

# Smartphone Addiction and Psychosocial Factors Among Rural Adolescents

## Kırsaldaki Ergenlerde Akıllı Telefon Bağımlılığı ve Psikososyal Faktörler

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### ABSTRACT

**Aim:** This study investigated smartphone addiction and related psychosocial factors in rural adolescents.

**Methods:** This cross-sectional study was conducted in a rural area of Turkey between September 2018 and June 2019 with 655 participants. Data were collected using the Socio-demographic Information Form, the Smartphone Addiction-Short Form, and the Coopersmith Self-Esteem Inventory.

**Results:** In this study, 41.8% of adolescents living in rural areas were at risk of addiction. Other psychosocial factors associated with smartphone addiction were low-income family relationships, repressive family attitudes, "bad" teacher relationships, and low academic achievement. Smartphone addiction was significantly higher among smokers, skipping meals, and long-term daily internet users ( $p<0.05$ ). Phone appearance, control frequency, and time spent on the phone showed significant differences in smartphone addiction ( $p<0.05$ ).

**Conclusions:** As a result of this study, it was determined that approximately half of the adolescents living in rural areas are at risk of addiction. Smartphone addiction is a significant public health problem for adolescents, not only in urban areas but also in rural areas. Multisectoral public health efforts should be expanded to fight against this addiction type.

**Keywords:** Smartphone addiction, adolescent, rural, psychosocial factor, self-esteem.

### ÖZ

**Amaç:** Bu çalışma, kırsal kesimdeki ergenlerde akıllı telefon bağımlılığı ve ilişkili psikososyal faktörleri araştırmak amacıyla yapılmıştır.

**Gereç-Yöntem:** Bu kesitsel çalışma, Eylül 2018 ile Haziran 2019 tarihleri arasında Türkiye'nin kırsal bir bölgesinde 655 katılımcı ile gerçekleştirilmiştir. Veriler Sosyodemografik Bilgi Formu, Akıllı Telefon Bağımlılığı-Kısa Formu ve Coopersmith Benlik Saygısı Envanteri kullanılarak toplanmıştır.

**Bulgular:** Bu çalışmada kırsal kesimde yaşayan ergenlerin %41,8'inin bağımlılık riski altında olduğu saptanmıştır. Zayıf aile ilişkileri, baskıcı aile tutumu, "kötü" öğretmen ilişkileri ve düşük akademik başarı akıllı telefon bağımlılığı ile ilişkili diğer psikososyal faktörlerdi. Sigara içenler, öğün atlayanlar ve uzun süre günlük internet kullananların akıllı telefon bağımlılığı anlamlı derecede yüksekti ( $p<0,05$ ). Akıllı telefon bağımlılığı üzerinde telefon görünümü, kontrol sıklığı ve telefonda geçirilen süre anlamlı farklılık göstermiştir ( $p<0,05$ ).

**Sonuç:** Bu çalışma sonucunda kırsal kesimde yaşayan ergenlerin yaklaşık yarısının bağımlılık riski altında olduğu saptanmıştır. Sadece kentsel bölgelerde değil kırsal bölgelerde de akıllı telefon bağımlılığı ergenler için büyük bir halk sağlığı problemidir. Bunun önlenmesine yönelik ve çok sektörlü halk sağlığı çalışmaları yaygınlaştırılmalıdır.

**Anahtar Kelimeler:** Akıllı telefon bağımlılığı, ergen, kırsal, psikososyal faktör, benlik saygısı.

### INTRODUCTION

World Health Organization (WHO) defines individuals between the ages of 10-19 as "adolescents." This period, characterized by rapid physical, cognitive and psychological changes, is considered a critical period in which the individual is indepen-

dent. Social skills, learning behaviors, and health risks also increase (1). In the 21st century, adolescence is the most vulnerable age group affected by technological dependence (2).

The prevalence of smartphone addiction, a global epidemic, is estimated to be between 9,3%-48%. (3-5). Previous international studies involving individuals from different age groups have reported that smartphone addiction was more prevalent among young people (6-8).

