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Relationship between adolescent smartphone use and peer attachment and nomophobia

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ABSTRACT

Introduction and aim. Nomophobia is fear of being without a cell phone or being unable to use one. This paper investigated the effect of friendship attachment on nomophobia in adolescents.

Material and methods. This descriptive cross-sectional study was conducted in five high schools in the Central Anatolia Region of Türkiye. The sample consisted of 1033 adolescents. Data were collected using a personal information form, the Adolescent Friendship Attachment Scale, and the Nomophobia Questionnaire. Data analysis was conducted using parametric tests such as One-Way ANOVA and Independent Sample t-Test, with Bonferroni tests for post-hoc comparisons.

Results. The majority of participants were girls (58.3%), lived in nuclear families (76.2%). Most students used their smartphones for 2-4 hours daily (40.3%), and were active on social media (86%). The study found significant differences in phone usage time and friend attachment scores among different age groups. Women had higher friend attachment scores and nomophobia scores compared to men. Social media use was associated with higher nomophobia and friend attachment scores.

Conclusion. Adolescents' smartphone uses characteristics influence their nomophobia levels and friendship attachment styles. Professionals should plan interventions to raise adolescents' awareness of nomophobia.

Keywords. adolescent, attachment style, nomophobia

Introduction

Mobile phones have become integral to our lives, providing access to the latest information and services thanks to the ever-evolving mobile ecosystem. Mobile phones have introduced a new term: nomophobia, an acronym for “No Mobile Phobia.” Nomophobia is the fear of not being able to communicate via a cell phone. This fear can lead to various addictive behaviors and symptoms.¹ Nomophobia affects youth because they are more likely than adults to communicate, interact, and play online games on their smartphones and the Internet.²

Nomophobic adolescents cannot stay away from their phones.^{3,4} Although nomophobia allows adolescents to socialize in the virtual world, it causes them

to become dependent on their smartphones or exhibit avoidance behaviors.⁴ Today, adolescents are inseparable from their mobile devices as they always carry them with them. However, smartphones can lead to addiction at a later stage.⁵ Adolescents who are always online on their smartphones face social, psychological, and physiological problems. Research shows that nomophobia is closely related to personality changes, loneliness, anxiety, and depression.⁵⁻⁸ Additionally, nomophobic students are more likely to experience emotional, personality, and mental health disorders.²

The psychosocial development of adolescents is significantly influenced by their friendships and peer relationships. Adolescents tend to be more oriented to

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wards their friends and peers, seeking emotional connection and support rather than solely focusing on physical intimacy.^{9,10} Attachment anxiety and avoidance, which are related to individuals' attachment styles, have been associated with neuroticism.^{10,11} Loneliness and the desire for social interaction are factors that contribute to excessive smartphone use and higher levels of nomophobia.² Insecure attachment styles have been found to be associated with various social difficulties and negative outcomes in adolescents, such as problems with social relationships, engagement in socially dangerous behaviors, low self-esteem, difficulties in forming close relationships, feelings of loneliness, and high levels of social anxiety.¹² Despite the growing recognition of nomophobia as a prevalent issue among adolescents, few studies have specifically examined the relationship between nomophobia and friendship attachment styles. Understanding how adolescents with high levels of nomophobia, who frequently use their cell phones, perceive and experience their friendship attachments is crucial. Therefore, the aim of this study is to investigate the relationship between friendship attachment styles and nomophobia in adolescents. In this study, the term "insecure attachments" refers to attachment styles characterized by either attachment anxiety or attachment avoidance. Attachment anxiety refers to an individual's tendency to worry about being rejected, abandoned, or unloved, while attachment avoidance refers to a tendency to avoid close emotional relationships and to be uncomfortable with emotional intimacy.^{10,11}

