

Assessing Mobile Phone Attachment: Validation of the Mobile Attachment Questionnaire in Turkish University Students and Examination of Related Variables

Psychological Reports
0(0) 1–33

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DOI: 10.1177/00332941211005117
journals.sagepub.com/home/prx



Özge Enez 

Department of Guidance and Psychological Counselling,
Giresun University, Turkey

Özden Yalçinkaya-Alkar

Department of Psychology, Ankara Yıldırım Beyazıt
University, Turkey

Abstract

The main aim of this study was to adapt the Mobile Attachment Questionnaire (MAQ) to Turkish culture. It was also aimed to investigate whether mobile phone attachment (MPA) exists in Turkish university students and whether it has the main characteristics of interpersonal attachment. This study also aimed to investigate the MPA's relationship with nomophobia, smartphone addiction and materialism, and to examine the predictive power of them on MPA. The study group consisted of a total of 242 university students. Exploratory and confirmatory factor analyses were conducted to determine the structural validity of the MAQ-TR. The goodness of fit

Corresponding Author:

Özge Enez, Department of Guidance and Psychological Counselling, Giresun University, Faculty of Education, Giresun 28200, Turkey.

Email: ozgeenez@gmail.com

indices met the model fit requirements for the four-factor 13-item MAQ-TR. Reliability analyses results provided high internal consistency coefficients. Correlation analyses results showed that individuals highly attached to their phones experienced more severe symptoms of nomophobia and smartphone addiction and materialists were more likely to accept their phones as attachment object. Regression analysis showed that nomophobia, smartphone addiction and materialism were significant predictors of MPA. Given that MPA is an understudied concept, this study provides a starting point for future researches on problematic and non-problematic phone use.

Keywords

Mobile phone attachment, nomophobia, smartphone addiction, materialism, problematic phone use

Introduction

In the early 2000s, communication technologies have developed rapidly. As a result, mobile phones (MPs) have become an integral part of everyday life and individuals have become dependent on their phones. Mobile applications and social networking sites have gained popularity among the young generation (Uzun et al., 2016). Around the world, approximately four billion people use the mobile internet and three billion people actively use social networking sites in 2017 (Kemp, 2017). The average time spent on the phone is 171 minutes per day in 2018 (Turner, 2019). The time spent on the phone among university students is even greater. The average duration of phone use among university students is five hours (Lepp et al., 2014). Moreover, 22% of young adults log in to their social media accounts at least 10 times a day and check their phones more than 150 times a day (Malik, 2018; O’Keeffe & Clarke-Pearson, 2011).

As can be seen from these statistics, a mobile phone (MP) is one of the most prevalent external objects owned and used by individuals in modern society. When the relevant literature is reviewed, it is seen that most of the previous research has focused on the time spent using the MP and problematic phone use (Walsh et al., 2010). However, few studies have focused on the non-problematic aspects of the relationship between individuals and their phones. On one hand, excessive use of the MP leads to several significant psychological and physical problems (Durak, 2019; Yildirim, 2014). On the other hand, MPs are used for many useful purposes such as communication, research and entertainment. While some users may demonstrate problematic outcomes due to excessive phone use, it is unclear whether problematic outcomes outweigh the benefits of phone use. Compared to problematic phone use, mobile phone attachment (MPA) is a more common and adaptive phenomenon. Most users feel anxiety or

distress in the absence of their phones (Arpaci, 2019) but rarely suffer from severe psychopathological symptoms such as withdrawal or indulgence (Kwon et al., 2013). In other words, MP usage may be an adaptive behaviour for some individuals. Based on this assumption, in the present study, it was assumed that individuals establish an attachment bond with the MP and this attachment can be considered as adaptive behaviour. In this paper, mobile phone attachment was explained within the frameworks of attachment theory (Bowlby, 1969) and extended-self theory (Belk, 1988).

Mobile phone attachment

According to Bowlby (1969), individuals are born with an innate attachment mechanism. Although the attachment mechanism occurs in early childhood, it affects human behaviours throughout life. The mechanism is active in times of danger and distress and motivates individuals to seek proximity to significant others. The proximity of the attachment figure gives individuals a sense of security, a secure base for exploring the environment and a safe haven in stressful situations. In contrast, separation from the attachment figure leads to separation anxiety (Bowlby, 1969). If individuals are rejected by their attachment figures in times of need, they may learn that other people are not reliable. It may cause attachment avoidance and emotional distance from others. Similarly, if their attachment figures are inconsistently available or provide unreliable support, it may cause attachment anxiety and compulsive seeking for proximity or protection. In both cases, individuals search for a reliable alternative attachment figure (Bowlby, 1969).

According to attachment theory, individuals may also form an attachment bond with an object which is similar to the bond between the baby and the caregiver (Bowlby, 1969). As shown by previous researches in psychology and marketing, the attachment can extend beyond interpersonal relationships to possessions (Ball & Tasaki, 1992; Kleine & Baker, 2004), brands (Park & Macinnis, 2006) and places (Williams & Vaske, 2003). Objects are seen as reliable and predictable attachment targets because individuals have control over them (Winnicott, 1953). Attachment objects provide relief from negative emotions when an individual is distressed (Bretherton, 1985). Therefore, object attachment is defined as a type of compensatory attachment strategy when the primary attachment figure is absent (Bowlby, 1969; Keefer et al., 2012). In other words, attachment object gives individuals a sense of security in stressful situations, allowing them to use adaptive emotional regulation strategies (Bowlby, 1969).

In the light of these explanations and empirical evidence, it is possible to assume that an MP can be controlled and always available, so it can be an attractive attachment target and a source of security for individuals who are concerned about the unreliability of others (Konok et al., 2016). This assumption has already been confirmed by several researchers. It was revealed that the

perceived unreliability of primary attachment figures increased MPA and proximity seeking behaviour to the MP. Individuals experienced greater anxiety, fear and distress upon being separated from the MP. Individuals also reported increased motivation to reunite with it (Arpaci, 2019; Cheever et al., 2014; Keefer et al., 2012; Konok et al., 2016; 2017; Mannion, 2018). Moreover, it was found that young adults saw their MPs as a source of security (Fowler & Noyes, 2015). More recently, Nie et al. (2020) showed that since an MP offers a variety of mobile activities such as personal assistants and satellite navigation systems, other communication tools cannot be an alternative attachment object to reduce individuals' mobile phone separation anxiety. These findings clearly show that individuals use the MP as an alternative attachment target. Moreover, considering that communication is the primary purpose of the phone use, individuals may also feel separation anxiety in the absence of it because they cannot reach their primary attachment figures. Therefore, the relationship-facilitating function of the MP may also increase the possibility of attachment to the phone. These statements can be seen as proof of the existence of MPA.

Belk (1988) explained object attachment from a different perspective in the extended-self theory. According to the extended-self theory, individuals can attach to the external objects and the object attachment is determined by the degree to which identities are extended to this ownership. As mentioned by Belk (1988), an individual's possessions, whether knowingly or unknowingly, intentionally or unintentionally, can become an extension of one's self and what people use habitually in daily life may become who they are (Belk, 1988). If people have control over an object, the brain incorporates it into the body diagram and accepts it as a part of the body. If an object reflects the identity of the owner, it is perceived as an extended-self and individuals want to stay close to this object (Belk, 1984; Walsh et al., 2010).

