ÖĞRETMEN ADAYLARININ FİZİKSEL AKTİVİTE SEVİYELERİNİN BELİRLENMESİ

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ÖZET

Bu araştırmada öğretmen adaylarının fiziksel aktivite düzeylerinin incelenmesi amaçlanmıştır. Çalışma 2013–2014 eğitim öğretim yılında Kırıkkale Üniversitesi Eğitim Fakültesinde öğrenim gören 191 öğrenci üzerinde yapılmıştır. Araştırmaya katılan öğrencilerin fiziksel aktivite düzeylerinin incelenmesi için uluslararası fiziksel aktivite anketi (FADA), Holter (SWA) ve pedometre kullanılmıştır. SWA cihazı ile katılımcıların fiziksel aktivite değerleri (MET= metabolik eşitlik) dışında günlük adım sayıları da ölçülmüştür. Bu yöntemlerle elde edilen verilere göre kız öğrencilerin metabolik holter cihazı ile ölçülen MET değeri ortalamaları 1.75 (sedanter/ fiziksel aktivite düzeyi düşük), FADA MET değeri ortalamaları ise 1398.36 MET- dk/hafta (fiziksel aktivite düzeyi düşük) olarak ölçülmüştür. Holter ile bir günlük adım sayısı ortalamaları 9388.68 iken, Pedometre ile 7189.02 olarak belirlenmiştir. Erkek öğrencilerin metabolik holter cihazı ile ölçülen MET değeri ortalamaları 1.93 (sedanter/ fiziksel aktivite düzeyi düşük), FADA MET değeri ortalamaları ise 1527.23 MET- dk/hafta (fiziksel aktivite düzeyi düşük) olarak ölçülmüştür. Holter ile bir günlük adım sayısı ortalamaları 11844.71 iken, Pedometre ile 8820.26 olarak belirlenmiştir.

Anahtar Kelimeler: Fiziksel aktivite, Adım sayısı, MET, Öğretmen adayı, Holter (SWA), Pedometre

DETERMINATION OF THE PHYSICAL ACTIVITY LEVELS OF CANDIDATE TEACHERS

ABSTRACT

The purpose of this study is to examine the physical activity levels of relevant candidate teachers. The participants of the study include 191 students studying in the Faculty of Education in Kırıkkale University during the 2013 to 2014 academic years. The International Physical Activity Questionnaire (IPAQ), Holter (SWA), and pedometer were used in order to examine the participants' physical activity levels. Physical activity levels (MET= metabolic equivalency) of the participants as well as their daily step counts were measured through SWA device. The average MET values of the female participants determined through metabolic Holter instrument were 1.75 (sedentary/low physical activity level) and their average IPAQ MET level 1398.36 MET - minute/week (low physical level) according to the data obtained through these methods. Their average daily step counts were measured as 9388.68 through Holter and their average daily step counts measured as 7189.02 by pedometer. Average MET levels of the male participants, on the other hand, were measured as 1.93 (sedentary/low physical activity level) through metabolic Holter instrument and their average FADA MET value measured as 1527.23 MET - minute/week (low physical activity level). Average daily step counts of them were measured as 11844.71 by means of Holter instrument and values were obtained as 8 820.26 through pedometer.

Keywords: Physical activity, Step number, MET, Candidate teachers, Holter (SWA), Pedometer

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INTRODUCTION

People who are healthy also for mental, physical, and social aspects are needed so that a healthy and productive society can be sustained. Inactivity and improper diet habits come at first among the points that spoil human health. A great number of works are carried out sitting constantly thanks to the development of technology and living conditions. Individuals who can spare more time for themselves, in this way, remain proportionally immobile. Less energy expenditure will, therefore, lead to serious health problems in body which results with a decrease in the quality of life along with increasing body weights. Some habits from childhood and teenage years also have the largest share for such cases. Correct behaviour styles which may put negative effects on our health must be, meanwhile, adopted carefully while living under today's conditions for sustaining healthy life afterwards. The study has targeted, hereby, upon surveying the physical activity levels of candidate teachers.

