

PART II. PHYSICAL ACTIVITY OF SOCIAL AND PROFESSIONAL GROUPS
DZIAŁ II. AKTYWNOŚĆ FIZYCZNA GRUP SPOŁECZNYCH I ZAWODOWYCH

PHYSICAL ACTIVITY AND SITTING DURATIONS AMONG EMPLOYERS AND
EMPLOYEES OF MICROENTERPRISES

AKTYWNOŚĆ FIZYCZNA I CZAS PRZEBYWANIA W POZYCJI SIEDZĄCEJ WŚRÓD
PRACODAWCÓW I PRACOWNIKÓW MIKROPRZEDSIĘBIORSTW

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B. Data collection/entry
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C. Data analysis/statistics
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Summary

Background. The durations of sitting and standing/walking in the workplace, moderate/vigorous physical activity (MVPA), structured walking, and sports done by employers and employees of microenterprises were examined in this study.

Material and methods. A total of 306 individuals (123 women and 183 men) voluntarily participated in the study. A demographic information form, the International Physical Activity Questionnaire-Short Form (IPAQ-SF), and an occupation-related index and sport index of the Physical Activity Assessment Questionnaire (PAAQ) were administered during face-to-face interviews.

Results. The participants were found to spend 4.42 hours sitting and 6.33 hours standing/walking in the workplace. The duration of MVPA among men was longer than among women ($p < 0.05$). The duration of walking among younger participants (30 years and under) was longer than among others. There was no statistically significant difference in the durations of regular exercise between employers and employees ($p > 0.05$). Half of them engaged in structured walking.

Conclusions. Although the participants had an insufficient duration of MVPA, they achieved the WHO's weekly recommended activity duration by taking part in structured walking. The participants spent more than 6 hours standing/walking in the workplace. This result is classified as low physical activity (LPA), which contributes to total physical activity. The effect of LPA on general health status should be examined in future studies.

Keywords: sitting duration, microenterprise, physical activity, employers, employees

Streszczenie

Wprowadzenie. W ramach badania analizowano czas siedzenia i stania/chodzenia w miejscu pracy, umiarkowanej/intensywnej aktywności fizycznej (MVPA), zorganizowanego spacerowania i uprawiania sportu przez pracodawców i pracowników mikroprzedsiębiorstw.

Materiał i metody. W badaniu dobrowolnie wzięło udział 306 osób (123 kobiety i 183 mężczyzn). Podczas bezpośrednich wywiadów zastosowano kwestionariusz informacji demograficznej, Międzynarodowy Kwestionariusz Aktywności Fizycznej – Kwestionariusz Krótki (IPAQ-SF) oraz indeks związany z zawodem i indeks sportowy Kwestionariusza Oceny Aktywności Fizycznej (PAAQ).

Wyniki. Stwierdzono, że uczestnicy spędzają w miejscu pracy 4,42 godziny siedząc i 6,33 godziny stojąc/chodząc. Czas MVPA wśród mężczyzn był dłuższy niż wśród kobiet ($p < 0,05$). Czas spacerowania wśród młodszych uczestników (30 lat i mniej) był dłuższy niż wśród pozostałych. Nie stwierdzono istotnej statystycznie różnicy w czasie trwania regularnych ćwiczeń między pracodawcami a pracownikami ($p > 0,05$). Połowa z nich uczestniczyła w zorganizowanym spacerze.

Wnioski. Pomimo tego, że uczestnicy wykazali niewystarczający czas MVPA, osiągnęli zalecany przez WHO tygodniowy czas aktywności dzięki udziałowi w zorganizowanych spacerach. Uczestnicy spędzali ponad 6 godzin stojąc/chodząc w miejscu pracy. Wynik ten zaliczany jest do niskiej aktywności fizycznej (LPA), która przyczynia się do całkowitej aktywności fizycznej. Wpływ LPA na ogólny stan zdrowia powinien zostać oceniony w przyszłych badaniach.

