

Research on the Relationship between Smartphone Dependency and Feelings of Loneliness: Novel Insights from the "Theory of Usage Ineffectiveness"

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Abstract: This research focuses on undergraduate students enrolled in different universities in Guilin, Guangxi Province. A total of 300 valid questionnaires were collected for the survey. The Mobile Phone Addiction Index (MPAI) and the UCLA Loneliness Scale (UCLA) were employed to assess smartphone dependency and loneliness, respectively. The Mobile Phone Addiction Index (MPAI), comprising 17 items grouped into four factors, was employed in this study. Participants who affirmatively responded to eight specific items were classified as smartphone dependents. The findings revealed a positive correlation between loneliness scores and the scores on various factors of smartphone dependency. Notably, the factor of inefficacy, representing the impact of excessive smartphone use on daily life and study efficiency, emerged as a significant positive predictor of loneliness among college students. While supporting the existing theory of a positive correlation, these results propose a novel theoretical perspective — the Theory of Usage Ineffectiveness. This theory suggests that if the tools embedded in smartphones fail to effectively address individuals' life and study challenges, usage ineffectiveness may compromise adaptability, potentially depriving individuals of opportunities for information exchange and social interaction, thereby intensifying feelings of loneliness.

1. Introduction

In recent years, the rapid advancement and constant innovation in technology have rendered smartphones indispensable tools for individuals.^[1-2] Concurrently, there is a growing prevalence of smartphone dependency among the youth (China Internet Network Information Center (CNNIC). The 45th Statistical Report on Internet Development in China, 2020). A survey conducted by Zheng Xiaona and Xin Bin (2012) on the smartphone usage patterns of college students indicated that approximately 85% of them use their phones, including engaging in activities like playing games,

during class. Smartphone dependency, also termed smartphone addiction or problematic smartphone use, refers to individuals excessively immersed in various activities facilitated by smartphones, experiencing strong and enduring cravings and dependency on smartphone use, leading to evident social and psychological functional impairments.^[3] In recent years, to bolster prevention and control of smartphone dependency, numerous studies have explored psychological factors closely associated with smartphone dependency, with loneliness emerging as one of the most scrutinized factors.^[4]

The phenomena of loneliness and smartphone addiction are prevalent in contemporary life. Despite various studies exploring their inherent connection from different theoretical perspectives, significant discrepancies exist in the research findings. The relationship between loneliness and smartphone addiction remains elusive.^[5] One perspective posits a substantial positive correlation, asserting that loneliness plays a crucial role in predicting smartphone dependency.^[6] The theories supporting this viewpoint include the "Compensatory Internet Use Theory" and the "Deficient Self-regulation Model," suggesting that individuals experiencing intense loneliness are more likely to escape real-life distress by immersing themselves in the online world through smartphones.^[6] Conversely, those with heightened loneliness may exhibit weaker self-regulation, resulting in uncontrolled increases in smartphone usage and the development of dependency.^[7]

The second perspective posits a significant negative correlation between loneliness and smartphone dependency.^[8-9] The primary theory supporting this viewpoint is the Stimulation Hypothesis, which suggests that smartphones, as portable devices, can effectively help individuals expand their social circles and enhance social initiatives through the inclusion of social networking programs. Consequently, this aids in reducing individual levels of loneliness.

The third perspective posits that there is no direct correlation between loneliness and smartphone addiction. The relationship between the two is intricately influenced by other variables, such as personality traits and self-disclosure. The theory supporting this viewpoint is the "Rich-get-Richer Hypothesis," suggesting that individuals with extroverted personalities derive more social benefits from mobile networks than their introverted counterparts.^[10]

The fourth perspective posits a nuanced U-shaped relationship between loneliness and smartphone addiction. Illustrated by the Digital Goldilocks Hypothesis, this theory suggests that in a society saturated with digital media, moderate usage is adaptive and beneficial. Excessive use may substitute other meaningful social activities, while insufficient use could deprive young individuals of vital opportunities for information exchange and social interaction (Bruggeman et al., 2019; Przybylski & Weinstein, 2017; Twenge et al., 2018).