The effects or benefits of daily physical activities haven't been taken into consideration sufficiently for people having no exercise habit. However, some people among the ones who have no regular exercise habit can be actually very active and lively in their daily lives at home or in the workplace (Zhang et al., 2003).

Particularly participation in regular physical activities may lead to numerous positive health outcomes such as lowering the risks of coronary heart disease, hypertension, depression, and obesity for young people (Zaccagani et al., 2014). Sedentary lifestyle and health problems posed by it have been one of the major interest areas of all branches of medicine. A need to investigate the scope of physical activity is evident when we take into account other major benefits such as increases in the development of the cardiovascular and respiratory system, in reducing the risk of heart and vascular diseases, self-confidence, recreation, and in efficiency at work and sporting activities (Çetin et al., 2008). Physical activity can be defined as physical movements that require consuming, above the basal levels, the energy produced by the contraction of skeletal muscles (Caspersen et al., 1985). It can be defined according to another description, on the other hand, as any force imposed on the muscles above the resting level and lead to energy consumption (Baranowski et al., 1992).

Physical activity is often defined in three stages. Time (hours, minutes), frequency (how many times monthly or weekly), and intensity (how many kilo joules in an hour or how many calories in a minute are spent). The leisure time physical activities include all activities outside work and these are divided into 3 areas:

1- Sports, games, and exercises for keeping fit,

2- Walking, cycling, climbing stairs,

3- Housework, recreational activities, gardening, car washing, and so on (Khan, 1998).

Any amount of energy that can be measured in units of kilojoule or kilocalorie (414 kilojoules = 1 kilocalorie) is required for accomplishing an activity. The amount of energy consumed continuously varies ranging from the less to the more. Total energy expenditure is, meanwhile, associated with the amount of muscle mass that causes body movements; intensity and time interval of the movement; and physical activity which causes the frequency of heart contractions

(Caspersen and colleagues, 1985). Physical activity may also be classified according to the purpose of performing any activity by a person or a group. The ones those widespread among the classifications are as follows:

- Vocational activities
- Home works
- Free time activities
- Transportation

Many methods have been developed to measure the levels of physical activities. These are some methods such as questionnaires for detecting the level of physical activity, tests, daybooks, direct observation methods, digital measuring instruments, determining the amount of energy consumption, etc. (Karaca and colleagues, 2000, Öztürk, 2005).

MATERIAL AND METHODS

Total 191 students between the ages of 19 and 26 all of whom attending the Faculty of Education, Kırıkkale University during 2013 to 2014 academic years were participated voluntarily in this survey. 89 female and 102 male students took their place in the study. The pedometer, metabolic Holter equipment, and the long form of the International Physical Activity Questionnaire were used to measure the physical activities. The students were asked to carry the pedometer device on them for 1 day long. They were asked take on them their pedometer devices when they waked up in the morning and remove them when they went to bed. The data obtained from the pedometers following day were recorded. The step counts and the amount of energy consumed were obtained from the pedometer and the metabolic Holter instrument.

Questionnaire Method: Physical activity is a complex structure of behaviours. The measurements carried out by asking persons to classify the level of physical activities are widely used in the epidemiological studies. It includes subjective methods, techniques performed on a person's self-knowledge, diaries, records, surveys, stories that may be claimed to be retrospective studies, and general reports (Vanhees, 2005).

An evaluation of physical activity has been performed by means of the International Physical Activity Questionnaire (FADA) developed by Craig et al. (2003). The questionnaire is available in eight versions consisting of four short and four long ones. It was developed in four short and four long forms. These forms have been known as telephone calls, interviews, and self-applied methods. The types of questions, on the other hand, can hold some changes as, 'the last 7 days' or 'at any weekend'. The short form (7 questions) provides information about the time consumed in walking, moderate-severity activities, and severe activities. The time spent sitting is taken into consideration as a separate question accordingly. The calculation of the total score of the short form includes the time (in minutes) and frequency (days) total spent in walking, moderate activity, and intense activity. The long form (27 questions) evaluates in detail the activities on this field such as home works, gardening, business activity, transportation, and leisure time activities. The time spent sitting is recorded as weekdays and weekends. The calculation of total score for IPAQ long form includes time (in minutes) and frequency (days) for all types of activities in all areas. There are two different assessment methods for the calculation of the total score. The first one is to take a score for the site-specific activities (work, transportation, home-garden works, leisure time) and the

