

Association of sex and training phase with physical activity and sedentary behavior in nursing students

Associação do sexo e fase de formação com atividade física e comportamento sedentário em universitários de enfermagem

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Abstract — Physical Insufficient levels of physical activity and sedentary behavior are highly prevalent worldwide and associated with cardiometabolic diseases and may vary according to gender and academic training. The objective was to investigate the association of sex and academic training with the level of physical activity and time spent in sedentary behavior in nursing students. It is a cross-sectional study with 286 nursing students from a public university. A sociodemographic and academic characterization instrument and an extended version of the International Physical Activity Questionnaire were applied. Data were analyzed descriptively and by Pearson's Chi-Square/Fisher's Exact test. The significance level was 5%. 65.7% of university students were active. Men were more active in leisure ($p=0.000$) and commuting ($p=0.03$). There was no association between sex and semester and total physical activity level. The prevalence of time in sedentary behavior ≥ 8 h/day for seven, five days, and weekends were 39.3%, 57.1%, and 21.4% for men and 55.0%, 65.1%, and 43.0% for women. A more significant proportion of women showed time in sedentary behavior ≥ 8 h/day on weekends ($p=0.015$) than men. A higher proportion between the 1st and 5th semesters remained ≥ 8 h/day in sedentary behavior on seven ($p=0.024$) and five days ($p=0.001$) week compared to those between the 6th and 10th semesters. The prevalence of insufficient physical activity levels and a long time in sedentary behavior were high and influenced by gender and training phase. Men were more active in commuting and leisure than women. Sedentary behavior is associated with gender and a training phase.

Key words: Motor activity; Sedentary behavior; Students, Nursing.

Resumo — Nível insuficiente de atividade física e comportamento sedentário estão associados a doenças cardiometabólicas e apresentam prevalências elevadas mundialmente e podem variar entre sexo e fase de formação de universitários (as) em enfermagem. Objetivou-se investigar a associação do sexo e da fase de formação acadêmica com o nível de atividade física e tempo em comportamento sedentário em universitários de enfermagem. Estudo transversal, com 286 universitários de enfermagem de uma Universidade pública. Aplicou-se instrumento de caracterização sociodemográfica, acadêmica e versão longa do Questionário Internacional de Atividade Física, analisados descritivamente e pelo teste Qui-Quadrado de Pearson/Exato de Fisher. O nível de significância foi de 5%. 65,7% dos universitários eram ativos. Homens foram mais ativos no lazer ($p=0,000$) e deslocamento ($p=0,03$). Não houve associação do sexo e do semestre com nível de atividade física total. As prevalências do tempo em comportamento sedentário ≥ 8 h/dia, durante sete, cinco dias e final de semana foram, respectivamente, 39,3%, 57,1% e 21,4% para homens e 55,0%, 65,1% e 43,0% para mulheres. Maior proporção de mulheres apresentou tempo em comportamento sedentário ≥ 8 h/dia no final de semana ($p=0,015$). Maior proporção entre o 1º e 5º semestres permaneceram ≥ 8 h/dia em comportamento sedentário em sete ($p=0,024$) e cinco dias ($p=0,001$) na semana comparados aqueles entre o 6º e 10º semestre. As prevalências do nível insuficiente de atividade física e tempo elevado em comportamento sedentário foram altas. Homens foram mais ativos no deslocamento e no lazer do que as mulheres. Comportamento sedentário se associou ao gênero e a fase de formação.

Palavras-chave: Atividade motora; Comportamento sedentário; Estudantes de Enfermagem.

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INTRODUCTION

Physical activity is an indicator of a healthy lifestyle, contributing to the prevention and control of chronic diseases and reducing mortality from all causes. It is recommended that adults achieve its benefits throughout the week with at least 150 to 300 minutes of moderate-intensity aerobic physical activity or at least 75 to 150 minutes of vigorous-intensity aerobic physical activity, or a combination of both¹.

Time in sedentary behavior, defined as any waking behavior with energy expenditure ≤ 1.5 metabolic equivalents, in a sitting, reclining, or lying position² is another indicator of a healthy lifestyle. When high, it compromises the general health status³.

In university students, a less active lifestyle has been identified⁴. Entering university is a moment of transition in the lives of young people who begin managing their daily lives and must dedicate themselves to the demands of academic training. This educational context corroborates the high prevalence of insufficient physical activity levels⁵ and long time spent in sedentary behavior with cardiometabolic repercussions⁶. If preventive measures are not adopted, these risk factors can cause comorbidities in adult life⁷.

Regarding the level of physical activity, studies carried out with university students from different areas of knowledge found a higher prevalence of physical inactivity in females^{4,7} and students from other areas of academic training⁴. However, studies on the level of physical activity among university students in the nursing field are scarce regarding the distinction between sexes. They may have specificities according to the training phase due to the theoretical and practical workload distribution throughout the course.