Słowa kluczowe: czas siedzenia, mikroprzedsiębiorstwo, aktywność fizyczna, pracodawcy, pracownicy

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Introduction

Long-term sedentary behavior and low levels of physical activity (PA) are considered to lead to major public health problems in industrialized countries, such as coronary heart disease, hypertension, stroke, diabetes, and cancer [1]. Physical inactivity is also a leading contributor to global mortality [2]. Having an active lifestyle with more than 150 minutes of moderate PA or 75 minutes of vigorous PA per week, as well as avoiding sedentary behavior, help adults to achieve the health benefits of physical activity [2]. Although global and national strategies for reducing physical inactivity have been developed and implemented [3], physical inactivity is continuously increasing in many countries [4]. According to the WHO, 32% of women and 23% of men worldwide were not active enough in 2016 [5]. The prevalence of inactivity among women (38.8%) is higher than among men (21.74%) in Turkey, as with many other countries [6].

Some parameters, such as gender and age [7], influence an individual's level of moderate/vigorous physical activity (MVPA) [8,9]. Chau et al. stated that 42% of men and 47% of women mostly sit at work [10]. As one's age increases, physical capacity decreases and the recovery time is prolonged; however, work demands may not change with age [11]. In their research, Bauman et al. reported that the total walking duration of younger adults was significantly longer than that of older adults in 10 out of 18 countries [12].

Some occupations require workers to sit, while others require MVPA, such as walking or carrying, which can significantly affect the level of PA. It has been reported that the percentage of workers employed in low-activity occupations is increasing due to technological improvements. Thus, occupations that traditionally required MVPA have shifted towards a reduction in MVPA at work. The rising prevalence of sedentary occupations leads to exposure in terms of limited MVPA and increased sedentary behavior [13,14].

Sitting duration in the workplace is a major part of daily sedentary time. Sitting time at work varies according to one's occupation [10]. White-collar workers spend 82% of their working hours sitting [13], while blue-collar workers have higher levels of PA during work time and a shorter sedentary duration [8]. Reducing workplace sitting time is known to contribute to improved health [15]. It is reported that replacing two hours of sitting with light movement, such as standing or stepping, may lead to better cardiometabolic risk biomarkers [16].

The aim of this study was to examine the durations of sitting and standing/walking in the workplace, MVPA, structured walking, and regular sports among employers and employees of microenterprises.

Material and methods

Participants

In this study, 173 microenterprises (businesses employing less than ten employees, such as hair salon, butcher shop, grocery store, tailor shop, bookstore, flowers shop, boutiques, etc.) operating in the urban area of Ankara, Turkey, were visited and invited to participate. After the scope and purpose of the study was explained, a convenience sample of 306 participants (183 men and 123 women; 169 employers and 137 employees) gave verbal informed consent and voluntarily agreed to participate during their work day. The mean age was 32.81 ± 9.39 years among the women and 37.75 ± 11.35 years among the men. This study was conducted according to the Declaration of Helsinki guidelines and the data was collected between March and May 2017. The characteristics of the participants are presented in Table 1.

Table 1. Characteristics of participants, by gender

	Female (n=123)		Male (n=185)		Total (n=308)	
	Mean	SD	Mean	SD	Mean	SD
Age	32.8	9.3	37.7	11.2	35.7	10.8
Height (cm)	164.4	6.6	175.3	7.3	171.0	8.9
Weight (kg)	65.9	8.0	79.6	11.2	74.1	12.0
BMI	24.4	3.1	25.9	3.8	25.35	3.6

Procedures and instruments

A demographic information form, the International Physical Activity Questionnaire-Short Form (IPAQ-SF), and the Physical Activity Assessment Questionnaire (PAAQ) were administered during face-to-face interviews with the employers and employees at their workplace during the work day.

Demographic information form

The first form consisted of information about the participants' age, gender, height, weight, and work status.

International Physical Activity Questionnaire-Short Form (IPAQ-SF)

The Turkish version of the IPAQ-SF was used in this study; its reliability is $r=0.69$ and its criterion validity is $r=0.30$ [17,18]. The IPAQ-SF contains questions about the durations of moderate PA, vigorous PA, walking, and sitting. MVPA duration is calculated by adding the durations of MPA and VPA. Total PA time is the sum of MVPA and walking duration. The guide prepared by the IPAQ Research Committee in 2005 was used to calculate the durations of MVPA, walking, and total PA [19].

Physical Activity Assessment Questionnaire (PAAQ)

The PAAQ is a self-reported questionnaire which asks participants to report their weekly PA durations and energy expenditure from occupation-related, home-related, transportation, stair climbing, and sport activity over the last year. The reliability of the PAAQ is between $r=0.36$ and $r=0.73$ and its validity is $r=0.72$ [20].

