

# Smartphone Use and Loneliness Among Female University Students: The Impact of Having or Not Having a Boyfriend

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## ABSTRACT

Administering a set of self-reporting questionnaires to 169 people who identify as female university students, this study investigated associations between smartphone-dependence scores and scores for loneliness and trait anxiety. Loneliness and trait-anxiety scores correlated with scores for smartphone dependence only for respondents who did not have a boyfriend: No similar association was apparent for those who had a boyfriend. These findings suggest that having or not having a boyfriend is a factor both in smartphone dependence and in loneliness and trait anxiety.

## KEYWORDS

Female University Students, Loneliness, Romantic Relationship, Smartphone Dependence, Trait Anxiety

## INTRODUCTION

In many countries, smartphones have rapidly come into widespread use. In Japan, the uptake has been particularly prominent among people in their twenties (Ministry of Internal Affairs and Communications, 2019). The rapid dissemination of smartphones has given rise to a number of social issues, including objectionable use in public places and excessive use or even dependence. Viewing problematic smartphone use as a type of technostress, the authors developed a new scale for gauging the smartphone dependence of university students, the Wakayama Smartphone-Dependence Scale (WSDS), and confirmed its reliability and validity (Toda et al., 2015b).

Previous studies on university students suggest that smartphone dependence may be associated with health problems such as lower sleep quality (Alzhrani et al., 2023; Demirci et al., 2015; Ibrahim et al., 2018; Kao, 2023), higher perceived stress (Alzhrani et al., 2023; Verma et al., 2023), and depression (Demirci et al., 2015; Desouky & Abu-Zaid, 2020; Shi et al., 2023; Zhong et al., 2022), as well as behavioral problems such as lower attention during learning (Kao, 2023; Sumuer & Kaşıkçı, 2022), poorer academic performance (Amez & Baert, 2020; Ibrahim et al., 2018; Sunday et al., 2021; Verma et al., 2023), and various accidents (Kim et al., 2017; Rosenthal et al., 2022). It is, therefore, important to elucidate the mechanism of smartphone dependence and to develop strategies to reduce the harmful consequences of smartphone dependence. Incidentally, some previous studies have found a higher risk of smartphone dependence for those who identify as female than those who identify as

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male university students (Alzhrani et al., 2023; Demirci et al., 2015; Desouky & Abu-Zaid, 2020; Mansourian et al., 2014).

In a previous study using the WSDS, the authors have found, particularly for those who identify as female university students, that types of childhood maternal relationships may be associated with smartphone dependence (Toda et al., 2018). From these results, the authors surmised that loneliness might lead to smartphone dependence. Several previous studies have found a positive relationship between smartphone dependence and loneliness (Bian & Leung, 2015; Du et al., 2023; Kao, 2023; Malaeb et al., 2022; Noh & Shim, 2024; Sönmez et al., 2021; Verma et al., 2023; Yilmaz et al., 2022). Furthermore, a recent meta-analysis study indicated a moderate positive association (Ge et al., 2023). Meanwhile, a negative relationship (Nguyen et al., 2022) and no relationship (Aktürk et al., 2018) were also observed. In another study, it has been found that emotional loneliness, but not social loneliness, is positively associated with smartphone dependence (Alzhrani et al., 2023). This inconsistency may be due to the contribution of multiple factors of associations between smartphone dependence and loneliness.

In the present study of university students who identify as female, examining associations between smartphone dependence and loneliness, the authors focused on one variable: having or not having a boyfriend. During adolescence, romantic love is an important type of human relationship (Matsui, 1990). Others have already investigated that having or not having a significant other may contribute to loneliness (Ogata et al., 2006; Özdemir & Tuncay, 2008) and trait anxiety (Ozen et al., 2010). The authors conjectured that, in those who identify as female, associations between smartphone dependence and loneliness may be affected by having or not having a boyfriend.

## METHOD

The authors distributed a set of questionnaires to 169 university students who identify as female and participated voluntarily. Statistical analysis could be performed for 167 respondents who properly completed each of the questionnaire items. Mean ( $\pm$  standard deviation) age was  $19.5 \pm 0.5$  years. Before the study, the protocol received approval from the institutional review board, and informed consent was obtained for each participant.

Smartphone dependence was evaluated using the WSDS (Toda et al., 2015b), a 21-item self-rating assessment with each response scored on a four-point Likert scale. Likert scores for each item were then summed to provide an overall smartphone-dependence score. Higher scores indicate greater dependence. In addition, the authors also investigated daily duration of use of the following services on smartphones: social networking services (SNS), video-sharing sites, and online game sites.