The MP is one of the most prevalent external objects owned by individuals in modern society. Therefore, this theory can be applied to MP users. MPs are personalized self-items that reflect the attitudes, values and social status of the owners because individuals express their identity by decorating their phones (Goggin, 2006). Furthermore, an MP is like an external memory because it is a useful tool for saving social contacts and storing, sharing and accessing personal memories (Vincent et al., 2005). Consequently, personal information recorded on the MP may play an important role in self-formation and reinforce the sense of self-extension (Han et al., 2017), which contributes to the emotional attachment to the MP (Kolsaker & Drakatos, 2009). Previous studies also found that individuals kept the MP nearby without actually using it (Shwetak et al., 2006; Walsh & White, 2007). These results indicate that individuals form a physical attachment to the MP and perceive it as an extension of their physical selves. To sum, extending phone ownership to the self increases the tendency of proximity-seeking behaviours and the possibility of attachment to the MP (Han et al., 2017).

To date, only a few studies investigated the relationship between MPA and the self. For example, an experimental study reported that a deprivation of the MP caused anxiety, an increase in blood pressure and a decrease in cognitive task performance. Participants also reported that the MP was perceived as a part of the self and the sense of self declined during the separation from the phone (Clayton et al., 2015). Similarly, it was found that self-identity predicted frequency of MP use (Walsh et al., 2010; Walsh & White, 2007).

Several researchers have explained MPA (Asante, 2019; Konok et al., 2017; Trub & Barbot, 2016; Wehmeyer (2007). Among these conceptualisations, only Konok et al. (2017) explained MPA from the attachment theory perspective. Therefore, this study is based on their conceptualisation.

Konok et al. (2017) claimed that MPA exists and it has the main characteristics of interpersonal attachment which are maintaining proximity with the caregiver, using the caregiver as a secure base for exploratory behaviour, viewing the caregiver as providing a haven of safety and experiencing separation anxiety when separated from the caregiver (Ainsworth, 1985; Konok et al., 2017). To test this hypothesis, they developed the Mobile Attachment Questionnaire (MAQ) (see Appendix 1). (Detailed information about the questionnaire is explained in the materials section.). In the light of their findings and all the information explained above, it is expected that Turkish university students form an attachment bond with their MPs. They show a desire for proximity to the MP when stressed, increased feelings of safety and comfort in the presence of the MP and anxiety in the absence of it. To test this hypothesis, the present study aims to examine the psychometric properties of the Turkish version of the Mobile Attachment Questionnaire (MAQ-TR). This study also aims to use the adopted version of it to measure MPA in Turkish university students. Therefore, the first hypothesis consists of two sub-hypotheses. These sub-hypotheses are as follows:

H1a: The MAQ-Turkish version is a valid and reliable measurement tool for Turkish culture to measure mobile phone attachment.

H1b: Mobile phone attachment exists in Turkish university students and it has the main characteristics of interpersonal attachment.

Problematic phone use and mobile phone attachment

While the MP is an attractive tool for communication, entertainment and interpersonal relationships, its problematic use leads to significant psychological problems, including nomophobia and smartphone addiction (Durak, 2019; Yildirim, 2014). SP addiction and nomophobia sometimes exist together and affect each other's intensity, but they are distinct constructs with some similar features and considered as problematic use of the MP (Durak, 2019; Lepp et al., 2014).

Nomophobia and mobile phone attachment. To start with nomophobia, it is a situational phobia and is defined as discomfort, stress or anxiety caused by the absence of an MP in people who use it habitually (King et al., 2014; Yildirim, 2014). Similar with MPA, a study about nomophobia found that young adults experienced separation anxiety upon being separated from the MP (King et al., 2013). Han et al. (2017) also reported that attachment to the MP increased the severity of nomophobia. The relationship between MPA and nomophobia was mediated by participants' phone proximity-seeking behaviour. Several studies also showed the relationship between interpersonal attachment style and nomophobia (Arpaci, 2019; Buyukcolpan, 2019; Parent, 2014). To sum, it is possible to assume that the sense of security felt in the presence of the attachment object can be related to nomophobic symptoms. Therefore, fear and anxiety may increase the likelihood that the MP is seen as an object of attachment. Moreover, nomophobic individuals may perceive the MP as a part of their extended-self. Thus, MPA can be greater in nomophobic individuals. Perceiving the MP as an attachment figure and extended-self may also increase nomophobic behaviours. Therefore, this study also aims to investigate the bidirectional relationship between nomophobia and MPA and to test the following hypothesis:

H2: There is a positive correlation between mobile phone attachment and university students' nomophobic tendencies.

Smartphone addiction and mobile phone attachment. To continue with SP addiction, it falls under the category of behavioural addiction that shares most features with drug addictions such as tolerance, withdrawal, craving, loss of control and relapse (Billieux et al., 2015; Kwon et al., 2013). SP addiction is defined as 'excessive or obsessive use of smartphones, which will interfere with the daily lives of users and cause negative consequences' (H. Lee, Ahn, et al., 2014, p. 1).

Several researchers have reported that SP addiction is associated with attachment problems and addicted individuals experience difficulties in emotion regulation and interpersonal relationships. They need an alternative way to deal with difficulties such as excessive phone use (Flores, 2004; Kim et al., 2017; Rodríguez-Torrío et al., 2020; Schimmenti et al., 2014; Wei et al., 2005). In light of these findings, on one hand, it is possible to assume that due to the problems with primary attachment figures, individuals may form an attachment bond with the MP and may overuse it. Moreover, some individuals may need the MP to resolve emotional problems and relieve the discomfort produced by the absence of the primary attachment figures (Choliz, 2012), which can cause SP addiction. On the other hand, compulsive MP use may also lead to an extension of the self to it. Therefore, overtime they may over-attach to the MP. Since MPA and SP addiction occur as a result of individuals' need to have and use the MP, it is possible to assume that there is a bidirectional relationship

between SP addiction and MPA. Therefore, this study aims to test the following hypothesis:

H3: There is a positive correlation between mobile phone attachment and smartphone addiction.

Materialism and mobile phone attachment

Another objective of this study was to investigate the association between MPA and materialism. Materialism is defined as ‘the importance a consumer attaches to worldly possessions’ (Belk, 1984: 291). Materialistic individuals place a broad emphasis on possessions by equating these possessions with happiness, power and success (Karabati & Cemalcilar, 2010; Richins & Dawson, 1992). They like to have and use objects that show their attitudes, values and social status (Roberts & Pirog, 2013). In other words, materialists often use the products to define themselves to others and enhance social identity (Eren et al., 2012; Shrum et al., 2013).

The MP plays a significant role in the social lives of young adults. It is an important status symbol and tool in creating a social identity for them. On one hand, the importance of the MP may trigger materialistic tendencies. Object attachment may lead to a reduction in the importance given to interpersonal relations and an increase in materialistic tendencies over time. On the other hand, if individuals are high in materialism, they may be more likely to see the MP as part of the extended-self (Oksman & Rautiainen, 2003). Moreover, as materialists pay more attention to the social acceptability and communicative ability of products or brands, the products are seen in public are more valuable than the products are used privately (Richins, 1994). Considering the importance and public visibility of the MP, the idea of being separated from it may cause separation anxiety and destructive effects on the integrity of identity in materialist young adults (Karabati & Cemalcilar, 2010).

To sum, materialism reflects a general valuing of objects and MPA reflects a valuing of the phone for the specific purpose of fulfilling attachment needs. Therefore, the values and privileges of materialists may play an important role in the formation of an attachment bond with the MP. Based on this assumption, this study aims to examine the relationship between university students’ materialistic tendencies and MPA and to test the following hypothesis:

H4: There is a positive correlation between mobile phone attachment and university students’ materialistic tendencies.

