CORRELATION BETWEEN PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN STUDENTS

Correlação entre atividade física e comportamento sedentário em estudantes

Relación entre actividad física y conducta sedentaria de estudiantes

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ABSTRACT

Objective: To evaluate the correlation between physical activity (PA) and sedentary behavior (SB) of Physical Education (PE) undergraduates over a year in the program. **Methods:** A quantitative and longitudinal study, involving all students of associates's degree (day and evening) and bachelor's degree programs of the Federal University of Pelotas (UFPel) in 2014 (n=115) and their follow-up in 2015. The first data collection occurred at the beginning of the first semester and the follow-up, after one year in the program. PA and SB were assessed by means of the long version of the International Physical Activity Questionnaire, and data analysis was performed using Pearson's correlation test. **Results:** The PA of the students presented a high median in the first and second analysis, and their SB showed a high mean in the baseline and in the follow-up. No correlation was evidenced between PA and SB at the baseline (r=-0.02). However, after one year, a weak but positive correlation was identified (r=0.12). **Conclusion:** The correlation between sedentary behavior and physical activity evaluated in both periods was weak, but a timid increase over a year was perceived.

Descriptors: Motor Activity; Students; Sedentary Lifestyle.

RESUMO

Objetivo: Avaliar a correlação entre atividade física (AF) e comportamento sedentário (CS) de estudantes de Educação Física (EF) ao longo de um ano no curso de graduação. Métodos: Estudo quantitativo e longitudinal, envolvendo todos os acadêmicos dos cursos de licenciatura (diurno e noturno) e bacharelado da Universidade Federal de Pelotas (UFPel) em 2014 (n=115) e o seu acompanhamento em 2015. A primeira coleta de dados ocorreu no início do primeiro semestre e o acompanhamento, após um ano no curso. A AF e o CS foram mensurados através da versão longa do International Physical Activity Questionnaire e realizou-se a análise de dados por meio do teste de correlação de Pearson. Resultados: A AF dos estudantes apresentou uma alta mediana na primeira e na segunda análise, e seu CS apresentou uma alta média na linha de base e no acompanhamento. Os dados não demonstram correlação entre AF e CS na linha de base (r=- 0,02). No entanto, após um ano, identificou-se uma correlação fraca, mas positiva (r=0,12). Conclusão: A correlação entre o comportamento sedentário e a atividade física em ambos os períodos é baixa, apesar de se observar um aumento tímido após o primeiro ano de graduação.

Descritores: Atividade Motora; Estudantes; Estilo de Vida Sedentário.

RESUMEN

Objetivo: Evaluar la relación entre la Actividad Física (AF) y la conducta sedentaria (CS) de estudiantes de grado de Educación Física (EF) a lo largo de un año. Métodos: Estudio cuantitativo y longitudinal con todos los académicos de grado (día y noche) y grado de licenciatura de la Universidad Federal de Pelotas (UFPel) en 2014 (n=115) y su seguimiento en 2015. El seguimiento se dio después de un año de curso y la primera recogida de datos. La AF y la CS fueron medidas a través de la versión larga del Cuestionario Internacional de Actividad Física y el análisis de los datos ha sido realizado con el test de correlación de Pearson. Resultados: La AF presentó elevada mediana en el primer y segundo análisis y también en la línea de base y en el seguimiento los estudiantes mostraron elevada media de CS. Los datos no señalan relación entre la AF y CS en la línea de base (r=-0.02). Sin embargo, después de un año ha sido identificada una relación débil pero positiva (r=0,12). Conclusión: La relación entre la conducta sedentaria y la actividad física evaluadas en ambos periodos ha sido débil pero un pequeño aumento ha sido percibido a lo largo de un año.

Descriptores: Actividad Motora; Estudiantes; Estilo de Vida Sedentario.

