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Araştırma Makalesi

# The Relationship between Physical Activity Level and Physical Activity Awareness among University Students

Üniversite Öğrencilerinde Fiziksel Aktivite Düzeyi Ve Fiziksel Aktivite Farkındalığı Arasındaki İlişki

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**ABSTRACT**

**Purpose:** The aim of this study was to determine physical activity awareness among university students, examine the relationship between physical activity and its awareness level and investigate whether there are differences according to gender. **Material and Methods:** Individuals (n=403) were assessed by an online form including a socio-demographic form, Cognitive Behavioral Physical Activity Questionnaire(CBPAQ), International Physical Activity Questionnaire-Short Form (IPAQ-SF). Daily step counts for 7 days were taken from participants whom agreed to report (n=162) by using their smartphone's pedometer. **Results:** There was a significant correlation between physical activity level and the physical activity awareness (p<0.01). There was a significant positive correlation between the self-regulation (p<,001) and the outcome expectations (p=,006); a significant negative correlation between the personal barriers (p=,001). There was a positive correlation between the number of steps and the physical activity awareness (p=,02). The effect of the self-regulation on physical activity behavior in males had a greater effect than in females (p<001), and personal barriers for women had a greater impact on physical activity than in males (p=025). **Discussion:** It is thought that social and cognitive factors and gender-specific differences should be taken into consideration while determining the strategies and setting targets to promote physical activity.

**Keywords:** Exercise; Students; Actigraphy

**ÖZ**

**Amaç:** Bu çalışmanın amacı, üniversite öğrencileri arasında fiziksel aktivite farkındalığını belirlemek, fiziksel aktivite ile farkındalık düzeyi arasındaki ilişkiyi incelemek ve cinsiyete göre farklılık olup olmadığını araştırmaktır. **Gereç ve Yöntem:** Bireyler (n = 403) sosyo-demografik form, Bilişsel Davranışsal Fiziksel Aktivite Anketi, Uluslararası Fiziksel Aktivite Anketi Kısa Formu içeren çevrimiçi bir form ile değerlendirildi. Adım sayısını bildirmeyi kabul eden gönüllüler (n=162) araştırmayı takip eden ikinci günden başlayarak 7 gün boyunca her gün adımlarını kaydetmeleri, haftanın sonunda online olarak gönderilen link üzerinden bildirmeleri istendi. **Sonuçlar:** Fiziksel aktivite seviyesi ile fiziksel aktivite farkındalığı arasında pozitif yönde anlamlı bir ilişki vardı (p <0.01). Fiziksel aktivite ile öz-düzenleme (p <, 001) ve sonuç beklentileri (p =,006) arasında pozitif yönde anlamlı bir korelasyon vardı ; kişisel engeller arasında negatif yönde anlamlı korelasyon vardı (p =, 001). Adım sayısı ile fiziksel aktivite farkındalığı arasında pozitif bir korelasyon vardı (p =, 02). Öz-düzenleme, fiziksel aktivite davranışı üzerine erkeklerde kadınlara olan etkisinden daha büyük bir etkiye sahipti (p <001). Kişisel engeller, fiziksel aktivite davranışı üzerine kadınlarda erkeklere olan etkisinden daha büyük bir etkiye sahipti (p = ,025). **Tartışma:** Fiziksel aktiviteyi teşvik etmek için stratejiler ve hedefler belirlenirken sosyal ve bilişsel faktörlerin ve cinsiyete özgü farklılıkların dikkate alınması gerektiği düşünülmektedir.

**Anahtar kelimeler:** Egzersiz; Öğrenci; Aktigrafi

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The World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that require energy expenditure; including activities carried out while working, playing games, traveling, doing daily chores and recreational activities (Organization, 2010). Physical inactivation which is associated with approximately 3.2 million deaths per year is defined as the fourth major risk factor for global mortality and the people over the age of 15 do not have sufficient physical activity (Organization, 2010). According to the survey conducted by Republic of Turkey Ministry of Health in 2011 named “Risk Factors For Chronic Diseases Survey”, 87% of women and 77% of men in Turkey do not have adequate physical activity level (Ünal, Ergör, Horasan, Kalaça, & Sözmen, 2013).

