactivity and sedentary lifestyles are increasingly common among young people, emphasizing the need for updated data to support health promotion and physical education policies. Nevertheless, little information is available regarding the current PA status and sedentary behavior of students within specific university settings.

Therefore, the present study aimed to investigate physical activity levels and sedentary behavior among students at Saigon University, Vietnam. The findings are expected to provide updated evidence regarding compliance with WHO recommendations and to contribute to the development of strategies aimed at promoting active lifestyles and improving the effectiveness of physical education and health promotion programs among university students.

2. Methodology

Participants

This cross-sectional study was conducted among students at Saigon University (SGU), Vietnam. A total of 3,778 students agreed to participate, from which 120 first-year students (52 males and 68 females) were randomly selected for the study. All participants voluntarily agreed to wear a Xiaomi Mi Band 9 smart wristband throughout the study period to monitor physical activity and sedentary behavior. In addition, 12 experts in physical education and sport science participated in the development and adaptation of the questionnaire.

Instruments and data collection

Physical activity (PA) was assessed using a questionnaire adapted from previously validated instruments, including APAR and GPAQ, and studies conducted by Booth et al. (2002), Abreu et al. (2010), Făgăraș et al. (2015), Rodriguez-Munoz et al. (2017), Hong et al. (2012), Ngan et al. (2023), and Phuong (2023). The questionnaire was modified to fit the Vietnamese context and consisted of 16 items covering demographic characteristics, PA related to work/study, transportation, sports and recreational activities, and sedentary behavior. PA levels were expressed as metabolic equivalent task minutes per week (MET-min/week) according to the WHO Global Physical Activity Questionnaire (World Health Organization, 2012).

Prior to the main survey, a pilot study involving 100 students was undertaken to examine the reliability of the instrument. The questionnaire demonstrated acceptable internal consistency, with a Cronbach's alpha coefficient of 0.81 and corrected item-total correlation coefficients exceeding 0.30 for all items.

In addition to the questionnaire, objective PA data were obtained using the Xiaomi Mi Band 9. The device continuously monitored heart rate, activity intensity, and sedentary time (Xiaomi Smart Band 9 User Manual, n.d.). Participants were also asked to maintain daily PA records throughout the monitoring period.

PA intensity and classification were determined according to WHO recommendations (World Health Organization, 2020). Moderate- and vigorous-intensity activities were assigned values of 4 METs and 8 METs, respectively (World Health Organization, 2012). Individuals accumulating at least 600 MET-min/week were considered to meet WHO guidelines for PA (World Health Organization, 2011, 2020). Based on total weekly energy expenditure, PA levels were categorized as low (<600 MET-min/week), moderate (600–3000 MET-min/week), and high (≥3000 MET-min/week) (Ministry of Health, Department of Preventive Medicine, 2016). Sedentary behavior was defined as time spent sitting during studying, working, recreational activities, communication, and other low-energy activities, excluding sleep.

Procedure

The study was conducted over a two-week period from September 30 to October 13, 2024. Following recruitment, participants received instructions regarding the study procedures and the use of the Xiaomi Mi Band 9. They were required to wear the device continuously throughout the study period and to complete daily records of their physical activities. Data obtained from the questionnaires, activity logs, and wearable devices were subsequently compiled and analyzed to determine PA levels and sedentary behavior among the participants.

Data analysis

Data were analyzed using SPSS version 22.0. Descriptive statistics are presented as mean ± standard deviation and percentages. Differences between male and female students were examined using chi-square tests and one-way analysis of variance (ANOVA). Statistical significance was established at $p < 0.05$ (Green & Salkind, 2005; Hair et al., 2014).

Ethical considerations

All participants provided informed consent before participation. The study protocol complied with the ethical principles of the Declaration of Helsinki and was approved by the institutional research committee. Participation was voluntary, and all collected data were treated confidentially

3. Results

The study assessed PA of SGU students through the questionnaire, categorised by work/study at school, travel, sports, or leisure activities, in terms of exercise intensity, gender, and major group, shown in Tables 1 and 2.

