The Impact of Personality Stability on Smartphone Addiction Among College Students

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Abstract: The rapid progress of information technology has led to a steady rise in the diversity and ubiquity of smartphones. College students are increasingly using cell phones to access social media, as they are no longer under parental control. Therefore, the harmful effects of excessive smartphone usage are becoming increasingly noticeable, resulting in the regular emergence of various psychological problems. It is crucial to analyze the relationship between the personality traits of college students and their smartphone addiction in this specific situation. A total of 375 sets of valid survey questionnaires were obtained from college students in Mianyang City, China. The data was analyzed using SmartPLS 4.1 software. Research findings indicate that college students with a stable personality are less prone to developing smartphone addiction.

Keywords: Personality; Stability; Smartphone addiction; College students

1. Introduction

Smartphone use has skyrocketed in the past decade, making it a vital part of our daily lives. Smartphones are increasingly important in education due to the COVID-19 pandemic. The lowering cost of smartphones and continued functionality improvements have increased their attractiveness among students and parents, driving their widespread acceptance at colleges and institutions. This has led to many school and college smartphone users. The growth of national digital education materials and online learning platforms has also made smartphone use in education easier. Smartphones meet students' educational, communication, and entertainment needs. Additionally, their powerful social elements contribute to their widespread college use. College students, being young, tend to embrace new technology. Their love for smartphones makes them crucial for school and life. Smartphones have improved student life due to their convenience and versatility, despite their disadvantages. Smartphone addiction is growing in society, especially among young people, due to the rise

in smartphone use in higher education.

Mobile phone addiction, also known as mobile phone dependence, refers to an individual's excessive addiction to mobile phones as a medium, and the strong and constant desire and dependence on its use and existence, resulting in significant social, physiological, and psychological impairment of individuals [1]. Research results show that mobile phone addiction is closely related to physical health problems, mental health problems, and interpersonal communication disorders [2]. While research shows the consequences of smartphone addiction, it is necessary to examine the factors causing smartphone addiction as numerous studies have also shown that there is a certain degree of correlation between personality traits and phone addiction. As such, it is necessary to examine the influence of personality on smartphone addiction among college students in China. As of March 2020, the 45th China Internet Network Development Statistical Report reveals that the total count of Internet users in China stands at 904 million whereby an overwhelming majority of approximately 99.3% of individuals utilize smartphones as their means of accessing the Internet. The growing use and gravity of social media in China have sparked concerns regarding smartphone addiction and its associated psychological ramifications. The aim of this study is to investigate personality stability as the independent variable, which consists of three dimensions: neuroticism, agreeableness, and conscientiousness. These three lower dimensions will later be combined into a higher-order dimension of stable personality. Regarding the dependent variables smartphone addiction, it has four dimensions: functional impairment, withdrawal, compulsive behavior, and tolerance.

In light of the aforementioned statement, this study puts forth the following research hypotheses and conceptual framework:

(1) H1: Stability personality will have a negative effect on functional impairment among college students.

(2) H2: Stability personality will have a negative effect on withdrawal among college students.

(3) H3: Stability personality will have a negative effect on compulsive behavior among college students.

(4) H4: Stability personality will have a negative effect on tolerance among college students.

2. Conceptual framework

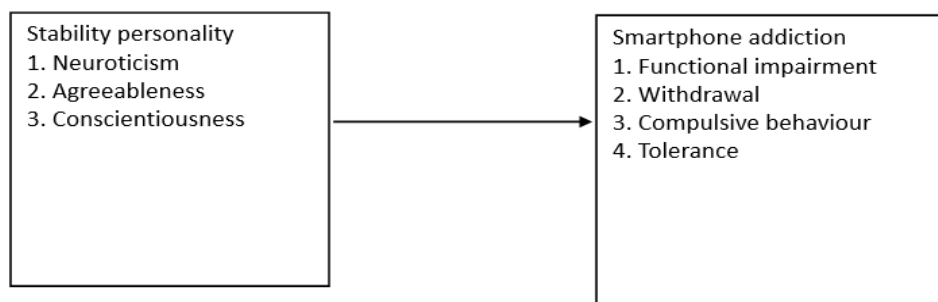**Figure 1** shows the conceptual framework of this study.

Figure 1. Conceptual framework

3. Methodology

375 sets of usable survey questionnaires were collected from four college students who are presently enrolled in Mianyang City, China. Mianyang City is the location of these four colleges: Sichuan College of Traditional Chinese Medicine, Sichuan Preschool Educators College, Mianyang China Polytechnic, and Mianyang

Teachers' College.

