Research Article

Investigation of the Effects of Physical Activity on Body Awareness, Posture and Anxiety in Smartphone Addicted Individuals

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Abstract

Aim: The aim of this study was to investigate the effect of physical activity on body awareness, posture and anxiety in smartphone addicted individuals.

Material and Method: The smartphone addiction level of 110 smartphone addicted young adult (20.27±2.25 years) included in the study was assessed with the Smartphone Addiction Scale-Short Version (SAS), physical activity level with the International Physical Activity Questionnaire Short Form (IPAQ), body awareness with the Body Awareness Questionnaire (BAQ), posture assessment with the New York Posture Rating Scale (NYPRS) and anxiety level with the Beck Anxiety Inventory (BAI). According to the IPAQ score, participants were categorised into three groups as inactive (I group), minimally active (M group) and active (A group). Body awareness, posture affectivity and anxiety levels of the groups were compared. The relationship between physical activity levels and body awareness, posture problems and anxiety levels of all participants was analysed.

Results: The BAQ score of the I group was lower than that of the M and A groups (p<.05), while the BAQ scores of the M and A groups were similar (p>.05). The BAI score of group I was higher than that of group A (p=.039). The NYPRS scores did not differ significantly between the groups (p>.05). There was a positive correlation between IPAQ score and BAQ score (r=.283, p=.003) and a negative correlation with BAI score (r=.212, p=.043). A negative correlation was found between sitting time and NYPRS score (r=.214, p=.041).

Conclusion: Physical activity has a positive effect on body awareness and anxiety in smartphone-addicted individuals. Physical activity can protect young adult from the negative physical and psychological effects of smartphones. In addition, it is important to pay careful consideration to the sitting time in order to prevent posture problems in these individuals.

Keywords: Smartphone addicted, physical activity, body awareness, posture, anxiety

INTRODUCTION

Mobile phones provide many different services in addition to providing communication technologies and internet use. Young people use mobile phones to express themselves, search for current information, follow videos, communicate with different communities (1). With the development of technology, smartphones have started to find more place in the lives of individuals with many advantages. Thus, it has a critical importance on human-machine interactions (2). With the use and widespread use of smartphones, it can be mentioned that they provide important benefits to the society and facilitate daily life (3). In addition to these benefits, the harms of smartphones are also mentioned. There is also the possibility that people can become addicted to their phones to the point of behavioural addiction (2).

Smartphone addiction refers to excessive and uncontrolled use of one's phone. An individual's addiction to the device is mentioned as a potential disorder leading to a psychological dependence. It is also categorised as a behavioural addiction, which can potentially cause negative physical, emotional and financial impact (4).

In studies on smartphone addiction in the young population, physical activity has been one of the topics investigated in related factors and interventions for

prevention (5). The literature indicates an inverse relationship between physical activity and mobile phone addiction among adolescents and young adults (6). It is reported that smartphone addiction causes serious psychological and physical negative effects (7).

Among the physical health problems of smart phone users, postural effects are at the forefront. These factors can also lead to disorders related to body awareness (8). Body awareness includes a multifaceted concept such as knowledge, position perception and cognitive elements about the body parts of the individual in mobile and immobile posture. At a basic level, it refers to the level of knowledge about the body type of the individual (9). Body awareness is closely related to posture and musculoskeletal system. It is stated that body awareness may also be negatively affected due to posture disorders in smartphone users (8). Studies indicate that smartphone addicted individuals experience more posture-related symptoms than non-addicted individuals, as they experience a poor posture (10-13).

Smartphone addiction can lead to psychosocial problems such as depression and anxiety as well as physical health problems (14). Many studies emphasise the presence of anxiety in addicts and it is stated that anxiety-related problems in individuals affect mental health in a multidimensional way (15).

Recently, smartphone addiction has been the topic of current research in addiction types due to the increase in the frequency of smartphone use. Although the frequency of smartphone addiction is gradually increasing, it is stated that there are not enough studies on this subject (13). All of the above-mentioned factors seem to be absent in a comprehensive research on smartphone addiction. Based on this information, the aim of this study was to investigate the effect of physical activity on body awareness, posture and anxiety in smartphone addicted individuals. We think that determining the effects of physical activity in smartphone addicted individuals will be instructive in terms of approaches to be made for smartphone addiction.

