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# FACTORS ASSOCIATED WITH SCREEN ADDICTION IN ADULTS: A PROSPECTIVE STUDY

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**Abstract:** Screen addiction is a common public health problem that causes significant harm to both individuals and society. This study's primary purpose is to examine the factors associated with screen addiction and to propose a sustainable solution to screen addiction. This research was conducted on staff who work at Cukurova University. Phone addiction, internet addiction and physical activity level were evaluated with Smartphone Addiction Scale-Short Form (SAS-SF), Internet Addiction Scale (IAS), and International Physical Activity Survey Short Form (IPAQ-SF), consecutively. Craniovertebral angle was measured with a goniometer and shoulder protraction was measured with a tape measure. The study group consisted of 189 individuals (111 women and 78 men). The mean age was 44.15 ± 11.25 years (min: 23, max: 60). The addiction level was determined to be higher in the sedentary individuals. Phone and internet addiction is statistically higher in sedentary individuals than in individuals with sports habits ($P<0.05$). While internet addiction is associated with age, body mass index, sports year, sports frequency, sports duration, back pain, shoulder protraction angle, severe activity level, moderate activity level, and sitting activity; phone addiction was found to be associated with age, sleep duration, sports year, sports frequency, sports duration, back pain, severe activity level, moderate activity level, and sitting activity ($P<0.05$). Sleep duration is especially negatively affected by phone addiction ($P<0.01$; $r=-0.23$). Internet addiction was found to be more related to postural problems ($P<0.01$; $r=0.024$). Consequently, sports habits are a crucial factor in preventing screen addiction. Which sports branches will be more effective for addicted individuals and what motivating activities should be done to direct working individuals to sports will require further study.

**Keywords:** Addiction, Physical activity, Sport, Mobile phone use, Internet addiction disorder

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## 1. Introduction

In the last decade, screen addiction has grown tremendously because of active working lives, long working hours, and effortless and easily accessible leisure activities. This situation has become a current health problem that concerns everyone due to its many negative effects, both physical and mental (Thompson, 2015). Although screen addiction is a public health problem, most of the studies in the literature are on adolescents and school-age individuals. There is not enough evidence for adults in active working life. The facts that screen addiction in adults is different from adolescents in many ways. For adults in active working life, it is sometimes an obligation rather than an addiction. Lack of options for leisure activities and difficulty in accessing physical activity trigger this obligation (Chau et al., 2012). Adults in working life often cannot spare time for physical activity and sports. Many adults use the internet and telephone in their free time activities to cope with the problems arising from intense working hours, an intensely competitive environment, and the stress of life (Haahr et al., 2007). There are studies on the negative effects of screen addiction in adolescents. These are the frequently mentioned negative effects such as postural problems and psychological problems (Sahu et al., 2019). Long-term phone and internet use affects the cervical region, especially. It generally causes deterioration in spine biomechanics and posture for adolescents and children. Also, it can cause fatigue and pain in the muscles that stabilize the spine (Betsch et al., 2021). This study aims to compare the internet and phone addiction levels of individuals who do and do not do sports. Another aim of the study is to examine the relationship between internet and phone addiction and cervical posture, sleep duration, and physical activity level.

## 2. Materials and Methods

### 2.1. Design

A survey research design was applied, using a non-probability convenience sampling technique. Data collection took place between January 2023 and August 2023. The Helsinki Declaration's guiding principles were followed during the study's execution. Written and verbal

consent was obtained from the participants just before starting the study.

**2.2. Sample Size**

G*Power 3.1.9.4 computed the required sample size. software. The Spearman Correlation coefficient (r) was calculated to determine the effect size of the significant results. To analyse the significance of the difference in the outcomes between the groups, the Mann-Whitney U test was conducted. To determine the effect size of the significance, eta-square ($n^2$) values were calculated. The predicted sample of 180 participants was adequate for a statistical power of %85 and a level of %5 considering the duration of the study.

**2.3. Participants**

Academic, administrative, and service personnel working at Çukurova University conducted the study. Individuals included in the study are divided into two groups, including those who regularly participate in the sports services provided by Çukurova University and those who do not. Individuals aged between 20 and 65 were included in the study. Individuals with an orthopedic, neurological, or oncological disease that would affect posture were excluded from the study. To form a homogeneous group, individuals who were single and had less than a university education were excluded from the study.

**2.4. Measurements and Instruments**

To determine the general descriptive characteristics of individuals, the following characteristics were asked respectively.

Body weight: The subjects were asked about their body weight and recorded in kilograms (kg).

Height: Subjects were asked about their height in centimeters (cm) has been recorded.