INTRODUCTION

Insufficient physical activity (PA) or physical inactivity represents one of the four major risk factors for noncommunicable chronic diseases (NCDs)[1]. That is one of the greatest health concerns in the world and is directly related to the increased risk for NCDs, such as hypertension, diabetes, cancer and premature mortality[2-4].

Sedentary behavior (SB), defined as any activity with an energy expenditure of less than 1.5 METs (one MET, or metabolic equivalent, is equivalent to the energy expenditure of a resting person) and in sitting/reclining posture[5], when in excess, is also a risk factor for NCDs and mortality, especially related to cardiovascular conditions[6]. Although both present risks in common, PA and SB are independent behaviors. An individual can be considered active for meeting the present PA recommendations, but also present high levels of SB, being subject to its negative effects, which is called active couch potato[7].

A recent study with more than one million individuals found that high levels of moderate or vigorous PA (60-75 min/day) seem to eliminate the high risk of mortality associated with sitting for long periods of time. Specifically about the habit of watching television, the results are similar; however, a high level of PA decreases but does not eliminate the risk of mortality in individuals who watch television five or more hours a day[8].

In Brazil, a study conducted in state capitals in 2013 verified a prevalence of leisure-time PA of 33.8% and transportation-related PA of 12.1%[9]. As regards the SB, a study conducted in 66 countries found that 41.5% of adults spend four hours or more a day in a sitting position[10] and, in Brazil, in 2013 almost 30% of the population watched television for three or more hours per day[9]. Besides, studies using objective measures such as the use of accelerometers have found that, in general, adults spend 62% of their awake time on sedentary activities[11].

A study[12] found that, in children and adolescents, there is a weak negative association between PA and being highly sedentary. Also, it is known that the practice of physical activity decreases from adolescence to early adulthood, while the inactive behavior remains throughout the period[13]. University students, in general, are adolescents and young adults and they present a series of health-risk behaviors[14], including low PA level[15].

In addition to a low PA level, university students also presents other negative health behaviors, such as bad eating habits, excessive alcohol consumption and smoking[14,16]. Therefore, the university environment seems to be an appropriated place for health promotion[17].

As in other areas, the Physical Education (PE) undergraduate programs also demands time for academic tasks, transportation and other tasks that may lead to the adoption of unhealthy behaviors, even though the program is part of the health area. Therefore, the present study aimed to evaluate the correlation between PA and SB over a year of undergraduate study of PE students from a public college in Southern Brazil.

METHODS

A quantitative and longitudinal study was carried out involving all the freshman students (n=115) of the three existing Physical Education programs at the Federal University of Pelotas: day associate's degree, evening associate's degree and bachelor's degree programs. Pelotas is located in the state of Rio Grande do Sul, Southern Brazil.

The study began in the first semester of 2014 and its follow-up at the beginning of the first semester of 2015, characterizing a full-year period in the PE program. Those students who were not enrolled or regularly attending classes in their respective courses were excluded.

The participants answered a self-completion, standardized and coded questionnaire in the week of their admission to the university in March 2014, and the same instrument was reapplied in the first week of the third academic semester of their respective programs (March 2015), characterizing then the end of the first year in the PE program. The study researchers were present throughout the data collection, in order to solve any questions regarding the questionnaire.

Written consent was requested from all students for participation in the research, thus guaranteeing the right of refusal to participate in the study as well as, if accepted, the confidentiality and secrecy of the information collected. Students under the age of 18 had the document signed by their legal guardian.

The research instrument consisted of questions related to socioeconomic variables: income (monthly income in Brazilian currency), marital status (single, married/living with partner); demographic variables: sex (male, female), age (years); skin color (white, black, brown, yellow, indigenous); program (bachelor's degree, day and evening associate's degree); nutritional status: body mass index (self-reported height and weight). The PA and SB outcomes were evaluated through the long version of the International Physical Activity Questionnaire (IPAQ), which is validated in Brazil[18]. For PA analysis, only the domains of leisure time and transportation were considered. For evaluation of SB, it was considered the passive transportation of the transportation domain and four questions added in the section related to the sitting posture, two of which are related to the time spent sitting during academic activities and two are related to the time spent in front of a screen (television, computer, smartphone and videogame). The questions added followed the same model of the questionnaire section on sitting, asking about the time spent on weekdays and weekends for each variable.