MATERIAL AND METHOD

Design and Participants

This prospective cross-sectional study was conducted between January 2024 and April 2024 at the Department of Physiotherapy and Rehabilitation, Gaziantep İslam Science and Technology University. Data were collected in accordance with the Declaration of Helsinki. Participants were informed in writing and a consent form was obtained.

Participants over the age of 18, without structural scoliosis, without any neurological and orthopaedic disorders, with men scoring above 31 and women above 33 on the Smartphone Addiction Scale-Short Version (SAS) were included in the study. A total of 278 people

were evaluated for the study. 168 people were not included in the study because they did not meet the cut off value of SASV and the study was completed with 110 young adult participants. Referring to the International Physical Activity Questionnaire Short Form (IPAQ), participants were grouped as inactive (I) with <600 MET-min/week, minimally active (M) with 600-3000 MET-min/week and active A) with more than 3000 MET-min/week.

Measurements

Demographic information, duration of daily-weekly phone use, primary purpose of smartphone use, and number of years of smartphone use were recorded. The level of smartphone addiction, physical activity level, body awareness, posture and anxiety level of the participants were also evaluated.

SAS was used to evaluate the risk of smartphone addiction. Scale scores range between 10-60. The higher the score obtained from the test, the higher the risk for addiction. The scale has one factor and no subscales. The cut-off score is 31 for men and 33 for women (16).

IPAQ: IPAQ was used to evaluate the physical activity level and exercise habits of individuals. The questionnaire, which consists of seven questions, evaluates the number of days and minutes of walking, moderate-to-vigorous and vigorous physical activities per week in the last week MET values by activity are calculated by multiplying MET values by minutes and days to obtain a total score in MET-minutes/week. Vigorous physical activity is assessed as 8 METs, moderate physical activity as 4 METs and walking as 3.3 METs. Daily sitting time is recorded as a separate parameter. The total physical activity score is grouped as inactive <600 minutes/min/week, minimally active 600-3000 MET-min/week and active over 3000 MET-min/week (17).

Body Awareness Questionnaire (BAQ): It is a questionnaire aimed at determining the level of normal or abnormal sensitivity of body composition. It consists of four subgroups (attention to changes and reactions in the body process, sleep-wake cycle, prediction at the beginning of the disease, prediction of body reactions) and a total of 18 statements. Rating in the questionnaire is done as a total score. The total score to be obtained from the questionnaire can be maximum 126 and minimum 18. The higher the total score, the better the body awareness. Total score was recorded (18).

New York Posture Rating Scale (NYPRS): It is an evaluation scale consisting of 13 items that evaluates static posture from the lateral and posterior aspects. For the assessment, the participant is assessed in a static position from the side and back in underwear. Each item in the evaluation sections is scored from 'good posture' to 'bad posture' (5-3-1) and the person receives a total score between 13-65. The higher the total score, the better the posture of the participant (19).

The Beck Anxiety Inventory (BAI): The scale assesses the state of anxiety in the last week. It consists of 21 items and each item is scored between 0-3. The total score in the scale takes a value between 0-63. A high total score is regarded as a high level of anxiety severity (20).

Statistical Analysis

SPSS 25 (IBM, Statistical Package for the Social Sciences) programme was used for data analysis. The normality of the variables was evaluated by Kolmogorov-Smirnov test. Numerical variables were presented as mean ± standard deviation (mean ± SD) and nominal values were presented as number (n). One-way analysis of variance (post hoc analysis Bonferroni correction) was used to evaluate the intergroup comparison of the participants grouped according to physical activity levels. Pearson correlation analysis was used to determine the relationship between two variables. P - values <.05 were considered statistically significant.

For power analysis, a 5% significance level, 80% power (1-b), and a medium effect size in the population (d=0.712) were assumed (8). G*Power analysis was used to estimate the minimum sample size required. The sample size was calculated as 28 participants in each group.

RESULTS

Comparison of demographic data and clinical characteristics of inactive (I), minimally active (M) and active (A) groups are presented in Table 1. The mean height of the inactive group was higher than the other two groups (Comparison of group A with group I, p=.034; comparison of group A with group M, p=.005). Considering that the IPAQ score was the discrimination parameter between the groups, there was a significant difference between the groups, as expected (p<.001 for pairwise comparisons between groups). The sitting time of group I was found to be longer than group A (p=.013). BAQ scores of group I were lower than those of groups M and A (p=.005, p=.002, respectively), whereas BAQ scores of groups M and A were similar (p>.05). The BAI score of group I was higher than that of group A (p=.039). No significant difference was found between the SAS and NYPRS scores between the groups (Table 1).