Traditionally, research has treated smartphone addiction as the dependent variable, assessing its prediction by loneliness. However, considering the theories mentioned above, the issue of usage time within smartphone addiction could equally impact individuals' experiences of loneliness. Therefore, this study, employing college students as samples and utilizing the "Mobile Phone Addiction Index (MPAI)," aims to delve deeper into the intricate relationship between smartphone addiction and loneliness. The study posits that various factors within smartphone addiction can effectively predict individuals' experiences of loneliness.^[11]

2. Participants and Methodology

2.1. Participants

The study focused on undergraduate students currently enrolled in different universities in Guilin, Guangxi. Participants willingly volunteered to take part in the research. Initially, 320 students participated in the online survey. After excluding incomplete or unreliable responses, the study analyzed 300 valid questionnaires.

2.2. Instruments

2.2.1. Mobile Phone Addiction Index (MPAI)

This study utilized the Mobile Phone Addiction Index (MPAI) in Chinese, developed by Leung based on the diagnostic criteria for addiction outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), a widely recognized clinical manual in the United States. The scale comprises 17 items organized into four factors: Loss of Control (referring to excessive time spent on the phone without self-control), Withdrawal (indicating emotional reactions of frustration when unable to use the phone normally), Escape (using the phone to evade real-life issues like loneliness or anxiety), and Inefficiency (denoting the impact of excessive phone use on daily life and study efficiency). Respondents rated items on a scale of 1 (Never) to 5 (Always), with higher scores indicating a greater tendency toward mobile phone dependency. Following Young's criteria for internet addiction screening, individuals affirming eight or more items among the 17 were classified as mobile phone-dependent. The Cronbach's α coefficient for the scale in this study was 0.86.^[12]

2.2.2. UCLA Loneliness Scale (UCLA)

The UCLA Loneliness Scale assesses loneliness resulting from a disparity between the desire for social interaction and the actual level of social engagement. It consists of 11 positively worded loneliness items and 9 negatively worded reverse-scored items. Respondents rate each item on a 4-point scale: (1) Never, (2) Rarely, (3) Sometimes, and (4) Always, with higher scores indicating a stronger sense of loneliness.

This scale possesses the following characteristics:

Omission of the term 'loneliness' in items: To mitigate response bias, as loneliness is often stigmatized and carries a negative societal connotation.

Unidimensionality: Reflecting a one-dimensional emotional state, as loneliness is conceptualized as a unidimensional construct.

Primarily a trait scale: Emphasizing inherent characteristics rather than transient states of loneliness.

Results are scored both as a total sum and standardized T-scores, with interpretations based on the obtained results.

3. Statistical Methods and Results

3.1. Methods

Descriptive statistical analysis, independent sample t-tests, correlation analysis, and regression analysis were employed to analyze the obtained data using SPSS 21.0.

3.2. Results

3.2.1. Disparities in Loneliness across Distinct Mobile Phone Dependency Groups

To assess differences in loneliness scores, independent sample t-tests were employed to compare the mobile phone dependency group with the non-dependency group. The findings underscored a noteworthy elevation in loneliness experiences within the mobile phone dependency group, demonstrating statistical significance (refer to Table 1).

Table 1: Disparities in Loneliness across Mobile Phone Dependency Groups (M±SD)

Item	Mobile Phone Dependency Group N=201	No Mobile Phone Dependence Group N=99	T-value
Loneliness	48.14±7.39	43.87±8.63	4.445***

Note: * indicates a significant difference at the 0.05 level (two-tailed), ** indicates an extremely significant difference at the 0.01 level (two-tailed), *** indicates an extremely significant difference at the 0.001 level (two-tailed), and the same applies throughout.