The trait portion of the State-Trait Anxiety Inventory was used as an index of general levels of personal anxiety (Spielberger & Gorsuch, 1983). This 20-item self-report inventory elicits responses rated on a four-point Likert scale. High scores in this inventory are considered to indicate trait anxiety. Trait anxiety is a relatively stable personality trait and refers to an individual predisposition to experience peril or uncertainty in various daily situations (Spielberger & Gorsuch, 1983). Loneliness was evaluated using the University of California, Los Angeles Loneliness Scale (Version 3; Russell, 1996), a self-report inventory of 20 items scored on a four-point Likert scale. High-scoring respondents are considered to be experiencing loneliness. Each respondent was also asked to report the average number of minutes she slept each day and whether she had a steady boyfriend.

All results are expressed as mean values  $\pm$  standard deviation. Students' *t* tests were used to compare the data between groups based on whether they did have or did not have a boyfriend. Furthermore, standard multiple regression analysis was performed with WSDS score as the dependent variable. Independent variables were daily duration of use of services on smartphones, daily duration of sleep, and scores for trait anxiety and loneliness. Values were considered to be significantly different when  $p < 0.05$ .

## RESULTS

Table 1 shows scores for each questionnaire. The group of students that did not have a boyfriend had statistically significantly higher loneliness scores ( $t = 2.43, p < 0.05$ ) and spent more time daily on video sharing sites ( $t = 3.73, p < 0.01$ ) than the group of students that did have a boyfriend. No statistically significant differences were found in other variables.

**Table 1. Scores for each self-test scale, daily duration of sleep, and of use time of different smartphone services**

	Having a boyfriend (n = 51)	Not having a boyfriend (n = 116)	$p^*$
Wakayama Smartphone Dependence Scale	30.5 ± 9.2	29.2 ± 9.7	0.44
Trait portion of State-Trait Anxiety Inventory	45.9 ± 8.8	47.3 ± 8.9	0.33
UCLA Loneliness Scale	36.3 ± 7.9	40.0 ± 9.5	< 0.05
Daily duration of sleep (min.)	369.2 ± 64.1	349.0 ± 73.9	0.09
Daily use time of smartphone service (min.)			
Social networking services	63.5 ± 54.2	84.9 ± 116.1	0.22
Video sharing sites	23.4 ± 36.3	50.2 ± 51.5	< 0.01
Online game sites	28.4 ± 55.3	31.0 ± 86.9	0.85

*Note.* Values are expressed as mean ± standard deviation; n = number; UCLA = University of California, Los Angeles.  
 \*Students' *t* test.

Table 2 shows multiple regression analyses performed to identify variables predictive of WSDS scoring tendencies. Multiple regressions for the group of students that did have a boyfriend ( $R^2 = 0.28, F = 2.52, p < 0.05$ ) and the group of students that did not have a boyfriend ( $R^2 = 0.42, F = 12.22, p < 0.01$ ) show statistically significant associations. For the group of students that did have a boyfriend, greater daily duration of use of SNS ( $\beta = 0.293, p < 0.05$ ) and shorter duration of sleep ( $\beta = -0.293, p < 0.05$ ) were associated with higher WSDS score. In the group of students that did not have a boyfriend, greater daily duration of use of SNS ( $\beta = 0.248, p < 0.01$ ), higher scores for trait anxiety ( $\beta = 0.590, p < 0.01$ ), and lower scores for loneliness ( $\beta = -0.225, p < 0.05$ ) were associated with higher WSDS scores.

**Table 2. Multiple regression models predicting smartphone dependence in groups reporting having and not having a boyfriend**

	Having a boyfriend (n = 51)		Not having a boyfriend (n = 116)	
	$\beta$	$p$	$\beta$	$p$
Daily use time of smartphone service				
Social networking services	0.293	< 0.05	0.248	< 0.01
Video sharing sites	0.170	0.24	0.120	0.13
Online game sites	0.051	0.73	0.090	0.25
Daily duration of sleep	-0.293	< 0.05	-0.125	0.11
Trait anxiety	0.056	0.75	0.590	< 0.01
Loneliness	0.178	0.28	-0.225	< 0.05

*continued on following page*

Table 2. Continued

	Having a boyfriend (n = 51)		Not having a boyfriend (n = 116)	
	$\beta$	$p$	$\beta$	$p$
Coefficient of determination		$R^2 = 0.28$		$R^2 = 0.42$
	$F = 2.52$	$p < 0.05$	$F = 12.22$	$p < 0.01$

Note. n = number.

## DISCUSSION

The group of students that did not have a boyfriend had statistically significantly higher loneliness scores than the group of students that did have a boyfriend. This finding is in line with the results of a study of Japanese high school students by Ogata et al. (2006). Using the University of California, Los Angeles Loneliness Scale, similar to this study’s results, they found that, for respondents who did not have a significant other, scores were statistically significantly higher than for those who had a significant other ( $39.3 \pm 8.3$  vs  $34.8 \pm 7.3$ ). Furthermore, Özdemir and Tuncay (2008) found statistically significantly higher loneliness scores for Turkish university students who reported no romantic involvement. Weiss (1973) suggested that individuals who lack attachment to other individuals are likely to feel lonely.

