



A Review of Multidimensional Studies on The Influencing Factors of Smartphone Dependence among University Students

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ABSTRACT

This study explores the influencing factors of smartphone dependence from four aspects: Individual factors, personal traits factors, psychological factors, and external environmental factors. It is found that: (1) In the study of individual factors, demographics is one of the research focuses. Gender and age are important demographic factors that affect smartphone dependence; (2) Personality traits are another major focus, and different personality dimensions can have different effects on smartphone dependence; (3) In terms of psychological factors, loneliness, anxiety and depression can positively predict individual smartphone dependence; (4) Family and university environment are considered two of the important external factors. It is concluded that more influencing factors of smartphone dependence within a larger social environment framework should be explored in the future research.

Keywords: smartphone dependence; multidimensional studies; influencing factors; university students

1. Introduction

The accessibility and convenience of smartphone make it an indispensable part of university students' life. However, the excessive use will lead to university students' over-reliance on smartphones, which is termed as "smartphone dependence" by psychologists (Kwon et al., 2013). Despite various definitions, three features are involved: first, excessive, improper use or abuse of smartphones; second, strong desire for and dependence on smartphones; third, impairment of physiological, psychological and social functions (Bianchi, 2005).

There is growing evidence for the negative effects of smartphone addiction, which hitherto mainly involves three aspects: (1) physiological problems, including low sleep quality, muscle pain, decreased vision, changes in brain structure (Chen et al., 2017), auditory and tactile delusions (Bhandari et al., 2017); (2) psychological problems such as anxiety, depression, impulse, negative emotions and even suicidal behavior (Jenaro et al., 2007); (3) other social behavioral problems involving interpersonal distress, poor time management, procrastination, poor attention executive function, low learning motivation, cognitive failure, etc. (Seo et al., 2016). The above problems will trigger university students' academic inadaptability like academic burnout, irrational procrastination, attention failure, and interpersonal inadaptability like social phobia, social fear and anxiety (Kim, 2017). Hence, it is of practical significance to explore the influencing factors of smartphone dependence among university students.

2. Theories on the influencing factors of smartphone dependence

2.1 Uses-and-Gratifications Theory

The uses-and-Gratifications theory proposed by Katz (1973) is a widely recognized theoretical viewpoint on the formation mechanism of mobile phone dependency. This theory suggests that when an individual has a certain psychological need, they will seek media that can meet their psychological needs. When certain functions of a mobile phone can meet individual psychological

needs, it will encourage individuals to use the phone purposefully and with motivation, ultimately forming a mobile phone dependency.

2.2 Theory related to emotional relief

Many researchers believe that the reason for excessive use of mobile phones by individuals is to use them as a way to avoid certain unpleasant situations or alleviate certain emotions. The trait state anxiety theory proposed by Spielberger (1972) suggests that situations that trigger anxiety are interpreted by individuals as dangerous and can trigger some behavioral responses, with the use of mobile phones being one of these behavioral responses. This behavioral response can be seen as a processing mechanism to reduce the intensity of anxiety experienced when facing threats. Similar to this view is Kardefelt Winther's (2014) compensatory internet use theory (CIUT), which mainly explains the motivation that drives individuals to overuse mobile phones. The viewpoint of this theory is that the pressure and negative emotions experienced by individuals can encourage them to use mobile phones to alleviate the discomfort caused by emotions. When individuals experience emotions such as anxiety and depression, they will use more mobile phones to alleviate stress and regulate negative emotions. The stress coping theory also suggests that problematic phone use behavior can be seen as a way for problematic phone users to cope with stress and loneliness. Individuals use their phones to reduce stress or loneliness.

2.3 Billieux's comprehensive model

Billieux (2012) proposes a comprehensive model to illustrate the four pathways that lead to problematic mobile phone usage. The first pathway is called the impulse pathway, which refers to the use of mobile phones by individuals primarily driven by poor self-control and negative emotional regulation. The second pathway is called the relationship maintenance pathway, which indicates that individuals excessively use their phones to gain a sense of security and affirmation in emotional relationships (partners, family, friends). These individuals are usually individuals with low self-esteem and high neuroticism. The third pathway is called the extraversion pathway. The extraversion pathway refers to the reason why individuals excessively use mobile phones because they are outgoing and good at socializing. They use mobile phones to communicate with peers and establish new potential relationships. The fourth pathway is called the cyber addiction pathway. This pathway refers to individuals becoming addicted to online games, ultimately leading to excessive use of mobile phones. In summary, the main reason for individual dependence on mobile phones is that individuals satisfy their psychological needs through the use of mobile phones, which is manifested in two aspects: alleviating unpleasant emotions (such as anxiety, depression, stress, loneliness, etc.) and establishing or maintaining interpersonal relationships.