Table 1. Comparison of demographic characteristics, phone usage duration, smartphone addiction, physical activity, body awareness, posture status and anxiety levels of inactive, minimally active and active groups

	Inactive (I) (n=35)	Minimal active (M) (n=45)	Active (A) (n=30)	p	Group comparison
Age (years)	20.68±2.68	20.37±2.40	19.63±1.12	0.190	
Height (cm)	168.88±8.52	167.86±7.35	174.03±8.40	0.004*	I=M<A
Weight (kg)	61.65±10.68	62.04±12.8	67.7±12.42	0.083	
SUT (hours)	5.82±2.12	6.15±2.61	6.56±3.14	0.531	
SAS score	36.77±6.53	39.6±6.97	40.1±8.46	0.127	
IPAQ score	485.88±180.60	1734±656.61	3503.46±545.29	0.000*	I<M<A
ST (hours)	370.28±123.03	328±99.58	288±121.43	0.017*	I>A
BAQ score	73.68±20.9	87.8±18.99	90.5±17.84	0.001*	I<M=A
NYPRS score	54.91±5.86	55.17±5.87	55.23±5.40	0.970	
BAI score	17.25±13.96	15.28±12.3	9.6±9.37	0.036*	I>A
	n	n	n		
Gender (female/male)	27/8	34/11	11/19		
Purpose of using a smartphone					
Social media	30	39	19		
Gaming	3	4	2		
Music	1	1	5		
Shopping	1		2		
Communication		1	2		

*p<0.05 one-way analysis of variance (post hoc analysis Bonferroni correction); ST: sitting time, SUT: smartphone usage time, IPAQ: International Physical Activity Questionnaire, SAS: Smartphone Addiction Scale, BAQ: Body Awareness Questionnaire, NYPRS: New York Posture Rating Scale, BAI: Beck Anxiety Inventory

Table 2 presented the correlation analysis between the duration of smartphone use, IPAQ scores and SAS, BAQ, NYPRS and BAI scores. A positive correlation was found between IPAQ score and BAQ score, and a negative correlation was found with BAI score (Table 2A negative correlation was found between sitting time and NYPRS score (Table 2). A positive correlation was observed between the duration of smartphone use and SAS score. A positive correlation was found between SAS score and BAI score (Table 2).

Table 2. Analysing the correlation between physical activity, phone use, body awareness level, posture problem and anxiety								
		IPAQ	ST	SUT	SAS	BAQ	NYPRS	
IPAQ	r	1						
	p							
ST	r	-0.250*	1					
	p	0.032						
SUT	r	0.119	0.050	1				
	p	0.215	0.604					
SAS	r	0.154	0.019	0.446**	1			
	p	0.107	0.849	0.000				
BAQ	r	0.283*	-0.029	0.044	0.095	1		
	p	0.003	0.766	0.646	0.325			
NYPRS	r	0.020	-0.214*	-0.063	-0.077	0.050	1	
	p	0.837	0.041	0.515	0.426	0.603		
BAI	r	-0.212*	0.054	-0.005	0.237*	-0.131	0.076	
	p	0.043	0.575	0.957	0.013	0.173	0.427	

*$p<0.05$, **$p<0.001$ Pearson correlation analysis, IPAQ: International Physical Activity Questionnaire score, ST: sitting time, SUT: smartphone usage time, SAS: Smartphone Addiction Scale score, BAQ: Body Awareness Questionnaire score, NYPRS: New York Posture Rating Scale, BAI: Beck Anxiety Inventory score

DISCUSSION

The aim of this study was to investigate the effect of physical activity level on body awareness, posture problems and anxiety levels in smartphone addicted individuals. As a result of this study, it was found that individuals with high physical activity had higher body awareness and lower anxiety levels. In addition, physical activity level was positively correlated with body awareness and negatively correlated with anxiety level. It was observed that individuals with high sitting time had worse posture.