Smartphone addiction is a significant public health problem in Turkey, where 12% of the popu-

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lation is adolescents, as it is in the rest of the world. (9). It has been reported that more than half of Turkey's population will use smartphones in 2021. (10). Evidence shows smartphone addiction is common among young people in Turkey (11-13).

Excessive use of smartphones is associated with physical and psychosocial problems such as low back pain, social withdrawal, sleep disturbance, and low self-esteem. The ability of young people to keep up with modern technology makes them more vulnerable and prone to the adverse effects of smartphones (14).

Although studies show the risk of smartphone addiction and psychiatric comorbidities among adults and young people living in urban areas (13, 15, 16), there is an urgent need to address the psychosocial factors caused by smartphones in Turkey. What is known about the predisposing factors that may be effective in rural adolescents' smartphone addiction is unclear.

This study aimed to investigate smartphone addiction and psychosocial factors in rural adolescents.

## **METHODS**

### **Participants and Procedures**

This cross-sectional study was conducted between September 2018 and June 2019 in Alaca, Çorum. Çorum is a province known for Hittite archeology in Turkey's Central Black Sea region. Alaca is a district in the rural Çorum. The study population consisted of 1800 adolescents training at the high school level in Alaca District's public schools. Based on the knowledge that the prevalence of smartphone addiction among high school students was 43,5% (17), the minimum sample size was 312 adolescents. A total of four high schools were included in the sample using a stratified random sampling method based on high school types (science, general, Islamic divinity, and professional and technical), and 950 adolescents were initially included. Among the adolescents, 74 were excluded from using dumbphones, and 34 were non-users of any phones. Participants who could not be found during the visits and were unwilling to participate in the study were excluded from the

sample. The study was completed with 655 participants, and we reached 77.8% of the participants.

### **Measuring Tools**

The data was collected via a questionnaire. The first part of the questionnaire included the socio-demographic information, and the second included the Smartphone Addiction-Short Form (SAS-SF) with the Coopersmith Self-esteem Inventory. The questionnaires were distributed to the participants in the classroom and then collected by the researcher. It took an average of 20 minutes to fill out the questionnaire.

### **Socio-Demographic Information Form**

In the socio-demographic information form, the participants were questioned about their socio-demographic characteristics, lifestyle behaviors, height and weight, interpersonal relationships and academic achievements, and smartphone use features. Adolescents' lifestyle behaviors (smoking, eating habits, physical activity, sleep quality), health perceptions, and body mass index (BMI) were evaluated according to their statements. In evaluations, BMI was defined as underweight in the 5th percentile, average between the 5th and 84th percentile, overweight between the 85th and 94th percentile, and obesity if the 95th percentile and above (18).

### **Smartphone Addiction - Short Form**

It was developed by Kwon et al. (2013) to measure the risk of smartphone addiction among adolescents. Scale items were scored from 1 to 6. Scale scores ranged from 10 to 60. It was stated that the higher scores, the higher the risk for addiction. The scale was one factor and had no subscales. The Korean sample reported that the cut-off point was 31 for men and 33 for women. In Turkey, the cut-off point of the scale was determined to be 29,5 for both genders (19). In this study, the cut-off score for both genders was 29,5. The original form's internal consistency and concurrent validity were 0,91 (20). The scale was adapted to Turkish by Noyan et al. (2015) and determined its validity and reliability 0,86 (17). In this study, the Cronbach alpha coefficient was found to be 0,88.

### Coopersmith Self-Esteem Inventory

The scale developed by Coopersmith in 1967 was translated into Turkish by Güçray (21). The scale consists of 58 items. Eight of these items are considered false items corresponding to defensive attitudes. In a study by Pişkin in 1996, the reliability coefficient of the scale was found to be reasonably high (Cronbach alpha = 0,86) (22). The range of points from the scale is 0–50, and the increase in points indicates high self-esteem. In this study, we found Cronbach's alpha 0,73.