second is for the activity-specific ones (walking, moderate-intensity activity and severe-intensity activity). The site-specific scoring, therefore, consists, within their sub-heading, of the sum of the scores of moderate-intensity activity and severe-intensity activity. In the activity-specific scoring, walking, moderate-intensity activity, and severe-intensity activity under their title are calculated by the sum of each activity separately. A score of MET-minutes is obtained from the aforespecified calculations. A MET-min is calculated by multiplying the minutes of activity performed with the MET score. The MET-minute scores have been determined based on the kilocalorie value of a person of 60 kilograms. Kilocalories can be calculated from the equation below:

MET-min x (a person's body weight in kg / 60 kg).
The following values are used for analysing the IPAQ data:
• Walking _ 3.3 MET
• Moderate-severity physical activity _ 4.0 MET
• Severe physical activity _ 8.0 MET.

The MET-min / week score of a person walking for 30 minutes 3 days a week is calculated, for instance, as 3.3 x 30 x 3 = 297 MET-min /weeks. A categorical scoring is performed using this continuous scoring, as well as the numerical data obtained from it (IPAQ research committee, 2005).

The MET levels were calculated by means of the International Physical Activity Questionnaire. Also, the data about MET values were obtained by the metabolic Holter instrument. A criterion assuming that each activity is being performed at least 10 minutes at a time is taken into account for the evaluation of all activities. A score as "MET-minutes / week" is obtained by multiplying the values of minute, day, and the MET (in multiples of resting oxygen consumption).

The physical activity levels have been categorized as follows (Craig et al., 2003):
• Physically inactive ones (<600 MET min / week)
• Ones with low physical activity (600 - 3000 MET-min / week)
• Ones with sufficient level physical activity (which is beneficial in terms of health) (> 3000 MET-minutes / week).

Pedometer (Step Counter): The pedometer measures the distance of running and walking by calculating the number of steps taken. The pedometer, which is similar to an accelerometer, senses also the vertical oscillations of the body. Step counts are calculated by a mechanism of internal stimulant. This mechanism records a step when the vertical oscillation passes beyond a certain threshold value. Then, step counts are converted into a distance at times when foot length of an average person is recorded into the pedometer. The pedometer can detect the physical activities which are associated with only walking and running. It cannot correctly record the movements such as cycling and swimming, upper extremity movements, movements such as weight-carrying or climbing. Nevertheless, usage of the pedometer is important for determining the total amount of daily movements since it builds up the majority of the physical activity patterns of walking and running (Tudor-Locke et al., 2004).
The pedometers cannot identify the static activities such as lifting taken by means of the upper extremities. They can measure the movements only in one direction. Still, it is not efficient in revealing the difference between downhill stroke and ascent with a bike, detecting static working, and recording the intensity of any activity. It has been identified by some researchers that the pedometer cannot correctly record the slow walking speed. Some changes

may be observed in speed for distance calculations or in stride length along the walk. The results of movements performed on the horizontal axis are not given while measuring the distance. The vertical movements measured by the accelerometer cannot be measured by means of a pedometer (Bouchard, 2000). Another important disadvantage of the use of the pedometer is, on the other hand, a potential confusion problem. The user may delete by accidentally pressing on a button the number of steps shown on the display of the instrument. The pedometer measurements can, hereby, be increased simply by holding and shaking manually depending on the device (Bates, 2006).