To continue with the last objective of this study, as explained above, an MP is not only a communication tool but also an indispensable instrument of individuals’ daily life (Kwon et al., 2013; Takao et al., 2009). When the MP is perceived as a part of the self, the tendency to seek proximity to it increases. As the

tendency increases, individuals are more likely to exhibit nomophobic behaviours or addictive behaviours and become attached to the MP (Han et al., 2017). The tendency of materialistic individuals to consider the MP as part of the extended-self can also increase the likelihood of mobile phone attachment. Moreover, studies have shown that higher levels of materialism trigger excessive MP use, SP addiction (Y.-K. Lee, Chang, et al., 2014; Long et al., 2019) and MP dependency (Gentina & Rowe, 2020). Considering all the explanations given above, it is assumed that SP addiction, nomophobia and materialism may lead to attachment to the phone. Therefore, this study aims to test the following hypothesis:

H5: Nomophobia, smartphone addiction and materialism have predictive power on mobile phone attachment.

To conclude, although there are English measurement tools (e.g. YAPS, MAQ) developed to measure MPA (Konok et al., 2017; Trub & Barbot, 2016), there is no Turkish measurement tool to measure MPA. The MAQ evaluates the MP as an object of attachment. Therefore, in this research, it is aimed to adapt the measurement tool to Turkish culture to determine the MPA levels of university students. Additionally, it is aimed to determine whether Turkish university students' relationships with the MP can be conceptualised within the framework of attachment theory and extended-self theory. This conceptualisation can contribute to a better understanding of the patterns and characteristics non-problematic MP use. Although few studies have examined the relationship between SP addiction, nomophobia, MPA and materialism; no studies are examining the predictive power of these three variables on MPA. In short, the findings of this study might contribute to the expansion of the literature on non-problematic phone use, provide a better understanding of problematic phone use and assist clinicians in the planning of prevention and education interventions.

Materials and method

Participants

Since the original questionnaire was developed with the participation of university students, the Turkish version was validated with the participation of university students. Additionally, this age group is considered to be "cell phone natives" (Forgays et al., 2014), so it is expected that MPA will be most pronounced in this age group (Konok et al., 2017). Therefore, the inclusion criteria were being a university student and having a mobile phone. The study group consisted of a total of 242 university students studying in various departments at Giresun University. To obtain a heterogeneous sample, data were collected from all grade levels. Data were collected during the fall semester of the 2019–2020 academic year. Of the total sample, 162 (66.9%) were female,

80 (33.1%) were male, and their ages ranged between 17 to 34 years, with a mean age of 20.85 ($SD = 2.08$).

Materials

Demographic information form was used for sample description and supplementary analyses. To measure mobile phone attachment, the Mobile Attachment Questionnaire (MAQ) is a self-report questionnaire and consists of 15 items. The items are graded on a 5-point Likert type scale (1 = *not at all characteristic of me* and 5 = *very characteristic of me*). The four factors of the MAQ are: (1) separation insecurity (SI) (decreased sense of security when separated from the phone), (2) separation anxiety (SA) (increased tension or anxiety upon separation), (3) safe haven (SH) (turning to the phone in tense situations to decrease anxiety) and (4) secure base (SB) (being more confident/at ease in the presence of the phone). These four factors together explained 70.8% of the total variance. The internal consistency coefficients (Cronbach alpha coefficient) were .91, .76, .74, .83 and .91 for SI, SA, SH, SB and the whole scale, respectively (Konok et al., 2017). In this study, the translated Mobile Attachment Questionnaire (MAQ) was used. In this study, Cronbach alpha coefficients were .85, .78, .77, .74 for the SI, SA, SH and SB sub-scales, respectively. It was .90 for the whole scale.

To assess nomophobia, the Nomophobia Questionnaire-Turkish Version (NMP-Q-TR) was used (see Appendix 2). The original form (NMP-Q) was developed by Yildirim and Correia (2015). The NMP-Q-TR was validated in 2016. According to the confirmatory factor analysis, CFI was .92, GFI was .97, and RMSEA was .08. Cronbach alpha coefficient of the NMP-Q-TR was .92. The sub-dimensions of NMP-TR are: (1) not being able to access information, (2) giving up convenience, (3) not being able to communicate and (4) losing connectedness. Cronbach alpha coefficients of the sub-dimensions were .90, .74, .94 and .91, respectively (Yildirim et al., 2016). In this study, Cronbach alpha coefficients were .81, .77, .92 and .80 for the sub-dimensions, and was .91 for the whole scale.

To assess SP addiction, the Smartphone Addiction Scale-Short and Turkish Version (SAS-SV-TR) was used (see Appendix 3). The original form (SAS-SV) was developed by Kwon et al. (2013). The SAS-SV was adopted for the Turkish culture in 2015. Cronbach alpha coefficient of the SAS-SV-TR was .86. Reliability coefficient of test/retest was .92 (Noyan et al., 2015). In this study, Cronbach alpha coefficient was .87.

To assess materialism, the short version of the Material Values Scale-Turkish Version (MVS-TR) was used (see Appendix 4). The Material Values Scale (MVS) was developed by Richins and Dawson's in 1992 and the short form was prepared by them in 2004 (Richins, 2004). The MVS was adopted for the Turkish culture in 2010. According to the confirmatory factor analysis, CFI was

.84 and RMSEA was .06. Cronbach alpha coefficient of the MVS-TR was .80. The sub-scales of the MVS-TR are: (1) centrality, (2) success and (3) happiness. Cronbach alpha coefficients of the sub-scales were .72, .74, and .74, respectively (Karabati & Cemalcilar, 2010). In this study, Cronbach alpha coefficient was .85 for the MVS-TR. Cronbach alpha coefficients were .65, .76, .73 for the sub-scales, respectively.

Procedure

In the current study, the MAQ was adapted to Turkish culture and its reliability and validity studies were conducted. After obtaining permission from the developers of the MAQ, ethical approval was obtained from the Giresun University Ethical Board. The adaptation procedure of the questionnaire was carried out following recommendations (Knudsen et al. (2000). First, the original questionnaire was translated into Turkish by four academicians who are advanced users of Turkish and English. Afterwards, the researchers decided on the initial form of the MAQ-TR. In a pilot study, the initial form was given to 5 university students and 5 academicians. They evaluated the comprehensibility of each item by rating from 1 (*very easy to understand*) to 5 (*very difficult to understand*). The mean scores for the difficulty of items ranged from 1 to 1.89. High scored items in the pilot study were reviewed and reconstructed by the researchers. The final form of MAQ-TR was developed. Lastly, the Turkish version of the questionnaire was translated back into English by two different academicians to check whether there were any changes in the meanings of the items. The back-translated form was sent to Konok to control the meanings of the items. In the present study, the Turkish version of the questionnaire was used for data collection.

Convenient sampling method was used for participant selection. To obtain a heterogeneous sample, the research was announced to the participants via posters posted on school boards. It is important to mention that students at Giresun University come from various provinces of Turkey. According to the rules of thumb, the sample size of the study was satisfactory (recommended: at least 10 participants for each scale item) (Bentler & Chou, 1987; Nunnally, 1978). The potential participants were informed about the nature, the requirements of the research and confidentiality before data collection. Informed consent was given to the participants. Student participation of the study was on a voluntary basis and data were collected during the class hours by paper-pencil data collection method. To test the test-retest reliability of the scale, randomly selected 34 participants completed the MAQ-TR for the second time four weeks after the initial data collection.