Body Mass Index (BMI): Using the formula body weight / height$^2$ (kg/m$^2$) has been calculated. A BMI ≤ 18.5 kg/m$^2$ is underweight, a BMI of 18.6-24.9 kg/m$^2$ is normal, a BMI of 25.0-29.9 kg/m$^2$ is defined as overweight, and a BMI ≥ 30.0 kg/m$^2$ is defined as obese. Daily sitting time and sleep hours were calculated and recorded in minutes. The frequency and duration of the sport performed, back pain severity and duration, addiction score, and physical activity score were calculated and recorded as numerical variables.

**2.5. Smartphone Addiction Scale-Short Form (SAS-SF)**

SAS-SF is a scale developed by Haug et al. to measure the risk of smartphone addiction, consisting of 10 items, and is evaluated with a six-point Likert scale (Haug et al., 2015). Scale scores vary between 10 and 60. It is evaluated that as the score obtained from the test increases, the risk of addiction increases (Evren et al., 2018; Noyan et al., 2015).

**2.6. Internet Addiction Scale (IAS)**

It is a scale consisting of 35 items and was developed by Günüç in 2008 to measure internet addiction and usage characteristics. The scale is a five-point Likert type, and the scale items are scored from 5 to 1. Scale scores vary between 35-175. Higher scores indicate greater addiction severity (Kayri and Gunuc, 2008).

**2.7. International Physical Activity Survey Short Form (IPAQ-SF)**

Between 1997 and 1998, the International Consensus Group developed four long and four short forms of the IPAQ instruments (Craig et al., 2003). In this study, the short form was used. The IPAQ was used to assess physical activity levels. A score in MET minutes is obtained from the calculations on the scale. In addition to scoring, categorical scoring can be done with the numerical data obtained (Saglam et al., 2010).

**2.7.1. Craniovertebral angle**

The craniovertebral angle is formed by the union of the horizontal line drawn from the 7th cervical vertebra and the line drawn from the 7th cervical vertebra to the tragus. Craniovertebral angles provide information about the position of the lower cervical region. In a study conducted on young adults, the average craniovertebral angle was found to be 53.6 degrees. This angle was evaluated with the help of a goniometer (Tudini et al., 2022). If this angle falls below 50 degrees, it indicates that the head position has shifted forward (Piekartz, 2015).

**2.7.2. Shoulder protraction**

The acromion wall distance will be evaluated with the help of a tape measure while standing upright. Participants will be in a standing position with feet shoulder-width apart, arms fixed at the side of the body, neutral upper body posture (without any postural correction that the patient feels comfortable with), and head facing forward (Temprom et al., 2019).

**2.8. Statistical Analysis**

The data obtained during the research process was analyzed with Jamovi 0.9.4.0 and SPSS 25 software. The suitability of the variables to a normal distribution was evaluated using visual (histograms and probability graphs) and analytical methods (Kolmogorov-Smirnov and Shapiro-Wilk tests). It was determined that the data was not normally distributed. Qualitative variables are defined with numbers and percentages. The statistical significance level for all analyses was determined to be 5% ($P<0.05$). SPSS for Windows version 22 software was used for statistical analysis. Demographic data were evaluated with descriptive analysis and presented as the mean (mean) ± standard deviation (SD). The relationship was analyzed using the Spearman correlation analysis test. The Mann-Whitney U test was used for group comparisons. Cases where the P value was below 0.05 were considered statistically significant results.

## 3. Results

The study group consisted of 189 individuals (111 women and 78 men). The mean age was 44.15 ± 11.25 (min: 23-max: 60). The individuals' body mass index was 26.31 ± 4.18 (min 20-max 34). In terms of homogeneous data distribution of the study; 8 individuals who were primary school graduates, 5 single individuals, and 1 individual with advanced stage cervical disc herniation

were excluded from the study. Since all individuals participating in the study are married, university graduates and public employees, no additional demographic data tables are provided. 106 active sports individuals participated in the study. 83 individuals were sedentary individuals who did not do sports. Factors related to screen addiction were examined in two distinct categories: phone and internet addiction. Internet addiction was associated with age, body mass index, sports year, sports frequency, sports duration, back pain, shoulder protraction angle, vigorous activity level, moderate activity level and sitting activity (P<0.05), (r=-0.34; r=0.40; r=-0.31; -0.52;r=0.26;r=-0.28;r=0,28 respectively), (Table 1, Table 2). It was also not found to be associated with sleep duration, head and neck position, or general physical activity level (P>0.05), (r=0.01; r=0.03; r=-0.00 respectively), (Table 1, Table 2). Phone addiction was associated with age, sleep duration, sports year, sports frequency, sports duration, back pain, vigorous activity level, moderate activity level and sitting activity (P<0.05),(r=-0.53;r=-0.23;r=-0.26;r=-0.28;r=0.28;r=0.43;r=-0.41;r=0.41 respectively). It also was not found to be associated with body mass index, head and neck location, shoulder protraction and general physical activity level (P>0.05, r=0.08; r=-0.13;r=0.30; r=-0.02) (Table 1, Table 2).