The study aims to enhance understanding of how friendship attachment styles and nomophobia intersect in adolescent development, potentially revealing the role of friendship attachments in influencing nomophobic behaviors. By addressing this gap in research, the study contributes to both attachment theory and nomophobia literature, offering theoretical insights and practical implications for interventions targeting healthier attachment patterns and reduced reliance on mobile technology among adolescents. This study delves into the intersection of friendship attachment styles and nomophobia in adolescents, a crucial yet underexplored area in the context of adolescent development. It highlights the profound influence of mobile technology on adolescent relationships and the emergence of nomophobia as a complex emotional issue. By positioning friendship attachments as a central focus, the study aims to unveil the nuanced mechanisms underlying nomophobic behaviors. Unlike previous research, which has often overlooked friendship attachments, this study sheds light on their pivotal role in shaping adolescents' relationship with mobile technology. The findings hold theoretical significance by enriching our understanding of adolescent development in the digital era and offer

practical implications for interventions aimed at promoting healthier attachment patterns and mitigating nomophobic tendencies among adolescents.

Aim

This paper investigated the effect of friendship attachment on nomophobia in adolescents.

Research questions

1. Is there a relationship between friendship attachment styles and mobile phone addiction in adolescents?
2. Is there a relationship between friendship attachment styles and nomophobia in adolescents?

Material and methods

Study design

This descriptive cross-sectional study was conducted in Türkiye during the spring semester of the 2021–2022 academic year, involving five public high schools in a district of Central Anatolia. The study population comprised 2358 high school students who met the inclusion criteria of owning a smartphone, being enrolled in high school, and volunteering to participate. Smartphone use was deemed necessary to accurately assess nomophobia, the primary focus of the research. High school students were targeted to examine adolescents, the study's intended demographic. Voluntary participation was emphasized to ensure participants' willingness and consent. Additionally, schools with similar family types and income levels were selected to control for potential confounding variables. The study did not explore the effects of culture, diet, or environmental events on anxiety control, as its focus was specifically on nomophobia and attachment styles in adolescents. The random sample selection procedure involved two stages: selecting high schools and then selecting students within those schools. In the first stage, the study randomly selected five high schools from a pool of 12 general high schools in the district center, considering economic status and family structure similarities among students. This random selection minimized bias and enhanced the study's generalizability. In the second stage, students were selected from the population of 2358 students across ninth to twelfth grades in the five chosen high schools using simple random sampling, ensuring each student had an equal chance of selection. The intended sample size was 331 students, determined through power analysis, but the actual sample comprised 1033 students due to unexpectedly high participation rates and support from the schools. Although exceeding the predetermined sample size, this larger sample offers opportunities for more detailed exploration of research questions and potentially increases statistical power, while recognizing the

importance of maintaining methodological rigor and generalizability.

Ethics approval

The study was approved by the ethics committee of the faculty of medicine of Selçuk University (20.01.2022-E.212504). Permission was obtained from the Directorate of National Konya (04.03.2022-247174). Authorization was obtained from the developers of the scales. Students and parents were briefed on the research purpose and procedure. Informed consent was obtained from those who agreed to participate. In the research, specific procedures were followed to protect the ethical rights of the participants. The informed consent process was designed to ensure that participants understood the purpose, procedures, potential risks and benefits of the research. During this process, all participants were provided with detailed information about the research and their voluntary participation was ensured. In the case of underage participants, written informed consent was first obtained from their parents. During this process, parents were given detailed information about the purpose, duration, expected outcomes and potential effects on their children. Parents had the opportunity to ask any questions and obtain information before giving consent for their children to participate in the study. After consent was obtained from the parents, assent was also obtained from the child participants. In this process, children were informed about the research using a language appropriate to their age and level of understanding and asked if they wanted to participate. Children's consent was obtained when they voluntarily expressed their willingness to participate in the research. Children were informed that they had the right to refuse to participate in the research or to leave at any stage.

Implementation of the study

All students, parents, and school administrators were informed about the purpose and procedure of the study. Informed consent was obtained from those who agreed to participate. School permission was obtained. Students who refused to participate and participants who filled out the forms incompletely were excluded from the study. Sample selection was based on simple random sampling. The population consists of 2358 students studying in ninth, 10th, 11th and 12th grades in five high schools selected by simple random sampling from 12 general high schools in the district center. Although the sample size was determined as 331 students by power analysis (95% confidence interval, 95% representativeness of the universe and 0.5% alpha level) to adequately represent the universe. The sample consisted of 1033 students. Data were collected face-to-face in classrooms. Each participant took 20 minutes to complete the data collection forms.