Data analysis

The collected data were uploaded to the Statistical Package for Social Sciences 23 (SPSS 23) program to conduct statistical analyses. First, descriptive statistics

were calculated. Outlier detection analysis was performed and no violation was observed. The values of skewness and kurtosis were calculated to assess normality assumption. Second, exploratory factor analysis (EFA) was conducted to determine the structural validity of the MAQ-TR on Turkish university students. Third, to confirm the factorial structure of the MAQ-TR, confirmatory factor analysis (CFA) was performed in Analysis of Moment Structures (AMOS). Fourth; internal consistency, split-half reliability and test-retest reliability coefficients were calculated. Fifth; inter-factors correlation and correlation between the questionnaire and its factors were calculated to reveal the construct validity. Sixth; since there is no similar Turkish measurement tool measuring MPA, Nomophobia Questionnaire-Turkish Version (NMP-Q-TR) and the Smartphone Addiction Scale-Short Version-Turkish Version (SAS-SV-TR), which are thought to measure MPA-related constructs, were used to investigate the concurrent validity of the MAQ-TR. Seventh, to reveal the correlational relationships between variables and to test the research hypotheses, the bivariate Pearson correlation analyses (one-tailed) were performed. Lastly, a multiple linear regression analysis forced entry (enter) method was performed to predict MPA from nomophobia, SP addiction and materialism. The significance level was accepted as .05 in the statistical analyses.

Results

Descriptive statistics were obtained for the demographic variables of the participants. Participants' demographic information was presented in Table 1. The skewness coefficients of the variables in the study ranged from $-.20$ to $.36$, the kurtosis coefficients ranged from $-.46$ to $.21$. The values are represented in Table 2. The skewness and kurtosis values were ranged between $+2$ and -2 . Therefore, it was found that the data were normally distributed (George & Mallery, 2010). Means, standard deviations, ranges, skewness and kurtosis values of the variables are presented in Table 2.

Validity and reliability analyses

According to the findings explained below, the following hypotheses were confirmed:

- H1a: The MAQ-Turkish version is a valid and reliable measurement tool for Turkish culture to measure mobile phone attachment.
- H1b: Mobile phone attachment exists in Turkish university students and it has the main characteristics of interpersonal attachment (proximity seeking, separation anxiety, secure base and safe haven).

Prior to hypothesis testing, data were screened for outliers. Assumptions of normality, linearity and homoscedasticity were examined. No violation was

Table 1. Participants' demographic information.

	N	%
Gender		
Female	162	66.9
Male	80	33.1
Living arrangement		
Home	98	40.5
Dormitory	144	59.5
Living with		
Family	39	16.1
Friends	188	77.6
Alone	15	6.2
Duration of smartphone ownership		
Less than 1 year	3	1.2
1–2 years	5	2.1
2–4 years	20	8.3
More than 4 years	214	88.4
Duration of daily phone use		
Less than 1 hour	7	2.9
1–3 hours	38	15.7
3–5 hours	69	28.5
More than 5 hours	128	52.9
Duration of daily mobile Internet use		
Less than 1 hour	12	5.0
1–3 hours	73	30.2
3–5 hours	55	22.7
More than 5 hours	102	42.1
Frequency of checking the phone		
0–10 minutes	69	28.5
11–20 minutes	73	30.2
21–30 minutes	81	33.5
31–60 minutes	18	7.4
More than 61 minutes	1	.4
Main purpose of phone usage		
Communication	57	23.6
Social media	151	62.4
Work	2	.8
Research	9	3.7
Camera	2	.8
Game	3	1.2
Music	17	7.0
Shopping	1	.4

Note. N: Number; %: Frequency.

Table 2. Means, standard deviations, ranges, skewness and kurtosis values.

Variables	M	SD	Range	Minimum	Maximum	Skewness	Kurtosis
MPA	48.23	11.91	60	15	75	-.04	-.32
Nomophobia	84.13	23.09	119	21	140	-.20	-.46
SP addiction	29.00	10.23	45	10	55	.29	-.40
Materialism	48.22	11.36	61	20	81	.36	.21

Note. M: Mean; SD: Standard deviation; SP: Smartphone; MPA: Mobile phone attachment.

observed (Tabachnick & Fidell, 2007). In order to determine the structural validity of the MAQ-TR on Turkish university students, EFA in SPSS 23 was performed. The suitability of the collected data for factor analysis was examined by the Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett sphericity test. The KMO measure of sampling adequacy showed that the sample was factorable ($KMO = .88$) and Bartlett's test of sphericity was significant ($\chi^2(105) = 1803.4, p < .001$). To determine the factor structure of the MAQ-TR, items were entered into factor analysis with a varimax rotation. As a result of the eigenvalue analysis, it was found that the MAQ-TR consisted of four factors whose eigenvalues are bigger than 1. No item was eliminated because all items contributed to four-factor structure and met the minimum criteria of having a factor loading of .30 or above (Field, 2013). The loads of items in the factors were ranged between .51 and .89. These four factors explained 66.95% of the variance. The corrected item total correlation was also calculated, and they were ranged between .17 and .69. In short, EFA indicated that MAQ-TR has 4 factors and 15 items like the original form.

To test the factor structure of the MAQ-TR, CFA in AMOS was performed. In CFA model, the factors were named in line with the original form. Factor 1 named as separation insecurity (items = 1, 2, 3, 4, 5), factor 2 as separation anxiety (items = 6, 7, 8, 9), factor 3 as safe haven (items = 10,11,12) and factor 4 as secure base (items = 13,14,15). To confirm the four-factor model, maximum likelihood method was chosen and each item was associated with a predetermined factor in the original form of the MAQ. Before the analysis, it was found that there were no missing values and no outliers. The goodness of fit for the model was tested using the most widely applied absolute and relative alternative fit indices (Byrne, 2010).

As can be seen in Table 3, the chi-squared test (χ^2/df) was 2.82, the comparative fit index (CFI) is .91, the incremental fit index (IFI) was .91, the adjusted goodness of fit index (AGFI) was .85, the parsimony normed fit index (PNFI) was .70 and the parsimony goodness of fit index (PGFI) was .63. These findings indicated adequate fit of the model. However, the goodness of fit index (GFI) and the Tucker-Lewis index (TLI) were .89 and did not reach an accepted value

Table 3. Goodness-of-fit indexes.

Goodness of fit indices	Perfect fit indices	Acceptable fit indices	Model 1	Model 2
¹ CMIN/DF	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 3$	2.82	2.52
² AGFI	$.90 \leq AGFI \leq 1.00$	$.85 \leq AGFI \leq 1.00$	.85	.88
³ GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq .95$	.89	.92
³ CFI	$.95 \leq CFI \leq 1.00$	$.90 \leq CFI \leq .95$	.91	.95
³ TLI	$.95 \leq TLI \leq 1.00$	$.90 \leq TLI \leq .95$	.89	.93
³ IFI	$.95 \leq IFI \leq 1.00$	$.90 \leq IFI \leq .95$	.91	.95
⁴ RMSEA	$.00 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$	.09	.07
⁵ PNFI	$.95 \leq PNFI \leq 1.00$	$.50 \leq PNFI \leq .95$	.70	.67
⁶ PGFI	$.95 \leq PGFI \leq 1.00$	$.50 \leq PGFI \leq .95$	.63	.58

Note. CMIN/DF, χ^2/df : the chi-squared test; AGFI: the adjusted goodness of fit index; GFI: the goodness of fit index; CFI: the comparative fit index; TLI: Tucker-Lewis index, IFI = the incremental fit index, RMSEA = the root mean square error of approximation; PNFI: the parsimony normed fit index; PGFI: the parsimony goodness of fit index. ¹(Kline, 2011), ²(Schermelleh-Engel & Moosbrugger, 2003), ³(Baumgartner & Homburg, 1996), ⁴(Browne & Cudeck, 1993), ⁵(Hu and Bentler, 1999), ⁶(Meyers et al., 2006).

of .90. The root mean square error of approximation (RMSEA) was .09 and was slightly above the accepted value (recommended $\leq .08$) (Baumgartner & Homburg, 1996; Browne & Cudeck, 1993; Hu & Bentler, 1999; Kline, 2011; Meyers et al., 2006; Schermelleh-Engel & Moosbrugger, 2003). Model 1 is represented in Figure 1.