In this study, the parameters "sport index" (SI) and "occupation-related index" (ORI) from the PAAQ were analyzed. The SI consists of two questions: "How many days do you engage in sport activities per week?" and "How many hours do you engage in sport activities per day?" If subjects engage in more than one sport activity regularly, including structured walking, the participants are requested to answer the questions for each activity [20]. The duration of sport was calculated by the following formula:

$$\text{duration of sport (hours/week)} = (\text{weekly frequency}) \times (\text{daily duration})$$

The ORI consists of three questions: "How many days do you work per week (days/week)?", "How many hours do you work per day (hours/day)?" and "How many hours do you sit at work per day (hours/day)?". The duration of standing/walking in the workplace was calculated by the following formula:

$$\text{standing/walking duration in the workplace (hours/day)} = (\text{daily working duration}) - (\text{sitting duration in one day in the workplace})$$

Statistical analysis

The data were checked for normal distribution using the Kolmogorov-Smirnov test. The independent sample t-test and one-way ANOVA were used to compare the means of normally distributed data. The Mann-Whitney U test and Kruskal-Wallis variance analysis were used to compare the means of the data which did not show a normal distribution. Frequency (f), percentage (%), mean, and standard deviation were used as descriptive statistical parameters for descriptive data in the study. Significance was set at $p<0.05$ and $p<0.01$.

Results

The results of the SI from the PAAQ are presented in Table 2, according to the work status and gender of the participants.

Table 2. Frequency of regular sport activities according to the SI from the PAAQ, by gender and work status

		n	None		Structured walking		Football		Other sports*	
			f**	(%)	f	(%)	f	(%)	f	(%)
Gender	Female	123	46	37.4	73	59.3	0	0.0	4	3.3
	Male	183	70	38.3	77	42.1	27	14.7	9	4.9
Work status	Employers	169	64	37.8	85	50.3	16	9.5	4	2.4
	Employees	137	52	38.0	65	47.4	11	8.0	9	6.6
All participants		306	116	37.91	150	49.02	27	8.82	13	4.25

Notes: *Taekwondo, volleyball, basketball, handball, etc.; **number (frequency) of the given answers.

About half of the employers and employees were engaging in structured walking. Walking for the purpose of exercise was declared by 59.3% of the women and 42.1% of the men. About 38% of the participants stated that they did not engage in regular exercise.

The results from the PAAQ and the IPAQ are presented in Table 3, according to the gender, age, and work status of the participants.

Table 3. Descriptive statistics of sitting and standing/walking durations of employers and employees according to the ORI from the PAAQ and total sitting duration from the IPAQ-SF

		n	Total sitting duration# (hours/day)			Sitting duration at work## (hours/day)			Standing/walking at work## (hours/day)			Work duration## (hours/day)		
			Mean	SD	p	Mean	SD	p	Mean	SD	p	Mean	SD	p
Gender	Female	123	7.63	2.37	0.832 ^b	4.14	1.52	0.033 ^b	5.95	1.73	0.014 ^b	10.10	1.38	0.000 ^b
	Male	183	7.72	2.68		4.61	2.01		6.60	2.32		11.26	1.67	
Age	≤30 years	116	7.47	2.47	0.475 ^a	3.70	1.49		6.73	1.91		10.56	1.42	
	31-44 years	124	7.76	2.71		4.64	1.90	0.000 ^a	6.41	2.11	0.000 ^a	11.07	1.66	0.046 ^a
	≥ 45 years	66	7.93	2.39		5.27	1.85		5.50	2.31		10.69	1.96	
Work status	Employer	169	7.68	2.68	0.841 ^b	4.76	1.89	0.001 ^b	5.97	2.17	0.001 ^b	10.75	1.73	0.903 ^b
	Employee	137	7.69	2.40		4.00	1.69		6.79	1.98		10.84	1.58	
All participants		306	7.69	2.55		4.42	1.84		6.33	2.12		10.79	1.66	

Notes: #Derived from the IPAQ-SF; ##derived from the work index of the PAAQ; ^aKruskal-Wallis test; ^bMann-Whitney U test.