Metabolic Holter (Sensewear Armband (SWA): SWA is worn to the back of the upper arm and collects data from multiple sensors such as skin temperature sensor, new body temperature sensor, heat flow sensor, galvanic skin response sensor, and biaxial accelerometer. The skin temperature sensor and the new skin temperature sensor consist of thermal resistors and they sense the changes in resistance resulted from a temperature change when a contact is made to the skin. The heat flow sensor is used for evaluating the heat loss and assessing the difference between skin temperature and new body temperature. The galvanic skin response sensor, on the other hand, measures the conductivity between two electrodes in contact with the skin and, therefore, the changes in skin conductivity are adjusted according to the aspects of the physical and emotional stimuli. The biaxial accelerometer records the movements of the upper arm and gives relevant data about body position. The energy consumption is estimated by combining within some special algorithms the data obtained from sensors with relevant data of age, height, weight, and gender. These algorithms are activity-specific ones and they are applied automatically based on the analysis of the signal patterns given by the sensors. The energy consumption is computed using data given by the sensors in 1 minute intervals along with the data of gender, age, height and weight (Arvidsson, 2007)

Figure 1. Operation Principle of the Holter Instrument

http://sensewear.bodymedia.com/SW-Learn-More/Product-Overview

The Sensewear arm band has multiple sensors within its structure. These innovator sensors provide various type of information about the life of patient or subject.

It can Be Viewed on Monitor

- Movement: The arm band includes a device that measures speed/movement.
- Step: The arm band counts steps using an accelerometer to measure walking steps or different patterns to be created by user.
- Galvanic Skin Response: It measures, by means of electrical conductivity, the changes resulted from sweating and stimuli on the skin.
- Skin Temperature: As a precision electronic thermometer it measures the skin temperature.

• Heat Flux: Measures the amount of heat in the body

MET Calculation Ranges of SWA device
0.0 ≤ sedentary <3.0
3.0 ≤ moderate <6.0
6.0 ≤ intensive <9.0
9.0 ≤ very intensive < ∞
(http://sensewear.bodymedia.com/SW-Learn-More/Product-Overview)

The SPSS 18 software package program was used for analysing the data obtained from the survey. The values of arithmetical average and standard deviation were computed for getting info about age, height, body weight, body mass index, and body fat percentage of the student subjects who took part in the study. The step counts were obtained using the data from SWA for the physical activity levels and MET values given by the pedometer and the questionnaire of international physical activity. Then, average values were computed for aforespecified data and Mann-Whitney U testing was applied accordingly.

FINDINGS

Table 1. Demographic Characteristics of Female and Male Students in Terms of Age, Height, and Weight.

		Average ±sd
Age (Years)	Female (N:89)	21.56±1.55
	Male (N:102)	22.73±1.57
Height (cm)	Female (N:89)	163.56±5.48
	Male (N:102)	176.42±6.24
Body Weight (kg)	Female (N:89)	56.86±8.18
	Male (N:102)	70.01±9.32

The table below gives an average age of 21.66 ± 1:55 for the females. An average height of 163.56 ± 5:48 cm and average weight of 56.86 ± 8:18 kg were computed for them. On the other hand, an average age of 22.73 ± 1.57, average weight of 70.01 ± 9:32 kg, and average height of 176.42 ± 6.24 cm were calculated for the male one.

Table 2. Findings Related to the Ratios of Body Fat Percentage (BFP) and Body Mass Index (BMI) for Female and Male Students.

		Average ±sd
BMI (Kg/m^2)	Female (N:89)	21.03±2.80
	Male (N:102)	22.24±2.64
BFP%	Female (N:89)	24.27±5.86
	Male (N:102)	12.34±5.41

An average BMI of 21.03 and body fat percentage (BFP) of 24.27% were measured for the female students participated in the study. An average BMI of 22.24 and BFP of 12.34% were measured, on the other hand, for the male students took part in this study.

Table 3. Findings in Terms of MET Levels and Step Counts for Female Students.

	Holter (SWA) MET	(FADA) Questionnaire MET- m/week	Holter AS (1 Day)	Pedometer AS (1 Day)
N	89	89	89	89
Average	1.75	1398.36	9388.68	7189.02
Std. Deviation	.31	553.56	5000.17	3383.68

The average MET values measured by means of metabolic Holter instrument for the female students were sedentary and their physical activity levels obtained per FADA results were in low levels. The average daily step counts were 9388.68 through Holter while their average daily step counts measured with a pedometer were found as 7189.02.

Table 4. Findings in Terms of MET Levels and Step Counts for Male Students.