Therefore, the model was modified based upon theory, high correlation between items, empirical results provided by the modification indices, and standardised regression weights. According to Model 2, the MAQ-TR consists of 13 items and includes two correlated errors (between item 1 and item 5, and between item 2 and item 3). Two items (item 12 and item 14) were excluded from the model due to low standardised regression weights (recommended $> .30$) (Karagoz, 2016; Martin & Newell, 2004). The elimination of the items is discussed in the discussion section. As presented in Table 3, the chi-squared test ($\chi^2/df = 2.52$) was satisfactory due to being lower than criterion value of 3. CFI (.95) and IFI (.95) values were within the perfect fit range of .95–1.00. The RMSEA (.07) was acceptable. Likewise, TLI (.93) and GFI (.92) values were within the acceptable range of .90–1.00. The AGFI (.88) also indicated a satisfactory value by remaining between the range of .85–1.00. Moreover, the PNFI (.67) and the PGFI (.58) were within the acceptable range of .50–1.00 (Baumgartner & Homburg, 1996; Browne & Cudeck, 1993; Hu & Bentler, 1999; Kline, 2011; Meyers et al., 2006; Schermelleh-Engel & Moosbrugger, 2003). In short, the goodness of fit indices met the model fit requirements for the 13-item MAQ-TR. Therefore, the 13-item MAQ-TR was used in further

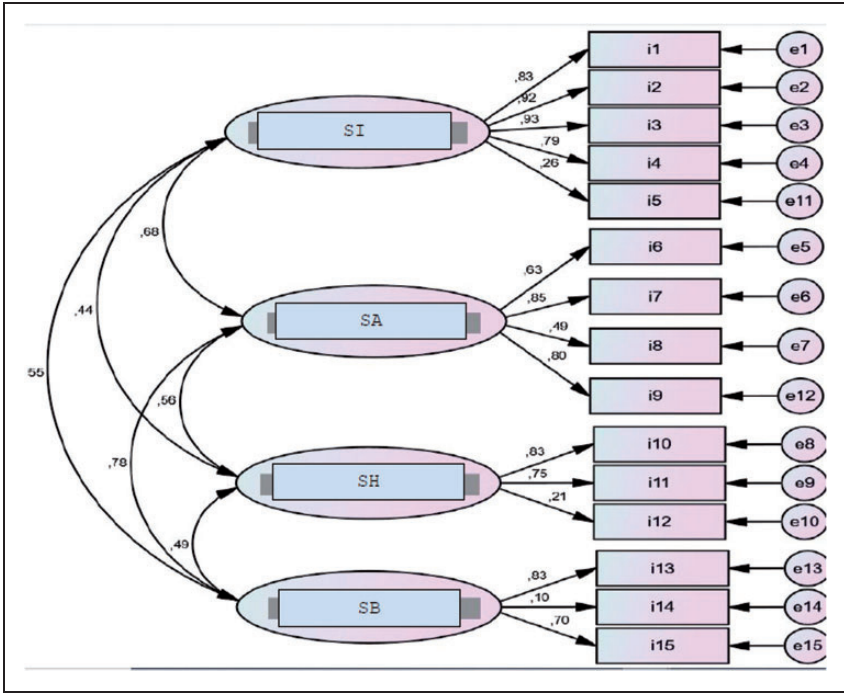


Figure 1. Standardised solution of Model 1. SI: separation insecurity; SA: separation anxiety; SH: safe haven; SB: secure base; i: item; e: error term. Values above the arrows indicate standardised regression weights.

analyses. Standardised solution of the 13-item and four-factor model of the MAQ-TR is represented in Figure 2.

To reveal the construct validity; inter-factors correlation and correlation between the MAQ-TR and its factors were calculated. All of the correlation coefficients were statistically significant ($p < .001$). Results of the analysis are represented in Table 4.

To investigate the concurrent validity of the questionnaire, the correlations between the MAQ-TR, the NMP-Q-TR and the SAS-SV-TR scores were calculated. The NMP-Q-TR ($r = .70$) and the SAS-SV-TR ($r = .67$) were statistically significantly correlated with the MAQ-TR, indicating the concurrent validity of it. It is important to note that the correlational relationships between them are also the hypotheses of this study. Therefore, the correlation analysis results are explained in detail in the correlation analyses section.

For reliability of MAQ-TR, internal consistency, split-half reliability and test-retest reliability coefficients were examined. The internal consistency coefficients (Cronbach alpha coefficient) were .85, .78, .77, .74 for the SI, SA, SH

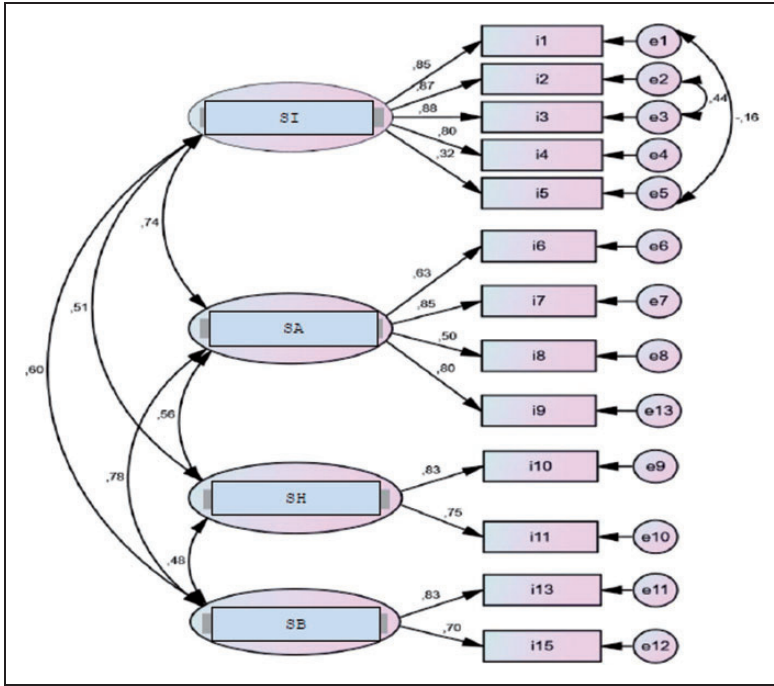


Figure 2. Standardised solution of Model 2. SI: separation insecurity; SA: separation anxiety; SH: safe haven; SB: secure base; i: item; e: error term. Values above the arrows indicate standardised regression weights.

Table 4. Correlation of the factors and MAQ-TR.

	2	3	4	5
1 SI	.68**	.48**	.52**	.90**
2 SA		.43**	.61**	.88**
3 SH			.38**	.65**
4 SB				.73**
5 MAQ-TR				1

Note. SI: separation insecurity; SA: separation anxiety; SH: safe haven; SB: secure base; MAQ-TR: Mobile Attachment Questionnaire-Turkish version.

**p < .01.

and SB sub-scales, respectively and was .90 for the whole scale. The internal consistency coefficients are very similar to the original MAQ. For the original MAQ, the coefficients were .91, .76, .74, .83 and .91 for SI, SA, SH, SB and the whole scale, respectively. Corrected item-total correlations ranged between .43

Table 5. Test-retest correlation coefficients for MAQ-TR with 4-week interval measurement.

