

ORIGINAL ARTICLE

The Effect of Smartphone Addiction on Sleep Quality and Lifestyle Behaviors of Adolescents*

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Main Points

- Smartphone addiction negatively affects sleep quality and lifestyle.
- Smartphone addiction is a significant predictor of sleep quality.
- Smartphone addiction negatively affects academic achievement.
- Lifestyle is negatively affected as the age of the first smartphone acquisition decreases.

Abstract

Many studies highlight the negative impact of smartphone addiction on adolescents' health. It disrupts sleep habits and lifestyle. The study was conducted to evaluate the effect of smartphone addiction on the sleep quality and lifestyle behavior of adolescents. It was conducted in public high schools in a city center in the Eastern Black Sea Region of Türkiye. The sample consisted of 546 high school students. Data were collected using a Descriptive Information Form for Adolescents, the Smartphone Addiction Scale—Short Version, the Pittsburgh Sleep Quality Index, and the Adolescent Lifestyle Profile Scale. According to the results, the incidence of smartphone addiction among adolescents differed according to gender, academic achievement, age of first smartphone ($p = .044$), and daily smartphone use time ($p = .000$). Mean Pittsburgh Sleep Quality Index scores were not significantly different for the same variables. There was a significant difference in mean Adolescent Lifestyle Profile Scale scores according to academic achievement, having a smartphone, and age of first smartphone acquisition. There was a weak positive correlation between smartphone addiction and Pittsburgh Sleep Quality Index scores and a weak negative correlation between smartphone addiction and Adolescent Lifestyle Scale scores. There was also a weak negative correlation between Pittsburgh Sleep Quality Index scores and Adolescent Lifestyle Scale scores. Smartphone addiction negatively affects adolescents' sleep quality and lifestyle.

Keywords: Addiction, adolescent, lifestyle, sleep, smartphone

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Introduction

Adolescence is a transitional period characterized by significant changes in physiological, psychological, emotional, and social development. The World Health Organization defines adolescence as the age range between 10 and 19 years (Çavuşoğlu, 2019, p. 109). A study on the prevalence of smartphone addiction among adolescents with an average age of 13 years reported it to be 31.333% (Nikhita et al., 2015). According to a recent study, the incidence

among Chinese adolescents aged 12 to 15 years is 23.8% (Zou et al., 2019).

Mobile devices can disrupt sleep by directly delaying or interrupting it; phone content can be stimulating; and light emitted from mobile devices can cause melatonin suppression, affecting circadian rhythms and sleep physiology (Calamaro et al., 2009).

Adolescence involves a complex relationship between different determinants such as healthy lifestyles, school/friends, and family. Basic healthy

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lifestyle behaviors include physical activity, healthy diet, positive interpersonal relationships, no alcohol/tobacco consumption, no use of caffeine or stimulants, adequate sleep, and less screen time (Akdeniz-Kudubeş & Bektaş, 2020; Marques et al., 2020).

As a new technology, smartphones offer numerous functions, such as access to information, social communication, and entertainment, and are becoming increasingly popular among adolescents. According to studies on smartphone addiction, this behavioral addiction leads to loss of academic performance, poor sleep quality, physical, psychological, and neurological problems, and impaired decision-making ability (Lin & Liu, 2020).

Material and Methods

Study Design

This descriptive study was conducted between December 2020 and February 2021 in public high schools in a city center in the Eastern Black Sea Region of Türkiye.

Hypotheses

- H1: Smartphone addiction negatively affects sleep quality in adolescents.
 H2: Smartphone addiction negatively affects the lifestyle of adolescents.

Participants

The population consisted of 1293 students from the ninth, tenth, 11th, and 12th grades of public high schools. To be able to minimize time and cost in the research, the formula for determining the sample size of the population was used (Tuğut & Bekar, 2008).

Inclusion Criteria

- (1) Having no communication barrier and agreeing to participate in the research.
- (2) Adolescents with a smartphone.