	Holter (SWA) MET	(FADA) Questionnaire MET- m/week	Holter (SWA) AS (1 Day)	Pedometer AS (1 Day)
N	102	102	102	102
Average	1.93	1527.23	11844.71	8820.26
Std. Deviation	.38	578.34	6230.72	4443.76

The average MET levels measured by means of the metabolic Holter instrument were sedentary for the male students and their physical activity levels obtained per the FADA results were in low levels. The average daily step counts were 11844.71 according to Holter data while the average daily step counts measured with the pedometer were detected as 60604.42.

Table 5. Mann-Whitney U Testing Findings Related to Step Counts and MET Levels for Female and Male Students

	Group	N	Seq Avr.	Seq Sum	U	P
Holter AS (1Day)	Female	89	83.31	7414.50	3409.50	.003
	Male	102	107.07	10921.50		
Pedometer AS (1Day)	Female	89	87.43	7781.00	3776.00	.045
	Male	102	103.48	10555.00		
Holter(SWA) MET	Female	89	81.42	7246.00	3241.00	.001
	Male	102	108.73	11090.00		
(FADA) Questionnaire MET-m/week	Female	89	89.72	7895.50	3979.50	.147
	Male	102	101.36	10440.50		

The Table above shows significant difference between daily step counts measured by means of Holter and pedometer for both the female and male students (p=.003, p=.045). It is indicated that the male students have more step counts than the counts taken by the female ones. Significant difference was observed between the male students and female students when the MET levels those measured using Holter instrument were evaluated. No significant difference was detected between the female and male students according to FADA results.

DISCUSSION

Initially, daily step counts and MET values were measured using the Metabolic Holter instrument for assessing the physical activity levels of the participants. In addition, daily step counts of the participants were determined by means of the pedometer. Their MET levels were found, hereby, using the International Physical Activity Questionnaire. The average of MET levels measured using the metabolic Holter instrument was determined as 1.75 (sedentary) and a level of 1398.36 MET-min / week (low level physical activity) was computed for the female students according to the data obtained after applying aforestated methods. The average number of daily steps with a Holter was 9388.68 while the number of daily steps with a pedometer was computed as 7189.02. The data obtained revealed that female students didn't take 10,000 steps daily. 10,000 steps a day is important for maintaining a healthy body weight and / or controlling the body weight according to the data obtained from the Ministry of Health (Obesity Handbook, the Ministry of Health, 2013).

The average MET level of the male participants was computed as 1.93 (sedentary) through metabolic Holter instrument and their average MET level measured as 1527.23 MET - minute/week (low physical activity level) according to the results of FADA. The average of their daily step counts was computed as 11844.71 through Holter instrument while their average was determined as 8820.26 through the pedometer. The metabolic Holter instrument can provide more reliable results since it has sensors which are capable of taking measurements taking into account the changes in body temperature and remain attached to the arm all day long (24 hours). With FADA, relevant data were obtained according to self-statements of persons. The International Physical Activity Questionnaire can be applied since the instruments required for computing the MET value of a person are expensive ones.

The study detected significant differences between the step counts of the students participated in the study taken in terms of gender. The male students took many steps than the female ones. We can claim that the male students move a lot more than the female students accordingly. Also, significant differences were detected between the male students and the female students when their MET levels obtained through Holter were analysed. According to the results of FADA, on the other hand, no significant difference was observed between males and females.

The study accomplished by Alemdağ (2013) analyses the candidate teachers for participation in physical activities, social appearance anxiety, and relationship of social self-efficacy. Total 2323 students (1483 females (63.8%)) and 840 males (36.2%)) who study in 8 departments of the Fatih Education Faculty and in the Department of Physical Education and Sports Teacher under the High School of Physical Education and Sports, Karadeniz Technical University were participated in this study during 2012 to 2013 academic years. The results of aforespecified survey revealed, in the event of participation in physical activities, that males have much higher participation rates than female ones.

Nicole and colleagues (2002) accomplished a survey on the physical activity levels, exercise self-efficacy, and changing steps of exercise behaviour for the candidate teachers attending the

Midwestern University. The results of their survey revealed significant difference in terms of higher participation of males in physical activities than the females on the changing steps of exercise behaviour (Alemdağ, 2013).