### Data analysis

Data were analyzed by SPSS 21,0 program. The Independent t-test, One-way Anova (Post-hoc Tukey), determined the differences between variables with mean scales. In the analysis of categorical variables, the Chi-square test was used. Pearson correlation coefficients have been calculated to evaluate the relationship between some variables with the level of self-esteem and smartphone addiction. In evaluations  $p < 0.05$  value was considered statistically significant.

**Ethics Committee Approval:** Institutional permissions were obtained from the Provincial and District Directorate of National Education and ethics committee approval from the Hitit University Ethics Committee to collect data from the participants (no:2018-33).

### RESULTS

In general, 41,8% had a risk of smartphone addiction. The risk was 44% in females and 40,3% in boys. However, there was no significant difference in the risk of smartphone addiction according to the gender of adolescents ( $p > 0.05$ ) (Table 1).

The study was completed with the participation of 655 adolescents. In the study group, 56,9% were in the 16-17 age group, 58% were male, 42% were female, and the mean age was  $15,7 \pm 1,2$  years. We found smartphone addiction was higher among the 16-17 age group, females, among those with good economic status, and adolescents with moderate/poor health perception, but this difference was not statistically significant ( $p > 0.05$ ) (Table 2).

Smartphone addiction was significantly higher among current smokers ( $t:3,186$ ;  $p < 0,05$ ) and meal skippers ( $t:3,738$ ;  $p < 0,01$ ). Smartphone addiction and self-esteem were higher among fast food consumers ( $F:3,048$ ;  $p < 0,05$ ). Self-esteem was higher in those with "poor" sleep quality ( $F:5,071$ ;  $p < 0,05$ ). Daily sleep duration, exercise status, and BMI were not differed by smartphone addiction and self-esteem ( $p > 0,05$ ) (Table 3).

Smartphone addiction was significantly higher among adolescents who preferred to use smartphones in favor of appearance ( $t:3,422$ ;  $p < 0,01$ ). Addiction was more common among those who controlled their smartphone more than 11 times in a day ( $F:20,541$ ;  $p < 0,01$ ), spent seven hours or more with a smartphone, and users of daily internet with four hours ( $F:13,111$ ;  $p < 0,01$ ). Smartphone addiction and self-esteem were significantly higher in those who stated that they had eye problems due to smartphone use ( $p < 0,05$ ). We found smartphone addiction and self-esteem were significantly higher in those who considered themselves smartphone addicts ( $p < 0,01$ ) (Table 4).

Smartphone addiction was significantly higher among those with low-income family relations ( $F:3,536$ ;  $p < 0,05$ ), who had repressive family attitudes, bad relations with their teachers, and low academic achievement ( $p < 0,05$ ). Smartphone addiction and self-esteem were significantly higher among those who stated that they had problems with their families due to excessive use of a smartphone ( $p < 0,01$ ). Peer relations did not differ in smartphone addiction and self-esteem ( $p > 0,05$ ) (Table 5).

We determined that smartphone addiction and self-esteem scores increased with the frequency of smartphone control, and the relationship between smartphone control frequency and smartphone addiction and self-esteem was positively significant ( $p < 0,05$ ). Smartphone addiction and self-esteem scores of adolescents increased with daily internet usage. It was determined that there was a significant correlation between daily internet use with smartphone addiction and self-esteem ( $p < 0,05$ ). As the duration of the adolescents' interaction with the smartphone increases, the level

of smartphone addiction also increases. It was determined that there was a positive but weak correlation between smartphone interaction time and smartphone addiction ( $p < 0.001$ ). Similarly, as the students' self-esteem scores increase, their smartphone addiction scores also increase, and the correlation between them is weak but significant in the positive direction. ( $p < 0,01$ ) (Table 6).