There was a significant difference between individuals who do and do not do sports in terms of internet and phone addiction (P<0.01), Table 3. According to the results of the analysis made by coding individuals as dependent and independent according to the scale cut-off values: According to the results of the chi-square analysis, there was a statistically significant relationship between sports activity and internet addiction (P<0.001).

**Table 1.** Factors associated with phone and internet addiction (n=189)

| | | Age(year) | BMI (kg/m²) | Sleep time (hour) | Sports year | Sport frequency | Sports duration (hour) | Back pain (cm) |
|---|---|---|---|---|---|---|---|---|
| Internet addiction | Correlation Coefficient | -0.34 | 0.40 | 0.01 | -0.31 | -0.52 | 0.26 | 0.26 |
| | p | <0.01 | P<0.01 | 0.86 | P<0.01 | P<0.01 | P<0.01 | P<0.01 |
| Phone addiction | Correlation Coefficient | -0.53 | 0.08 | -0.23 | -0.26 | -0.28 | 0.28 | 0.43 |
| | P | 0.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00* |

P= statistical significance level of Spearman correlation analyse test. SD= standard deviation; BMI= body mass index, P*<0.05, n= number.

**Table 2.** Relationship between phone and internet addiction and posture and physical activity (n=189)

| | | Cranio-vertebral angle (degree) | Acromion-wall distance (cm) | Physical activity score | Severe activity (hour) | Moderate activity (hour) | Walking time (hour) | Sitting time (hour) |
|---|---|---|---|---|---|---|---|---|
| Internet addiction | Correlation Coefficient | 0.03 | 0.24 | -0.00 | -0.15 | -0.28 | -0.01 | 0.28 |
| | P | 0.59 | P<0.01* | 0.94 | 0.03 | P<0.01* | 0.82 | P<0.01* |
| Phone addiction | Correlation Coefficient | -0.13 | 0.30 | -0.02 | -0.41 | -0.41 | 0.08 | 0.53 |
| | P | 0.07 | 0.68 | 0.76 | P<0.01* | P<0.01* | 0.23 | P<0.01* |

P= statistical significance level of Spearman correlation analyse test, p*<0.05, n=number.

**Table 3.** Comparison of screen exposure in individuals who do and do not do sports

| | | | n | Mean | SD | Median | Percentile 25 | Percentile 75 | p |
|---|---|---|---|---|---|---|---|---|---|
| Do you do sports? | Yes | IA | 106 | 56.58 | 14.37 | 53.00 | 42.00 | 73.00 | <0.001 |
| | No | IA | 83 | 91.08 | 43.28 | 88.00 | 54.00 | 109.00 | |
| Do you do sports? | Yes | SA | 106 | 21.27 | 14.14 | 18.00 | 10.00 | 21.00 | <0.001 |
| | No | SA | 83 | 27.51 | 14.87 | 27.00 | 13.00 | 32.00 | |

P= statistical significance level of Mann Whitney U Test, n= number, SD= standard deviation, IA= internet addiction, SA= smartphone addiction.

While the rate of people who were addicted to the internet among those who do sports is .9 %, the rate of those who were addicted to the internet among those who do not do sports is 42.2 % (Table 4). According to the results of the chi-square analysis, there was a statistically significant relationship between sports activity and phone addiction (P= 0.032). While the rate of people who were addicted to their phones among those who do sports is 17.9 %, the rate of people who were addicted to their phones among those who do not do sports is 31.3 % (Table 4).

**Table 4.** Percentage distribution of screen addiction in individuals who do and do not do sports

| | | | Do you do sports? | | Total | p |
|---|---|---|---|---|---|---|
| | | | Yes | No | | |
| Internet addiction | Yes | N | 1 | 35 | 36 | |
| | | % | 0.9 % | 42.2 % | 19.0 % | |
| | No | N | 105 | 48 | 153 | |
| | | % | 99.1 % | 57.8 % | 81.0 % | |
| Total | | N | 106 | 83 | 189 | |
| | | % | 100.0 % | 100.0 % | 100.0 % | 0.00* |
| Phone addiction | Yes | N | 19 | 26 | 45 | |
| | | % | 17.9 % | 31.3 % | 23.8 % | |
| | No | N | 87 | 57 | 144 | |
| | | % | 82.1 % | 68.7 % | 76.2 % | |
| Total | | N | 106 | 106 | 83 | 0.03* |
| | | % | 100.0 % | 100.0 % | 100.0 % | |

P= statistical significance level of Pearson Chi-Square, n= number, P*<0.05.