Data collection tools

The data were collected using a personal information form, the Adolescent Friendship Attachment Scale (AFAS), and the Nomophobia Questionnaire (NMP-Q).

Personal information form

The personal information form was based on a literature review conducted by the researcher.^{3,13} The form consisted of 20 items on age, gender, grade level, family type, smartphone use status, etc.

Adolescent friendship attachment scale (AFAS)

The AFAS was developed by Wilkinson and adapted to Turkish by Ercan.^{14,15} The instrument consists of 23 items rated on a five-point Likert scale. It has three subscales: secure attachment, avoidant attachment, and anxious/ambivalent attachment. In secure attachment, children perceive their mothers as caring and responsive, fostering a sense of security and trust. They feel confident that their mother will be available when needed, promoting emotional well-being and positive social development. Conversely, avoidant attachment arises when mothers demonstrate insensitivity, leading children to distance themselves emotionally and develop a sense of detachment. When separated from their mothers, they display indifference upon reunion. Anxious-ambivalent attachment occurs when mothers are inconsistently responsive, causing children to experience anxiety and insecurity. These children may exhibit clingy behavior and struggle with regulating their emotions. Overall, the quality of maternal responsiveness shapes the attachment style, influencing children's emotional adjustment and social interactions. When children are separated from their mothers, they are more cry and react more, cannot be calmed by other adults, experience anxiety in unfamiliar situations.¹⁵ Higher scores on a subscale indicate the dominance of that attachment style. The scale has a Cronbach's alpha of 0.88.¹⁵ In the present study, the questionnaire had a Cronbach's alpha of .79. As a result of the analyses, it was found that the item-total score correlations for the sub-dimensions of the scale ranged between 0.21-0.71, the Cronbach Alpha internal consistency coefficient ranged between 0.60-0.89, and the test-retest reliability values ranged between 0.81-0.83. As a result of the confirmatory factor analysis using LISREL 8.7 program, the fit index values were χ^2/sd (648.27/227)=2.856, NNFI=0.91, CFI=0.95, GFI=0.88, AGFI=0.86, RMSEA=0.067, SRMR=0.059, and the three-factor structure (secure attachment, avoidant attachment and anxious/ambivalent attachment) overlapping with the original scale was confirmed. Criterion validity analyses revealed that there were correlations in the expected direction between the scores of the Attachment to Friends Scale

for Adolescents and the scores of the Relationship Scales Questionnaire.

Nomophobia questionnaire (NMP-Q)

The NMP-Q was developed by Yildirim and Correia and adapted to Turkish by Yildirim et al.^{16,17}The questionnaire consists of 20 items rated on a seven-point Likert scale. It has four subscales: not being able to access information (four items), giving up convenience (five items), not being able to communicate (six items), and losing connectedness (five items). Total scores range from 20 to 140. Scores are rated on a scale. 0–20 points indicate no nomophobia, 21–60 low, 61–100 moderate, and 101–140 high nomophobia.¹⁷A pretest was conducted to assess the validity and reliability of the Turkish NMP-Q, a measure of nomophobia among Turkish college students. Confirmatory factor analysis (CFA) was performed using AMOS 22 software to validate the underlying structure of the items. The results of the CFA indicated a valid model fit, with acceptable thresholds for normed χ^2 , CFI, and RMSEA. The reliability of the NMP-Q was found to be high (Cronbach's alpha = 0.92), with satisfactory alpha values for the four factors (ranging from .74 to .94). In the present study, the questionnaire had a Cronbach's alpha of 0.85.

Data analysis

The data analysis for this study was conducted using the Statistical Package for Social Sciences (IBM SPSS Corp; Armonk, NY, USA, v. 24.0). Statistical significance was assessed at both the 0.05 and 0.001 levels, which is a common practice in social science research to balance the risk of Type I and Type II errors. Descriptive statistics, including means and standard deviations, were reported to provide a concise summary of the variables. To examine the underlying distribution of the data, the Shapiro-Wilk test for normality was performed. The results of this test indicated that the data exhibited a normally distributed structure (p-values >0.05), satisfying the key assumption for the use of parametric statistical tests. Consequently, parametric methods were employed, including One-Way Analysis of Variance (ANOVA) and Independent Sample t-Tests. One-Way ANOVA was utilized to determine if the means of the dependent variables differed significantly across multiple groups, while the Independent Sample t-Test was used to assess differences in means between two independent groups. Furthermore, post-hoc Bonferroni analyses were conducted to allow for a more detailed examination of the differences between specific groups. The robustness of the parametric tests to moderate deviations from normality, given the large sample size, provided additional confidence in the appropriateness of the selected statistical approaches.