**DISCUSSION**

Technological advances made adolescents vulnerable to technological addictions such as smartphone addiction in the current century (2). Smartphone addiction adversely affects young people's health and psychosocial life and makes their lives complex, additional problems of this period (23). As mentioned in a literature review, smartphone use was more common in urban areas than rural areas due to easy access and widespread technology (16). The distinguishing aspect of this study from other studies was determining smartphone addiction and psychosocial factors among rural adolescents.

In the present study, the risk of smartphone addiction was 41,8% in the whole group (Table 1). This result was not consistent with the low self-assessments of adolescents regarding addiction in Table 4. In another study conducted in Turkey, smartphone addiction was reported as 57,7% among adolescents (24). This ratio varies in different societies. The risk of smartphone addiction was 16.9% among young people in Switzerland, 26,9% in Romania, and 36,5% in Saudi Arabia (7, 8, 25). The results obtained from this study were low compared to our country and were relatively high compared to those abroad.

Despite the high tendency of men to use technology (26), it has been revealed in various studies that women prefer socializing through smartphones, and therefore, smartphone addiction was seen more in women. (7, 12). Studies conducted with high school and university students in Korea and Romania found that the risk of smartphone addiction was significantly higher among females (7, 27). Another study conducted in Saudi Arabia showed that the risk of smartphone addiction was

higher in males than females (25). The results obtained from this study were consistent with the results of studies conducted in Korea and Romania. There was no significant difference between genders regarding smartphone addiction risk (Table 1).

The risk of smartphone addiction among rural adolescents was shown in Table 1.

**Table 1.** Smartphone addiction risk among rural adolescents, Alaca-Çorum 2019

Gender	Smartphone Addiction				p
	Risk		No risk		
	No.	%	No.	%	
Female (n=275)	121	44,0	154	56,0	0,339
Male (n=380)	153	40,3	227	59,7	
Total (n=655)	274	41,8	381	58,2	

Although the risk of smartphone addiction was high among adolescents in the older age group, we found that age groups had no significant effect on smartphone addiction (Table 2). This result may be due to the age distribution of adolescents being close to each other. Studies conducted in different societies showed additional evidence on age. A study conducted in Turkey showed that the age of individuals had no significant effect on smartphone addiction (28). In contrast, some studies stated that smartphone addiction decreased with aging (6-8, 11-13)—these differences are due to different sample groups.

This study found that the risk of smartphone addiction was higher and self-esteem was lower among females than males (Table 2). On the other hand, in China and Korea, high levels of addiction among both genders are related to low self-esteem (29, 30). Recent evidence suggests that high self-esteem was a protective factor against smartphone addiction in adolescents (30). A possible explanation for this might be that the differences between genders in society regarding smartphone use may be related to socio-cultural patterns.

Smartphone addiction and self-esteem according to socio-demographic characteristics of rural adolescents were shown in Table 2.

**Table 2:** Smartphone addiction and self-esteem according to socio-demographic characteristics of rural adolescents , Alaca-Çorum 2019

Characteristics	n	Smartphone addiction $\bar{X} \pm SS$		Self-esteem $\bar{X} \pm SS$	
<b>Age group</b>					
14-15 years	282	26,95±12,11	t:1,648 p:0,100	22,13±5,20	t:0,080 p:0,936
16-17 years	373	28,49±12,00		22,16±4,81	
<b>Gender</b>					
Male	380	27,36±12,01	t:1,198 p:0,231	22,23±5,28	t:0,524 p:0,600
Female	275	28,48±11,58		22,03±4,53	
<b>Perceived economic status</b>					
Good	246	28,54±12,44	t:1,201 p:0,230	22,00±5,20	t:0,592 p:0,555
Moderate/bad	409	27,40±11,45		22,24±4,84	
<b>Perceived general health</b>					
Good	531	27,72±11,95	t:0,177 p:0,838	22,02±4,87	t:1,385 p:0,167
Moderate/bad	124	28,29±11,38		22,71±5,39	
<b>Total</b>	<b>655</b>	<b>27,82±11,84</b>		<b>22,16±4,98</b>	

a, b, c: The difference between groups that do not carry the same letter in each column was significant.