Measure	R	Cronbach alpha	ICC
MAQ-TR Total	.70**	.82	.82
MAQ-SI	.78**	.84	.84
MAQ-SA	.58**	.73	.73
MAQ-SH	.40*	.58	.57
MAQ-SB	.58**	.73	.53

Note. SI: separation insecurity; SA: separation anxiety; SH: safe haven; SB: secure base; MAQ-TR: Mobile Attachment Questionnaire-Turkish version; R: correlation; ICC: intraclass correlation.

** $p < .01$.

* $p < .05$.

to .72. The scale was splitted in half by odd and even numbers. Guttman split-half coefficient was .92 and Spearman-Brown coefficient was .92. Cronbach alfa coefficient for the odd numbers was .83 and was .78 for the even numbers. The correlation between forms was .86. The test-retest correlation coefficients with 4-week interval can be found in Table 5 ($N = 34$). These findings indicate that the MAQ-TR has acceptable reliability.

Correlation analyses

To reveal the correlational relationships between variables, the bivariate Pearson correlation analyses (one-tailed) were performed. Pearson correlation coefficient matrix was calculated for the multi-collinearity check. No multi-collinearity was observed in variables because each correlation pair was below the selection criteria of .90 (Dohoo et al., 1997). Linearity was assessed visually using scatterplots of the data. According to the results of correlation analyses, the following hypotheses were confirmed:

- H2: There is a positive correlation between mobile phone attachment and university students' nomophobic tendencies.
- H3: There is a positive correlation between mobile phone attachment and smartphone addiction.
- H4: There is a positive correlation between mobile phone attachment and university students' materialistic tendencies.

Results of the correlation analysis confirmed that both the MAQ-TR total score and the factor scores showed moderate to large and significant correlations with nomophobia ($r = .70$, $p < .001$), SP addiction ($r = .67$, $p < .001$) and materialism ($r = .43$, $p < .001$) scores. The results of the analyses are represented in Table 6.

Table 6. Correlation matrix of the scales.

Scales	MAQ-TR	SI	SA	SH	SB
Nomophobia	.70** [.62, .77]	.63** [.53, .71]	.65** [.57, .73]	.42** [.30, .53]	.47** [.35, .59]
Smartphone addiction	.67** [.58, .75]	.57** [.46, .66]	.63** [.54, .71]	.44** [.33, .53]	.49** [.37, .58]
Materialism	.43** [.33, .53]	.39** [.26, .51]	.40** [.29, .5]	.26** [.13, .39]	.30** [.18, .41]

Note. SI: separation insecurity; SA: separation anxiety; SH: safe haven; SB: secure base; MAQ-TR: Mobile Attachment Questionnaire-Turkish version.

Values in square brackets indicate the 95% confidence interval for each correlation.

** $p < .01$.

Regression analysis

A multiple linear regression analysis forced entry (enter) method was performed to predict MPA from nomophobia, SP addiction and materialism. Prior to analysis, multi-collinearity diagnostics were calculated. The variance inflation factor (VIF) values were below 10 for all variables and the tolerance statistics were above .1 (Field, 2013). Therefore, there was no multi-collinearity in predictor variables. There was no first-order autocorrelation because Durbin-Watson statistic was 1.86 (acceptable range is 1.50–2.50) (Field, 2013). Homoscedasticity assumption was confirmed using linear regression plots for each predictor variable and MPA. According to the results of multiple linear regression analysis, the following hypothesis was confirmed:

H5: Nomophobia, smartphone addiction and materialism have predictive power on mobile phone attachment.

Result of the analysis showed that regression model was statistically significant ($F(3,238) = 126.52, p < .001$). This findings showed that nomophobia, SP addiction and materialism were significant predictors of MPA. The three-predictor model was able to account for 61.5% of the variance in MPA ($R = .78, R^2 = .61$). According to the standardised regression coefficients, the importance order of predictor variables on MPA was as follows: nomophobia ($\beta = .45, t = 9.21, p < .001$), SP addiction ($\beta = .37, t = 7.37, p < .001$) and materialism ($\beta = .11, t = 2.43, p = .01$). After controlling the effect of other variables, the partial correlation between nomophobia and MPA was .51, between SP addiction and MPA was .43 and between materialism and MPA was .16. The results of the multiple linear regression analysis are represented in Table 7.

Table 7. Results of the multiple linear regression analyses of the regression model to test the predictive power of predictor variables on MPA.

Predictors	B	SE	β	t	p	95% CI for B		Correlations		Collinearity statistics	
						Lower	Upper	Zero-order	Partial	Tolerance	VIF
Constant	5.73	2.25		2.55	.01	1.3	10.17				
Nomophobia	.22	.02	.45	9.21	<.001	.18	.27	.7	.51	.67	1.5
SP addiction	.42	.06	.37	7.37	<.001	.3	.53	.67	.43	.64	1.57
Materialism	.11	.05	.11	2.43	.01	.02	.2	.43	.16	.8	1.26
Model Fit	F(3,238) = 126.52, p < .001, R = .78, R ² = .61										

Note. SE: standard error; SP: Smartphone; VIF: The variance inflation factor; CI: confidence interval; B: unstandardised beta; β : standardised beta.

Discussion

In the literature, there is a debate around whether individuals are addicted or attached to the MP (Fullwood et al., 2017). Studies on the MP have often focused on SP addiction or nomophobia. However, MPA is different from SP addiction or nomophobia because it can be adaptive and involves an emotional bond with the phone (Kolsaker & Drakatos, 2009). According to the results of a qualitative study, the absence of the MP was equivalent to the loss of loved ones and loss of identity. In that study, the most common metaphors to define the MP were life, friend and a necessity. The most frequently used metaphors to define the absence of the MP were death, loneliness and emptiness (Onal, 2019). These findings clearly show the importance of the MP for users and highlight the importance of research on MPA. It is possible to assume that the findings of the present study will fill the gap in the literature to some extent. The present study has several contributions to both theory and practice. The important findings and contributions are discussed below.

In this study, the psychometric properties of the MAQ-TR were examined. The four dimensions of MPA in Turkish university students were also assessed. In this study, first, the structural validity of the MAQ-TR through exploratory factor analysis with a varimax rotation was examined. The eigenvalue analysis showed that the MAQ-TR consisted of four factors. Later, confirmatory factor analysis in AMOS was used to assess the construct validity of the MAQ-TR. The goodness of fit indices met the model fit requirements for the 13-item MAQ-TR. To sum, the results supported a four-factor structure for the adopted form, consistent with the original form.

It is important to explain that two items were eliminated due to their low standardised regression weights. The standardised regression weights of all remaining items are above the recommended value (recommended > .30)

(Karagoz, 2016; Martin & Newell, 2004). When item 12 and item 14 are excluded from the model, two factors (SH and SB) contain two items per factor. Some researchers recommend at least three items per factor. According to their opinion, factors with two items are more prone to estimation problems, especially when the sample size is small (Kline, 2005; MacCallum et al., 1999; Raubenheimer, 2004). However, some researchers recommend that single-factor models should contain at least three items per factor but multi-factor models can contain less than three items per factor (Hair et al., 2011; Kline, 1998). Moreover, factors that are very widely defined may need more items to assess the construct but two items may be sufficient for narrowly defined factors (Bearden et al., 1999). Since the model in this study consists of four narrowly defined factors and the sample size is quite large, it is believed that two items factors will not cause measurement error. The goodness of the fit indices in CFA can be seen as evidence for the construct validity of the MAQ-TR. Moreover, the remaining items in SH and SB factors have high factor loadings ($r \geq .70$) and are fairly uncorrelated with other items. It is also possible to say that brief scales are more useful because they reduce participants' boredom by eliminating item redundancy and item repetition. Moreover, there are scales in the literature that support the factor structure of the MAQ-TR. For example, Gosling et al. (2003) developed a personality scale with only two items per factor. Similarly, Yoo and Donthu (2001) developed a scale to measure the quality of internet shopping which has two items factors. Littman et al. (2006) developed a single-item measure of psychosocial stress. These scales can be seen as supporting evidence for the model in the current study. Therefore, it is possible to think that the factor structure of the MAQ-TR is also valid.

