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Original research papers

PHYSICAL ACTIVITY OF CAR DEALERSHIP EMPLOYEES ASSESSED USING THE IPAQ-SF QUESTIONNAIRE

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Abstract
Introduction. Studies on physical activity among adults are rarely conducted. The main reason is the limited availability of study groups, as employers do not always grant permission for their employees to participate in research. The aim of this study was to assess the self-reported level of physical activity among car dealership employees using the IPAQ questionnaire. ***Material and Methods.*** The study involved 32 car dealership employees aged 18-50 years. Physical activity was assessed using the short version of the IPAQ questionnaire. Based on the self-reported data, employees were classified into one of four categories of physical activity. The correlation between time spent sitting and the age of the participants versus their weekly physical activity, due to the lack of significant differences between men and women, was presented collectively for all participants. The distribution of weekly physical activity was strongly skewed to the right, so statistical calculations were performed on logarithmic values. The Student's t-test for independent samples was used for the calculations. ***Results.*** No statistically significant differences were found in the level of physical activity between men and women after they were classified into one of four categories of physical activity. Weekly physical activity of car dealership employees was negatively correlated with time spent sitting and the age of the participants. ***Conclusions.*** The physical activity assessment of employees at the car dealership indicate a trend towards higher average values of calculated weekly physical activity for men compared to women. No statistically significant differences were found in the level of physical activity between women and men after classifying them into one of four physical activity categories; 60% of women and 68% of men were highly physically active.

Key words: physical activity, IPAQ, adults

Introduction

Physical activity is a crucial component of human health, representing one of the basic needs, and its fulfillment ensures optimal physical development while providing essential psychological and social comfort [1]. The reduction of physical activity, which is observed alongside the advancement of civilization, poses an undeniable threat to human health.

In 2020, the World Health Organization (WHO) published new recommendations on physical activity, updating the previous guidelines issued in 2010. Experts analyzed the scientific evidence on the relationship between physical activity, sedentary behavior, and health, and recommended that individuals aged 18-64 engage in 150-300 minutes per week of moderate-intensity physical activity or 75-150 minutes per week of vigorous-intensity physical activity. The guidelines also advise regular muscle-strengthening exercises of moderate or greater intensity involving all major muscle groups, to be performed 2 or more days per week. Additionally, reducing sedentary behavior is recommended; however, due to insufficient scientific evidence, an acceptable level of sedentary behavior has not been specified [2].

Low quality of life and often poor health are frequently associated with low levels of physical activity. On the other hand, an active lifestyle can play a preventive role. High or moderately high, especially regular, physical activity is an effective way to reduce cholesterol levels, stabilize lipid metabolism, and consequently decrease the risk of developing atherosclerosis. It has been shown that atherosclerotic changes detected in early childhood can lead to the development of atherosclerosis in adulthood. Ramirez-Velez argues that mortality from cardiovascular diseases can be reduced by 20-40% in middle-aged individuals who engage in moderate-intensity physical activity, ranging from 3 to 6 METs, with a minimum energy expenditure of 1,000 kcal per week [3]. A sedentary lifestyle and low levels of physical activity, common among various social groups in industrialized countries, double the risk of coronary heart disease, as well as hypertension, stroke, cancer, obesity, and type 2 diabetes. According to WHO estimates from 2018, the prevalence of insufficient physical activity among adult Poles aged 18+ in 2016 was 34.3%, and it was higher in women than in men (35.7% vs. 32.6%) [4].

Studies have proven that daily regular physical activity is sufficient to prevent type 2 diabetes, and in cases where the disease is already present, it can reduce its severity by up to 30% [5]. The intervention mechanism involves increasing the demand for glucose by working muscles, which prevents hyperglycemia and consequently reduces tissue insulin resistance [6]. There is also a confirmed positive correlation between moderate physical exercise lasting at least 30 minutes (preferably 45–60 minutes) and performed at least 5 days a week, and the reduced incidence of breast and colon cancer, as well as, most likely, pro-

state, endometrial, and lung cancers [7]. Physical activity after the diagnosis and treatment of cancer reduces the risk of recurrence in breast and colon cancer and increases survival rates by up to 50%.

The assessment of physical activity is challenging due to organizational constraints, particularly the availability of research groups. Research is most commonly conducted among adolescents [8, 9, 10], students [11, 12, 13, 14, 15, 16, 17], and older adults [18, 19]. However, conducting studies among employees of industrial plants and public service institutions (offices, schools, universities, banks), which may disrupt the workflow, is generally not permitted by employers. As a result, these institutions are often omitted from various studies, including those on physical activity. There is still a lack of research on physical activity among adults of working age. Therefore, it seemed purposeful to assess the self-reported level of physical activity of car dealership employees of working age using the short version of the IPAQ questionnaire.