Table 1. Distribution and relationship of demographic and social variables related to nomophobia and friend attachment total scores*

Variables	n	Average daily mobile phone time used			NMP-Q total score			AFAS total score		
		Mean±SD	t/F	p	Mean±SD	t/F	p	Mean±SD	t/F	p
Age	14 (n=119) ¹	2.29±1.01	2.338	0.054 5>2>1	72.95±26.92	0.817	0.514	74.78±7.81	4.281	0.002 1>4 2>4
	15 (n=294) ²	2.23±0.91			69.77±22.68			73.87±8.81		
	16 (n=351) ³	2.31±0.97			70.00±24.66			71.97±9.27		
	17 (n=230) ⁴	2.32±0.87			67.95±25.21			71.27±9.27		
	18 (n=39) ⁵	2.71±1.05			70.58±31.28			72.56±13.51		
	Gender	Female (n=602)			2.28±0.91			0.769		
Male (n=431)		2.33±0.99	67.75±25.24	71.28±10.76						
Family type	Nuclear family (n=787) ¹	2.30±0.94	3.231	0.040 3>2>1	69.89±25.10	0.237	0.789	72.65±9.70	0.389	0.678
	Extended family (n=199) ²	2.37±0.93			69.16±23.63			72.62±9.41		
	Fractured family (n=47) ³	2.59±0.92			71.89±24.52			73.91±9.31		
Family income level	Income is less than expenses (n=168)	2.30±1.04	1.225	0.294	66.29±23.81	2.063	0.128	73.85±9.83	2.128	0.120
	Income equal to expenses (n=623)	2.33±0.92			70.52±24.96			72.72±8.86		
	Income exceeds expenses (n=242)	2.22±0.92			70.56±24.86			71.85±11.18		
Place of residence	Village (n=243) ¹	2.34±0.91	1.993	0.137	70.69±21.58	3.213	0.041 1>3	72.90±9.05	1.914	0.148
	District (n=763) ²	2.28±0.96			69.98±25.38			72.76±9.72		
	Province (n=27) ³	2.62±0.88			58.07±31.69			69.14±11.42		
Number of siblings	Only child (n=44)	2.34±1.05	1.533	0.204	68.09±26.98	0.622	0.601	72.59±12.89	0.635	0.593
	One sibling (n=404)	2.23±0.93			69.01±24.80			72.27±8.93		
	Two siblings (n=248)	2.32±0.94			71.56±25.52			72.67±9.99		
	Three siblings and above (n=337)	2.37±0.95			69.79±23.94			73.25±9.67		

* one-way ANOVA, independent sample t test, SD – standard deviation

Results

The study involved mostly girls (58.3%) from nuclear families (76.2%), with 39.1% having no siblings and 73.9% living in districts. Less than half used smartphones for 2-4 hours daily (40.3%) and 17.9% checked them every 20 minutes. Most participants (78.2%) used their smartphones immediately upon waking, and 86% were social media users. Significant differences were found in phone usage times among 14, 15, and 18-year-olds ($p=0.054$), with 18-year-olds using phones more. Friend attachment scores varied significantly between 14, 15, and 17-year-olds ($p=0.002$), with lower scores for 17-year-olds. Women had higher friend attachment and nomophobia scores than men ($p<0.05$). Broken families had higher phone usage ($p=0.04$). No significant relationships were found between family type and friend attachment or nomophobia scores, or between family income and phone usage, nomophobia, or friend attachment scores ($p>0.05$). However, village residents had higher nomophobia scores than those in provinces ($p=0.041$). No significant relationships were found between the number of siblings and phone usage, friend attachment, or nomophobia scores ($p>0.05$).