In order to investigate the impact of stable personality on smartphone addiction, we utilized the Chinese Big Five Personality Inventory Brief Version (CBF-PI-B), which was developed by Wang *et al.* [3]. The assessment primarily evaluates five dimensions of personality using a total of 40 items. Each dimension is assessed with eight items, and a 5-level scale is employed. A rating of 1 indicates a "strongly disagree" response, while a rating of 5 indicates a "strongly agree" response. This study utilized three dimensions of stable personality traits, namely neuroticism, agreeableness, and conscientiousness. The level of smartphone addiction was assessed using the Smartphone Addiction Scale (SPAI) developed by Lin *et al.* [4], which is derived from the Internet Addiction Scale (CIAS-R) [5]. The four aspects included are functional impairment, withdrawal, compulsive behavior, and tolerance. The Smartphone Addiction Scale (SPAI) utilized the 26-item to assess the presence of smartphone addiction.

The gathered data was analyzed using two statistical software programs, specifically SPSS version 29.0 and SmartPLS 4.1 [6]. The analytic presentation begins by providing an overview of the background information of the respondents, who are the main source of data for the study. Next, the data validation approach is described, which involves evaluating the measurement model before testing the structural model and analyzing the study hypothesis.

4. Results

During the preliminary stage of the survey, data was gathered from a total of 400 participants. In order to ensure the accuracy of the data, a technique called trimming was employed with the objective of removing responses from participants who seemed uninterested or not fully engaged. This procedure involved eliminating responses that showed consistent patterns, such as giving the same ratings to all items on a Likert scale, as well as responses that displayed inconsistency, such as answering items on a 5-point Likert scale in a sequential pattern like 5, 4, 3, 2, 1 or the reverse, and similarly for a 7-point scale. After excluding the unengaged respondents, the dataset contained 375 valid responses, which accounted for 93.75% of the original responses.

In terms of responder profiles, the gender distribution is almost symmetrical, with 55.50% being women and 44.50% being men. The majority of respondents, specifically 74.70%, fall within the age range of 16 to 20 years. This is followed by 25.10% of respondents who are between the ages of 21 and 25 and a mere 0.30% who are beyond 25 years old. The majority of the respondents, comprising 70.70%, reside in rural areas, whilst 29.30% reside in cities. 47.70% of participants utilized their mobile devices for a duration of 4–7 hours. A further 26.90% of individuals utilized their phones for a duration of less than 4 hours, while 16.30% used their phones for a duration of 7 to 10 hours, and 9.10% used their phones for more than 10 hours. Therefore, the predominant participants in the study are young individuals residing in rural areas who utilize their mobile devices for a duration above 4 hours but not surpassing 7 hours.

The study's findings, as presented in **Table 1**, demonstrate that all indicator loadings, Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) values indicate strong internal consistency reliability and convergent validity. All the loadings of the measurement indicators are over 0.6, specifically ranging from 0.637 to 0.864. Based on the outcomes of Hair *et al.* [7], it is recommended that indicator loadings exceed 0.7. However, loadings between 0.400 and 0.690 may be considered acceptable if the value of AVE is higher than 0.500. **Table 1** displays the AVE value, which ranges from 0.515 to 0.739. Therefore, the reliability and convergent validity were validated. Agree3 was deleted due to low loading (loading of 0.057).

Table 1. Measurement model for reliability and validity

Dimension	Loading	CA	CR	AVE
Agree	0.637-0.828	0.859	0.879	0.515
Cons	0.828-0.815	0.879	0.903	0.540
Neuro	0.739-0.864	0.919	0.934	0.638
FI	0.714-0.816	0.901	0.920	0.591
WDW	0.680-0.839	0.874	0.905	0.615
CB	0.687-0.832	0.899	0.918	0.555
TOL	0.811-0.832	0.823	0.894	0.739

Abbreviation: Agreeableness (Agree), Conscientiousness (Cons), Neuroticism (Neuro), Functional impairment (FI), Withdrawal (WDW), Compulsive behavior (CB), Tolerance (TOL); Cronbach's alpha (CA), composite reliability (CR), average variance extracted (AVE)

The study employed the Heterotrait-Monotrait ratio of correlations (HTMT) as a method to assess discriminant validity. **Table 2** displays the calculated HTMT values for all dimensions. According to Henseler *et al.* [8], in order to prove discriminant validity, the HTMT ratio must be below 0.90. The HTMT values demonstrate that all values are below this threshold, confirming discriminant validity across all dimensions. The HTMT analysis provides evidence for the discriminant validity of the measurement model. The study's conceptions are clearly distinguished, and the discriminant validity was proven.

