

Review of the Research on Teenagers' Dependence on Smartphones

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Abstract; Mobile phone dependence is a kind of illness that causes mobile phone users to be physically or psychologically uncomfortable due to excessive abuse of mobile phones for some reason. The author combs this field from concept measurement, group characteristics and related personality factors. There has been some consensus on the concept of mobile phone dependence: 1. Excessive use of mobile phones; 2. Dependents have psychological dependence on mobile phones; 3. It belongs to the category of behavioral addiction; 4. It will affect individual physical and mental health and social function. Most of the mobile phone dependence meters are based on the concept of mobile phone dependence, which can basically achieve the effect of identification and screening. The factors of people with high dependence on mobile phones include extraversion, nervousness, loneliness, alienation and so on. In the future, the research direction of mobile phone dependence will continue to advance in concept and measurement and the development of mobile phone dependence mechanism may become an important breakthrough point in this field.

1. Introduction

According to *China Internet Development Report (2021)*, by the end of 2020, there were 989 million Internet users in China, and the Internet penetration rate reached 70.4%, especially the total number of mobile Internet users exceeded 1.6 billion. Mobile phones have become indispensable and important belongings for people to realize various functions such as socializing, playing games and shopping. It is precisely because of this situation that teenagers are kidnapped by mobile phones. The author noticed that many teenagers can't even control the time and function of their normal use of mobile phones. On the contrary, quite a few teenagers fall into a kind of dependence on mobile phones-they can't get rid of the state of brushing their screens and putting their energy into smart phones. A large number of research results have confirmed that mobile phone dependence will bring adverse effects on individual physical and mental health: inattention, memory loss, emotional problems, etc. [1][2][3]. Bianchi and Phillips took the lead in proposing "problematic mobile phone use" in 2005 and compiled the first mobile phone problem use scale [4]. Since then, there have been a large number of researches on mobile phone dependence at home and abroad, which involve the measurement, related factors and hazards of mobile phone dependence. The author sorts out the previous literature, summarizes and comments on the concept measurement, group characteristics and related factors in the research field of mobile phone dependence, and looks forward to the future research, hoping to provide a basis for future research and practice.

2. Concept and Measurement

2.1 Concept

With regard to mobile phone dependence, different scholars put forward different terms from different angles, including "mobile phone dependence", "problematic mobile phone use", "excessive use of mobile phones", "mobile phone addiction" and so on.

"Mobile phone dependence", according to Han Dengliang and Qi Zhifei (2005), mobile phone dependence is a kind of physical or psychological maladjustment caused by excessive abuse of mobile phones for some reason, which mainly consists of cognitive, behavioral and physiological

symptoms, and then leads to obvious impairment of their physiological, psychological or social functions [5]. Shi Jianguo (2009) thinks that mobile phone dependence is an obsession state in which the individual's physiological, psychological and social functions are obviously damaged because of the uncontrolled use of mobile phones [6]. "Problem Mobile Phone Use" is understood by Bianchi and Phillips(2005) according to the concept of behavioral addiction, they think that the lack of social control or self-control of mobile phones are the two main factors of problem mobile phone use, which are measured by five dimensions (tolerance, avoidance of problems, abstinence, expectation and negative results [4]. "Excessive use of mobile phones" was proposed by Sanchez-Martinez(2009) that excessive use of mobile phones should be determined by mobile phone bills and frequency of use [7]. However, this method of defining the usage bill, time and frequency is too superficial to be the standard for judging the dependence of mobile phones. "Mobile phone addiction" adopts the concept and standard of addiction, and pays attention to the behavior and psychological state caused by improper use of mobile phones.

At present, researchers at home and abroad have not unified the concept of mobile phone dependence, and the terms used are different, such as mobile phone dependence, mobile phone addiction or problematic mobile phone use. Although the concept definition is not uniform, researchers tend to think that mobile phone dependence has four basic characteristics: 1. Excessive use of mobile phones; 2. Dependents have psychological dependence on mobile phones; 3. It belongs to the category of behavioral addiction; 4. Functionally, it will affect individual physical and mental health and social function.