Material and Methods

The study conducted in the spring of 2023 involved employees of the Carolina Toyota Włochy used car dealership in Warsaw, aged 18 to 50 years. All employees participated in the study – 10 women and 22 men, most of whom were white-collar workers, with a smaller portion being manual laborers. The type of work performed and the positions held by the employees varied, ranging from receptionists, sales advisors, mechanics, fleet and service workers, to office staff and management. Among the participants, 22 individuals (68.6%) reported having a secondary education, while 10 had higher education.

The study utilized the International Physical Activity Questionnaire – Short Form (IPAQ-SF), which includes questions about all types of physical activity over the past 7 days [20]. The questionnaire was distributed to employees who, during the week before the study, had not been hospitalized, had not been diagnosed with any illness, were not in the recovery period after an illness, had not been on vacation, and, in the case of women, were not pregnant. These limiting factors could have significantly impacted the study's final results, as the physical activity of these individuals in the past 7 days might have differed significantly from others. The survey data were collected through standard direct interviews conducted by a trained interviewer. No participants refused to answer the survey questions. Fully completed IPAQ questionnaires, along with data on age, gender, education, and job position, were collected from all 32 employees.

The participants reported the time spent on moderate and vigorous physical activity. Information was also collected on the time spent sitting and walking. The data obtained were used to calculate the weekly physical activity.

Respondents were informed that when reporting the number of days they engaged in vigorous and moderate efforts, they also needed to provide the duration of these efforts. According to IPAQ guidelines, only activities that last at least 10 minutes without interruption are considered in the assessment of physical activity. Each type of physical activity was expressed using MET intensity coefficients, corresponding to multiples of resting metabolic rate. By multiplying the coefficient assigned to a given activity by the number of days it was performed per week and the duration in minutes per day, physical activity was calculated in MET-minutes/week. Weekly physical activity was determined by summing the results of each type of physical activity [20].

The study results were classified according to IPAQ guidelines [20]. The following categories were distinguished: insufficient activity (<600 MET-min/week), sufficient activity (600-1500 MET-min/week), and high activity (>1500 MET-min/week, but at least 3 days per week of vigorous activity, or more than 3000 MET-min/week), as well as an additional category of augmented activity (less than three days of vigorous activities accumulating total physical activity of at least 1,500 MET-minutes/week) [21].

Based on the reported data, the employees of the car dealership were classified into one of four physical activity categories. The significance of percentage differences between women and men, due to the occurrence of zero values, was assessed using the χ^2 function in its logarithmic version [22].

The distributions of the studied variables were analyzed graphically by comparing raw and transformed values with the cumulative normal distribution. The distribution of the variable "sitting time" (min/week) and the distributions of physical activities expressed in MET-min/week were highly right-skewed. Therefore, they were transformed into logarithms, resulting in distributions close to normal, and in this form, statistical calculations were performed. The variation of the studied variables depending on gender was assessed using the Student's t-test for independent variables. The correlation between sitting time (min/week), age (years), and weekly physical activity (MET-min/week) was presented collectively for all participants, given the lack of significant differences between men and women. Statistical significance was set at $p \leq 0.05$. The mean values and SD ± 1 presented in Table 1 were calculated by delogarithmizing the logarithmic values.

Results

The detailed results of the physical activity assessment of car dealership employees indicate a tendency for higher average self-reported sitting time (2087·1.37 ± 1 min/week vs. 1770·1.64 ± 1 min/week) and calculated physical activity related to walking (1670·2.41 ± 1 MET-min/week vs. 1343·2.40 ± 1 MET-min/week) among women compared to men, with the exception of moderate physical activity (353·1.50 ± 1 MET-min/week vs. 521·2.22 ± 1 MET-min/week), vigorous physical activity (852·2.91 ± 1 MET-min/week vs. 1343·2.20 ± 1 MET-min/week), and total weekly physical activity (2868·2.09 ± 1 MET-min/week vs. 2926·2.49 ± 1 MET-min/week) (Tab. 1). After classifying the employees into one of four physical activity categories, no significant differences in the level of physical activity were found between women and men in any category (Fig. 1). The vast majority of employees (60% of women and 68% of men) were highly physically active.