In addition, regarding the time spent in sedentary behavior in university students, little is known about the accumulated duration per day during the week and weekend and how it behaves concerning sex. Studies, in general, have prioritized time in front of screens⁸, which, although necessary, does not cover the diversity of factors related to time spent in sedentary behavior, such as attending classes, carrying out other academic activities, and talking with friends, etc.

Knowing the level of physical activity and the time accumulated in sedentary behavior will show the exposure of nursing students to cardiometabolic risks and possible damage to quality of life. These data can also offer subsidies for promoting physical activity and combating sedentary behavior in university life through interventions aimed at exposed groups and provide relevant information for public policies to preserve future health professionals' lives.

The study objective was to investigate the association of sex and academic training with the level of physical activity and time spent in sedentary behavior in nursing students

METHOD

The cross-sectional study was carried out at a nursing school at a public university in Salvador, Bahia. In this institution, the course is developed in the morning and afternoon shifts, presentational classes, with a total workload of 4,440 hours.

University students who participated in the investigation met the criteria of being enrolled between the 1st and 10th semesters of the course. They also could be both sexes and have a minimum age of 18 years. It was an exclusion criterion to be away from the course with enrollment in the lockout.

According to the enrollment record made available by the Undergraduate Course Collegiate, 353 enrolled students were invited to the study. Of these, 65 refused to participate, and two had their enrollment closed. Thus, 286 students met the inclusion criteria and constituted access participants.

Data collection was performed in the classroom by trained researchers. A questionnaire with closed and semi-structured questions was applied to collect data such as gender and current semester. The level of physical activity and time spent in sedentary behavior were collected using the extended version of the International Physical Activity Questionnaire (IPAQ) was used, through an interview⁹.

The IPAQ contains questions about the frequency, duration, and intensity of physical activity performed at work, commuting, domestic activities, and free time. It allows the classification of the individual in levels of physical activity according to the score obtained: very active, insufficiently active.⁹ Subjects were classified as insufficiently active when they performed <150 min/week of moderate physical activity or < 75 min/week of vigorous physical activity or <150 min/week of any combination, those who performed ≥ 150 min/week of moderate physical activity or ≥ 75 min/week of vigorous physical activity or ≥ 150 min/week of any combination were classified as active¹⁰.

The time spent in sedentary behavior during one day of the week (Monday to Friday) was estimated by the time sitting and/or lying accumulated in one day of the week (Monday to Friday) X 5. The value obtained was divided by five.

The time spent in CS during the weekend (Saturday and Sunday) was estimated by the time sitting and/or lying accumulated in one day on the weekend X 2. The value obtained was divided into two.

It was adopted as the cutoff point for a high time in CS ≥ 8 hours/day^{11,12}.

Data were analyzed using the Statistical Package for Social Science program (IBM SPSS version 18.0). Categorical variables were analyzed in absolute and relative frequencies. Pearson's chi-square or Fisher's exact test was used in the associations between physical activity level and time in sedentary behavior on seven days of the week (from Monday to Sunday), on five days of the week (from Monday to Friday), and on the weekend according to variables of interest. The level of statistical significance adopted was 5%.

The Research Ethics Committee approved the project, opinion No. 353.038, and complied with the ethical principles in Resolution No. 466 of December 12, 2012, of the National Council of Health.

RESULTS

Amongst the 286 university students, there was a predominance of females (90.2%), aged between 18 and 25 years old (83.6%), without partners (91.6%), and self-declared black (87.8%). Most of them used the bus to commute (75.2%) and spent 31 to 60 minutes on the way to the university (44.4%). Between the 1st and 5th semesters, there were 45.5%, between the 6th and 10th semesters, 54.5%. 74.8% attended course activities five or more days a week, and 80.4% in two or more shifts. Most attended the university in two shifts (76.2%), dedicated

up to three hours of study per day in addition to the semester workload (58.0%), and performed extracurricular activities (48.6%).

As for the level of global physical activity, a more significant proportion was active (65.7%). There was no association between the level of global physical activity and sex. Considering the IPAQ domains, predominantly university students who were insufficiently active at work (90.6%), commuting (78.0%), leisure (67.8%), and at home (64.7%). Gender and level of physical activity during leisure time and commuting were associated with a higher prevalence of men active during leisure time (53.3%) and commuting (35.7%) than women (Table 1).

Table 1. Global physical activity level and IPAQ domains in nursing students according to sex (n=286).