Table 3 showed smartphone addiction and self-esteem according to lifestyle behaviors of rural adolescents.

**Table 3.** Smartphone addiction and self-esteem according to lifestyle behaviors of rural adolescents, Alaca-Çorum 2019

Life style behaviors	n	Smartphone addiction $\bar{X} \pm SS$		Self-esteem $\bar{X} \pm SS$	
<b>Daily sleep duration (hour/day)</b>					
<8	330	28,82±11,83	F:2,402 p:0,091	22,09±4,91	F:0,715 p:0,490
8	209	26,96±10,89		22,00±4,95	
>8	116	26,57±13,26		22,64±5,22	
<b>Sleep quality</b>					
Good	314	26,99±12,00	F:2,632 p:0,073	21,97±4,81 <sup>a</sup>	F:5,071 <b>p:0,007</b>
Moderate	208	27,84±11,17		21,68±5,17 <sup>a</sup>	
Bad	133	29,79±12,30		23,34±4,92 <sup>b</sup>	
<b>Smoking status</b>					
Never/quited	540	27,15±11,53	t:3,186 <b>p:0,002</b>	22,05±4,67	t:0,954 p:0,342
Current smoker	115	31,00±12,74		22,63±6,21	
<b>Physical activity</b>					
Regular	63	25,93±12,20	F:2,878 p:0,057	22,27±3,76	F:0,259 p:0,772
Sometimes	396	27,36±11,51		22,04±5,09	
Never	196	29,40±12,25		22,34±5,11	

<b>Frequently consumed food</b>					
Meat, egg, legume	373	27,10±12,02 <sup>b</sup>	F:3,048 p:0,017	22,06±5,09 <sup>a,b</sup>	F:2,551 p:0,038
Grain	81	27,47±11,54 <sup>a,b</sup>		21,88±4,33 <sup>a,b</sup>	
Vegetable and fruit	79	28,90±11,93 <sup>a,b</sup>		22,91±4,36 <sup>a,b</sup>	
Fast food	63	32,38±11,60 <sup>a</sup>		23,37±5,37 <sup>a</sup>	
Dairy products	59	26,67±10,86 <sup>b</sup>		20,83±5,20 <sup>a,b</sup>	
<b>Skipping meal</b>					
Yes	385	29,26±12,15	t:3,738 p:0,000	22,19±5,06	t:0,243 p:0,808
No	270	25,79±11,08		22,10±4,87	
<b>BMI</b>					
Weak	174	27,32±10,73	F:0,524 p:0,592	22,63±5,02	F:2,089 p:0,125
Normal	419	27,85±12,29		21,86±4,96	
Overweight/obese	62	29,11±11,72		22,80±4,92	
<b>Total</b>	<b>655</b>	<b>27,82±11,84</b>		<b>22,15±4,98</b>	

a, b: The difference between groups that do not carry the same letter in each column was significant.

Smartphone addiction and self-esteem according to the characteristics of adolescents regarding smartphone use were shown in Table 4.

**Table 4.** Smartphone addiction and self-esteem according to the characteristics of adolescents regarding smartphone use, Alaca-Çorum 2019