Exclusion Criteria

1. Not attending or dropping out of school.

The schools and the number of students included in the study are as follows: X High School ($n = 525$), Y High School ($n = 336$), and Z and Q High School ($n = 432$). Vocational high schools and Anatolian high schools were considered as schools providing education in similar fields, and their data were combined into four high schools by stratifying in the same category. The ratio of schools that make up the population to schools that represent the population was calculated as 41% for First High School, 26% for Second High School, and 33% for Third and Fourth Anatolian High School. The sample size of the study was .05 at the 95% CI.

Tools for Collecting Data

The Descriptive Information Form for Adolescents, the Smartphone Addiction Scale—Short Version (SAS-SV), the Pittsburgh Sleep Quality Index (PSQI), and the Adolescent Lifestyle Profile Scale (ALPS) were used to collect data.

The Descriptive Information Form for Adolescents

The Descriptive Information Form for Adolescents was prepared by the researcher after reviewing the literature (Fidan, 2016; Karlı et al., 2018; Milli Eğitim Bakanlığı, 2018; Noyan et al., 2015; Yıldırım & Kışioğlu, 2018). The form includes 17 questions

regarding students' age, grade, parental education level, family type and income status, purposes and habits of mobile phone use, and academic achievement. There are also questions about the frequency of changing mobile phones, the purpose and duration of use, the criteria for selecting a smartphone, the monthly phone bill, and the social networking sites they spend time on.

The Smartphone Addiction Scale—Short Version

A Turkish validity and reliability study of the scale developed by Kwon et al. (2013) was carried out to determine the risk level of smartphone addiction among adolescents (Kwon et al., 2013; Şata & Karip, 2017). The study of the content validity index proposed by Polit and Beck (2006) was conducted by seven experts (three psychiatrists, two PhD nurses, and two psychologists) (Polit & Beck, 2006). The 33-item Smartphone Addiction Scale was revised by the researchers and reduced to 10 items, and the SAS-SV was created. The one-dimensional and six-point Likert scale is scored as “strongly disagree (1), disagree (2), partly disagree (3), partly agree (4), agree (5), strongly agree (6).” The score to be obtained from the scale varies between 10 and 60. A total score below 29.50 indicates no smartphone addiction, and a score above 29.50 indicates smartphone addiction (valid for both female and male adolescents). The Cronbach alpha value was calculated to be 0.90 (Şata & Karip). The Cronbach alpha value for this study was 0.908. Items in the questionnaire included “Even if my daily life is severely affected, I never stop using my phone,” “I use my smartphone longer than I think,” and “People around me say I use my smartphone too much.” Daily smartphone usage time and questions about social networking sites used via smartphone were also some of the questions on the scale.

The Pittsburgh Sleep Quality Index

The PSQI is a retrospective self-rated questionnaire that assesses sleep quality and sleep disturbance over a 1-month period. The validity and reliability study of the scale developed by Buysse et al. (1989) was carried out by Agargün et al. (1996) and found to be appropriate for Turkish society. The PSQI has seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is scored on a scale of 0–3, and the sum of the seven component scores gives the total PSQI score. The total PSQI score varies between 0 and 21. A total PSQI score of five or less indicates good sleep quality and a score above five indicates poor sleep quality. The Cronbach alpha internal consistency coefficient was found to be 0.80 for the original scale and 0.78 for this study.

The Adolescent Lifestyle Profile Scale

The ALPS was developed by Pender and completed by Hendricks et al. (2006) to measure the frequency of health-promoting behaviors in early, middle, and late adolescence. Its validity and reliability study in Türkiye was conducted by Ardic and Esin (2015). The scale consists of 40 items and seven subdimensions including health responsibility, physical activity, nutrition, positive life perspective, interpersonal relations, stress management, and spiritual development. The lowest and highest possible scores on the 4-point Likert scale are 40 and 160 points, respectively. The scale is scored as “never (1), sometimes (2), often (3), always (4).” It has no cutoff point and as the score increases, so does the level of positive health behavior. The total internal consistency

coefficient of the scale was found to be 0.87 (Ardıç & Esin, 2015; Hendricks et al., 2006). The Cronbach alpha value of this study was found to be 0.946.