Physical activity level	Total n (%)	Gender		p-value*
		Female n(%)	Male n(%)	
Global				0.132*
Active	188(65.7)	166 (64.3)	22 (78.6)	
Insufficiently active	98 (34.3)	92 (35.7)	6 (21.4)	
By IPAQ domains				
Work				0.370**
Active	27 (9.4)	23 (8.9)	4 (14.3)	
Insufficiently active	259 (90.6)	235 (91.1)	24 (85.7)	
Commuting				0.028*
Active	63 (22.0)	53 (20.5)	10 (35.7)	
Insufficiently active	223(78.0)	205 (79.5)	18 (64.3)	
At work				1.000*
Active	101(35.3)	91 (35.3)	10 (35.7)	
Insufficiently active	185(64.7)	167 (64.7)	18 (64.3)	
Leisure				0.000*
Active	92(32.2)	77 (29.8)	15 (53.6)	
Insufficiently active	194(67.8)	181 (70.2)	13 (46.4)	

Note. * p-value obtained by Pearson's Chi-square. ** p-value obtained by Fisher's Exact Test.

The analysis of the association between global physical activity level and training period showed that the variables are independent (Table 2).

Table 2. Association between the level of global physical activity and the current semester of nursing students (n=286).

Semester in progress	Global physical activity level		p-value*
	Active n(%)	Insufficiently active n(%)	
1st to 5th	85 (65.4)	45 (34.6)	*0.909
6th to 10th	103 (66.0)	53 (34.0)	

Note. * p-value obtained by Pearson's chi-square test.

The prevalence of time spent sedentary behavior ≥ 8 h/day on seven and five days a week and at the weekend were 39.3%, 57.1%, and 21.4% for men and 55.0%, 65.1%, and 43.0% for women.

There was no association between sex and time spent in sedentary behavior on seven ($p=0.112$) or five days a week ($p=0.403$). The variables sex and time spent in weekend behavior were dependent ($p=0.015$), with a higher proportion of women (43.0%) in sedentary behavior ≥ 8 h/day (Table 3).

Table 3. Association between sex and time spent in sedentary behavior per day, seven and five days a week and weekends in nursing students (n=286).

Gender	Time in sedentary behavior		p-value*
	< 8 h/day n (%)	≥ 8 h/day n (%)	
On each of the seven days a week			
Male	17 (60.7)	11 (39.3)	0.112
Female	116 (45.0)	142 (55.0)	
On each of the five days a week			
Male	12 (42.9)	16 (57.1)	0.403
Female	90 (34.9)	168 (65.1)	
On each day of the weekend			
Male	22 (78.6)	6 (21.4)	0.015
Female	141 (54.7)	123 (43.0)	

Note. *p-value obtained by Pearson's Chi-square.

The variables semester in progress and time in sedentary behavior seven days a week were dependent ($p=0.024$). Those between the 1st and 5th semesters had a more significant proportion of ≥ 8 h/day in sedentary behavior seven days a week (60.8%) compared to those between the 6th and 10th semesters (47.4%) (Table 4).

On five days a week (Monday to Friday), a more significant proportion of those between the 1st and 5th semesters spent ≥ 8 h/day sedentary behavior (52.7%) than those from the 6th and 10th semesters (47.3%). The variables semester in progress and time in sedentary behavior five days a week were associated ($p=0.001$) (Table 4).

There was no association between time spent in sedentary behavior on the weekend and the current semester. Still, a higher proportion between the 6th and 10th semesters remained ≥ 8 h/day in sedentary behavior compared to those between the 1st and 5th semesters (39.8%) (Table 4).

Table 4. Association between time in sedentary behavior and current semester in nursing students (n=286).

Semester in progress	Time in sedentary behavior		p-value*
	< 8 h/day n (%)	≥ 8 h/day n (%)	
On each of the seven days a week			
1st to 5th	51 (39.2)	79(60.8)	0.024
6th to 10th	82 (52.6)	74(47.4)	
On each of the five days a week			
1st to 5th	33 (32.4)	97(52.7)	0.001
6th to 10th	69 (67.6)	87(47.3)	
On each day of the weekends			
1st to 5th	81 (49.7)	49(39.8)	0.097
6th to 10th	82 (50.3)	74(60.2)	

Note. *p-value obtained by Pearson's Chi-square.

DISCUSSION

As for the level of global physical activity, active students were prevalent, which has already been verified for nursing students from other regions of the country¹³. However, other national and international studies showed a predominance of insufficient physical activity levels among university students in the health area^{14,15}, constituting a worldwide phenomenon¹⁶. It is worth mentioning that

there is a diversity of instruments to measure the level of physical activity, which may justify different results found for university students¹³.

Despite the higher percentage of active university students in the global physical activity level, there was a higher proportion of insufficiently active students in each IPAQ domain. This result shows that it is essential to stimulate an improvement in the level of physical activity by domain to enhance the global level of physical activity. Among the main reasons for the insufficient level of physical activity in university students is a lack of time¹⁷, the need to spend most of their time on academic activities, and, sometimes, paid work necessary to cover their expenses¹⁴.