<b>The decisive factor in smartphone preference</b>	<b>n</b>	<b>Smartphone addiction <math>\chi \pm SS</math></b>		<b>Self-esteem <math>\chi \pm SS</math></b>	
Function	445	26,75±11,39	t:3,422 p:0,001	22,14±4,83	t:0,033 p:0,974
Appearance	210	30,11±12,44		22,16±5,29	
<b>Daily smartphone control</b>					
Never	11	22,46±18,34 <sup>a</sup>	F:20,541 p:0,000	20,81±5,21	F:1,658 p:0,175
1-5 times	243	24,50±11,52 <sup>b</sup>		21,90±5,04	
6-10 times	176	26,89±9,79 <sup>b</sup>		21,84±4,78	
>11 times	225	32,42±11,85 <sup>c</sup>		22,72±5,03	
<b>Time spending with smartphone (hour/day)</b>					
0	14	23,36±19,75 <sup>a</sup>	F:13,111 p:0,000	20,58±4,64	F:0,836 p:0,474
1-3	397	25,83±11,08 <sup>a</sup>		22,23±4,22	
4-6	172	30,54±11,00 <sup>b</sup>		21,90±5,80	
≥7	72	33,22±13,01 <sup>b</sup>		22,59±6,57	
<b>Smartphone connected vision problem</b>					
Yes	270	30,44±11,98	t:4,809 p:0,000	22,89±4,84	t:3,175 p:0,002
No	385	25,99±11,40		21,64±5,02	

<b>Self-assessment regarding addiction</b>					
No	410	24,62±10,85 <sup>c</sup>	F:55,434 p:0,000	21,58±4,92 <sup>b</sup>	F:12,077 p:0,000
Yes	106	36,50±12,39 <sup>a</sup>		24,19±4,87 <sup>a</sup>	
Had no idea	139	30,68±10,10 <sup>b</sup>		22,30±4,84 <sup>b</sup>	
<b>Daily internet use (hour/day)</b>					
0	15	20,47±17,05 <sup>a</sup>	F:17,987 p:0,000	21,93±2,94	F:1,813 p:0,125
1	166	23,42±11,28 <sup>a</sup>		21,41±5,35	
2	193	26,59±10,65 <sup>b</sup>		22,40±4,36	
3	95	29,59±10,47 <sup>b</sup>		21,81±4,33	
≥4	186	32,74±11,71 <sup>c</sup>		22,74±5,59	
<b>Total</b>	<b>655</b>	<b>27,82±11,84</b>		<b>22,16±4,98<sup>b</sup></b>	

a, b, c: The difference between groups that do not carry the same letter in each column was significant.

Smartphone addiction and self-esteem of rural adolescents according to interpersonal relations and school achievement were shown in Table 5.

**Table 5.** Smartphone addiction and self-esteem of rural adolescents according to interpersonal relations and school achievement, Alaca-Çorum 2019

<b>Peer relations</b>	<b>n</b>	<b>Smartphone addiction <math>\bar{x} \pm SS</math></b>		<b>Self-esteem <math>\bar{x} \pm SS</math></b>	
Good	542	27,60±11,75	F:2,678 p:0,069	22,00±4,89	F:1,910 p:0,149
Moderate	98	29,80±12,24		22,77±5,29	
Bad	15	23,07±10,96		23,87±5,59	
<b>Family relations</b>					
Good	559	27,46±11,64 <sup>a</sup>	F:3,536 p:0,030	22,02±4,84	F:2,043 p:0,130
Moderate	73	28,79±12,15 <sup>a</sup>		22,52±5,88	
Bad	23	33,87±14,10 <sup>b</sup>		24,04±5,08	
<b>Family attitude</b>					
Foster	402	27,17±11,36 <sup>c</sup>	F:5,495 p:0,000	21,93±4,90	F:1,264 p:0,283
Repressive	90	32,82±13,07 <sup>a</sup>		22,96±5,60	
Authoritarian	74	25,92±12,58 <sup>c</sup>		21,70±5,03	
Democratic	68	26,34±11,10 <sup>c</sup>		22,58±4,91	
Inconsistent	21	30,57±9,62 <sup>b</sup>		23,14±3,26	
<b>Having trouble with family connected with excessive use of smartphone</b>					
No	449	25,71±11,24	t:6,984 p:0,000	21,44±5,17	t:5,468 p:0,000
Yes	206	32,43±11,81		23,69±4,15	
<b>Relations with teacher</b>					