Additionally, inter-factors correlations and correlations between the MAQ-TR and its factors were calculated for construct validity. All of the correlation coefficients were statistically significant. To investigate the concurrent validity of the MAQ-TR, its correlations with the NMP-Q-TR and the SAS-SV-TR were examined. The correlations were statistically significant. According to the results of reliability analysis, the internal consistency coefficient of the MAQ-TR was fairly high with alpha levels above .76. Similarly, SI factor had fairly high internal consistency coefficient. SB and SA factors had high internal consistency. Only SH factor had satisfactory internal consistency. Furthermore, Guttman split-half coefficient and Spearman-Brown coefficient showed the split-half reliability of the MAQ-TR with alpha levels above .70 (Taber, 2018). Additionally, assessment after a four weeks interval can be shown as evidence of its reliability over time.

To sum, the overall results provided satisfactory reliability and validity indices for the MAQ-TR, supporting the cross-cultural utility of the questionnaire and confirmed H1a. The Turkish version of the MAQ appears to be a promising measure for the phone attachment research and a beneficial tool for researchers

and clinicians. It allows evaluating the dimensions of phone attachment among Turkish university students. So, a researcher can investigate to what extent mobile phone attachment contributes to problematic phone use or another psychological problem. Moreover, what is often conceptualised as problematic phone use may be an indicator of mobile phone attachment and mobile phone attachment can be an adaptive construct. With the MAQ-TR, the distinction between problematic phone use and mobile phone attachment can be made more clearly, so it is a useful tool to assess non-problematic use of the MP in Turkish university students. However, since this inference is not possible with the findings of this study, further studies are needed.

To continue with H1b, in line with previous work from Keefer et al. (2012) and Konok et al. (2016, 2017), findings from the present study indicate that Turkish university students form some degree of attachment to the MP. The phone attachment has the main features of interpersonal attachment that are separation anxiety, safe haven, secure base and proximity maintenance (Ainsworth, 1985). These findings support the conceptualisation of Turkish university students' relationships with the MP within the framework of attachment theory. The present study has important implications for the development of theory in the area of university students MP use.

In this study, MPA's correlational relationships with nomophobia, SP addiction and materialism were also investigated. As expected in H2, correlation analysis results showed that there was a high positive correlation between nomophobia and MPA. This finding is also in line with the findings of previous studies (Han et al., 2017; King et al., 2013). According to all these findings, the relationship between nomophobia and MPA can be bidirectional but it is not possible to determine the direction of the relationship. However, both nomophobic individuals and individuals who are highly attached to their phones experience intense anxiety and fear in the absence of the phone. In contrast, the presence of the phone gives them a sense of security (Konok et al., 2017; Yildirim, 2014). In particular, nomophobic individuals may need the physical presence of the MP to reduce their anxiety and fear. After a while, these individuals may perceive the phone as part of their extended-self. Therefore, they may develop a kind of dependence on the phone and attach to it. Moreover, perceiving the MP as an attachment figure may cause fear of being without it, namely nomophobia.

As expected in H3, the results of this study showed that there was a high level of positive correlation between SP addiction and MPA. This finding is similar to the findings of previous studies (Parent, 2014; Rodríguez-Torrico et al., 2020). The positive and bidirectional relationship between MPA and SP addiction can be explained as follows. First, excessive use of the MP can be an alternative for SP addicts' lack of secure attachment with the primary attachment figure (Flores, 2004). Since they use their phones constantly, they may substitute the presence of the MP as a primary attachment figure. Second, compulsive MP use

may lead to an extension of the self to the phone. Consequently, it increases the level of MPA. Likewise, the constant presence of the phone as an attachment object may lead to the habitual use of it, especially in negative situations. This means that MPA can also cause SP addiction by increasing the need for the MP. These results also indicate that individuals highly attached to their phones experience more severe symptoms of nomophobia and SP addiction. Accordingly, it can be assumed that nomophobic individuals and SP addicts may be more likely to see the MP as an object of attachment. Therefore, they can feel a sense of security, just as a baby does in the presence of the attachment figure. However, this assumption needs further investigation with future studies.

As expected in H4, findings showed that materialist individuals were more likely to accept their phones as an external attachment object. The relationship between materialism and MPA is in line with extended-self theory. If the MP reflects the identity of materialist individuals, it is perceived as a part of the self. Therefore, they want to stay close to the MP (Belk, 1984; Walsh et al., 2010). As discussed previously, materialism is an important consumer value that affects many of the decisions people make as consumers. Materialist individuals buy an MP not only for its functional utility but also its symbolic meaning. Material possessions, especially mobile phones, gain social meaning and are used as a tool to enhance materialist individuals' self-image and self-identity as well as others' perceptions of them (Eren et al., 2012). For example, some MP brands carry a status symbol in the society, thus individuals prefer these brands to enhance their social identity. Therefore, materialists, who ascribe importance to the symbolic meaning of the MP, may become more attached to it and experience separation anxiety without it (Solomon, 1983). Moreover, the MP may have replaced the primary attachment figure in materialists. In particular, in the presence of negative life events, they may need their attachment objects to deal with unwanted situations and to feel safe, just like a baby needs a caregiver (Billieux et al., 2008; Roberts & Pirog, 2013). In one hand, the values and privileges of materialists may play an important role in the formation of an attachment bond with the MP. On the other hand, object attachment may lead to a decrease in the importance given to interpersonal relations and an increase in materialism over time, supporting the bidirectional relationship between the two. To sum, the findings of the present study support the idea that to prevent or treat over-attachment to the MP, the effect of materialism should be considered.

Lastly, the predictive power of nomophobia, SP addiction and materialism on MPA was examined. The results of the regression analysis confirmed H5. Findings indicated that the three-predictor model was statistically significant and accounted for 61.5% of the variance in MPA. There is a strong possibility that nomophobic individuals, materialists and SP addicts view the MP as a part of their extended-self and as an alternative attachment figure. Due to excessive

preoccupation with the MP; individuals, who have high scores on nomophobia, SP addiction and materialism scales, may be more likely to develop an attachment bond with objects. They may need an object to control their emotions and feel safe or calm in stressful situations, rather than seeking support from others. Additionally, considering that the strongest predictor of MPA in the regression model is nomophobia, it is possible to say that the most common effect of the absence of the MP on individuals is fear and anxiety because these two emotions are defining characteristics of nomophobia and MPA. Therefore, this finding supports the idea that clinicians should focus on these negative emotions in their therapy programs that designed to prevent or treat over-attachment to the MP or nomophobia.

To conclude, this study might make valuable contributions to the field by testing the psychometric properties of the Turkish version of the MAQ. Before this study, there was no Turkish measurement tool to measure mobile phone attachment. Now, MPA can be included in studies conducted in Turkey. This means that MAQ-TR will contribute to future academic studies. Additionally, MPA was explained within the frameworks of attachment theory and extended-self theory and a regression model was tested. Thus, this study provides a novel theoretical perspective to understand MPA. Meanwhile, unlike the growing literature on problematic phone use, MPA can be an adaptive phenomenon. The MAQ-TR does not consider behaviours that may be normative as pathological. Therefore, this understanding may contribute to the development of interventions, educational programs and marketing campaigns aimed at promoting healthy and responsible use of the MP that increases the benefits of MP use and reduces its negative consequences.