## 4. Discussion

The results of the current study demonstrate that the rate of internet addiction and mobile phone addiction is significantly lower in individuals who do sports. Thus, the idea that sports could be a cure for screen addiction was supported. In this study, smartphone and internet addiction were investigated in individuals who do and do not do sports, and the possible effects of internet addiction were examined. Most of the studies in the literature have been conducted on young and adolescent individuals. There are not enough studies on actively working individuals. For working individuals, access to physical activity is more difficult.

Working adults spend approximately one-third to half of their workday sitting (Chau et al., 2010). Married adults also spend most of their free time sitting for hours (e.g., watching TV) (Chau et al., 2012). Screen addiction has been associated with poor posture (Kee et al., 2016). The factors that may contribute to screen exposure are examined, it has been reported that factors such as age, gender, lack of self-control, stress, and depression are effective (Chen et al., 2022). Long-term phone and internet use and lack of physical activity can lead to musculoskeletal problems and soft tissue injuries. These negative effects include postural disorders of the spine; forward head, thoracic kyphosis, scoliosis, increased lumbar lordosis, kypholordosis and flat back postures (Piekartz, 2015). The spine is a whole; angular deviation in one curvature results in another curvature (Torkamani et al., 2023). The ideal position of the head and neck is achieved with minimum effort on the muscles. In ideal head posture, the external auditory canal and acromioclavicular joint are in the same vertical plane and there is normal anterior concavity in the neck. The posture in which the head tilts forward causes flexion of the lower cervical spine and a general deterioration in spinal biomechanics and posture. Long-term phone and internet use can cause fatigue in the muscles that stabilize the spine and negatively affect body posture.

Head placement and shoulder position have been found associated with screen addiction. In addition to postural problems, screen addiction has also been associated with individuals' depression, anxiety level, emotional state, and sleep duration (Salvi and Battin, 2018). In the present study, sleep duration was found to be related to phone addiction, while cervical biomechanics was found to be related to internet addiction. Many studies in the literature have similarly found a relationship between phone addiction and sleep quality (Ibrahim et al., 2018; Tahir et al., 2021). However, most of the studies are related to children and young people. It is recommended that children and adolescents be directed to physical activity and sports. It has been reported in the literature that screen addiction is higher among physically inactive adolescents who do not participate in any sports. Physical activity is recommended as a treatment for internet addiction in school children (Azam et al., 2020).There is not enough evidence in this field on working adults. Although occupational sedentary periods vary by status among public personnel, there is not enough information regarding sedentary behavior outside of work. The present study found that high sitting time and low activity level were associated with screen addiction (Chau et al., 2012). The important thing in screen addiction rehabilitation is to ensure sustainability in sports. For physical activity to become sustainable,

sports areas that can be easily accessed by individuals working in workplaces should be created. Businesses for employees can create and develop various physical activity areas and organize various organizations. Developing special exercise programs for employees and creating physical activity areas will prevent screen addiction. Simply put, a common use area can be created with a treadmill and a bicycle ergometer that employees can use.

## 5. Conclusion

This study will provide evidence for the effects of screen addiction on adult individuals. Also, finding a permanent solution to the negative effects of screen addiction is important for public health. Examining the relationship in a multifaceted way between individuals' sports habits, physical activity levels and screen exposure may offer a solution to improve the negative effects of screen addiction and ensure that this improvement is permanent. Sport and physical activity may provide a sustainable solution to the negative effects of screen addiction. As a result, screen addiction is almost non-existent in individuals who do sports. Playing sports and physical activity accessible to working individuals will be a healthy alternative to screen consumption for adults. Screen addiction has also been associated with low physical activity, poor posture, and back pain. Another result obtained from the study is that sleep duration is affected by phone addiction. Strength of the study is that it was conducted in a demographically homogeneous group. The fact that all individuals participating in sports in the study benefited from the sports opportunities of Çukurova University eliminated the effect of different branches. Since the addiction rate was found to be quite low in individuals who do sports in our study, no conclusion could be made as to whether sports can eliminate the negative effects of screen addiction on cervical biomechanics. Examining the effects of sports on addicted individuals in future studies will contribute to the literature.

**Author Contributions**

The percentage of the author(s) contributions is presented below. All authors reviewed and approved the final version of the manuscript.

| | A.G. | G.İ. |
|---|---|---|
| C | 50 | 50 |
| D | 50 | 50 |
| S | 50 | 50 |
| DCP | 50 | 50 |
| DAI | 70 | 30 |
| L | 70 | 30 |
| W | 100 | |
| CR | 50 | 50 |
| SR | 70 | 30 |
| PM | 50 | 50 |

C=Concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management.

**Conflict of Interest**

The authors declared that there is no conflict of interest.

**Ethical Approval/Informed Consent**

The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered to. The experimental procedures were approved by the Tarsus University Non-Invasive Clinical Research Ethics Committee (approval date: 18 January, 2023, protocol code: 2023/01).

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