Table 1. Comparison of Students Participating in PA by Exercise Intensity and Gender

Activity	PA intensity	Total students N = 120		Male N = 52		Female N = 68		Sig
		N	%	N	%	N	%	
Work/study	High	18	15.0	13	25.0	5	7.53	.029
	Medium	80	66.67	42	80.77	38	55.88	.001
Exercise or recreational activities	High	54	45.00	31	59.62	23	33.82	.001
	Medium	80	66.67	43	82.69	37	54.41	.001
Travel to and from places		120	100.0	52	100.0	68	100.0	1.00

Table 1 demonstrates that students engage in Physical Activity (PA) in relation to their work or academic tasks at school. The percentage of students engaging in vigorous-intensity PA is 15.0% (male: 25.0%, female: 7.53%), while those engaging in moderate-intensity PA account for 66.67% (male: 80.77%, female: 55.88%). The percentage of students participating in moderate- and vigorous-intensity PA is higher among males than females (sig < 0.05).

The students participate in PA related to sports or recreational activities. The percentage of students engaging in vigorous-intensity PA is 45.0% (male: 59.62%, female: 33.82%), while those engaging in moderate-intensity PA account for 80% (male: 82.69%, female: 54.41%). Again, the percentage of students participating in moderate- and vigorous-intensity PA is significantly higher among males (sig < 0.05).

For light-intensity PA (such as commuting, household chores, or classroom cleaning), 100% of SGU students participate.

To accurately evaluate the level of physical activity among SGU students, the study further examines the total number of days per week, the total number of minutes per week dedicated to physical activity, and the duration of sitting/resting per day/week, classified by gender and academic group, as illustrated in Table 2.

Table 2. Comparison of Weekly Minutes of PA and Daily/Weekly Rest Time of Students by Gender

Activity	PA intensity	Participation time	Total students N = 120		Male N = 52		Female N = 68		Sig
			$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD	
Work/study	High	Days/week	0.56	1.40	0.90	1.70	0.29	1.04	.001
	Medium		1.81	1.37	2.27	1.21	1.46	1.39	.001
Exercise or recreational activities	High		1.26	1.42	1.65	1.40	0.96	1.37	.001
	Medium		2.44	1.90	3.04	1.66	1.99	1.94	.001
Total	High		1.82	2.15	2.56	2.38	1.25	1.76	.001
	Medium		4.25	2.55	5.31	2.25	3.44	2.46	.001
Travel to and from places			7.0	0.0	7.0	0.0	7.0	0.0	1.000
Work/study	High	MET Minutes/week	38.80	93.68	64.96	114.96	18.80	66.80	.001
	Medium		73.52	59.92	100	59.8	53.28	51.56	.001
Exercise or recreational activities	High		251.36	309.6	367.84	347.2	162.24	242.24	.001
	Medium		213.08	188.84	277.48	172.16	163.84	186.2	.001
Total	High		290.16	333.04	432.8	364.08	181.04	258.64	.001
	Medium		286.6	205	377.48	184.8	217.12	192.08	.001
Travel to and from places			228.32	63.68	230.48	62.48	226.72	64.52	.001

Resting time per day/week	Study and Work (hours)	9.60	0.81	9.46	0.76	9.71	0.83	.089
	Recreational (hours)	2.14	0.51	2.05	0.48	2.21	0.52	.084
	Communication and Social (hours)	0.57	0.17	0.55	0.16	0.58	0.15	.298
	Other Sedentary (hours)	0.94	0.15	0.92	0.13	0.96	0.14	.109
	Total (hours)	13.25	1.73	12.76	1.54	13.62	1.77	.005

As can be seen in Table 2, the average weekly PA duration of SGU students based on PA intensity levels totals to the average day spent on vigorous-intensity PA, which is 1.82±2.15 days per week, with the students participating in PA related to work or academic tasks at school is 0.56±1.40 days per week and the students participating in PA related to sports or recreational activities is 1.26±1.42 days per week. For moderate-intensity PA, the total average duration is 4.25±2.55 days per week, with the students participating in PA related to work or academic tasks at school is 1.81±1.37 days per week and the students participating in PA related to sports or recreational activities is 2.44±1.90 days per week. For travel to and from places PA, students perform it throughout the week.