Moreover, based on the findings, it will be possible to include the effect of MPA in the treatment programs developed for problematic phone use. Considering that MPA is related with deterioration in interpersonal relationships and problematic phone use (Han et al., 2017; Konok et al., 2016), it is possible to recommend that therapists should strengthen clients' interpersonal relationships and focus on attachment issues in treatments applied to treat problematic phone use. Additionally, individuals should be encouraged to give importance to emotional values instead of material objects.

It is important to note that MAQ is a relatively new scale and the cultural validation of it in different countries has not yet been established. Thus, further evidence is needed to test its cross-cultural validity in other cultures. Although; the total internal consistency coefficient of the MAQ-TR is fairly high, the internal consistency coefficient of one sub-scale was satisfactory. Considering that the reliability is affected by the characteristics of participants, it is suggested to prefer total score calculation rather than sub-scale scores.

Regarding the findings, some recommendations for future research are possible and some limitations of this study need to be mentioned. First, a convenience sample of students from a public Turkish university was used, which may limit the generalizability of the findings. Second, participants were selected among university students (range: 17– 34 years). This age group was chosen because the MAQ was developed with the participation of university students and therefore the Turkish version was also validated with the participation of university students. Therefore, future research should focus on more diverse populations with different age groups, which could improve the understanding of mobile phone attachment at different developmental stages. Third, two-thirds of the participants were female, which might affect the results. Lastly, due to the limitations of the cross-sectional nature of this study, even though test-retest assessment has been done, longitudinal studies are needed to test the stability of the results over time.

Appendix I Mobile attachment questionnaire (MAQ)

Please use the scale below by placing a number between 1 and 5 in the space provided to the right of each statement.

1 ———— 2 ———— 3 ———— 4 ———— 5

Not at all characteristic of me

Very characteristic of me

1. If my phone runs out of battery, I do not feel safe. _____
2. If I do not have my phone on me, I do not feel safe. _____
3. (3 If I leave my phone at home, I do not feel safe. _____
4. If I lost my phone, I would not feel really safe for long. _____
5. If I am stressed I take out my phone to calm down. _____
6. If I left my phone at home, I would be willing to go home for it even from a distance (more than 5 minutes away from home). _____
7. I am nervous/tense when I leave my phone at home. _____
8. It does not bother me when I leave my phone at home/it runs out of battery. _____
9. I am nervous/tense when my phone runs out of battery. _____
10. If I feel uneasy/tense in company, I take out my phone. _____
11. In a tense situation I take out my phone. _____
12. If I am nervous, dealing with my phone does not calm me down. _____
13. If my phone is in my hand, I feel more confident. _____
14. I am not more confident/easy-going if I have my phone with me. _____
15. _____
If my phone is in my hand, I can behave more easily/unreserved. _____

Note: MAQ-TR can be shared upon request.

Appendix 2 Nomophobia questionnaire (NMP-Q)

Please indicate how much you agree or disagree with each statement in relation to your smartphone.

1-----2-----3-----4-----5-----6-----7
Strongly disagree Strongly agree

1. I would feel uncomfortable without constant access to information through my smartphone.
2. I would be annoyed if I could not look information up on my smartphone when I wanted to do so.
3. Being unable to get the news (e.g., happenings, weather, etc.) on my smartphone would make me nervous.
4. I would be annoyed if I could not use my smartphone and/or its capabilities when I wanted to do so.
5. Running out of battery in my smartphone would scare me.
6. If I were to run out of credits or hit my monthly data limit, I would panic.
7. If I did not have a data signal or could not connect to Wi-Fi, then I would constantly check to see if I had a signal or could find a Wi-Fi network.
8. If I could not use my smartphone, I would be afraid of getting stranded somewhere.
9. If I could not check my smartphone for a while, I would feel a desire to check it.
10. If I did not have my smartphone with me, I would feel anxious because I could not instantly communicate with my family and/or friends.
11. If I did not have my smartphone with me, I would be worried because my family and/or friends could not reach me.
12. If I did not have my smartphone with me, I would feel nervous because I would not be able to receive text messages and calls.
13. If I did not have my smartphone with me, I would be anxious because I could not keep in touch with my family and/or friends.
14. If I did not have my smartphone with me, I would be nervous because I could not know if someone had tried to get a hold of me.
15. If I did not have my smartphone with me, I would feel anxious because my constant connection to my family and friends would be broken.
16. If I did not have my smartphone with me, I would be nervous because I would be disconnected from my online identity.
17. If I did not have my smartphone with me, I would be uncomfortable because I could not stay up-to-date with social media and online networks.
18. If I did not have my smartphone with me, I would feel awkward because I could not check my notifications for updates from my connections and online networks.
19. If I did not have my smartphone with me, I would feel anxious because I could not check my email messages.

20. If I did not have my smartphone with me, I would feel weird because I would not know what to do.

Appendix 3 Smartphone addiction Scale-Short version

Please indicate how much you agree or disagree with each statement in relation to your smartphone.

1-----2-----3-----4-----5-----6
 Strongly disagree Strongly agree

1. Missing planned work due to smartphone use	1	2	3	4	5	6
2. Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	1	2	3	4	5	6
3. Feeling pain in the wrists or at the back of the neck while using a smartphone	1	2	3	4	5	6
4. Won't be able to stand not having a smartphone	1	2	3	4	5	6
5. Feeling impatient and fretful when I am not holding my smartphone	1	2	3	4	5	6
6. Having my smartphone in my mind even when I am not using it.	1	2	3	4	5	6
7. I will never give up using my smartphone even when my daily life is already greatly affected by it.	1	2	3	4	5	6
8. Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook	1	2	3	4	5	6
9. Using my smartphone longer than I had intended	1	2	3	4	5	6
10. The people around me tell me that I use my smartphone too much.	1	2	3	4	5	6

Appendix 4 Material Values Scale-Short Form

1-----2-----3-----4-----5
 Not true at all Completely true

1. I admire people who own expensive homes, cars, and clothes.
2. Some of the most important achievements in life include acquiring material possessions.
3. I don't place much emphasis on the amount of material objects people own as a sign of success.
4. The things I own say a lot about how well I'm doing in life.
5. I like to own things that impress people.
6. I don't pay much attention to the material objects other people own.
7. I usually buy only the things I need.

8. I try to keep my life simple, as far as possessions are concerned.
9. The things I own aren't all that important to me.
10. I enjoy spending money on things that aren't practical.
11. Buying things gives me a lot of pleasure.
12. I like a lot of luxury in my life.
13. I put less emphasis on material things than most people I know.
14. I have all the things I really need to enjoy life
15. My life would be better if I owned certain things I don't have.
16. I wouldn't be any happier if I owned nicer things.
17. I'd be happier if I could afford to buy more things.
18. It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like


Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Özge Enez  <https://orcid.org/0000-0002-5521-7691>

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Author Biographies

Özge Enez, MSc, is a faculty member at the Department of Guidance and Psychological Counselling, Giresun University, Turkey. Her research area is Clinical Psychology and research interests are smartphone addiction, nomophobia, grief and death. Özge has extensive experience in teaching at the university.

Özden Yalçinkaya-Alkar, PhD, is a faculty member at the Psychology Department, Ankara Yıldırım Beyazıt University, Turkey. Her research area is Clinical Psychology and research interests are mainly focused on psychological contributing factors of various psychopathologies. Özden has extensive experience working with various inpatient and outpatients in cognitive behavioral therapy and supervising of graduate students.