The conduct the research in public high schools in Gümüşhane, the institutional permission from Gümüşhane Provincial Directorate of National Education on November 2,2020, and the ethics committee approval (no. 2020/9), dated September 24, 2020, were obtained from the Ethics Committee for Scientific Research and Publication of Gümüşhane University, with decision/protocol no.95674917-108.99-E.33572.As part of the research, the consent of the students and their parents was obtained.

Statistical Analysis

As the data did independent samples *t*-test follow a normal distribution, the one-way analysis of variance (ANOVA) *F* test was used to compare two independent groups, the Kruskal – Wallis *H* test was used to test the significance of the difference between the means of three or more groups, and the chi-square test was used to compare two nonparametric variables. Spearman's correlation analysis was used to determine the strength and direction of the relationship between the two variables (Hayran & Hayran,

2018). The hierarchical regression model was used by omitting the demographic variables in the first step and the independent variables in the second step. The IBM Statistical Package for the Social Sciences Statistics, version 25 (IBM Corp., Armonk, NY, USA), software was used to perform the statistical analyses.

Results

Table 1 shows that 55.1% of the adolescents are girls and 44.9% are boys. A total of 3.3% are aged 10 – 13, 65.2% are aged 14 – 16, and 31.5% are aged 17 or over. Of these, 72% have good academic achievements, 80% have a smartphone, and 61.5% had their first smartphone between the ages of 14 and 16. Also, 68.7% have a daily smartphone usage time of 4 hours or more. According to chi-square test evaluations, the absence of smartphone use among adolescents differed according to gender ($\chi^2 = 3.959, p = .047$), academic achievement ($\chi^2 = 15.085, p = .001$), age of first smartphone acquisition ($\chi^2 = 6.229, p = .044$), and daily smartphone use time ($\chi^2 = 18.264, p = .000$). When gender was taken into account, smartphone addiction was found more among girls, adolescents with poor academic achievement, those who first

Table 1.

Comparison of Sociodemographic and Smartphone Use Characteristics of Adolescents With and Without Smartphone Addiction

Characteristics	Smartphone Addiction			Test Statistics	
	No n (%) ^a	Yes n (%) ^a	Total n (%) ^b	χ^2	<i>p</i>
Gender					
Female	212 (70.4)	89 (29.6)	301 (55.1)	3.959	.047***
Male	191 (78.0)	54 (22.0)	245 (44.9)		
Age range					
10 – 13 years	14 (77.8)	4 (22.2)	18 (3.3)	1.145	.564
14 – 16 years	267 (75.0)	89 (25.0)	356 (65.2)		
≥17 years	122 (70.9)	50 (29.1)	172 (31.5)		
Academic achievement					
Poor	58 (58.6)	41 (41.4)	99 (18.1)	15.085	.001**
Good	301 (76.6)	92 (23.4)	393 (72.0)		
Very good	44 (81.5)	10 (18.5)	54 (9.9)		
Having a smartphone					
Yes	316 (72.5)	120 (27.5)	436 (80.0)	1.858	.173
No	86 (78.9)	23 (21.1)	109 (20.0)		
The age of the first smartphone acquisition					
≤13 years	98 (65.3)	52 (34.7)	150 (34.2)	6.229	.044***
14 – 16 years	206 (76.3)	64 (23.7)	270 (61.5)		
≥17 years	15 (78.9)	4 (21.1)	19 (4.3)		
Daily smartphone use time (hours)					
<2 hours	54 (90.0)	6 (10.0)	60 (11.0)	18.264	.000*
2 – 4 hours	92 (82.9)	19 (17.1)	111 (20.3)		
≥4 hours	257 (68.5)	118 (31.5)	375 (68.7)		

Note: χ^2 = Chi-square test statistics.