It was found that employers and employees worked 10.79 hours per day on average. Both employers and employees spent 4.42 hours sitting at work. The work duration, sitting duration, and standing/walking duration at work were all longer among the men than among the women ($p < 0.05$). The work duration of employees aged 31-44 was higher than among the other age groups ($p < 0.05$). The standing/walking duration of participants aged 30 and under was longer than in the other age groups ($p < 0.001$) and the sitting duration of employees aged 45 and over was longer than in the other age groups ($p < 0.001$). Although there was no significant difference between working hours of employers and employees ($p > 0.005$), the employers' sitting duration at work was longer than that of employees ($p < 0.001$). Additionally, employees' standing/walking duration in the workplace was longer than that of employers ($p < 0.001$). A comparison of PA durations (minutes/week) by gender, age, and work status is presented in Table 4.

Table 4. Comparison of PA durations (minutes/week), by gender, age, and work status

		Sport [§] (min/week)			MVPA (min/week)			Walking (min/week)			Total physical activity (min/week)		
		Mean	SD	<i>p</i>	Mean	SD	<i>p</i>	Mean	SD	<i>p</i>	Mean	SD	<i>p</i>
Gender	Female (n=123)	106.30	107.57	.063 ^a	13.82	69.05	.000 ^b	153.69	125.63	.114 ^a	167.52	156.68	.440 ^a
	Male (n=183)	83.52	102.79		55.08	150.93		129.39	135.54		184.48	206.60	
Age	≤30 years (n=116)	111.76	104.92	.058 ^c	35.51	100.92	.878 ^c	167.67	135.21	.012 ^c	203.18	172.29	.167 ^c
	31-44 years (n=124)	75.40	96.63		37.66	126.29		120.64	127.85		158.30	196.51	
	≥ 45 years (n=66)	91.59	116.07		45.30	162.46		123.86	126.93		169.16	195.89	
Work Status	Employers (n=169)	89.55	103.20	.565 ^a	40.59	125.25	.748 ^a	135.73	129.89	.615 ^a	176.33	195.21	.891 ^a
	Employees (n=137)	96.52	107.67		35.91	127.65		143.39	134.86		179.30	179.50	

Notes: [§]Including structured walking; ^aindependent sample t-test; ^bMann-Whitney U test; ^cOne-way ANOVA, $F(2,303)=4.470$.

It was found that the male participants had a longer duration of MVPA than the female participants ($p<0.05$). It was found that the walking duration of the participants aged 30 and under was longer than that of the other groups ($p<0.05$).

Discussion

The WHO's Physical Activity and Sedentary Behavior Guidelines suggest that replacing sedentary time with physical activities (including those of light intensity) can contribute to positive health outcomes [21-23]. Our study revealed that both employers and employees met the WHO criterion, which recommends that adults undertake at least 150 min of moderate-intensity aerobic physical activity per week [21,23]. This result was mostly based on their reported regular sport activities, including structured walking. Surprisingly, we also found that the participants were sitting for a total of 7.69 hours per day (derived from the IPAQ-SF) and for 4.42 hours at work (derived from the PAAQ). The sitting duration of the employers was found to be longer than that of the employees. Furthermore, the duration of sitting time at work was significant in terms of gender and age (Table 3).

Self-reported sitting duration (occupational or daily) is an indicator of sedentary behavior [21,22,24,25], which leads to increased risk of non-communicable diseases such as coronary heart disease, hypertension, stroke, diabetes, cancer, obesity, and musculoskeletal and respiratory illnesses [4,21,22,26]. Thorp et al. reported that workers were sitting at work for approximately 3 to 5 hours per day in the Netherlands and Australia [15]. Kazi et al. found that prolonged sitting at work covered 54% of the total daily sitting time in a workday. In their study, male employees spent more time sitting at work as compared to their female colleagues [27]. In our study, we found similar results as Thorp et al. and Kazi et al., in terms of sitting duration at work [15] and the gender differences among those hours [27]. Although sedentary behavior could be more common in various occupations, occupational sitting is considered to be job-dependent [21,25,28]. That's why we could not define the self-reported worksite sitting duration as "sedentary behavior" for our study sample. Microenterprises (hair salon, flowers shop, grocery store etc.) which took part in this study were open for more than 10 hours per day and the reported worksite sitting duration was 4.42 hours. Some sedentary activities, such as watching TV, spending a prolonged time on computer games, or working on computers, are said to be more closely related to poor health when considering total sedentary time [22]. Therefore, the amount of sitting time and how it is accumulated should be taken into consideration when measuring sedentary behavior [21,23,25].