Table 2 reveals significant differences in nomophobia scores based on phone checking frequency, with higher scores for those who check their phones more often. Notably, individuals who check their phones immediately upon waking show higher nomophobia scores, suggesting a link between early phone use and intense nomophobia. Social media users also exhibit higher nomophobia and friend attachment scores, indicating that social media use increases both nomophobia and social connection. The analysis shows that individuals using fewer applications (0–3) have higher attachment scores compared to those using more applications (4–6 or 7–9). Furthermore, phone use for social media is associated with higher nomophobia and attachment scores compared to using phones for music, texting, or gaming, highlighting the significant impact of social media on these metrics.

Table 3 indicates that women have significantly higher secure attachment (38.64) and lower avoidant attachment (15.53) scores than men ($p<0.001$ for both). Women also have slightly higher anxious-fearful attachment scores (19.49) than men ($p=0.018$). In nomophobia sub-dimensions, women score slightly higher than men in not being able to access information (13.98, $p=0.002$), sacrificing comfort (18.66, $p=0.02$), and not being able to communicate (23.37, $p=0.038$), but there is no significant gender difference in the fear of losing online connection ($p=0.896$). Additionally, there are no significant differences in secure, avoidant, and anxious-fearful attachment sub-dimensions across nuclear, extended, and fragmented fam-

Table 2. The effect of phone usage habits on nomophobia and attachment to friends: comparison of variables*

Variables	n	NMP-Q total score			AFAS total score		
		Mean±SD	t/F	p	Mean±SD	t/F	p
Frequency of checking the smartphone	I do not check (n=138) ¹	62.42±30.53			72.63±11.02		
	Every five minutes (n=167) ²	74.86±26.56			73.55±8.56		
	Every ten minutes (n=182) ³	76.33±22.49			72.95±8.41		
	Every twenty minutes (n=185) ⁴	67.84±21.83	6.111	$p<0.001$	73.50±9.17	1.490	0.167
	Every thirty minutes (n=153) ⁵	70.83±22.62		$2>1$	72.40±10.07		
	Once an hour (n=147) ⁶	67.04±22.07		$3>1$	70.85±10.74		
	Every two hours (n=29) ⁷	58.34±22.11		$3>2$	74.55±7.39		
	Every three hours (n=32) ⁸	68.78±26.42			70.93±10.87		
Checking the smartphone as soon as you wake up in the morning	Yes (n=808)	71.91±25.18			72.78±9.59		
	No (n=225)	62.4±21.78	26.577	$p<0.001$	72.41±9.75	0.260	0.610
Social media use	Yes (n=887)	71.15±24.52	9.044	$p<0.001$	73.02±9.32	4.490	0.011
	No (n=145)	61.91±25.01			70.64±11.12		
Number of applications used on the smartphone	0–3 applications (n=462) ¹	67.9±23.23			73.06±9.54		
	4–6 applications (n=377) ²	71.88±25.64	2.161	0.091	73.55±8.77	5.707	0.001
	7–9 applications (n=95) ³	68.69±22.45			69.80±9.39		$1>3$
	10 or more applications (n=99) ⁴	72.2±29.69			70.55±12.31		$2>1$
	Listening to music (n=252) ¹	72.4±9.68			72.78±9.68		
Purpose of smartphone use	Messaging (n=207) ²	66.53±25.06			70.57±11		
	Talking (n=160) ³	65.41±23.82			72.9±8.89		
	Studying (n=67) ⁴	67.38±23.20	5.208	$p<0.001$	73.92±10.28	4.987	$p<0.001$
	Spending time on social media (n=247) ⁵	75.03±23.29		$5>1>2$	74.63±8.3		$5>6>2$
	Playing games (n=96) ⁶	65.9±28.16			70.92±9.14		

* one-way ANOVA, independent sample t test, SD – standard deviation

ilies ($p>0.05$). Similarly, no significant differences are found in nomophobia sub-dimensions related to family type ($p>0.05$).