^aPercentage of rows.

^bPercentage of columns.**p*<.001; ***p*<.01; ****p*<.05

used a smartphone at age 13 or younger, and those who used a smartphone for four hours or more per day.

According to Table 2, the means of the PSQI scores were determined by independent samples *t*-test for paired groups and one-way ANOVA test for more than two groups. No significant differences were found for gender ($t = 1.788, p > .05$), age ($F = 2.062, p > .05$), academic achievement ($F = 0.825, p > .05$), having a smartphone ($t = 1.444, p > .05$), age of first smartphone acquisition ($F = 0.333, p > .05$), and daily smartphone use time ($F = 2.010, p > .05$).

For statistical analyses, we employed independent samples *t*-test for paired groups and a one-way ANOVA test for more than two groups to determine whether the mean scores of adolescents on

the Adolescent Lifestyle Scale differed significantly according to different variables, after that, the mean Adolescent Lifestyle Scale scores were determined by academic achievement ($F = 12.020, p = .000$), having a smartphone ($t = -2.120, p = .034$), and age of first smartphone acquisition ($F = 7.847, p = .000$). According to the results of Tamhane's T2 test, which was used in the multiple comparison tests to determine which group was responsible for the difference in academic performance, the means of the Adolescent Lifestyle Scale scores were classified as very good, good, and poor. The Adolescent Lifestyle Scale shows that the mean scores of those who do not have a smartphone are higher than the others. According to the results of the Tukey test, which was used in the multiple comparison tests to determine which group the difference in the age of first smartphone acquisition originated from, it was found that the mean Adolescent

Table 2.

Comparison of Pittsburgh Sleep Quality Index and Adolescent Lifestyle Profile Scale Score Averages of Adolescents According to Their Sociodemographic Characteristics

Characteristics	n	PSQI Scale			ALP		
		Mean \pm SD	Test Statistics	p	Mean \pm SD	Test Statistics	p
Gender							
Female	301	5.87 \pm 2.46	$t = 1.788$	.074	100.53 \pm 18.93	$t = 1.942$	.053
Male	245	5.50 \pm 2.42			96.88 \pm 24.03		
Age groups							
10 – 13 years	18	5.33 \pm 1.53	$F = 2.062$	.128	99.61 \pm 19.83	$F = 0.094$	.910
14 – 16 years	356	5.58 \pm 2.42			99.13 \pm 20.44		
≥ 17 years	172	6.01 \pm 2.56			98.32 \pm 23.59		
Academic achievement							
Poor ¹	99	5.64 \pm 2.61	$F = 0.825$	.825	91.77 \pm 21.85	$F = 12.020$	.000*
Good ²	393	5.70 \pm 2.34			99.30 \pm 19.64		1 – 2 ($p = .006$)
Very good ³	54	5.89 \pm 2.88			109.00 \pm 28.03		1 – 3 ($p = .001$) 2 – 3 ($p = .049$)
Having a smartphone							
Yes	436	5.78 \pm 2.47	$t = 1.444$	.149	97.95 \pm 21.62	$t = -2.120$	.034
No	109	5.40 \pm 2.35			102.80 \pm 20.33		
The age of the first smartphone acquisition							
≤ 13 years ¹	150	5.65 \pm 2.57	$F = 0.333$	.717	92.97 \pm 21.08	$F = 7.847$	.000**
14 – 16 years ²	270	5.85 \pm 2.37			100.09 \pm 27.34		1 – 2 ($p = .003$)
≥ 17 years ³	19	5.68 \pm 3.04			108.58 \pm 21.61		1 – 3 ($p = .008$)
Daily smartphone use time (hours)							
<2 hours	60	5.23 \pm 1.97	$F = 2.010$	.135	100.00 \pm 24.91	$F = 0.090$	.914
2 – 4 hours	111	5.51 \pm 1.99			98.75 \pm 18.93		
≥ 4 hours	375	5.84 \pm 2.62			98.76 \pm 21.57		

Note: ALPS = The Adolescent Lifestyle Profile Scale; F = One-way analysis of variance test; PSQI = Pittsburgh Sleep Quality Index; SD = Standard error; *t* = Independent samples *t*-test.