Baydur and Sözmen (2015) surveyed in their study the eating habits, physical activity levels, and affecting factors related to the university students. According to the results of their survey, average total physical activity MET level of students was 2079±2541, an therefore, 3.5% of the participants were active at a level of improving the health, 5.8% were physically active, and 90.8% of them were categorized in the class of physically inactive ones.

Murathan's (2013) survey has examined the prevalence of obesity, level of physical activity, and healthy lifestyle behaviours of the university students. 1260 students studying at the University of Adıyaman participated in the study. The anthropometric measurements of the students participated in the study were taken and the scale of physical activity and healthy lifestyle were applied accordingly. The study revealed that 35% of the students with a BMI level of 25 kg / m2 and above had sufficient physical activity.

Öztürk's (2005) study accomplished on the university students to determine their physical activity levels concluded that 14.8% of the students were inactive, 67.5% minimally active, and 17.7% active ones.

Total 250 Physical Training Teachers with ages ranging between 25 and 65 years, serving in Bursa as the physical training teachers, participated in the study of Arabacı and Çankaya (2007) in order to determine the physical activity (FA) levels of them. The International Physical Activity Questionnaire (IPAQ) was applied to determine the level of physical activity. The levels of FA were determined categorizing them as the groups of inactive, minimum active, and HEPA active through the MET method. Relevant FA levels of the physical training teachers were determined in terms of their age, gender, marital status, number of children, alcohol abuse, and smoking. The Ki-square Test was applied for evaluating the findings obtained accordingly. The average duration of physical activity for the study participants was 1380.16 min/week and 41.6% of them were inactive, 41.6% minimum active, and 16.8% HEPA active. It can be claimed, hereby, that the levels of physical activity of the physical education teachers have been inadequate and in an inactivity widespread style.

The study carried out by Yolcu (2008) aimed to determine the physical activity levels of the university students of the Turkish community studying in the health-related departments and to evaluate the correlation between the physical activity level and BMI and body compositions by means of the metabolic Holter (Sensewear Armband (SWE)). The other purposes of his study were, therefore, to calculate the resting energy expenditure (REE) by different methods and to evaluate the validity of the 24 hours of physical activity assessment questionnaire (24-s-FADA). 23 male and 19 female students took part in the survey. The methods of SWA and 24-s-FADA were administered simultaneously on an ordinary day of the students in order to determine physical activities. The body composition was determined, in compliance with the BIA method, using the TBF300 Tanita Body Composition Analyser. Consequently, the physical activity levels of the students were detected as 23.8% low, 31% moderate, 35.7% high, and 9.5% too high. While the

physical activity level (PAL) was found to have been unrelated to the BMI, the levels of both BFP and FFM (Fat Free Mass) were found to have been associated with PAL. Whereas the physical activity levels and the BFP levels of the female students were determined to have been statistically significantly higher than males' levels, the levels of TEE, REE, FFM, and BMI of the male students were statistically significantly higher than the levels of female students. No statistically significant difference was found for the physical activity levels of the second and fourth graders. The 24-s FADA has been reported, therefore, as a valid method in the estimation of total daily consumed calorie count of the adult population in the Turkish society.

The study accomplished by Kırıcı (2011) has intended to test the validity of SWA by measuring and comparing the energy consumption during exercise using the Sensewear Armband and Indirect Calorimetry. Total 21 persons, 10 of them males and 11 females with an average age of 21.38 (Â ± 2.2) were subjected to an exercise sequence consisting of four phases. The resting energy expenditure and maximal oxygen consumption of them were measured and they were subjected to the laboratory and field running tests at the speed levels of 30% and 60% higher than the measured value. It may be claimed according to the study findings, referring to the strong correlation between the results, that Sensewear Armband is a valid method for measuring the energy consumption in resting and exercise phases.

CONCLUSION

Consequently, the physical activity levels, measured through the Holter and questionnaire, of the students who participated in the survey were found to have been at low levels. The survey shows, therefore, that the students who participated in the study have sustained a sedentary lifestyle. It was determined that the university students required to be supported in terms of physical activities. The female students were found to have taken less step counts than the step counts of male ones. It is suggested that the female students must be supported in terms of athletic activities for maintaining a healthy life.

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