The database was built in the Excel program and data analysis was performed using the program STATA 13.0. The proposed analysis plan defined the following steps: a descriptive analysis of all variables collected was performed, with calculations of central tendency and dispersion for numerical data and proportions for categorical data. Next, a t-test (for SB with normal distribution) and Wilcoxon rank-sum test (for non-normal distribution PA) were performed in order to verify any difference between the means of the outcomes over a year and, subsequently, Pearson's correlation between the outcomes. For PA and SB, a significance level of 5% was adopted.

The study was submitted to and approved by the Research Ethics Committee of the Superior School of Physical Education of the Federal University of Pelotas, receiving approval under opinion nº 1.109.109.

RESULTS

Table I presents data regarding the socioeconomic, demographic, educational and nutritional profile of the sample under study at the beginning of the program at university and after one-year follow-up period. As to sex, the majority of the sample were male (58.3%) and 48.7% were 19 years old or less in the first year. Day associate's and bachelor's were the programs with the highest percentage of students, each with respectively 40.9% and 33.0% of the total students.

Regarding the body mass index (BMI), 2/3 were classified in the eutrophic category. The great majority of students had white skin color (87%); 27.8% were in the second lowest income quartile and about 86% were single. In the second year, the age range of 20 to 29 years was the most prevalent (46.9%), as well as the lowest income quartile (30.2%). For all other independent variables, there was no difference between the two periods. In addition, it can be noticed that the number of students decreased in one year, in all three programs, due to college dropout or program transfer-out.

Table II describes the mean and the median PA and SB in the first and in the second year. The median PA found was similar in both years, being 80 and 78.6 minutes a day, respectively. Regarding SB, despite the increase, no difference was found during one year of program (p = 0.10); the mean verified in the first year was 475.1 minutes per day and it increased to 511 minutes per day in the second year.

Table I - Description of the academic sample according to socioeconomic, demographic, educational and nutritional variables in the years 2014 (n=115) and 2015 (n=98). Pelotas, Rio Grande do Sul, Brazil, 2015.

| Variables	2014 n (%)	2015 n (%)
Sex		
Male	67 (58.3)	56 (57.1)
Female	48 (41.7)	42 (42.9)
Age		
≤ 19 years	56 (48.7)	32 (32.7)
20 to 29 years	44 (38.3)	46 (46.9)
30 or older	15 (13.0)	20 (20.4)
Program		
Associate's (day)	47 (40.9)	42 (42.9)
Bachelor's	38 (33.0)	27 (27.6)
Associate's (evening)	30 (26.1)	29 (29.5)
Body Mass Index	**n=109**	
Eutrophic	72 (66.1)	57 (58.2)
Overweight/obese	37 (33.9)	41 (41.8)
Skin color		
White	100 (87.0)	80 (81.6)
Others	15 (13.0)	18 (18.4)
Income (quartile)	**n=97**	**n=86**
1 (lowest)	25 (25.8)	26 (30.2)
2	27 (27.8)	22 (25.6)
3	21 (21.7)	25 (29.1)
4 (highest)	24 (24.7)	13 (15.1)
Marital status	**n=114**	
Single	98 (86.0)	82 (83.7)
Married/living with partner	16 (14.0)	(16.3)

Table II - Description of the academic sample according to the outcomes physical activity and sedentary behavior in the years 2014 (n=115) and 2015 (n=97). Pelotas, Rio Grande do Sul, Brazil, 2015.