2.2 Measurement

Xu Hua et al. (2008), according to the description of material dependence and behavioral addiction in DSM-IV and related data, regarded mobile phone dependence as including four dimensions: behavioral tolerance, behavioral abstinence, social function and physiological response [8]. There are 13 questions in the scale, which are scored by 5 points. The reliability of the scale is 0.50-0.59, which has high efficiency. This scale is an early scale for studying mobile phone dependence in China, which fully arouses researchers' enthusiasm for exploring mobile phone dependence measurement.

Huang Hai et al. (2014) studied the Chinese version of Mobile phone addiction index, MPAI [9]. The mobile phone dependence index scale, compiled by Leung, refers to Young's Internet addiction standard, in which many questions are mobile phone dependence screening questions, which require the subjects to make "yes" and "no" judgments. The scale has four dimensions: runaway, abstinence, evasion and inefficiency, with 17 questions and 5 points. Huang Hai et al. (2014) translated this scale and verified it in Chinese among college students, with a reliability of 0.81-0.87 and validity.

Tu Binbin et al. (2010) divided mobile phone dependence into mobile phone relationship addiction, mobile phone entertainment addiction and mobile phone information gathering addiction from the perspective of "type-addiction tendency", and each category includes cognitive dependence, emotional dependence and behavioral dependence with 3 sub-dimensions, 52 items and 5 points [10]. The internal consistency coefficient of the scale is between 0.588 and 0.759, which has good validity.

Xiang Mingqiang et al. (2019) tested the SAS (Smart Phone Addiction Scale) compiled by Kwon et al. based on the diagnostic criteria of Internet addiction, and verified the six dimensions of Kwon et al.'s scale: daily interference, positive expectation, withdrawal symptoms, network intimacy, overuse and tolerance [11]. There are 33 questions in the scale, and 6 points are scored. The internal consistency coefficient of the scale is 0.928, and the scale has good validity.

Su Shuang et al. (2014) took Internet addiction proposed by Young as the definition of mobile phone dependence for mobile phone addicts, and the mobile phone addiction scale for college students compiled by Su Shuang et al. includes six dimensions: abstinence behavior, prominent behavior, social Appeasement, negative influence, App use and app update [12]. The scale has 22 questions, with 5 points. The new internal consistency of the scale is 0.44 to 0.85, which has good validity.

Xiong Jie and Zhou Zongkui (2012) compiled the scale of mobile phone addiction tendency of college students [13]. The scale includes four dimensions: withdrawal symptoms, prominent behavior, social comfort and mood change. There are 16 questions in the scale, which are scored by 5 points. The higher the total score on the scale, the more serious the tendency of mobile phone addiction. The reliability of the scale is 0.55-0.83, which has good validity.

At present, more and more researchers have compiled scales for mobile phone dependence from various angles. Most of these scales are based on the concept of mobile phone dependence, which can basically achieve the effect of identification and screening.

3. The Characteristics of the Group

Huang Junxia et al. (2018) used Leung's mobile phone dependence index scale to conduct a cross-sectional study of 1554 college students to investigate their smartphone use and dependence [14]. Results: The detection rate of smartphone dependence of college students was 15.3%. There are significant gender differences in the usage patterns of smart phones, such as the service life, daily usage time and the most commonly used functions of smart phones. There are significant differences in students' origin, family type, parents' marital status, monthly mobile phone expenses, parents' education level, and usage patterns of smart phones (such as daily usage time, total number of smart phones and most commonly used functions). Logistic regression analysis shows that the dependence of smart phones is related to grade, monthly mobile phone cost, parents' marital status, parents' education level, the most commonly used functions and daily use time.

Jiang Qiaolei, Hao Xiaoming and Lin Cuijuan (2019) compared the psychology, behavior and dependence of college students on smart phones in two specific contexts in China and Singapore [15]. It is found that both in China and Singapore, college students' smartphone users show two types of mobile phone dependence: unable to control their desire for mobile phones and the resulting decline in efficiency, escape and anxiety; Personal media dependence demands and psychological characteristics (self-esteem, leisure boredom and stimulation seeking) are significantly and positively related to mobile phone dependence.