*Tamhane's T2 test was used for multiple comparisons since the groups were not homogeneously distributed ($p < .05$) according to the homogeneity test.

**Tukey test was used for multiple comparisons since the groups were homogeneously distributed ($p > .05$) according to the homogeneity test.

Table 3.
Correlation Between the Smartphone Addiction Scale—Short Version, Pittsburgh Sleep Quality Index, and Adolescent Lifestyle Profile Scale Scores

		SAS-SV	PSQI
PSQI	<i>r</i>	.127	–
	<i>p</i>	.003**	–
ALPS	<i>r</i>	–.169	–.111
	<i>p</i>	<.001*	.009**

Note: SAS-SV = Smartphone Addiction Scale—Short Version; PSQI = The Pittsburgh Sleep Quality Index; ALPS = The Adolescent Lifestyle Profile Scale.**p*<.001; ***p*<.01

Lifestyle Scale scores of those aged 14 – 16 and 17 years were higher than those whose age of first smartphone acquisition was 13 years and younger.

Correlation results showed a weak positive relationship between smartphone addiction and PSQI scores and a weak negative relationship between smartphone addiction and Adolescent Lifestyle Scale scores. A weak negative correlation was found between PSQI scores and Adolescent Lifestyle Scale scores (Table 3).

In Table 4, gender, age, and academic achievement are examined together in the first model, and having a smartphone, age of first smartphone acquisition, daily smartphone use time, and smartphone addiction are examined together in the second model. The regression model was found to be significant ($F_{(7, 430)} = 3.198, p = .003$). In predicting the level of sleep quality, gender ($\beta = -.046, t = -0.932, p > .05$), age ($\beta = .057, t = 1.095, p > .05$), academic achievement ($\beta = .062, t = 1.280, p > .05$), having a smartphone ($\beta = -.040, t = -0.843, p > .05$), age of first smartphone acquisition

($\beta = .023, t = 0.431, p > .05$), and daily smartphone use time ($\beta = .058, t = 1.206, p > .05$) had no significant effect, whereas smartphone addiction ($\beta = .179, t = 3.626, p = .000$) significantly predicted sleep quality. The independent variables accounted for 3.4% of the total variance in sleep quality ($R^2 = .034$).

In Table 5, gender, age, and academic achievement were examined together in the first model, while having a smartphone, age of first smartphone acquisition, daily smartphone use time, and smartphone addiction were examined together in the second model. The regression model was found to be significant ($F_{(7, 430)} = 6.762, p = .000$). Gender ($\beta = -.036, t = -0.750, p > .05$), age ($\beta = -.037, t = -0.720, p > .05$), having a smartphone ($\beta = -.053, t = 1.133, p > .05$), and daily smartphone use time ($\beta = -.058, t = -1.250, p > .05$) had a significant effect on academic achievement ($\beta = .159, t = 3.367, p = .001$); also, age of first smartphone acquisition ($\beta = .163, t = 3.172, p = .002$), and smartphone addiction ($\beta = -.137, t = -2.852, p = .005$) significantly predicted lifestyle. The independent variables accounted for 8.4% of the total variance in lifestyle ($R^2 = .084$).