Physical activity is critical for maintaining health and preventing mortality (21). In the literature, there are many studies showing that there is a negative relationship between smartphone addiction and physical activity (5). In a study conducted on students, smartphone addiction and physical activity levels were examined and it was stated that participants with high smartphone addiction had lower physical activity levels (22). In another study, it was concluded that 67.8% of young people using smartphones had low physical activity levels (23). Similarly, we think that the reason why there was no relationship between physical activity level and duration of smartphone use in our study is that all participants were addicted to smartphones and the duration of phone use of all individuals was very high. For this reason, it can be thought that the participants in our study did not spend time for physical activity because of the high duration of smartphone use. The fact that 80 of the 110 students with smartphone addiction were inactive and minimally active in terms of physical activity supports this situation.

Body awareness is an indicator of the individual's ability to identify their body and sensory awareness and examines the individual in social, physical, emotional and psychological aspects (24). The number of studies examining the relationship between body awareness and physical activity level is limited in the literature (25). In a study investigating the relationship between physical activity and body awareness in athletes, it was reported that body awareness was higher than non-athletes (26). In other studies, it was found that those with low physical activity levels also had low body awareness (27,28). In our population of smartphone addicted individuals, the fact that the body awareness of the inactive group was different from the other groups and that the physical activity level was positively correlated with the body awareness level shows a mutual cause and effect relationship. In line with these findings, it can be hypothesised that physical activity relatively prevents body awareness in smartphone addicted individuals.

In the literature, there are studies on the beneficial effects of physical activity on mental health (30,31). However, when current studies are analysed, contradictory results are observed. In some studies, it is stated that there is a positive relationship between increased physical activity level and anxiety and depression symptoms (30,31), while in some studies, it is stated that there is a positive relationship between only moderate physical activity level and depression and anxiety (32). The possible reason for these contradictions may be methodological differences such as subject selection, characteristics of the subjects, and measurement methods used (33). One of the most common mental problems in university students is anxiety (34). In a study conducted in university students, high physical activity was found to be more effective in reducing anxiety than moderate physical activity (35). However, there was no relationship between the level of physical activity and depression and anxiety in secondary school students (36). In our study, it was observed that anxiety decreased with increasing physical activity level. This suggests that physical activity may be an important

method in the process of cope with anxiety, especially in a young population consisting of university students. Smartphone addiction may increase the level of anxiety. In our study, the fact that the anxiety level of the inactive group was higher than the active group may be considered that physical activity relatively protects the mental state.

Young adults with smartphone addiction showed a tendency to decrease in physical activity, which resulted in decreased muscle mass and different postural problems (22). In the study by Kee et al. it was emphasised that craniocervical posture and mobility were negatively affected in 16-17 year old individuals with smartphone addiction and this may cause temporomandibular joint pathologies (37). Similarly, in another study conducted in university students aged 18-32 years, an increase in nondominant side shoulder protraction, thoracic kyphosis, neck lateral flexion and pelvic obliquity was found in the posture evaluation performed before and after 5 minutes of smartphone use. It has been suggested that these disorders may cause low back pain, thoracic region pain and neck pain in the future (38). In our study, although the posture problems were not similar according to the physical activity groups, it was observed that individuals with high sitting time had worse posture. We think that this is due to the fact that all of the participants were addicted to smartphones and the mean NYPRS scores were close to the total score in all three groups. In addition, it is stated in the literature that long sitting time is an independent risk factor for deterioration of fitness, irrespective of physical activity level (39). In posture problems seen in smartphone addicts, parameters such as inappropriate sitting position and sitting time during smartphone use may be a more determining factor than physical activity level. Further comprehensive and controlled studies in this field may provide more accurate information about the level of physical activity and posture status. In addition, randomised controlled trials with physical activity interventions of different intensity may be important in knowing the effectiveness of approaches to prevent smartphone addiction.

There are some limitations of our study. Since the population of our study consisted of university students, anxiety level may be high in this age group. Accordingly, the level of anxiety in this age group may have increased independently of the smartphone. In addition, the fact that university students stay in a sitting position for a long time due to their academic studies may have affected the posture.

CONCLUSION

With the changing world, the increasing use of various technological devices such as smartphones by young people brings with it spine, shoulder, elbow and various postural problems. In addition, body awareness and mental state can be affected. In our study, physical activity had a positive effect on body awareness and anxiety in young people with smartphone addiction. We think that physical activity will be a method to protect young people

from the harmful effects of smartphones. In addition, sitting time is an important factor in posture problems and even in young people with high physical activity level, to avoid various posture problems, attention should be paid to sitting time.

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