Given the lack of significant differences in physical activity levels between women and men, the analysis of the correlations between time spent sitting, age, and weekly physical activity (after prior transformation to logarithms) was performed for all participants combined (Fig. 2-3). The analysis revealed a low impact of the predictors studied. Approximately 6.7% ($R^2 = 0.067$) of the variability in the dependent variable (weekly physical activity) was explained by the independent variable (time spent sitting). To a lesser extent (3.5%), weekly physical activity was explained by age ($R^2 = 0.035$). The total activity of the youngest participant (18 years old) was 11,970 MET-min/week, while that of the oldest participant (50 years old) was 1,794 MET-min/week, with the average value for all employees being 4043 MET-min/week.

Table 1. Self-reported sitting time in min/week and physical activity in MET-min/week of car dealership employees

Variable	Women (n = 10)	Men (n = 22)	Total (n = 32)
	Mean·SD±1 V_{min}-V_{max}	Mean·SD±1 V_{min}-V_{max}	Mean·SD±1 V_{min}-V_{max}
Sitting, min/week	2087·1.37±1 (1523-2861)	1770·1.64±1 (1079-2903)	1863·1.57±1 (1184-2936)
Walking, MET-min/week	1670·2.41±1 (696-4042)	1343·2.40±1 (560-3220)	1440·2.42±1 (596-3478)
Moderate activity, MET-min/week	353·1.50±1 (236-529)	521·2.22±1 (235-1155)	461·2.06±1 (224-949)
Vigorous activity, MET-min/week	852·2.91±1 (292-2481)	1343·2.20±1 (611-2948)	1165·2.48±1 (469-2892)
Weekly activity, MET-min/week	2868·2.09±1 (1402-6107)	2926·2.49±1 (1152-7139)	2886·2.36±1 (1220-6826)

The delogarithmized values (mean·SD±1) and the ranges of observed values (Vmin-Vmax) are presented.

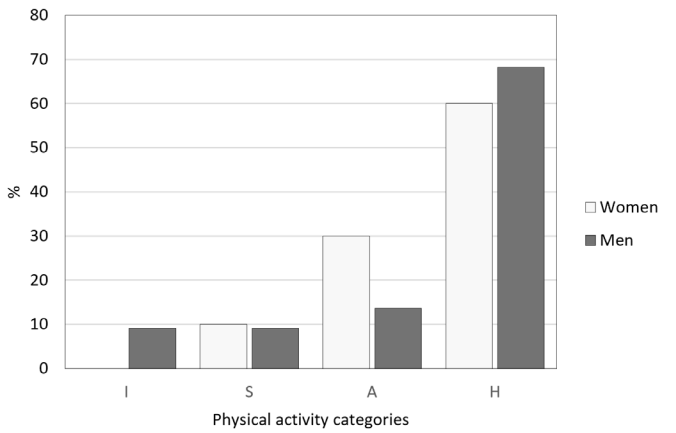

Figure 1. Percentage of car dealership employees reporting physical activity at insufficient (I), sufficient (S), augmented (A), or high (H) levels

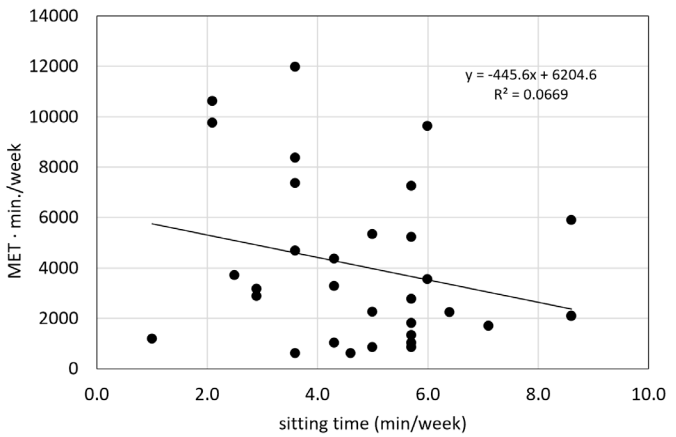

Figure 2. Correlation between sitting time (min/week) and weekly energy expenditure (MET-min/week) among all participants (n = 32)