Variables	2014		2015		p-value
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	
Physical activity (min/day)	128.1 (±175.3)	80.0 (27.1 – 159.3)	112.0 (±114.0)	78.6 (40.0 – 142.8)	0.80*
Sedentary behavior (min/day)	475.1 (±174.9)	467.1 (355.7 – 591.4)	511.0 (±225.7)	450.0 (357.1 – 617.1)	0.10#

*Paired Wilcoxon rank sum test for difference between means; #Paired t-test for difference between means; SD = Standard deviation; IQR = Interquartile Range.

In the analysis of correlation between PA and SB, Figure 1 showed that there was no linear relationship between the two behaviors (r = -0.02). Furthermore, the direction of the line fitted on the scatter plot indicated that, as the SB time increased, there was no increase or decrease in the PA time.

Figure 2 showed the correlation between the outcomes in the 2015 follow-up. The value of the coefficient of correlation (r = 0.12) indicated a positive, though very weak, correlation among these variables.
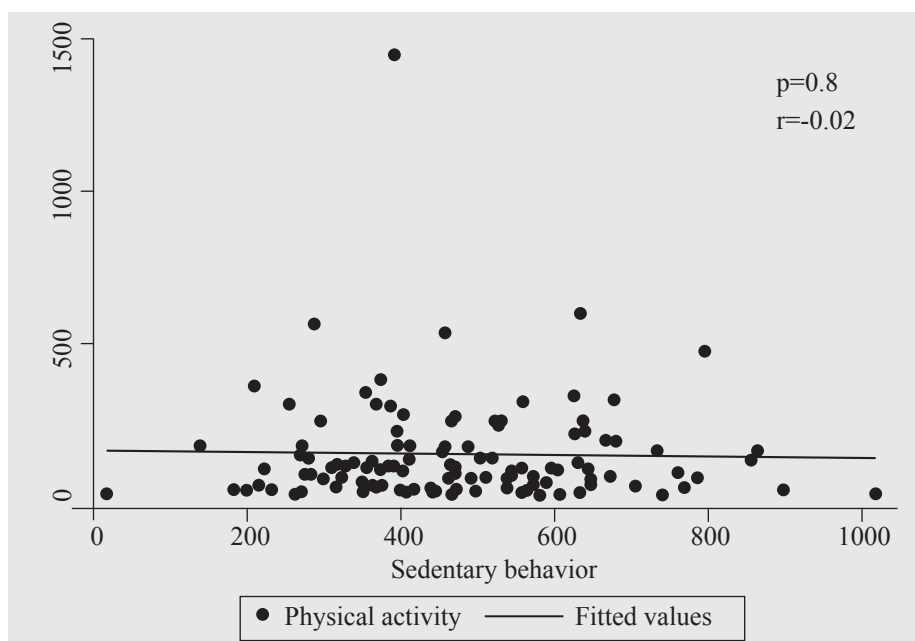
p= p-value; r= correlation coefficient.

Figure 1 - Pearson's correlation between physical activity and sedentary behavior (minutes/day) assessed in 2014.
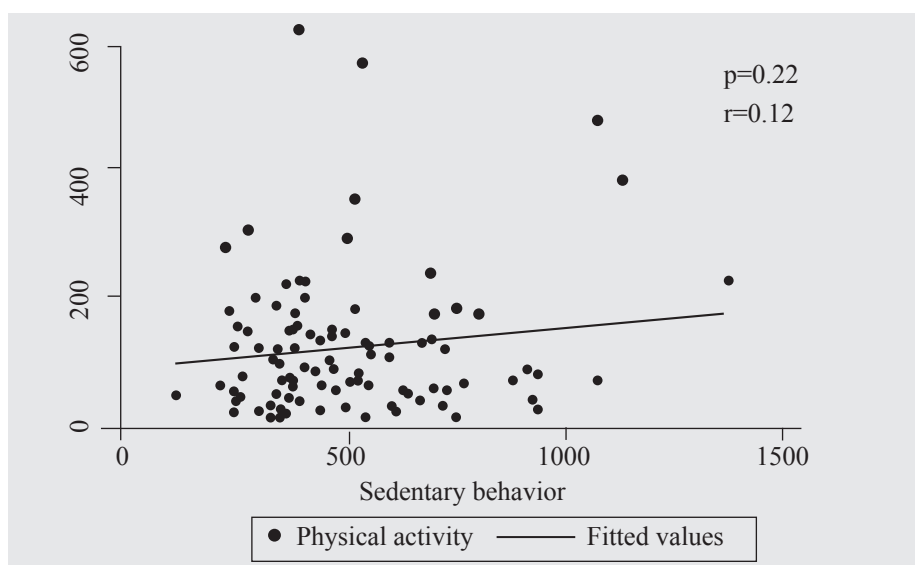
p= p value; r= correlation coefficient.