The findings of this study reveal a widespread prevalence of smartphone dependence among college students, with a substantial 67% constituting two-thirds of the sample. Additionally, independent sample T-tests demonstrate that, in comparison to the non-dependent group, the smartphone-dependent group exhibits a heightened sense of loneliness. These results underscore the pivotal role of smartphone dependence as a significant factor impacting individual experiences of loneliness.^[13]

3.2.2. Correlation Analysis between Smartphone Dependence and Loneliness in College Students

Standardized scores were employed for the dimensions of smartphone dependence and loneliness among college students to mitigate biases arising from disparate scoring units in different measures. Pearson product-moment correlation analysis was conducted to examine the relationships, revealing significant positive correlations among various factors, as detailed in Table 2. This implies that as smartphone dependence strengthens among college students, the experience of loneliness also intensifies.

Table 2: Correlation Analysis of Smartphone Dependence and Loneliness in College Students

	Withdrawal	Inability to Control	Inefficiency	Escapism	Loneliness
Withdrawal	1.00				
Inability to Control	0.719**	1.00			
Inefficiency	0.673**	0.725**	1.00		
Escapism	0.559**	0.518**	0.554**	1.00	
Loneliness	0.244**	0.226**	0.296**	0.140*	1.00

3.2.3. Prediction of Loneliness Based on Mobile Phone Dependency in College Students

To delve deeper into the relationship between the four dimensions of mobile phone dependency and loneliness among college students, this study employed a stepwise regression analysis. The four dimensions of mobile phone dependency were treated as independent variables, while the total loneliness score served as the dependent variable. The results are presented in the table below. As shown in Table 3

Table 3: Regression Analysis of Mobile Phone Dependency and Loneliness in College Students

Dependent Variable	Predictor Variable	R ²	Adjusted R ²	F	Beta
Loneliness	Inefficiency	0.088	0.085	28.627***	0.296

As illustrated in the Table3 above, among the four predictor variables, only Inefficiency entered the regression equation, and the regression coefficient reached a significant level at $t(298) = 5.35$, $p < 0.001$. The standardized regression coefficient is 0.296. The multiple correlation coefficient R is

0.296, with a multiple determination coefficient R^2 of 0.088, signifying that 8.8% of loneliness can be explained by the inefficiency of mobile phone dependence. A variance analysis of the regression model was conducted, and the regression equation was significant, $F(1,298) = 28.627$, $P < 0.001$. This indicates a good fit between the model and the data. It suggests that inefficiency resulting from excessive mobile phone use affecting daily life and learning efficiency can effectively predict the experience of loneliness.^[14]

4. Discussion

The findings from this study reveal a positive correlation between mobile phone dependence and feelings of loneliness among university students. Mobile phone dependence emerges as a significant predictor of the experience of loneliness, especially concerning the impact of excessive phone use on daily life and learning efficiency. While these results align with prior research outcomes,^[15] they challenge interpretations based on the "Compensatory Internet Use Theory" and "Deficient Self-regulation Model." Specifically, the concept of inefficiency in this context refers to the detrimental effects of excessive mobile phone use on daily life and learning efficiency. In essence, if individuals fail to efficiently use the tools offered by their phones to address real-life and academic challenges, this inefficiency can lead to a loss of adaptability or hinder opportunities for information exchange and social interaction, ultimately contributing to heightened feelings of loneliness. This suggests a novel theoretical perspective, termed the "Mobile Phone Usage Inefficiency Theory," emphasizing the psychological impact when mobile phone use lacks meaningful connection to problem-solving in real-world contexts.^[16]

5. Future Research Directions

This study has predominantly concentrated on the psychological and behavioral aspects of individuals, primarily within the university student demographic, thereby constraining the breadth of its applicability. In future research endeavors, there will be a deliberate effort to broaden the scope by delving into societal perspectives and extending investigations to encompass age-diverse groups, including both younger and older demographics. This expansion is envisioned to produce more universally applicable and scientifically robust results by exploring a wider array of social and age-related factors.^[17]

6. Conclusions

Mobile phone dependence emerges as a significant predictor of the experience of loneliness. When mobile phone use cannot solve problem in real-world especially in on daily life and learning efficiency. It cause more psychological impact among university students.

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