Meanwhile, the group of students that did not have a boyfriend reported statistically significantly greater daily duration of use of video sharing sites than the group of students that did have a boyfriend. This finding suggests that video sharing sites may provide, temporarily at least, an escape from loneliness. It should be also noted that the group of students that did not have a boyfriend reported less sleep ( $t = -1.69, p = 0.09$ ). A recent review article, however, has found no direct association of loneliness with sleep duration (Griffin et al., 2020). If loneliness is eliminated, then shorter duration of sleep could be associated with greater use of video sharing sites. In a recent study, the authors found that, particularly for those who identify as female, longer daily duration of web browsing on smartphones may be associated with evening chronotype (Toda et al., 2015a). Those who identify as female tend to use mobile phones in bedrooms more often than those who identify as male, and excessive use there may cause delayed sleep (Brunborg et al., 2011).

In the group of students that did not have a boyfriend, the loneliness score was negatively associated with the smartphone-dependence score. Some previous studies also found a negative and significant correlation between smartphone (or mobile phone) dependence and loneliness (Jafari et al., 2019; Mansourian et al., 2014; Nguyen et al., 2022). Reporting on a longitudinal study, Karsay et al. (2019) suggested that if individuals use phones for self-disclosure, excessive smartphone use actually helped them relieve loneliness. Online self-disclosure may lead to rewarding experiences such as encouragement by other users (Valkenburg & Peter, 2007). Furthermore, those who identify as female in particular tend to prefer remote communication and to maintain close relationships by this means (Boneva et al., 2001). In the present study, in both groups, daily duration use of SNS positively correlated with smartphone-dependence scores. Incidentally, in the group of students that did have a boyfriend, lack of association between scores for smartphone-dependence and loneliness may result from its members feeling less lonely than those in the group of students that did not have a boyfriend.

In addition, in the group of students that did not have a boyfriend, the score for trait anxiety positively correlated with the smartphone-dependence score. Trait anxiety is a personal tendency to experience peril and uncertainty even in daily situations and is a relatively enduring characteristic in individuals (Spielberger & Gorsuch, 1983). Desouky and Abu-Zaid (2020) also found a positive correlation between smartphone dependence and trait anxiety. These findings so far lead to the following hypothesis: In the group of students that did not have a boyfriend, respondents with higher

levels of trait anxiety frequently use SNS to communicate with other people, which may alleviate loneliness while increasing the smartphone dependence score.

In the group of students that did have a boyfriend, daily duration of sleep was negatively associated with smartphone-dependence score. Since the majority (76.5%) of respondents who have a boyfriend are living at home with their families, they may stay up late to interact with their boyfriend via SNS. In a previous study, identifying as female university students classified as evening chronotype scored higher for smartphone dependence (Toda et al., 2015a). Even so, although respondents in the group of students that did not have a boyfriend tended to report shorter daily duration of sleep, for this group, this study found no statistically significant correlation between daily duration of sleep and smartphone-dependence score. Meanwhile, Demirci et al. (2015) have reported that smartphone dependence is associated with sleep quality but not with sleep duration. Further studies are needed to confirm this speculation.

This research has several limitations. First, the study focuses solely on university students who identify as female, so the findings may not be generalizable to other populations or gender identities. Further examination of more diverse populations, including those who identify as male, is required. Comparative studies across different demographics could provide a broader understanding of the issues. Second, self-reported data can be subject to biases, such as social desirability or inaccurate self-assessment, which may affect the reliability of the findings. Third, because of the cross-sectional design, this study did not clarify causal direction. This limits the ability to draw definitive conclusions about the nature of the relationship. Future research should employ longitudinal designs or experimental methods to better assess causal relationships.

Meanwhile, ranging from Facebook to Instagram to Twitter/X to LINE and beyond, SNS are very diverse. Some specific SNS have been found to be associated with loneliness (Shettar et al., 2017; Yang, 2016). There are also potential confounding variables that may influence the relationship between smartphone dependence and loneliness, such as social support, academic stress, or personality traits. A recent longitudinal study has reported that cumulative ecological risk (family context, peer context, and school context) predicts smartphone dependence one year later (Xiong et al., 2024). The authors hope to address these methodological problems in future studies. Furthermore, a mixed-methods approach incorporating qualitative methods, such as interviews or focus groups, may provide deeper insights into the experiences of participants regarding smartphone use and loneliness.

This study found, for university students who identify as female, that loneliness and trait anxiety was associated with greater smartphone use, particularly for individuals who did not have a boyfriend. The present findings may have substantial practical and managerial significance, particularly in the context of university settings and mental health support, and can inform university counseling services and mental health professionals. Understanding the relationship between smartphone use and loneliness can help institutions develop targeted interventions and strategies to support students who may be struggling with these issues. Furthermore, it may lead to the development of programs that promote healthy smartphone use and foster social connections among students.

## **COMPETING INTERESTS**

The authors of this publication declare there are no competing interests.

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