3. Research on the mechanism of smartphone addiction among university students

The research on the mechanism of mobile phone addiction has multidimensional and multifaceted characteristics. The current academic community at home and abroad has explored this issue from different perspectives and achieved rich findings. Specifically, previous research has mainly focused on three aspects: individual factors, psychological factors, and external environmental factors.

3.1 Individual factors

Gender

Gender is one of the most common influencing factors. Although scholars have explored the correlation between smartphone dependence and gender, there is currently no universally accepted conclusion on whether there is a significant difference in smartphone dependence among individuals of different genders. According to Cholz et al (2012), who measured adolescent smartphone dependence, it was concluded that girls have a higher degree of smartphone dependence than boys. The reason for this phenomenon is that girls have better endurance and are more disturbed by other activities. They are more inclined to use their phones to avoid negative emotions. Girls are more likely to show discomfort when they cannot use their phones. In addition, their use of smartphone can generate greater economic pressure and family conflicts. Contrary to the study by Cholz et al (2012), Dafna et al (2005) found that individuals with a strong tendency to rely heavily on mobile phones are precisely males, as mobile phones have more positive promoting effects in both men's personal and professional lives. Unlike the previous two perspectives, Bianchi and Phillips (2005) found that technology is not correlated with gender, and there is no significant difference in the impact of mobile technology on boys and girls. The study by Bianchi and Phillips was supported by Motoharu Takao et al (2009). Motoharu Takao et al. (2009) also found that gender did not show significant differences in the degree of dependence on mobile phones.

Age

Age is an indispensable variable in the study of smartphone dependence. Researchers have found that on university campuses, younger students use mobile phones more frequently than older students (Boumosleh, 2017), indicating that smartphone addiction gradually decreases with age and grade. The study by Bianchi and Phillips (2005) also pointed out that older people are less affected by mobile phone technology than younger people, and younger people are more susceptible to problems related to using mobile phones. Similar views were also confirmed in Christoph et al.'s (2011) study. The possible reason is that compared to older people, young people are more easily attracted to new technologies and prefer to try new features. Therefore, they use smartphone more frequently and are more prone to smartphone dependence. But some studies have also found that the level of smartphone addiction increases with grade.

In addition, individuals from low-income families are more likely to become addicted to smartphone than those from high-income families, while some studies have found the opposite,

with individuals from affluent families exhibiting more smartphone addiction behavior.

3.2 Personality traits factor

Personality traits are another major focus of current research on individual factor, and different personality dimensions can have different effects on smartphone addiction.

Big five personality

Most researchers have found a positive correlation between neuroticism and smartphone dependence (e.g., Billieux, 2012). Neurotic individuals have unstable emotions and are prone to experiencing anxiety and other emotions. They have poor emotional regulation abilities, so they are more likely to achieve emotional regulation goals by using their phones to divert attention. Neurotic individuals are more sensitive in social interactions and are prone to conflicts with others. The tension in interpersonal relationships can cause anxiety and other negative emotions. In order to avoid experiencing negative emotions, they tend to use smartphones instead of face-to-face communication, thus easily forming smartphone dependence. Neurotic individuals avoid real-life social interactions, but their social needs need to be met. The social and entertainment functions of mobile phones have become an effective way to meet their emotional needs, which also makes them prone to developing phone dependence. But Bianchi et al. (2005) found that neuroticism is not a predictive factor for problematic smartphone use.

There is currently no consensus among researchers on whether extraversion personality can predict smartphone dependence. Most researchers have found that extroverted individuals are more likely to develop smartphone dependence (Billieux, 2012). Extraverted individuals love socializing and have a strong need to communicate or establish relationships with others, so they tend to use their phones more frequently to make phone calls and send messages, ultimately forming phone dependence (Bianchi, 2005; Billieux, 2012). But some researchers also believe that extraverted individuals use their phones less frequently and have less phone dependence due to participation in social activities and spending more time with friends. On the contrary, introverted individuals interact less with others and have more time to be alone. The versatility of their phones has become a tool for them to pass the time. In addition, introverted individuals tend to be nervous in real interpersonal communication, and the social function of their phones has become a substitute for face-to-face communication, which can effectively alleviate their sense of tension. Therefore, introverted college students may be more inclined to use their phones frequently and are more prone to phone dependence.

Researchers have found that individuals with high rigor are less dependent on mobile phones (Billieux, 2012). Individuals with high rigor have good self-control, so they will not become overly addicted to mobile phones. Individuals with low rigor have weak willpower, poor self-control, and poor control over behavior. The various functions of mobile phones such as social and

entertainment, as well as the various network resources that mobile phones can provide, are a huge temptation for individuals with low rigor. They lack self-restraint towards mobile phones, cannot resist the temptation they bring, and are easily addicted to them, unable to extricate themselves, forming a dependence on mobile phones, which in turn affects their personal life, study and work. In addition, individuals with low rigor are unable to adjust their emotions well due to poor self-control. When experiencing anxiety, they are more likely to alleviate negative emotions through the use of mobile phones.