Weng Wenwen and Julie (2016) conducted an interview survey and analysis of 275 first-to third-grade students randomly selected from a university in Zhejiang Province on the general use behavior of touch-screen smart phones, the main uses and replacement reasons of mobile phones and the bad use behavior of mobile phones [16]. The results show that among 275 respondents, the period of college students' mobile phone use is obviously shortened; The number of mobile phones charged more than 3 times a day is 30, accounting for 10.91%; Mobile phones are mainly used for chatting (QQ, WeChat, etc.), with 108 people, accounting for 39.00%. The reason for changing the mobile phone is that there are 77 people who cannot use more apps due to insufficient memory, accounting for 28.00%; 235 people went to bed with mobile phones before going to bed, accounting for 85.45%; There were 138 people (0.18%) with anxiety caused by the lack of power in classroom mobile phones.

Wang Hao (2018) conducted a survey on the use of smart phones by college students in five major universities in Shanxi [17]. Through investigation and analysis, the author found that Shanxi college students' dependence on smart phones has symptoms such as anxiety, compulsion, emotional loss and auditory hallucination. The specific behaviors are as follows: First, they rely too much on smart phones to order food, call taxi and shop in their lives; Second, I don't listen carefully to the teacher's lectures in my study. I use my smartphone to shoot the teacher's blackboard instead of taking notes; After class homework, do not actively think, first think of using the smart phone to find the answer online, etc.; Third, when entertainment is accompanied by a smart phone, it is relatively silent when gathering and ignores the scenery when traveling; Fourth, over-reliance on social software of smart phones has become a "slave" of social software. The main causes of "mobile phone dependence" of Shanxi college students include the induction of adverse factors in social environment, the lack of relevant management measures in colleges and universities, parents' neglect of family education and different psychological demands of individuals.

Yu Ji, Wang Lingyan and Yang Xiaodan (2016) conducted a questionnaire survey on 1287

secondary vocational school students by using the Table of Smartphone Usage of Secondary Vocational School Students and the Scale of Mobile Addiction Tendency [18]. Results Secondary vocational school students' smartphone dependence has great differences in gender, age, smoking, drinking, good appetite in school, monthly mobile phone use cost, monthly Internet traffic and main uses of mobile phone use.

Previous studies have studied the phenomenon of mobile phone dependence among college students, secondary vocational school students and other groups, investigated the behavior, psychological indicators and family status, the selected indicators are also different. Taken together, the individual's boredom and poor self-control ability are the reasons for the phenomenon of mobile phone dependence. However, the functions of mobile phones are too powerful, social and entertainment functions are the main external environmental factors that make dependence happen.

4. Related Personality Factors

4.1 Extraversion and Neuroticism

Wang Junke (2014) investigated 576 undergraduates and postgraduates with the research tools of College Students' Smartphone Dependence Scale, Short Big Five Personality Questionnaire NEO-FFI and Coping Style Questionnaire [19]. The results show that there is a significant negative correlation between agreeableness and responsibility and college students' dependence on smart phones. There is a significant positive correlation between introversion, neuroticism, openness and college students' smartphone dependence. Big Five personality traits can significantly predict college students' dependence on smart phones, in which different coping styles play a mediating role.

Guo Shaoqing, Chen Jun and Zhang Xishun (2014) studied the personality factors related to mobile phone dependence of college students and found that college students with extroversion and high neuroticism are more dependent on mobile phones [20].

The above research suggests that extroversion personality and high neuroticism personality may be more likely to rely on mobile phones. The high extroversion type indicates that the number and density of interpersonal interaction are large and the need for stimulation is strong. Nowadays, smart phones are powerful, individuals with high extraversion are naturally more attracted by them, so they get more stimulation needs and interpersonal interaction needs. Neuroticism reflects the process of individual emotion regulation, the tendency of individual to experience negative emotions and emotional instability. Highly neurotic individuals tend to have psychological pressure, unrealistic ideas, excessive demands and impulses, are more likely to experience negative emotions such as anger, anxiety and depression. The powerful function of mobile phone seems to be just the channel and method for highly neurotic individuals to escape the inner psychological pressure.

4.2 Loneliness and Alienation

Liuhong and Wang Hongli (2012) surveyed 459 college students with MPAI and UCLA Loneliness Scale, found that loneliness is related to college students' mobile phone dependence tendency and their children. Loneliness may increase the tendency of college students to rely on mobile phones.