Figure 2 - Pearson's correlation between physical activity and sedentary behavior (minutes/day) assessed at the follow-up in 2015.

DISCUSSION

The PA values found in the present study are higher than the daily 30 minutes recommended by the World Health Organization[3]. In addition, data suggests that only 1/4, or the lowest quartile of PA, may not have met the recommendations. These results are in agreement with those verified in other study[19], where most of the students met the current recommendations for the practice of PA. This can be explained by the profile of the PE student. The demand for the undergraduate program involves affinity with the area and possible previous experiences, which in the case may have been as athlete, coach, PA practitioner or others.

PE students attend practical courses in their college program, which help them to be active in class and encourage them to practice various types of PA. Thus, in general, the PE student is inserted in a context propitious to the practice of PA, making them more active than other students and the population in general[19].

As for the SB, the values found are higher than those verified in adults in the city of Pelotas (Southern Brazil), for which the authors identified an average of 345 minutes per day[20]. These results can be explained by the population and SB domains verified in the present study (screen time, passive transportation and time performing academic tasks), since students generally spend much of their time sitting inside a classroom accumulating high SB levels.

An ideal scenario would be high PA levels of and low SB levels[8]. About the relationship between the outcomes, the ideal would be a positive correlation, meaning that the higher the SB values, the higher the PA values. Being so, the deleterious effects of SB can be attenuated or eliminated by the high PA levels in this study population[8].

The increased correlation after one year as PE undergraduates may indicate that, as the students progress in the program, the correlation between these two variables tends to be more positive. Trend analysis of data on PA practice and time watching television between Brazilian capitals shows that these behaviors are changing over time. The results indicate that Brazilians are increasing their leisure-time PA, with a prevalence of 33.8% in the last data collection, and are decreasing the PA performed during transportation, with the last verified prevalence of 12.1%[9]. Despite that, the same PE students in the three programs did not show changes from the first to the second year, in PA during leisure and transportation and in total PA[21]. On SB, data from another survey showed a downward tendency in the prevalence of people who are engaged in it for three hours or more per day, with a value of 28.6% in their last follow-up[9].

Although other studies do not show differences between health behavior in undergraduates at the beginning and at the end of their programs[15], the present article shows the need for longitudinal studies. This understanding is necessary for planning health promotion actions inside the university in the long and short term. Specifically for the PE programs, understanding the practice of PA and the SB of the students is of great importance.

Some points of this research should be emphasized, such as the logistical process for student follow-up, the use of a questionnaire with standardized instruments and cautious data collection. In addition, the measure of the outcome as total PA score (leisure and transportation) and the SB domains (passive transportation, screen time and time performing academic tasks) are positive points, since they were consistent within the study population.

One limitation of the study is the lack of data regarding light-intensity PA, which seems to have a strong negative correlation with SB and is also associated with some health benefits[7]. This gap was mainly caused by the research instrument used (questionnaire), that is not able to capture the time in individual's light activities, thus requiring the use of objective measures such as the use of accelerometers. In addition, there were a large number of dropouts and program transfer-out. However, the fact that the actual number of enrollments with the college graduates made it possible to work with the actual population of active students in the program.

CONCLUSION

The correlation between sedentary behavior and physical activity evaluated in both periods was weak, but a timid increase over a year was perceived.

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