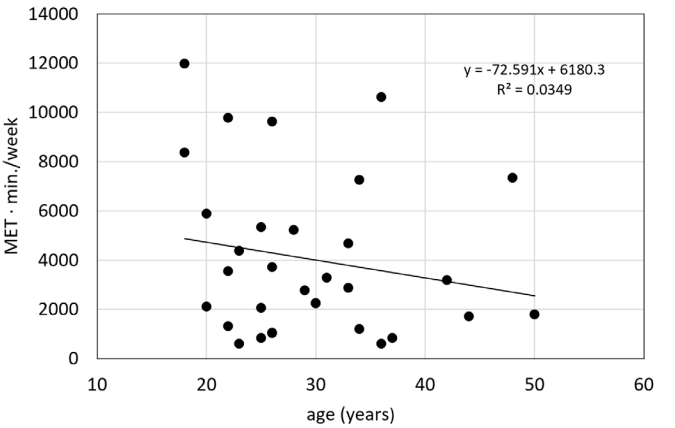

Figure 3. Correlation between age (years) and weekly energy expenditure (MET-min/week) among all participants (n = 32)

Discussion

The level of self-reported physical activity among all employees at the car dealership during the week preceding the study was satisfactory, averaging 2886·2.36 ± 1 MET-min/week. The high results may be attributed to the fact that after classifying the participants into different physical activity categories (Fig. 1), 60% of women and 68% of men were highly physically active, which was influenced by the nature of their work. The study found that men tended to report higher average values of time spent on vigorous physical activity compared to women. On the other hand, women spent more time sitting and walking during the day, indicating a different approach to physical activity in the context of its health benefits [23].

Unlike car dealership employees, the predominant form of physical activity for waitresses and waiters was walking, which constituted 63% of weekly physical activity for women and 64% for men, corresponding to 1507 MET-min/week and 1509 MET-min/week, respectively. Waitresses engaged in more moderate-intensity activities per week, whereas waiters, similar to car dealership employees, engaged in more high-intensity activities [24].

Similarly, in the profession of paramedics, a trend of insufficient physical activity is noticeable. The predominant type of physical activity in this group was low-intensity activity, with weekly physical activity levels being 1883 MET-min/week for women and 2046 MET-min/week for men [25].

In contrast, the results of physical activity among librarians revealed that over 75% of respondents exhibited a high level of physical activity. On average, women expended 4314 MET-min per week, while men expended 5617 MET-min per week, with only 9% of respondents in this group reaching an insufficient level of physical activity. The high results for 80.5% of the participants might be attributed to the self-reporting nature of the IPAQ questionnaire and difficulties in accurately determining the type of physical activity, including estimating the time spent sitting [26]. According to Gajewski [27], this may be due to difficulties in distinguishing between moderate and vigorous activity and the tendency of respondents to overestimate the duration of their physical efforts.

Comparable results to those of car dealership employees were found among police officers. The majority of them exhibited a high level of physical activity (69%), 18% had a sufficient level of activity, and the remaining respondents showed an insufficient level of physical activity (13%). Significant differences

were observed between the various groups of officers regarding vigorous activity ($p < 0.001$), moderate activity ($p < 0.001$), and total weekly activity ($p < 0.001$). The highest level of activity was found among officers in the independent antiterrorism unit, while the lowest was among those in the criminal division. A low level of vigorous activity was also noted among officers in the prevention division [28].

The fact that the car dealership employees engaged in a profession characterized by high physical activity may be attributed to the minimal amount of time spent on sedentary tasks. The symptoms of sedentariness leading to insufficient levels of physical activity affected only 9.1% of men. This is also supported by the observed correlation between time spent sitting and total weekly physical activity, where activity levels were dependent on sitting time by only 6.7%.

Physical activity may vary depending on age [29]. A tendency was observed for a decrease in total weekly physical activity with increasing age among employees (Fig. 3). Older individuals working in office positions spent most of their time sitting in front of a computer, which was associated with relatively less time spent walking. In contrast, younger individuals, such as those working at a car wash, dedicated significantly more time to walking rather than passive sitting due to the nature of their job. This is supported by a previous cross-sectional study by Menai et al. [30], who found that walking frequency among employees decreased with age, affecting both work-related and leisure-time physical activity. In our study, the explanation of only 3.5% of total weekly physical activity by age suggests that it had a minimal impact on activity levels. This may also be attributed to the relatively high average age of car dealership employees (29.4 ± 8.2 years) and 27.8% variability. WHO guidelines suggest that engaging in any form of physical activity may provide greater benefits than not engaging in any activity at all [31].

Conclusions

1. The results of the physical activity assessment of employees at the car dealership indicate a trend towards higher average values of calculated weekly physical activity for men compared to women.
2. No statistically significant differences were found in the level of physical activity between women and men after classifying them into one of four physical activity categories; 60% of women and 68% of men were highly physically active.
3. Weekly physical activity of the car dealership employees was negatively correlated and explained to a small extent by the independent variables: sitting time (6.7%) and age of the participants (3.5%).

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