College students with open personality traits tend to try new things, and the constant introduction of new features on their phones can meet their needs, leading to a tendency to develop phone dependence. There is a significant negative correlation between agreeableness and smartphone dependence. College students with agreeableness personality traits are able to establish good and trusting relationships with others, and do not feel lonely due to poor interpersonal relationships. Therefore, they use smartphone as a tool to alleviate loneliness, resulting in less smartphone dependence. Individuals with impulsive personality traits are prone to dependence on smartphone due to a lack of control (Billieux, 2012).

Self-esteem

Previous research has confirmed that individuals with low self-esteem are more likely to develop dependence on smartphones (Hong, 2012). Individuals with low self-esteem may see their phones as a way to escape aversive situations (Bianchi, 2005), so they may have smartphone dependence. Individuals with low self-esteem have lower self-evaluation and need to be recognized by others. However, due to their difficulty in establishing relationships with others in real social interactions, they tend to prefer indirect communication channels, such as chat tools, emails, etc. The social functions provided by smartphone can make it easier for individuals with low self-esteem to interact with others, gain social support from them, and improve their self-esteem. Therefore, they will use smartphones more, ultimately forming a dependence on them (Billieux, 2012).

3.3 Psychological factors

Loneliness

Researchers have found that loneliness is related to phone dependence. In real interpersonal communication, college students who cannot meet their social needs will experience a sense of loneliness, and mobile phones have become an effective tool for college students to alleviate their loneliness, making it easy to develop dependence on smartphone. Some researchers have also pointed out that when individuals experience loneliness, they tend to use their phones more to communicate with others. Lonely individuals rely more on using their phones as a medium of communication rather than face-to-face communication. However, the social support that smartphone bring to individuals is not significant, so lonely individuals use their phones more

often, ultimately leading to their dependence on smartphones (Spielberger, 1972).

Anxiety

Researchers have found that individuals with anxiety are more likely to develop smartphone dependence (Hong, 2012). Anxious individuals face difficulties in real-life interpersonal communication, which can trigger their anxiety. Therefore, they tend to use their phones as an important way to connect and interact with others (Billieux, 2012). Although anxiety can make individuals avoid interpersonal communication, their social needs need to be met. The social and entertainment functions of their phones meet the needs of anxious individuals. Therefore, anxious individuals spend more time on their phones and are prone to becoming dependent on them.

Depression

Previous researchers have found a close relationship between depression and smartphone dependence (Ge et al, 2022). Individuals with depression may experience negative emotions in real life, leading to compensatory behavior and seeking liberation in the online world, increasing the likelihood of smartphone addiction. These negative emotions may also lead to executive dysfunction, further increasing the likelihood of smartphone addiction (Ge et al, 2022). It is found that the multifunctional features of smartphones such as social media, entertainment, and games make them an effective tool for college students to alleviate negative emotions such as depression. Depressive emotions lead individuals to avoid socializing, so depressed individuals tend to spend more time on their phones, which can easily lead to smartphone dependence.

3.4 External environmental factors

The external environment also plays an important role in the formation of smartphone addiction, with family and school environments being considered as the important factors.

Family factors

In the family environment, parental parenting style and parent-child attachment are the focus of research. Variables such as authoritarian parenting style and parent-child attachment avoidance can positively predict smartphone addiction, that is, when an individual is in a relatively negative family environment, they are more likely to experience smartphone addiction and other phenomena. On the contrary, when individuals are in a relatively warm family environment, the likelihood of smartphone addiction is reduced. In addition, studies have found that overprotection and parental rejection can positively predict smartphone addiction.

University factors

In the school environment, research has found that negative school atmosphere, low-level

school connections, and poor peer interaction are important factors that lead to individual smartphone addiction. When individuals perceive support at a lower level, they are more likely to experience smartphone addiction. In addition, school regulation can negatively predict individual mobile phone addiction. Low levels of school regulation prevent individuals from meeting their psychological needs and may use mobile phones as alternative satisfaction and compensation tools, leading to smartphone addiction.

Concluding remarks

Most scholars currently use scales to empirically investigate the current situation of adolescent smartphone dependence, and have drawn valuable conclusions on its harm and influencing factors. These results will provide great help for us to further research in this field. However, currently scholars have mostly focused on the factors influencing smartphone dependence, such as emotions, psychology, and personal traits, while paying little attention to the differences in external social and family cultivation patterns that lead to smartphone dependence. In fact, smartphone dependence is a symptom that arises from the interaction between an individual's internal traits and external environment. In future research, domestic and foreign scholars should place the influencing factors of smartphone dependence within a larger social environment framework, adopt diverse exploration perspectives, and be conducive to obtaining more comprehensive and systematic research results.

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