Studies investigating the effects of physical activity on overall health are mostly focused on walking and recreational activities (Tudor-Locke et al., 2011). Walking, one of the most recommended physical activity is generally assessed by walking distance and duration on walking (Tudor-Locke et al., 2011). Also, using of the measurement of the number of steps has become widespread to provide motivational support and to follow up an individuals physical activity level(Lubans, Morgan, & Tudor-Locke, 2009). It was reported that the number of daily steps taken in inactive communities is between 2000 and 2500, while in active communities it has reached the level of 10000 steps (Tudor-Locke et al., 2011). The low number of steps has been shown to increase the risk of many diseases including life-threatening diseases such as heart diseases, type 2 diabetes, cancers, and reduced life expectancy (Lubans et al., 2009).

Plotnikoff et al. stated that social cognitive theories are promising for behavior change, and physical activity behavior also superior to existing theories (Plotnikoff, Costigan, Karunamuni, & Lubans, 2013). According to Bandura, mechanisms that affect behavior should be used for health promotion and improvement (Bandura, 2004). Determinants of health-related behavior include knowledge, self-efficiency, goals, outcome expectations, perceived facilitators and barriers (Bandura, 2004). One of the prerequisites for behavioral change is to have knowledge about health risks and benefits of a health-related habit, but there is often a need for additional influences to help people overcome the inertia (Bandura, 2004). Self-efficacy is considered a central determinant in cognitive behavior theories (Bandura, 2004). Self-efficacy affects the behaviors directly and indirectly (Bandura, 2004). Self-regulation is defined as the personal arrangement of the behavior or performance towards the target and includes goal determination, self-support, self-monitoring, corrective self-response, performance self-guidance, and reaching or avoidance of individual outcome expectations (Umstattd, Motl, Wilcox, Saunders, & Watford, 2009). The outcome expectations, goals, facilitators and barriers of an individuals mediate the indirect impact of behaviors (Bandura, 2004; Umstattd et al., 2009).

It is important to determine the attitudes and behaviors of individuals towards regular exercise participation in order to direct individuals to physical activity or to implement effective practices related to increasing their participation (Bandura, 2004; Organization, 2010; Plotnikoff et al., 2013; Umstattd et al., 2009; Ünal et al., 2013). The hypothesis of this study was based on this main idea and in this way it was aimed to determine physical activity awareness among university students, to examine the relationship between physical activity awareness level and physical activity level and to investigate whether there are gender differences.

## MATERIAL AND METHODS

The research received approval from University Ethics Committee and it was carried out in accordance with the Helsinki Declaration. Signed consent was obtained from the participants.

Individuals having a smartphone were included in the study according to the following inclusion criteria; aged between 18-30, have no regular medication and medical treatment during the research, have no orthopedic, neurological or systemic disease, receive surgical treatment within the last year, experience any trauma related to the musculoskeletal system in the last year. 408 people volunteered; three were excluded from the study because they had complaints about the musculoskeletal system and two were excluded from the study because they had cardiovascular disease. Volunteers who agreed to participate in the study were asked to fill out an online form included a sociodemographic questionnaire form, Cognitive Behavioral Physical Activity Questionnaire(CBPAQ) (Eskiler, Küçükibiş, Gülle, & Soyer, 2016; Schembre, Durand, Blissmer, & Greene, 2015), International Physical Activity Questionnaire-Short Form (IPAQ-SF)(Craig et al., 2003; Öztürk, 2005). And, participants were asked to share the number of steps a week with the researchers. Volunteers who agreed to report the