Table 3. Comparison of friend attachment and nomophobia sub-dimensions by gender and family type*

Variables	Gender	Mean±SD	t	p
Sub-dimensions of attachment to friends				
Secure connecting	Female	38.64±7.59	27.377	p<0.001
	Male	35.88±9.36		
Avoidant attachment	Female	15.53±4.66	18.269	p<0.001
	Male	16.77±4.56		
Anxious fearful attachment	Female	19.49±5.97	5.636	0.018
	Male	18.62±5.63		
Nomophobia sub-dimensions				
Inability to access information	Female	13.98±6.06	9.882	0.002
	Male	12.76±6.27		
Don't give up on comfort	Female	18.66±7.40	5.445	0.020
	Male	17.56±7.54		
Inability to communicate	Female	23.37±9.14	4.337	0.038
	Male	22.16±9.23		
Lose online connection	Female	15.30±7.16	0.017	0.896
	Male	15.24±7.60		
	Family type	Mean±SD	F	p
Sub-dimensions of attachment to friends				
Secure connecting	Nuclear family	37.36±8.52	2.056	0.128
	Extended family	38.38±8.43		
	Fractured family	35.87±7.87		
Avoidant attachment	Nuclear family	16.02±4.72	4.916	0.08
	Extended family	15.69±4.34		
	Fractured family	18.04±4.63		
Anxious fearful attachment	Nuclear family	19.23±5.88	1.623	0.198
	Extended family	18.54±5.63		
	Fractured family	20±6.12		
Nomophobia Sub-Dimensions				
Inability to access information	Nuclear family	13.39±6.28	0.612	0.543
	Extended family	13.9±5.68		
	Fractured family	13.17±6.5		
Don't give up on comfort	Nuclear family	18.19±7.53	0.988	0.373
	Extended family	17.93±7.29		
	Fractured family	19.63±7.33		
Inability to communicate	Nuclear family	23.01±9.39	0.412	0.663
	Extended family	22.49±8.57		
	Fractured family	22.12±9.19		
Lose online connection	Nuclear family	15.29±7.39	1.613	0.200
	Extended family	14.82±7.06		
	Fractured family	16.95±7.59		

* one-way ANOVA, independent sample t test, SD – standard deviation

Discussion

In the study, it was observed that 18-year-olds spent more time on their phones compared to 14-year-olds and 15-year-olds, albeit not statistically significant ($p=0.054$). This finding aligns with existing research indicating an increase in phone usage among adolescents and young adults.¹⁸⁻²⁰ Factors such as height-

ened independence, social networking, and access to diverse applications and online content likely contribute to this trend in older age groups.^{21,22} Regarding friend attachment scores, it was found that 14-year-olds and 15-year-olds scored higher than 17-year-olds ($p=0.002$). This decline in peer attachment among 17-year-olds may be influenced by various factors, including shifting priorities, changing social dynamics, and increased focus on academic and future goals. Attachment to friends is a dynamic process shaped by individual values, social influences, and environmental factors.^{23,24} Studies by Kindschi et al. and Chang and Wu underscore the significance of values and peer relationships in adolescents' attachment dynamics.^{23,25} Moreover, De Meulenaere et al. emphasize the role of both internal cognitive models and environmental factors in shaping attachment relationships during adolescence.²⁶

In the study, women's friend attachment scores and nomophobia scores were higher than men ($p<0.05$). Research consistently shows that women tend to have higher levels of nomophobia, or fear of being without their smartphones, compared to men.^{27,28} This gender difference is attributed to women's greater use of smartphones for social connection and their stronger emotional attachment to these devices.²⁷ These findings are in line with broader gender differences in technology use and psychological attachment.²⁸

The study shows higher rates of phone use among adolescents from fractured homes compared to other family types, potentially influenced by reduced parental supervision and communication. Studies support this finding.²⁹⁻³¹ However, in this context, excessive phone use is associated with negative health consequences, highlighting the need for strategies to encourage healthier phone use habits in all family structures.