Good	458	26,69±11,64 <sup>a</sup>	F:8,202 p:0,000	21,87±4,93	F:2,698 p:0,068
Moderate	148	29,84±11,36 <sup>b</sup>		22,77±4,49	
Bad	49	32,44±13,29 <sup>c</sup>		23,04±6,43	
<b>Academic achievement</b>					
High	189	25,28±11,96 <sup>a</sup>	F:7,972 p:0,000	21,58±5,37	F:2,167 p:0,115
Moderate	424	28,54±11,57 <sup>b</sup>		22,32±4,76	
Low	42	32,02±12,02 <sup>c</sup>		23,00±5,22	
<b>Total</b>	<b>655</b>	<b>27,82±11,84</b>		<b>22,16±4,98</b>	

a,b,c: The difference between groups that do not carry the same letter in each column was significant.

The correlation coefficients between various variables with smartphone addiction and self-esteem were shown in Table 6.

**Table 6:** The correlation coefficients between various variables with smartphone addiction and self-esteem, Alaca-Çorum 2019

Variables	Smartphone addiction		Self-esteem	
	r	p	r	p
Daily smartphone control	0,274	p<0.001	0,109	0,005
Daily internet use	0,289	p<0.001	0,079	0,043
Time spending with smartphone	0,246	p<0.001	0,005	0,892
Self-esteem	0,231	p<0.001		

Studies reported that the economic situation was an essential determinant of smartphone addiction, and there was a linear relationship between income level and smartphone use (13). Results from this study are in line with other studies that showed no significance (28, 31) (Table 2). Such a result may be since individuals could obtain smartphones regardless of their economic situation.

The perception of health status may vary according to the severity of health-related complaints. It was stated that smartphone addiction harmed general health status and lifestyle behaviors (8, 32). In this study, although the risk of smartphone addiction increased with the deterioration of general health perceptions of adolescents, general health perception didn't differ between smartphone addiction and self-esteem (Table 2). Taken together, these results suggest that the existence of health-related complaints did not constitute an obstacle to excessive smartphone use.

In this study, it was found that although the risk of smartphone addiction was higher among adolescents with fewer sleep hours and poor sleep quality, daily sleep duration and sleep quality did not differ in terms of smartphone addiction (p> 0,05) (Table 3). In Lebanon, 35.1% of university students sleep less than 4 hours daily due to smartphone use (33). It can be said that adequate daily sleep time protects against smartphone addiction and supports self-esteem.

Consistent with the results of all studies, our study revealed the effect of unhealthy lifestyle behaviors on smartphone addiction. This effect was found to be more precise, especially in terms of smoking, fast food consumption, and meal skipping. Excessive fast food consumption also increased self-esteem levels (Table 3). Excessive use of smartphones due to participation in social networks, gaming, and various applications can lead to more negative health behaviors in young



people. Unhealthy lifestyle behaviors of adolescents may provide the basis for physical, mental, and social problems (34-36). In studies conducted in Turkey (26) and Switzerland (8), inadequate physical activity was closely associated with high-level smartphone addiction.

Studies conducted in Korea and Saudi Arabia concluded that adolescents used smartphones even during meals and skipped meals due to excessive use, so smartphone addiction was related to detrimental health behaviors such as skipping a meal, unhealthy nutrition with energy-intensive foods, weight gain, sleep disorder, sedentary lifestyle (34, 35). It has been found that approximately 30% of Saudi Arabian adolescents consumed more fast food and increased their body weights more than before (34).

A study revealed that the quality of smartphones was affected by the income level of individuals, and those with high-income levels were more selective in smartphone use (13). A similar result was found in this study. We found the risk of smartphone addiction was higher in adolescents who gave importance to the appearance of the phone ( $p < 0.05$ ) (Table 4). Among adolescents, it can be said that their perceptions about the external appearance of the phone affect their excessive use.

In some research, it has been determined that when internet addiction increased, smartphone addiction also increased, and the use of social networks contributed to the increasing internet and smartphone addiction (12, 17, 26). This study determined that smartphone addiction risk increased significantly with internet use, and self-esteem did not differ (Table 4).