In total, the average MET (minutes/week) spent on vigorous-intensity PA is 290.16±333.04 MET (minutes/week), with the students participating in PA related to work or academic tasks at school is 38.80±93.68 MET (minutes/week) and the students participating in PA related to sports or recreational activities is 251.36±309.6 MET (minutes/week). For moderate-intensity PA, the total average duration is 286.6±205.0 MET (minutes/week), with the students participating in PA related to work or academic tasks at school is 73.52±59.92 MET (minutes/week) and the students participating in PA related to sports or recreational activities is 213.08±188.84 MET (minutes/week). The travel to and from places PA averages is 228.32±63.68 MET (minutes/week), with male students at 230.48±62.48 MET (minutes/week) and female students at 226.72±64.52 MET (minutes/week).

Regarding sedentary behavior, SGU students spent an average of 13.25±1.73 hours per day in sedentary activities (excluding sleep). Female students had significantly higher total sedentary time (13.62±1.77 hours/day) than male students (12.76±1.54 hours/day) (p=0.005). Study and work-related activities accounted for the greatest proportion of sedentary time (9.60±0.81 hours/day), followed by recreational activities (2.14±0.51 hours/day), whereas communication and social activities (0.57±0.17 hours/day) and other sedentary activities (0.94±0.15 hours/day) contributed relatively little. No significant sex differences were observed in individual sedentary domains (p>0.05).

The comparison of PA participation across intensity levels and sedentary time on both weekdays and weekends, indicates that male students engage in significantly more PA than female students (sig < 0.05). Additionally, male students have lower sedentary time than female students on both weekdays and weekends (sig < 0.05). A summary comparison of the survey results on the proportion of students participating in PA according to WHO's recommendations by gender is presented in Table 3.

Table 3. Proportion of Students Participating in PA Based on WHO's Recommendations by Gender

Participation Time (WHO's Recommendations)	Students (120)	Male (52)	Female (68)	Sig.
Active activity (≥ 3000 MET Minutes/week)	00 (0.00%)	00 (0.00%)	00 (0.00%)	1.000

Participation Time (WHO's Recommendations)	Students (120)	Male (52)	Female (68)	Sig.
Moderate activity (600 MET Minutes/week ≤ PA ≤ 3000 MET Minutes/week)	67 (55.83%)	36 (69.23%)	31 (45.59%)	.000
Low activity (< 600 MET Minutes/week)	53 (44.17%)	16 (30.77%)	37 (54.41%)	.000

The data in Table 3 shows that there are no students classified as having active participation. Average activity classification: 67 students (55.83%), of which 36 male students (69.23%) are higher than 31 female students (45.59%) (sig < 0.05); low activity classification: 53 students (44.17%), of which 16 male students (30.77%) are lower than 37 female students (54.41%) (sig < 0.05). The data in Table 5 show that there is a significant difference in the rate of students participating in physical activity according to WHO recommendations between males and females, with a statistical significance of sig < 0.05; male students participate in physical activity according to WHO recommendations more than female students.

4. Discussion

The present study provides updated evidence regarding physical activity (PA) and sedentary behavior among Saigon University students. Overall, students accumulated an average of 4.25 days/week of moderate-intensity PA and 1.82 days/week of vigorous-intensity PA, with sports and recreational activities representing the main source of moderate-to-vigorous physical activity (MVPA). These findings are consistent with previous studies showing that leisure-time sports contribute substantially to PA among university students (Făgăraş et al., 2015; Kljajević et al., 2022).