Women were more insufficiently active than men in the overall level of physical activity. Men generally perceive fewer barriers to engaging in some physical activity, commonly performing vigorous activities. They present greater motivation and engagement for physical activity due to its benefits in self-image than women¹⁸.

Most university students were insufficiently active in the leisure domain. The lack of available time due to the hours dedicated to studies, research, and extension projects, along with the generally non-uniform class schedules, configuring a barrier to adherence to physical activity^{16,19}. Men were more active in leisure time than women, corroborating other investigations that identified sociocultural constructions as factors directly related to these results since, even in childhood, boys are encouraged to develop games that promote active participation in sports practices^{16,20}.

In commuting, most were insufficiently active. The long-distance covered by university students between residence and university may interfere with the choice of less active commuting options. Therefore, the travel time for most students to arrive at the university can contribute to the insufficient level of physical activity in this domain. Furthermore, studies emphasize commuting by public transport as a culture inherent to university life^{11,14}.

In addition, the insufficient level of physical activity while commuting may be associated with environmental variables not addressed in this study, such as the safety of public roads, unavailability of bicycle lanes and sidewalks, or other characteristics of the urban environment generated a feeling of insecurity²¹.

Women remained in a more significant proportion, eight or more hours a day, seven, five, and two days a week, in sedentary behavior compared to men, especially on Saturday and Sunday. This finding may be associated with changes observed in contemporary lifestyle resulting from the rise of new technologies and increasing exploitation of internet access²².

It was also found that men and women spent more hours in sedentary behavior five days a week than on the weekend, which may be directly related to the long duration of classes, study, and academic work²³.

Most university students attended school in two shifts; about half dedicated more than three hours to individual study and extracurricular activities, contributing to more time in sedentary behavior during the week. Furthermore, the new teaching and research methodologies require that academic activities are increasingly carried out online^{24,25}. Despite their advantages, they promote the expansion of screen exposure time.

The high proportion of university students in sedentary behavior greater or equal to eight hours a day on the weekend may also be related to the ease of acquiring technological devices in the last two to three decades, promoting greater internet access in leisure time. The growing and indiscriminate use of social media are

made by young people as leisure and recreation, reducing dedication to physical activity²⁴ and increasing time in activities with low energy expenditure²⁵.

In a more significant proportion, university students between the 1st and 5th semesters spent eight or more hours in sedentary behavior daily compared to those between the 6th and 10th semesters. This finding is possibly associated with the different distribution of curriculum components. In the first years of the nursing course, a more significant workload is focused on theoretical components aimed at scientific deepening before immersion in the fields of practice. Therefore, activities are more restricted to classrooms. In the last years of the course, practical activities and internships constitute a greater workload²⁶, requiring greater mobility, and are generally performed with the body assuming the sitting position less frequently.

The increasing expansion of higher education in nursing in Brazil²⁷ reveals the importance of public policies to reduce sedentary behavior and encourage physical activity in academic education. It is necessary to encourage university students to be included in physical activity programs and raise awareness to develop a more active lifestyle, reducing exposure to chronic non-communicable diseases¹⁰.

A solid intervention to raise awareness amongst teachers and educational managers is also necessary to implement programs aimed at combating long-term sedentary behavior and insufficient level of physical activity, which could directly impact the quality of life of university students.

As a limitation of the study, we highlight non-probabilistic sampling and the fact that the study was carried out in a single center. However, it is noteworthy that the study deals with a scarce object in the literature and reveals variables mainly associated with the time spent in sedentary behavior, which is prevalent in nursing students.

CONCLUSION

Most nursing students were active in terms of overall physical activity level but predominantly insufficiently active when analyzing physical activity in the isolated domains of the IPAQ. Men were more active in leisure and commuting than women.

Most nursing students had high accumulated time sitting during the week and weekend. Men and women spent more time sitting during the week than at the weekend. However, among those who spent eight hours or more sitting on the weekend, the highest proportion were women. Students from the 1st to the 5th semester spent more time seated than those from the 6th to 10th semester.

The study reveals the possible impact of academic training, contemporary technologies, and gender on excessive sedentary behavior. The development of programs aimed at promoting regular physical activity and reducing sedentary behavior is essential during academic training.

COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval

Ethical approval was obtained from the Ethics Committee in Research with Human Beings of the Federal University of Bahia, opinion nº 353.038. The protocol was written following the standards established by the Declaration of Helsinki.

Conflict of interest statement

The authors have no conflict of interests to declare

Author Contributions

Conception and design of the experiment: FCM, EBS, FMSS; Experiments: FCM, EBS, FMSS; Data analysis: FCM, EBS, FMSS, FJGP, ALP, ACPC; Contribution with reagents/research materials/analysis tools: FCM, EBS, FMSS, FJGP, ALP, ACPC; Article writing: FCM, EBS, FMSS, FJGP, ALP, ACPC.

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