Table 2. Heterotrait-Monotrait ratio (HTMT)

	Neuro	Agree	Cons	Extra	Open	FI	WDW	CB	TOL
Neuro									
Agree	0.166								
Cons	0.125	0.472							
FI	0.436	0.093	0.147	0.134	0.126				
WDW	0.461	0.148	0.179	0.162	0.159	0.756			
CB	0.475	0.180	0.186	0.161	0.195	0.885	0.891		
TOL	0.357	0.104	0.129	0.159	0.135	0.745	0.703	0.852	

Abbreviation: Agreeableness (Agree), Conscientiousness (Cons), Neuroticism (Neuro), Functional impairment (FI), Withdrawal (WDW), Compulsive behavior (CB), Tolerance (TOL)

The objective of this investigation is to evaluate the variables in the model for greater parsimony by positioning stability personality traits as a lower-order construct to form a higher-order construct. In particular, the higher-order construct "personality stability" encompasses three dimensions of stable personality traits: agreeableness, neuroticism, and conscientiousness. The structure of these higher-order constructs is reflective-formative. The results of the analysis, as shown in **Table 3**, indicate that agreeableness, which has *P* values exceeding 0.05 and an outer loading of only 0.186, is substantially below the 0.7 threshold, resulting in its removal from the model. Significant outer weight results were observed in the remaining dimensions of neuroticism and conscientiousness. It is important to note that, despite the fact that conscientiousness' outer loading is less than 0.7, its substantial outer weight substantiates its inclusion in the model. Lower order dimension of agree was deleted for structural modal.

Table 3. Convergent validity for formative higher-order constructs

Construct higher order	Construct lower order	Outer weight	Sample mean	T value	P value	Outer loading
PS	Agree	0.115	0.113	1.116	0.265	0.186
	Cons	0.249	0.245	2.267	0.023	0.311
	Neuro	0.949	0.941	20.985	0.000	0.949

Abbreviation: Agreeableness (Agree), Conscientiousness (Cons), Neuroticism (Neuro), PS (Personality stability)

The results of the path analysis are presented in **Table 4**. The results suggest that the PS construct has a large and negative effect on all external constructs. The impact of the PS on FI is statistically significant with a beta coefficient of -0.412, a t value of 7.198, and a P value of less than 0.001. The study found that there is a significant negative relationship between PS and WDW (β = -0.431, t = 7.390, P < 0.001), as well as between PS and CB (β = -0.451, t = 8.009, P < 0.001), and between PS and TOL (β = -0.317, t = 5.118, P < 0.001). Therefore, H1, H2, H3, and H4 are all supported.

Table 4. Path coefficients for direct effects

Hypothesis	Direct effect	Beta	SE	t statistics	P value	Result
H1	SP -> FI	-0.412	0.057	7.198	0.000	Supported
H2	SP -> WDW	-0.431	0.058	7.390	0.000	Supported
H3	SP -> CB	-0.451	0.056	8.009	0.000	Supported
H4	SP -> TOL	-0.317	0.062	5.118	0.000	Supported

Abbreviation: PS (Personality stability), Functional impairment (FI), Withdrawal (WDW), Compulsive behavior (CB), Tolerance (TOL)

5. Discussion

Based on the aforementioned studies, we may deduce the conclusions of the four hypotheses. Personality stability has a significant negative effect on functional impairment (FI), with higher personality stability linked to lower levels of FI among college students. Similarly, personality stability is negatively associated with withdrawal (WDW), indicating that higher personality stability correlates with lower withdrawal tendencies. Additionally, personality stability has a significant negative effect on compulsive behavior (CB), as higher personality stability is associated with lower levels of CB. Furthermore, personality stability negatively influences tolerance (TOL), with higher personality stability linked to lower tolerance levels among college students. These findings suggest that a stable personality contributes negatively to various aspects of smartphone addiction in college students.

6. Conclusion and implications

Empirical evidence shows that there is a negative link between stable personality qualities and smartphone addiction among college students. People who possess consistent personality features are able to efficiently regulate their emotions, allowing them to properly control and adjust their emotions. As a result, they are less likely to rely on smartphones for emotional comfort or to escape negative emotions. Moreover, these individuals exhibit remarkable self-discipline, enabling them to effectively manage their time and regulate their

consumption of content, thus avoiding the development of smartphone addiction. Their reduced impulsivity and heightened propensity for thought and prudence in decision-making additionally contribute to a well-regulated smartphone usage pattern.

Effective stress management is essential for persons with stable personalities, as they are more inclined to utilize positive coping strategies rather than relying on smartphones to deal with emotional and scholastic stress. These individuals frequently participate in a range of interests and activities, such as sports, social events, and hobbies, that aid in diminishing their reliance on smartphones. In addition, individuals often derive happiness from internal pursuits and personal accomplishments rather than external stimuli, such as smartphone usage. This drives them to pursue long-term objectives and experience profound contentment rather than seeking immediate gratification.

This study is crucial for comprehending the psychological mechanisms behind addictive behaviors and for formulating efficacious preventative and intervention measures to improve the mental well-being of college students. The research investigates the impact of personality factors on smartphone usage and explores how various personality types may contribute to smartphone addiction.

Disclosure statement

The authors declare no conflict of interest.

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