number of steps (n=162) were asked to register their steps every day for 7 days starting from the second day following the completion of the forms and to enter the total number of steps through the link sent daily online to their phones at the end of each day. Volunteers recorded their number of steps through the free and licensed application installed on smartphones (Bort-Roig, Gilson, Puig-Ribera, Contreras, & Trost, 2014; Case, Burwick, Volpp, & Patel, 2015). Participants were assisted by researchers in setting up a free, secure and licensed number of steps (pedometer) application(Tudor-Locke et al., 2011). The validity and reliability of the methods used to collect data are shown. (Craig et al., 2003; Eskiler et al., 2016; Öztürk, 2005; Schembre et al., 2015; Tudor-Locke et al., 2011) The process of the study was summarized in the flow diagram (Figure 1).

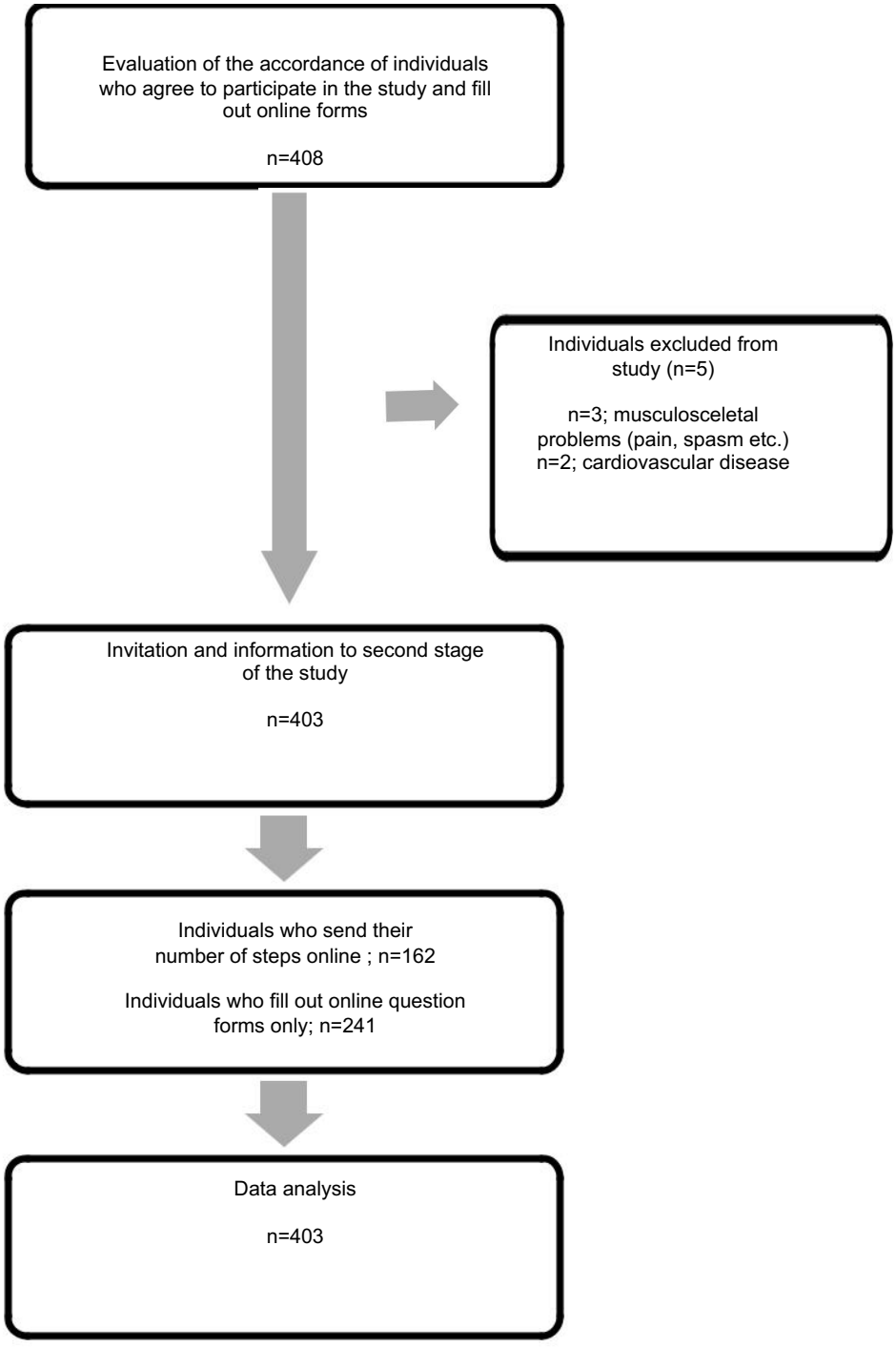


**Figure 1.** Flow Diagram

Awareness of physical activity was evaluated by using the cognitive behavioral physical activity questionnaire(CBPAQ). The CBPAQ was developed by Schembre et al. (2015)(Schembre et al., 2015) and adapted in Turkish by the Eskiler et al. (2016)(Eskiler et al., 2016). The CBPAQ scale, consisting of fifteen items, includes three sub-dimensions as personal barriers, outcome expectations, and self-regulation. Individual scores the questions on a 5-point Likert scale. The higher the score, the higher the level of awareness. The total score of the scale is calculated by subtracting the personal barriers score from the total scores of outcome expectations and self-regulation subscales.

Physical activity levels of individuals were also determined by IPAQ-SF which has Turkish validity and reliability (Craig et al., 2003; Öztürk, 2005). This short form consists of seven questions and provides information about sitting, walking, moderate activities and time spent in vigorous activities. The total score calculation for the IPAQ is the sum of duration (minutes) and frequency (days) for all types of activity in all the fields. The seating score (sedentary behavior level) is calculated separately. In the evaluation of all activities, criteria are taken to ensure that each activity is carried out for at least 10 minutes at a time. To calculate MET minutes a week multiply the MET value given (walking = 3.3, moderate activity = 4, vigorous activity = 8) by the minutes the activity was carried out and again by the number of days that activity was undertaken (Craig et al., 2003).