In the study, the total nomophobia score of those living in the village was higher than those living in the city ($p=0.041$). Research indicates that nomophobia is prevalent among young people, especially females and those who view their phone use as harmful to their nutrition.²⁸ Higher nomophobia levels in rural areas may be influenced by differences in technology access, social networks, psychological factors, and cultural aspects like vertical collectivism.^{32,33}

In the study, no statistically significant relationship was found between family income level, number of siblings, phone use, friend attachment scores and total nomophobia scores ($p>0.05$). The lack of a significant relationship between family income level, number of siblings, phone use, friend attachment scores, and total nomophobia scores is consistent with previous study.² This suggests that the influence of these factors on phone use and engagement with technology may be more subtle and context-dependent.¹ Further research is

needed to explore the complex interplay between these factors and the development of nomophobia.¹⁶

In the study, individuals who check their phones more frequently have higher nomophobia total scores ($p < 0.001$). Studies have shown a strong positive correlation between high phone use frequency and increased nomophobia, with frequent checking and dependence on phones linked to higher nomophobia scores.^{2,34,35} Research by Rodríguez-García et al. and Humood et al. highlights the prevalence of severe nomophobia and its negative impact on mental health, especially among university students.^{2,34}

In the study, checking the phone immediately in the morning is associated with higher total nomophobia scores. Research indicates that increased smartphone usage is linked to higher levels of loneliness, anxiety, and nomophobia, especially among individuals with social anxiety and loneliness who frequently use system and social media apps.^{36,37} The fear of missing out significantly contributes to problematic smartphone use and nomophobia, with habits like checking phones first thing in the morning reflecting a desire for social connection and fear of missing out.³⁸

In the study, individuals who use social media have higher nomophobia scores and friend attachment scores. Research shows that social media use is linked to higher levels of nomophobia and friend attachment, with smartphone use and feelings of personal inadequacy being strong predictors of nomophobia.^{27,39} Additionally, online social connections positively predict Facebook communication and relational closeness, suggesting that social media use can both increase nomophobia and strengthen social connections.⁴⁰

Those who use fewer and medium numbers of applications have higher total attachment scores ($p < 0.05$). Tam et al. and Mehra et al. both explore factors influencing the continued use and adoption of mobile apps, with satisfaction, habit, and perceived usefulness being key drivers.^{41,42} These studies provide a foundation for understanding the potential link between the number of actively used applications and attachment scores, suggesting that individuals who use fewer apps may have a stronger attachment to specific ones. However, further research is needed to confirm this relationship.

Spending time on social media is associated with higher nomophobia scores and friend attachment scores, compared to other activities like playing games and texting. The purpose of phone use can have an impact on nomophobia and attachment, with social media use showing significant effects. Research has shown that the purpose of phone use, particularly social media use, is a significant factor in understanding the psychological implications of smartphone usage.² Spending time on social media has been associated with higher nomophobia scores and friend attachment scores com-

pared to other activities like playing games and texting.³⁶ This is further supported by Elhai, who found that non-social smartphone use, which includes social media, is linked to problematic smartphone use and fear of missing out.⁴³

In Table 3, in the secure attachment subscale, the mean of women (38.64) is higher than that of men and there is a statistically significant difference ($p < 0.001$). Research indicates that women have lower levels of avoidant attachment but slightly higher levels of anxious-fearful attachment compared to men, suggesting gender differences in attachment styles with women tending towards secure attachment and men towards avoidant attachment.⁴⁴

The study suggests that women experience slightly higher levels of specific nomophobia sub-dimensions compared to men, particularly in areas of inability to access information, sacrificing comfort, and not being able to communicate, while no significant gender difference was found in losing online connection. A systematic review by Rodríguez-García et al. found nomophobia prevalent in the general adult population, especially among university students, with further studies by Humood et al. and León-Mejía et al. highlighting high prevalence in this group and greater vulnerability among women and younger individuals.^{2,34,45}

In the study, no significant differences regarding attachment sub-dimensions (secure attachment, avoidant attachment, and anxious-fearful attachment) were found among nuclear family, extended family, and fragmented family ($p > 0.05$). No significant differences regarding nomophobia sub-dimensions (not being able to access information, sacrificing comfort, not being able to communicate, and losing online connection) were found among different family types ($p > 0.05$). Research indicates no significant differences in attachment and nomophobia sub-dimensions among different family types, suggesting that individual experiences and interactions, rather than family structure alone, play a stronger role in influencing these factors.^{46,47}