The frequency of controlling the phone during the day and time spent with the phone was considered an important indicator in determining the risk of smartphone addiction (8). This study found that the risk of smartphone addiction increased with the frequency of daily control and the time spent with the smartphone (Table 4). In the studies conducted in Turkey, the frequency of daily controlling and spending long hours with the smartphone

has been shown to contribute to smartphone addiction development (17, 24, 31).

Several studies conducted in Lebanon, India, Romania, Korea, Netherlands, Switzerland, and Saudi Arabia also showed that long time spent on smartphones increased the risk of addiction (7, 8, 25, 32, 33). The results obtained from this study were in parallel with the studies conducted in our country and abroad.

In this study, almost half of adolescents had vision problems due to smartphone use, and it was found that smartphone addiction and self-esteem scores were higher in those who had vision problems (Table 4). A study conducted in Korea determined that adolescents' most common physical problem was eye disorders such as dryness of the eyes and decreased visual acuity due to smartphone use (37).

It was stated that in cases of poor family environment and impaired family relationships, adolescents change their expectations and lead them to exhibit unhealthy and anti-social behaviors (38). In this study, the striking effect of smartphone addiction emerged in family relationships and attitudes. It was found that smartphone addiction risk was more common in negative family relationships and repressive family attitudes (Table 5).

Excessive use of smartphones reduces school interests among adolescents. It makes it difficult to focus on the lessons and what the teacher tells, making it difficult to learn, so communication and school success are negatively affected (36). A study in India determined that students had a lazy, shorter attention span because they spent more time on smartphones. Their ability to focus on specific subjects decreased, and this situation caused a decrease in academic performance (39). Similarly, studies in the United States, Thailand, India, and Saudi Arabia supported that smartphone addiction harmed students' relationships with teachers and academic performance (34, 36, 39). Consistent with all the studies, the risk of smartphone addiction was observed in poor teacher-student relationships and low school success (Table 5).

Another critical factor was that this study's high smartphone addiction and self-esteem had problems with the family related to smartphone use (Table 5). This result supports the prevalent addiction, common among adolescents with negative family relationships. Also, a study conducted in Thailand found that young people had problems and rarely communicated with their families due to the adverse effects of smartphone addiction on social relations (36).

Evidence shows the relationship between self-assessments of people with addiction and high smartphone addiction (17, 20). Contrary to expectations, in this study, the self-assessment of adolescents did not overlap with the high risk of smartphone addiction (Table 5, Table 1).

In this study, factors significantly related to the risk of smartphone addiction were frequency of smartphone control, time spent with the smartphone, daily internet use, and self-esteem (Table 6).

### **Limitations and Directions**

Adolescents are the group most at risk for smartphone addiction. This study determined how many adolescents living in rural areas are at risk for smartphone addiction and the psychosocial factors. However, the limitations of this study are that the study was conducted in a specific region and the research data consisted of the participants' self-reports. In future studies, the risk level of adolescents whose access to technology is doubtful in rural areas and related psychosocial factors can be carried out in more than one center and with qualitative or quantitative research designs by adding other variables. Thus, intervention plans can be created for adolescents against smartphone addiction and other technological addictions.

### **CONCLUSION AND RECOMMENDATIONS**

Our study detected the risk of smartphone addiction in almost half of rural adolescents. Risky groups were smokers, fast food consumers, meal skippers, excessive smartphone and internet users, negative interpersonal relationships, and self-esteem for smartphone addiction.

In future research, rural adolescents should not be overlooked for the risk of smartphone addiction; epidemiological studies should be planned on addiction risk, etiological factors, and psychosocial problems. Adolescents at risk for technology addiction in schools should be identified and included in education and counseling programs with the cooperation of school and family. In the adolescent period, training and multisectoral public health efforts should be expanded in rural areas about the benefits of positive interpersonal relations and healthy lifestyle behaviors in preventing such technological dependencies.

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### **CONFLICT OF INTEREST**

None

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