Physical activity levels were classified as low-level physical activity (<600 MET-Min/week), moderate level physical activity (600-3000 MET-Min/week), and high-level physical activity (>3000 MET-Min/week) (Craig et al., 2003).

Individuals were regarded as active or not by using a zone-hierarchical model: 1) <5000 steps.d (sedentary); 2) 5000-7499 steps.d (low active); 3) 7500-9999 steps.d (somewhat active) and 4) > or =10,000-12,499 steps.d (active)(Tudor-Locke et al., 2011).

*Statistical Analyses*

Statistical analysis was performed using SPSS version 22.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics were used as mean and standard deviation. The suitability of variables for normal distribution was evaluated by visual (histograms) and analytical (Kolmogorov-Smirnov and Shapiro-Wilk tests) methods. Relationships between variables were determined by Pearson correlation analysis. The significance level was determined as $p<0.05$. Comparisons between groups were conducted based on gender. The student's t-test was used to compare the variables.

## RESULTS

According to IPAQ-SF, the average weekly energy consumption of university students was 3012±3463 MET-min/week, the number of weekly steps was 4796±22294 steps. According to the results of IPAQ-SF the participants were grouped based on the activity levels; 67% (N=272) of the individuals declared that they did not participate in vigorous physical activity, 47% (N=188) of them did not participate in moderate physical activity, and 4% (N=11) of them did not perform low-level physical activity. When individuals were classified according to their total MET score obtained from IPAQ-SF 14% (N=57) had a low physical activity level, 52% (N=209) had a moderate physical activity level, 34% (N=137) had a high physical activity level. When individuals were classified according to the number of steps, 27% (N=44) sedentary, 38% (N=61) low active, 23% (N=37) a little active, 12% (n=20) active individuals were seen. Physical characteristics and physical activity levels of participants were summarized in Table .1.