Discussion

Smartphones, especially new models, represent a commodity for adolescents that enhances their autonomy, serves as an indicator of their identity, and is a source of entertainment and leisure activities, which facilitates the formation of interpersonal relationships (Choliz, 2012). In this context, the study aimed to determine how adolescents’ characteristics, such as having a smartphone, age of first smartphone acquisition, frequency of changing phones, and daily smartphone use time, affect smartphone addiction. The results showed that adolescent girls had higher mean scores on the smartphone addiction scale than male adolescents, with a significant difference between the groups,

Table 4.
Hierarchical Regression Analysis Results for Predicting Sleep Quality Levels by Adolescents’ Sociodemographic Characteristics and Smartphone Addiction Levels

Model		B	SE	β	t	p
1	Constant	3.814	1.729	-	2.205	.028
	Gender	–0.356	0.239	–.072	–1.492	.136
	Age	0.136	0.100	.066	1.371	.171
	Academic achievement	0.169	0.225	.037	0.751	.453
$R = .103, R^2 = .004, F_{(3, 434)} = 1.555, p = .200$						
2	Constant	3.333	2.670	-	1.248	.213
	Gender	–0.226	0.243	–.046	–0.932	.352
	Age	0.118	0.108	.057	1.095	.274
	Academic achievement	0.287	0.225	.062	1.280	.201
	Having a smartphone	–1.471	1.745	–.040	–0.843	.400
	The age of the first smartphone acquisition	0.103	0.239	.023	0.431	.667
	Daily smartphone use time	0.237	0.196	.058	1.206	.229
	Smartphone addiction	0.042	0.012	.179	3.626	.000*

$R = .222, R^2 = .034, F_{(7, 430)} = 3.198, p = .003^{**}$

Note: SE = Standard error.**p*<.001; ***p*<.01

Table 5.
Hierarchical Regression Analysis Results for Predicting Lifestyle by Adolescents' Sociodemographic Characteristics and Smartphone Addiction Levels

Model		B	SE	t	t	p
1	Constant	79.404	14.896	-	5.331	.000
	Gender	-2.115	2.055	-.049	-1.029	.304
	Age	0.430	0.857	.024	0.502	.616
	Academic achievement	7.887	1.939	.195	4.067	.000*
$R = .206, R^2 = .036, F_{(3, 434)} = 6.420, p = .000$						
2	Constant	83.197	22.756	-	3.656	.000
	Gender	-1.553	2.070	-.036	-0.750	.454
	Age	-0.662	0.919	-.037	-0.720	.472
	Academic achievement	6.448	1.915	.159	3.367	.001**
	Having a smartphone	16.852	14.871	.053	1.133	.258
	The age of first smartphone acquisition	6.467	2.039	.163	3.172	.002**
	Daily smartphone use time	-2.092	1.674	-.058	-1.250	.212
	Smartphone addiction	-0.281	0.098	-.137	-2.852	.005**
$R = .315, R^2 = .084, F_{(7, 430)} = 6.762, p = .000^*$						

Note: SE = Standard error. * $p < .001$; ** $p < .01$

which is consistent with the literature (Chung et al., 2018; Liu et al., 2020; Nishida et al., 2019). As a result of the research conducted with 271 high school students in support of this study, a significant difference was observed according to the gender variable, and the smartphone addiction levels of female adolescents were found to be higher than those of male adolescents (Göymen and Ayas, 2019). In another study examining the smartphone addiction of high school students, it was stated that the scores of female students were significantly higher than those of males (Sağıröğlü and Akkanat, 2019). In a study conducted on 1796 adolescents in Korea, it was stated that the female gender has a significantly higher risk for smartphone addiction (Chung et al., 2018). A comparative study among Japanese and Thai high school students associated the female gender with an increased likelihood of smartphone addiction (Tangmunkongvorakul et al., 2020).

A statistically significant difference was found between smartphone addiction and academic achievement, and adolescents with poor academic achievement had a higher smartphone addiction than those with good or very good academic achievement. Similar studies have also found that smartphone use is associated with lower academic achievement (Chung et al., 2018, Eijnden et al., 2018).