In the cultural context of Türkiye, these findings are particularly relevant. The strong family bonds and social structures in Turkish society might influence attachment styles and smartphone usage behaviors differently than in more individualistic cultures.⁴⁸⁻⁵⁰ However, the similarities with global patterns suggest that nomophobia and attachment issues transcend cultural boundaries, driven more by the ubiquitous presence of technology and the universal human need for social connection. Nomophobia, the fear of being without a mobile phone, is a growing concern in Türkiye, particularly among the younger generation. Sarı et al. and Alini both highlight the psychological and religious aspects of this issue, with Sarı et al., suggesting psychotherapy and Islamic therapy as potential treatments.^{48,51} Bernar-

dini and Bak further emphasize the global nature of nomophobia, with Bernardini noting its prevalence in Italy and Bak finding it to be a common issue across different generations in Türkiye.^{52,53} These studies collectively underscore the need for culturally sensitive interventions to address nomophobia and excessive smartphone use in Türkiye. Thus, this study underscores the importance of considering both individual and cultural factors in addressing attachment and nomophobia. It highlights the need for culturally sensitive approaches in interventions and educational programs aimed at reducing excessive smartphone use and its psychological impacts in Türkiye.

Study limitations

The cross-sectional nature of our research design represents an important limitation, as it precludes our ability to establish causal relationships between the variables examined. We can only identify associations, rather than determine the direction of causation. The primary limitation of this study is its regional focus on Central Anatolia, which may affect the generalizability of the results to other geographic areas due to unique socioeconomic and cultural characteristics. To enhance generalizability, future research should expand to include multi-regional or nationwide studies and international comparisons to understand how these phenomena vary across different contexts.

Study implications

To address the effects of excessive smartphone use and nomophobia, schools and parents should collaborate on educational initiatives. Schools can implement workshops and counseling services focused on healthy friendships and coping strategies to reduce smartphone dependence, while also promoting responsible social media use and regulating screen time during school hours. Parents need to be educated on nomophobia and encouraged to support balanced phone use in their children by setting boundaries and modeling healthy behaviors. Mental health professionals can provide assessments, cognitive behavioral therapy, and coping skills training. Practical interventions such as digital literacy programs, digital detox, mindfulness practices, and apps to monitor screen time can significantly reduce nomophobia and improve adolescents' well-being and emotional regulation.

Conclusion

Friendship attachment styles influence nomophobia in adolescents, alongside smartphone use characteristics, indicating the importance of interventions by health professionals, educators, and parents to mitigate nomophobia. Future research should focus on testing the effectiveness of educational programs, exploring the im-

port of different types of attachment (parental, romantic, friendship), and investigating how attachment styles in these relationships affect nomophobia levels. Friendship attachment styles significantly impact nomophobia in adolescents, influenced by smartphone use characteristics, prompting the need for interventions by health professionals, educators, and parents to mitigate nomophobia through targeted educational programs. Understanding the mediating and moderating roles of psychological, social, and environmental factors in the relationship between friendship attachment styles and nomophobia can provide valuable insights for developing effective interventions and promoting healthy smartphone use habits among adolescents.

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Author contributions

Conceptualization, B.M.; Methodology, B.M.,F.Ö. and M.T.B; Software, B.M.,F.Ö. and M.T.B; Validation, B.M.,F.Ö. and M.T.B; Formal Analysis, B.M.,F.Ö. and M.T.B; Investigation, B.M.; Resources, B.M.,F.Ö. and M.T.B; Data Curation, B.M.,F.Ö. and M.T.B; Writing – Original Draft Preparation, B.M.; Writing – Review & Editing, B.M.,F.Ö. and M.T.B; Visualization, B.M.; Supervision, B.M.,F.Ö. and M.T.B; Project Administration, B.M.,F.Ö. and M.T.B.

Conflicts of interest

The author(s) declare no competing interests.

Data availability

To increase the transparency and reproducibility of this research, data sets generated and/or analyzed during the study may be made available from the corresponding author for further analysis or replication by other researchers.

Ethics approval

The study was approved by the ethics committee of the faculty of medicine of Selçuk University (20.01.2022-E.212504). Permission was obtained from the Directorate of National Konya (04.03.2022-247174).

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