**Table 1.** Physical characteristics and physical activity levels of the participants

| | **Woman (n=301)** | **Man (n=102)** | **Total (n=403)** |
|---|---|---|---|
| **Age (year)** | 20,94±2,32 | 21,87±2,67 | 21,1791±2,45107 |
| **Body Mass Index (kg/m$^2$)** | 21,67±3,52 | 24,21±3,19 | 22,32±3,61 |
| **Low physical activity level (%)** | 15,3 | 10,8 | 14,1 |
| **Moderate physical activity level (%)** | 55,8 | 40,2 | 51,9 |
| **High physical activity level (%)** | 28,9 | 49 | 34 |
| **Step count – sedantery (%)** | 30 | 15,6 | 27 |
| **Step count - low active (%)** | 36,9 | 43,8 | 38 |
| **Step count - somewhat active (%)** | 25,4 | 9,4 | 23 |

There was a significant correlation between the level of physical activity assessed by IPAQ SF and the awareness of physical activity (p<0.01). There was a significant positive correlation between the self-regulation (p<,001) and the outcome expectations (P=,006) subscale of CBPAQ and MET score and a significant negative correlation between the personal barriers (p=,001) subscale of CBPAQ and MET score.A positive correlation was found between the number of steps and the awareness of physical activity (p=,02). There was a positive correlation between the number of steps per week and in the outcome prediction subscale (p=,04) of CBPAQ. But there was no significant correlation between the number of steps per week and self-regulation and personal barriers subscales of CBPAQ. The relationship between the physical activity level assessed by pedometer and physical activity awareness of the participants was summarized in Table 2.

**Table 2**. The Relationship Between Physical Activity Level and Physical Activity Awareness

| **Pearson Corelation Analysis** | **CBPAQ Total Scor** | | **Self-regulation** | | **Outcome Expectations** | | **Personal Barriers** | |
|---|---|---|---|---|---|---|---|---|
| | p | r | p | r | p | r | p | r |
| **IPAQ SF Total Scor** | p<,001 | ,254 | p<,001 | ,276 | ,006 | ,136 | ,001 | -,165 |
| **Weekly number of steps** | ,02 | ,183 | ,151 | ,056 | ,04 | ,162 | ,151 | -,114 |

*CBPAQ: Cognitive Behavioral Physical Activity Questionnaire, IPAQ SF: International Physical Activity Questionnaire Short Form, p<,05*

The effect of subscales of CBPAQ on physical activity behavior on gender-dependent changes was examined and the self-regulation of physical activity behavior in males had a greater effect than in females (p<001), and personal barriers for women had a greater impact on physical activity than in males (p=025). Although the outcome expectations were a factor affecting physical activity behavior for both women (p=148) and men (p=004), there was no significant difference between genders (p>0.05) (Table 3). Total MET scores of males were significantly higher than females (p<0.001). There was no difference in the number of steps in the subjects who reported the number of steps (p=,085).

**Table 3.** Differences between gender in terms of physical activity awareness

| **Student t test** | **Woman (n=301)** | **Man (n=102)** | **p** |
|---|---|---|---|
| **CBPAQ Total Scor** | 4,2187±1,97643 | 5,0020±2,04910 | ,001 |
| **Self-regulation** | 2,9473±,92300 | 3,4000±,98955 | p<,001 |
| **Outcome Expectations** | 4,1813±,76139 | 4,2812±,69580 | ,245 |
| **Personal Barriers** | 2,9100±,86494 | 2,6792±,96461 | ,025 |

*CBPAQ: Cognitive Behavioral Physical Activity Questionnaire*

## DISCUSSION

This study showed that 65% of university students in the collected sample had lower levels of physical activity than the level recommended by WHO. In addition, the level of physical activity is directly affected by the awareness of physical activity; while self-regulation and outcome expectations had positive effects on physical activity level, personal barriers had negative effects. It was observed that physical activity awareness was determined by the outcome expectations. It was found that gender-based differences were caused by personal barriers in women and self-regulation ability in men.