Liu Zhiqiang (2014) studied the influence of loneliness on smartphone dependence of vocational college students [22]. 400 vocational college students in Yancheng City, Jiangsu Province were selected by convenient sampling method, and their loneliness and mobile phone dependence were investigated by MPATS and ESLI. The results showed that the four factors of loneliness, emotional isolation, emotional loneliness, social isolation and social loneliness, can predict the mobile phone dependence of vocational college students. Path analysis reveals that loneliness has a direct impact on smartphone dependence with an effect of 0.35.

Li Chao (2018) discussed the relationship among college students' mobile phone dependence, alienation and psychological resilience [23]. In this study, 600 college students were measured and analyzed by using the revised questionnaire of college students' smartphone dependence, focusing

on the mediating role of psychological resilience in the influence of college students' alienation on smartphone dependence. The results show that there is a significant positive correlation between college students' alienation and smartphone dependence. Psychological resilience did not play a mediating or regulating role in the relationship between college students' alienation and smartphone dependence.

The above study found that loneliness and alienation can predict the dependence on mobile phones. Loneliness and alienation mainly emphasize the painful experience of lack of contact and rejection between individual and collective. This kind of experience itself stimulates the needs and desires of interpersonal communication for teenagers at the same time. Smartphones are powerful, social and entertainment are all-encompassing, they are within easy reach, so they can meet their inner psychological needs with a few clicks.

4.3 Other Personality

Jiang Yongzhi and Bai Xiaoli (2015) measured 1488 college students with *Shyness Scale*, *Interpersonal Relationship Comprehensive Diagnostic Scale* and *Overuse Behavior Scale of Mobile Internet for College Students* [24]. The results show that there is a significant positive correlation between shyness and overuse of mobile Internet. Shyness can positively predict college students' overuse of mobile Internet, and the role of shyness and overuse of mobile Internet is completely realized through interpersonal troubles.

Deng Huaqiong (2015) combined with the existing Chinese youth sensory seeking scale and middle school students' self-control questionnaire to explore the relationship between smartphone dependence, sensory seeking and self-control of middle school students [25]. The results show that there is a significant positive correlation between sensory seeking and smartphone dependence, and sensory seeking has a significant predictive effect on smartphone dependence. There is a significant negative correlation between sensory seeking and self-control, and sensory seeking can predict self-control. Self-control partially mediates the relationship between sensory seeking and smartphone dependence.

The above study found that shyness personality and feeling seeking personality have an impact on mobile phone dependence. Shyness refers to the sensitive nerve activity, high sensitivity to external stimuli, low tolerance, quiet environment, avoidance of stimuli, introversion and high neuroticism. Feeling seeking personality traits is a tendency to seek and explore novel environmental stimuli. Both of these two personalities tend to use smart phones as a tool to meet their internal psychological needs, and because the psychological needs corresponding to personality are stable and persistent, the dependence on mobile phones is relatively stable.

5. Conclusion

Domestic researches on mobile phone dependence are basically conducted under the guidance of addiction behavior theory, and there are mainly two research directions. First, based on the theory of addiction behavior, we operate addiction behavior and compile the questionnaire and scale of mobile phone addiction. Another research tendency is to explain the causes, manifestations, influencing factors and hazards of mobile phone addiction through questionnaire survey or theoretical deduction.

By combing the above two research trends, it can be found that, limited by the theoretical hypothesis of addiction behavior theory, the research in the field of psychology all analyzes the youth's mobile phone use behavior as a negative behavior, and regards it as a psychological disease, and seldom makes a positive analysis on it. Moreover, all the analyses attribute the dependence on mobile phones to personal reasons, and lack of macro research.

Future research trends of mobile phone dependence. The author believes that it can be further deepened in the following aspects. First, although the concept of mobile phone dependence is still not unified, it needs the joint efforts of researchers to deepen the conceptual analysis and deconstruction, and to form a unified concept of connotation and extension. Second, mobile phones rely on measurement tools. In terms of measurement tools, self-report is mainly used now, but there

are some deviations in self-report. Measurement tools with high reliability and validity and stronger applicability are needed in the future. Third, the understanding of the internal mechanism of mobile phone dependence has not yet formed a clear and systematic theory. In the future, we should pay more attention to the study of mobile phone dependence from more angles and more systematically. And the study of this mechanism is more fundamental. Only by making a breakthrough in this key part can we make a big step forward in the overall research of mobile phone dependence.

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