The total weekly working hours of the participants was 72.19±14.26 hours, which was above the International Labor Organization's (ILO) optimal 45-55 hours of work per week [29]. It was observed that the standing/walking duration of the participants in the workplace was also longer due to their occupation type and long working hours. Additionally, employees' standing/walking duration in the workplace was significantly longer

than that of the employers (Table 3). Clark et al. and Akhavan Rad et al. pointed out that questionnaires rarely inquire as to which sitting aspect is used, for how long, or about interruptions [21,25]. One of the strengths of our study is that the PAAQ asks about both sitting duration at work and how it is interrupted by standing/walking in terms of hours/day [20].

All adults should meet the recommended physical activity level for substantial health benefits [2,21-23,26]. Sitting for long hours causes exercise intolerance and gradually reduces workers' (employers and employees) ability to perform daily or work-related physical tasks [25]. The participants of this study were recruited from multiple workplaces with different occupational physical activity levels. However, it is well known that occupational physical activity may not confer similar benefits as structured physical activity [26]. In this study, 37.9% of the participants did not engage in any structured physical activities. None of the participants' structured PA durations was sufficient to meet the recommended weekly PA duration. However, the sum of structured and unstructured MVPA and walking durations were sufficient to meet the WHO's recommendation. This result could be explained by the fact that the total PA duration was the sum of structured sports activities and structured and unstructured walking. No significant difference was found between the employers' and the employees' PA durations ($p>0.05$). Similar to the findings of Lindsay et al., the MVPA values of the men were found to be higher than those of the women in our study ($p<0.05$) [30] (Table 4).

Physical activity may vary depending on age [9,30]. The walking frequencies of employees decreases with age [31]. Fortunately, it was seen that the ≥ 45 age group in this study met the WHO's recommendation of 150 min of weekly PA by walking. There was no significant difference between age groups in terms of duration of total PA, MVPA, and regular sport activities ($p>0.05$). Although the MVPA values were not at the desired level in our study, when combined with structured walking, the total PA duration met the WHO recommendations. The guidelines suggest that workplace PA, leisure and household-related activities, and the type of transportation all contribute to the recommended quantities [23,26].

The most preferred form of regular PA among the participants was structured walking (49.2%). Apart from walking, 14.7% of the male participants reported playing football regularly. It was found that only 4.25% of all participants regularly participated in other sports, such as taekwondo, volleyball, basketball, or handball (Table 2). The duration of regular sports activities was not significantly different in terms of gender, age, or work status ($p>0.05$). It is thought that since the participants worked more than 10 hours per day, they did not have the opportunity for a physically active lifestyle [26,32]. The WHO guidelines suggest that every type of population engaging in some amount of physical activity can benefit more than those who do none [23].

The strength of this study can be its research population. The participants of this study were recruited from microenterprises with different levels and types of occupational physical activity. Occupational physical activity studies are generally conducted on either high physically demanding (construction workers, blue-collar workers, etc.) or low physically demanding (office workers, call center workers, white-collar workers, etc.) occupational groups [8,10,11,13,15,21]. This study was carried out among 173 microenterprises with 10 or fewer workers (hairdressers, florists, dry cleaners, etc.) through face-to-face interviews in order to examine the PA and sitting durations. A limitation of the study would be the lack of objective measurement methods such as an accelerometer or other digital test device. Appropriate measurement methods are required to monitor PA and sitting duration as well as to "break up" periods at work. Fortunately, we were able to obtain subjective data about the duration of the participants' standing/walking periods in the workplace.

Conclusions

The most important finding of our research was that although the duration of MVPA among microenterprise workers who work for more than 10 hours per day seemed low, they had reached the WHO's weekly recommended activity level through the contribution of structured walking. Additionally, it was found that the participants spent more than 6 hours standing/walking at the workplace due to their occupations. This result is classified as low physical activity (LPA) and contributes to total PA, which has recently been emphasized in the literature. It is said that there is still a lack of evidence about leisure time PA among workers in moderate/highly physically demanding jobs [26]. In this context, since the duration of standing/walking at work corresponds to LPA and "breaks up" bouts of prolonged sitting, we suggest that LPA's effect on general health status should be examined in future studies.

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