The European Union Research Group investigated the level of physical activity and activity habits in 28 member countries (S., 2018). It was reported that 25% of the individuals in the age group of 15-24 did not participate in physical activity, and also it was that 70% of individuals walked for at least 4 days a week, 10 minutes a day, 8% did not perform walking activity for more than 10 minutes during the week. This report also states that 51% of the individuals spend more than 5.5 hours a day sitting (S., 2018). In the report published by the American College Health Association in 2016, 52.8% of university students (American College Health Association–National College Health Assessment (ACHA-NCHA) Spring 2016 Reference Group

Executive Summary, 2016); in the report published by the British Heart Foundation in 2015, 17% of individuals in the age group of 16-24 reported that their physical activity level was below the recommended level(Townsend, Wickramasinghe, Williams, Bhatnagar, & Rayner, 2016). In the study of Savcı et al., which assessed physical activity levels of university students studying in health-related departments using the IPAQ-SF questionnaire; they found that the activity level of 87% of the students was insufficient in the protection and development of health and only 18% of the students had a sufficient level of physical activity(Savcı, Öztürk, & Arıkan, 2006). In the current study, it was found that the percentage of students with insufficient physical activity was higher than those previously reported by various organizations. The fact that this result of the present study differs from the examples of Europe and America may be due to sosio-cultural differences (Haase, Steptoe, Sallis, & Wardle, 2004). Haase et al. described the differences between countries in terms of political, cultural, geographic and economic factors. They reported that these factors affect the level of physical activity independent of age, gender and health beliefs (Haase et al., 2004). It is thought that the different results of the present study may arise from that the sports and physical activity in western societies where socioeconomic status is different are due to the fact that it is supported in the social, educational and professional field.

Deliens et al. investigated the physical activity and sedentary behaviors of university students (Deliens, Deforche, De Bourdeaudhuij, & Clarys, 2015). In the study, it was not stated which factors affecting the physical activity level at what rate, a general framework has been drawn which determines the factors affecting physical activity (Deliens et al., 2015). Keating et al. grouped the factors affecting physical activity behavior under 4 main headings as personal, social, cognitive and environmental factors(Keating, Guan, Pinero, & Bridges, 2005). In the general judgments obtained from the previous studies included in the review, researchers emphasized that self-efficacy and self-motivation were the variables affecting the physical activity behavior of university students (Keating et al., 2005). Consequently the studies of Sullum et al., high self-efficacy is generally associated with high physical activity participation level(Sullum, Clark, & King, 2000). Dishman et al. also stated that interventions including cognitive/behavioral self-regulation skills are effective in increasing the adoption and maintenance of exercise behaviors (Dishman et al., 2005). Hallam et al. found that there was an increase in self-regulation skills of individuals after the structured training process and they continued their regular exercise habits for a longer period compared to the individuals in the comparison group with lower self-regulation skills. So they have shown that self-regulation mediates exercise behaviour (Hallam & Petosa, 2004). In a study which investigated the availability of Social Cognitive Theory as an indicator of participation of university students in vigorous physical activity revealed the positive relationship between self-regulation, self-efficiency and outcome expectation and participation in vigorous physical activity (Petosa, 1993). The correlation between self-regulation and participation in vigorous physical activity was shown to be higher than the outcome expectation(Petosa, 1993). Rovniak et al. investigated the relationship between social cognitive variables and the physical activity level of university students and they reported that self-efficacy has the greatest impact on physical activity through self-regulation, while outcome expectations have a small impact on a statistically insignificant level(Rovniak, Anderson, Winett, & Stephens, 2002). Young et al. reported that self-regulation was investigated within the scope of 23 research studies and in all of the studies, self-efficacy was consistently associated with physical activity. 16 of these 23 studies showed that self-efficacy and physical activity were directly and significantly related(Young, Plotnikoff, Collins, Callister, & Morgan, 2014). Also, it was stated that physical activity was directly and significantly related with the outcome expectation in 21 out of 70 studies examining outcome expectation(Young et al., 2014). Thus, there was a positive correlation between self-efficacy and self-regulation and physical activity behavior, but there was no relationship between outcome expectation and physical activity behavior(Young et al., 2014). The results of our study showed that the outcome expectation and self-regulation were closely related to the physical activity level. In other words, individuals participate in physical activity based on their own ability to self-regulate, the acceptability of the time required for the physical activity and the results of physical activity. Unlike previous studies(Deliens et al., 2015; Dishman et al., 2005; Hallam & Petosa, 2004; Keating et al., 2005; Petosa, 1993; Rovniak et al., 2002; Sullum et al., 2000; Young et al., 2014), our study showed that outcome expectations were the more effective determinant of physical activity than other parameters. As mentioned