A significant gender difference was observed, with male students reporting higher PA levels and a greater proportion meeting WHO recommendations than female students. Specifically, 69.23% of male students and 45.59% of female students achieved at least 600 MET-minutes/week. Similar sex-related differences have been reported previously among university students (Pengpid et al., 2015; Guthold et al., 2020; Kljajević et al., 2022; Keating et al., 2005). According to socio-ecological and health behavior theories, these differences may be associated with variations in motivation, social support, self-efficacy, and perceived barriers to exercise (Green & Kreuter, 1999; Glanz et al., 2008; Gochman, 2013).

Although more than half of the students (55.83%) met WHO recommendations, a considerable proportion (44.17%) remained insufficiently active. This finding is of public health concern because physical inactivity is associated with increased risks of cardiovascular disease, obesity, type 2 diabetes, metabolic disorders, depression, and premature mortality (Lee et al., 2012; Guthold et al., 2018; Dhuli et al., 2022). Compared with previous studies conducted in Vietnam (Dang, 2018; Ngan et al., 2023), the PA level of SGU students could be considered moderate.

Another notable finding was the high level of sedentary behavior. Students spent an average of 13.25 hours/day in sedentary activities, with female students exhibiting significantly longer sedentary time than males. Study and work accounted for the largest proportion of sedentary time (9.60 hours/day). These findings are concerning because prolonged sedentary behavior has been recognized as an independent risk factor for adverse health outcomes. Previous studies have demonstrated associations between excessive sitting time and increased risks of all-cause mortality, obesity, cardiovascular disease, and metabolic disorders (Ekelund et al., 2019;

Katzmarzyk et al., 2019). The coexistence of moderate PA participation and prolonged sedentary behavior observed in the present study has also been reported in other university populations and highlights the importance of simultaneously promoting PA and reducing sedentary time.

Overall, the findings support socio-ecological models suggesting that PA behavior is influenced by interactions among individual, social, and environmental factors (Green & Kreuter, 1999; Glanz et al., 2008; Gochman, 2013). Therefore, interventions aimed at increasing PA among university students should focus on enhancing opportunities for participation and encouraging active lifestyles, particularly among female students.

5. Conclusion

The study has some concluding remarks. First, regarding PA intensity levels, the average day and time spent on vigorous-intensity PA is 1.82±2.15 days per week and 290.16±33.04 MET (minutes/week). For moderate-intensity PA, the average duration is 4.25±2.55 days per week and 268.6±205.0 MET (minutes/week). One hundred percent of SGU students participated in the with travel to and from places with an average of 228.32±63.68 minutes per week. Second, regarding sedentary behavior, the average daily sedentary time of SGU students (excluding sleep) is 13.25±1.73 hours per day.

55.83% of SGU students engage in more than 600 MET of PA per week (male: 69.23%, female: 45.59%).

In terms of average PA duration per week, day, time spent resting, sitting, or socializing, and satisfying WHO's PA recommendations, male students perform better than female students.

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7. Acknowledgements (Optional)

The study's results were extracted from the research topic titled "Physical activity status of students at Saigon University," Vietnam, by the first author in this article. The project's code: CSA2024-04 according to the decision 3043/QĐ-DHSG issued on 25/11/2024.

8. Author Declaration

Compliance with ethical standards

This article does not contain any studies with human participants or animals performed by the authors. Extracting and inspecting publicly accessible files (scholarly sources) as evidence, before the research began no institutional ethics approval was required.

Data availability statement

All data produced or examined in this study are presented within the published article. The authors will provide the raw data underpinning the study's findings upon reasonable request. Anonymized datasets can be obtained by contacting the corresponding author via email.

Author contributions

Each author listed has contributed significantly, both directly and intellectually, to the completion of this work and has approved the final version for publication. The authors collectively assume responsibility for the accuracy and integrity of the data analysis..

Conflict of interest statement

The authors affirm that the research was carried out without any commercial or financial affiliations that could be interpreted as a potential conflict of interest.