A significant difference was observed between the age of first smartphone use and smartphone addiction. Smartphone addiction among adolescents increased as the age of first smartphone ownership decreased. In a study, the average age of adolescents with smartphones was reported to be 13.57 ± 2.039 years (Özdemir et al., 2019). Similar to our study, Bülbül and Tunç (2018) found that the level of addiction increased as the age of smartphone use decreased (Bülbül & Tunç, 2018).

In a study, "prolongation of usage time" was accepted as the most important indicator of smartphone addiction (Cha & Seo, 2018). Our study is compatible with the literature, and accordingly, it was found that daily use of a smartphone for four hours or more was associated with a statistically significant increase in smartphone addiction among adolescents. Some studies in the literature have reported no significant difference in sleep quality with increasing age (Bülbül et al., 2010; Dağ & Kutlu, 2017).

In the current study, mean PSQI scores did not differ significantly by gender, age, academic achievement, having a smartphone, age of first smartphone acquisition, and daily smartphone use. In a study, the odds of poor sleep quality were much higher for girls than boys (Galland et al., 2017). Consistent with our findings, a study conducted in Bangkok reported no statistically significant relationship between grade level and sleep quality (Hounnaklang et al., 2015). A study investigating the relationship between academic performance and sleep quality in adolescents found that sleep quality was positively related to academic performance and differed significantly in contrast to our findings (Adelantado-Renau et al., 2018). There is no significant difference between smartphone use and sleep quality among the participants of the current study, but in the literature, there is a study reporting that sleep quality decreases with increasing time of smartphone use (Chang et al., 2022). In a study of adolescents in Korea, the group that was not satisfied with their sleep had a significantly higher average daily smartphone usage time and total score on the smartphone addiction scale than the group that was satisfied with their sleep (Kim & Lee, 2022). Another study concluded that high school students in Makkah, Saudi Arabia, have high smartphone addiction. Moreover, high smartphone addiction is significantly associated with poor sleep quality (Alahdal et al., 2023).

The relationships between various lifestyle habits and academic achievement in adolescent girls and boys have been investigated, and it has been observed that academic achievement increases with the improvement of various lifestyle factors (Stea & Torstveit, 2014).

The ALPS scores showed that the increase in academic achievement also had a positive effect on their lifestyle. Also, the increase in academic achievement was associated with a significant increase in health responsibility, suggesting that increasing educational level and the effect of sociodemographic characteristics can increase individual health protection and development. In the study of Bebiş et al. on adolescents, it was concluded that sociodemographic characteristics affect health promotion behaviors, and age and nutritional habits are effective variables in promoting health. (Bebiş et al., 2015). Smartphone addiction has been reported to trigger conditions that negatively affect lifestyles, such as childhood distress, depressive disorders, anxiety disorders, and symptoms of post-traumatic stress disorder, which is consistent with our findings (Dolbier et al., 2021). Similar to our findings, a study investigating the effects of the age of first smartphone acquisition on students reported that the age of first smartphone acquisition influences smartphone use and smartphone addiction (Han, 2022). According to the hierarchical regression model used in the current study and similar studies, smartphone addiction is associated with poor sleep quality in adolescents (Acikgöz et al., 2022; Chung et al., 2018; Kim & Lee, 2022).

Various studies emphasize that regardless of gender, people with lower education are more likely to be addicted to smartphone use, which may be due to a lack of self-regulation, which is thought to be associated with the risk of gaming addiction; the age of first smartphone acquisition affects smartphone use and smartphone addiction; and similar results were reported in the regression analyses in the literature (El Sayed El Keshky, 2022; Han, 2022).

Limitations

The main limitation of this study is that it was conducted in six public high schools in one district in the Eastern Black Sea Region. It is recommended to conduct further studies with a larger sample size.

Ethics Committee Approval: This study was approved by the Ethics committee of Gümüşhane University (Approval No: 2020/9, Date: 24/09/2020).

Informed Consent: Informed consent was obtained from the patients and their parents who agreed to take part in the study.

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