before, the difference in the results of our study is thought to be appropriate in this context.

Keating et al. also reported that the development of studies examining the effect of one's own motivation on physical activity behavior is still in its early stages (Keating et al., 2005). In addition, they reported that the primary motivation of university students in participating in physical activity was to look good(Keating et al., 2005). It was stated that among the primary motivations of the students, the lack of expectations of being healthy is thought to be related to the age and lack of concern about health problems of the students(Keating et al., 2005). This may be due to the fact that the students do not have enough knowledge about why they should be physically active(Keating et al., 2005). The result of our study is consistent with the literature in this matter. It was observed that the physical activity of the participants increased or decreased with the increase or decrease in physical activity awareness.

Brown et al. found that 14 personal barriers including laziness, lack of willpower and lack of time to exercise, accounted for more than 35% of the change in vigorous physical activity in a university case(Brown, Huber, & Bergman, 2006). Greaney et al. stated that boredom and stress are important barriers to physical activity (Greaney et al., 2009). Özşaker examined the factors that limited the physical activity levels of university students in their free time and reported that the individual's psychology, lack of knowledge and time dimension perceived as more obstacles by girls than boys (Özşaker, 2012). However, the gender differences in participation in physical activity are controversial. While a group of studies suggests that there are no gender differences in participation in physical activity (Behrens & Dinger, 2003; Stock, Wille, & Kramer, 2001), another group indicates that male students are more involved in physical activity than female students of their peers (Huang et al., 2003; Leslie, 2000). Consequently, of Keating et al.'s research, it was observed that the expectation of the results for the female students was higher than for the male students. Additionally, it has been reported that being good looking is the most important outcome expectation for all students. While male students aimed to increase muscle mass, female students aimed to lose weight (Keating et al., 2005). In this study, it was observed that the physical activity levels of males were higher than girls. The difference was in favor of the male students due to the better self-regulation ability of male student and the negative effects of personal barriers on physical activity levels of female students.

According to Krejcie et al., as the population increases the sample size increases at a diminishing rate and remains relatively constant at slightly more than 380 cases. The strong aspect of the present research is that the sample size is large enough to represent the population(Krejcie & Morgan, 1970).

The present research has some limitations. The lack of questioning of what personal barriers are and the fact that the participant has answered the questions without the opportunity to consult the researcher during the online form is undermining the generalization of the results of the study.

In conclusion, since regular physical activity is directly related to physical and psychological health, factors affecting physical activity should be taken into consideration in attempts to increase physical activity level. Among the determinants of physical activity level, the awareness of physical activity comes first. It is thought that making attempts to promote physical activity using evidence-based foundations, following the examination of social and cognitive factors that affect the awareness of individuals, will be beneficial. In addition, gender-specific differences should be taken into consideration while determining the strategies and setting targets. It can be observed that intervention and/or education methods including environmental interactions together with the individual's own biopsychosocial characteristics must be implemented in order to increase the level of physical activity which is an important requirement of public health. It may be useful planning subsequent studies in determining the orientation of the planned interventions, investigating the effectiveness of physical activity associated with education. Also it is recomended to use qualitative analysis methods in which individuals can identify their disability and support at different age and health conditions.

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