



Correlational Research on Mobile Phone Addiction and the Interpersonal Relationship Distress of Chinese College Students



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Abstract: In this essay, we utilized the following scales: Mobile and Internet Addiction Test, Basic Psychological Needs Scale, Negative Coping Style Questionnaire, and Interpersonal Relationships Assessment Scale. With those, we surveyed 1,730 college students, investigating the influence of mobile phone addiction on their interpersonal relationship distress and the mediating chain effect of basic psychological needs and negative coping styles on mobile phone addiction and interpersonal relationship distress. The results indicate that: (1) Mobile phone addiction can predict interpersonal relationship distress in college students; (2) Basic psychological needs serve as the mediating variables between mobile phone addiction and interpersonal relationship distress; (3) Negative coping styles prove to be the mediator between mobile phone addiction and interpersonal relationship distress; and (4) Basic psychological needs and negative coping styles establish a mediating chain effect between mobile phone addiction and interpersonal relationship distress.

Keywords: Mobile phone addiction; interpersonal relationship distress; basic psychological needs; negative coping styles.

Introduction

Given the development of mobile phone intelligence in China, the mobile phone permits us many unprecedented conveniences, for instance, mobile social networking, payments, games, internet shopping, and numerous other mobile-related contents¹.

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Moreover, any Chinese person can move globally with a mobile phone. Still, while using mobile phones has proven widely convenient, it has also had some adverse effects. Thus, a new mental illness has emerged: mobile phone addiction.

The definition of mobile phone addiction is an individual becoming addicted to a cell phone, making them fall into a state of obsession that leads to significant impairments of their physical, psychological, and social functioning. Mobile phone addiction is a type of “behavioral addiction,” referring to the excessive use of mobile phone functions like games, the internet and text messages, thereby jeopardizing one’s regular studies, work and lifestyle. Based on the data from the fiftieth *Statistical Report on China’s Internet Development*,² the number of mobile internet users in China is 1.47 billion. The proportion of Internet users utilizing mobile phones to access the internet is 99.6%, among which the ratio of Internet users in the 20–29 age group is 17.2%, accounting for about eight hundred million people. The group of college students fits this age bracket, highlighting the extensive mobile phone use among college students. Once college students overuse their cell phones and become addicted, it impacts their physical and mental development and social functions. Therefore, this study aims to explore the relationship between mobile phone addiction and other psychological factors in college students, to propose targeted intervention programs. They are of great practical significance to college students’ physical and mental health.

1. Theoretical Reflection on the Related Research

‘Mobile phone addiction’ is a term invented in light of the rapid development of mobile communication devices and comes from the concepts of behavioral addiction and technology addiction. Certain scholars also call it ‘problematic mobile phone use’, ‘excessive mobile phone use’, ‘mobile phone dependence’ and so forth, trying to explain the behavior related to the excessive use of cell phones.

Comparing studies performed domestically and abroad, we discovered that foreign researchers are used to describing and defining mobile phone addiction, concentrating on mobile phone use problems. For example, Bianchi and Phillip (2005) first utilized the term ‘mobile phone problem’ to describe the trend stemming from mobile phone addiction. They were referring to situations in which the use of a mobile phone is prohibited or in which there is a potential danger in the use of a mobile phone; where people continued the use of mobile phones regardless, due to a lack of social or self-control (Bianchi & Philips 2005, 39–51).

Moreover, ‘mobile phone addiction tendency’ in China outlines mobile phone addiction. Jianguo Shi described it as a state of compulsion, in which individuals’ physical, psychological and social functions are significantly impaired due to their out-of-control

² China Internet Network Information Center (August 31, 2022). For the 50th Statistics Report on the China’s Internet Development see <https://cnnic.cn/n4/2022/0914/c88-10226.html>

use of mobile phones (Shi 2009, 138–139). Shanshan Hu deemed the addiction to mobile phones inappropriate and declared that excessive use leads to uncontrolled use of mobile phones (Hu 2015). Thus, normal psychological and social functions are affected. In addition, this is the final stage of an addiction that meets the diagnostic criteria after excessive usage of mobile phones. Specific Chinese scholars also define mobile phone addiction as ‘smartphone addiction’. Shuang Su (2014) suggested the concept of smartphone addiction in his study among college students, listing the personal psychological or behavioral problems caused by smartphone abuse (Su, Pan, Liu et al. 2014, 392–397).

There is no common consensus in academic circles on mobile phone addiction. Still, most researchers from the field of psychology tend to include mobile phone addiction in the behavioral addiction category. They broadly define it as a physical, psychological and social function impairment caused by an individual’s uncontrollable mobile phone use (Lopez-Fernandez, Kuss, Griffiths, & Billieux 2015). This research will utilize the widely accepted concept of mobile phone addiction to conduct further research.

Previous studies on mobile phone addiction primarily focus on exploring the influencing factors of mobile phone addiction and a person’s core traits (personality, social cognition, psychopathology, etc.), subjective perception (negative emotions, personal conflict, social support, etc.), emotional responses (coping styles, internet-related expectations, etc.) and family environment (parental match, parenting style, attachment, etc.). Furthermore, some studies utilize mobile phone addiction as an antecedent variable to investigate the adverse effects of mobile phone addiction on individuals, like academic procrastination, creativity, depression, academic burnout, academic performance, and sleep quality etc. however, the researchers also discovered that in addition to the adverse effects of mobile phone addiction on college student’s intellectual, physical and mental health, it also impacts their social functions.

In the existing research, only certain scholars have explored the mechanism behind the effect of mobile phone addiction on interpersonal relationship distress. Broadly, an interpersonal relationship refers to the psychological relationship between people in a society. Narrowly, an interpersonal relationship refers to the direct psychological distance established in interpersonal communication and interaction (Tan & Yang 2018). Carl Rogers (1962) highlights that if individuals can develop friendly relations with others in an objective environment and satisfy a specific inner desire (psychological, power, interpersonal, or other factors), they can form relatively stable and harmonious interpersonal relationships (Rogers 1962, 416–429). Zheng Xue (2007) believed that an interpersonal relationship refers to the direct psychological distance established by people during the communication process, and that it is an interdependent and interrelated social relationship formed by the public as a result of contact (Zheng 2004). Interpersonal distress refers to the psychological maladjustment and conflicts that people experience in interpersonal communication that is conducive to establishing interdependent and interconnected social relations (Deng 2021). The interpersonal relationship can either

directly or indirectly affect people's psychological and social environment, and is also influenced by people's psychological and social environment (Chen 2008). Throughout a correlational study of the interpersonal relationship and mobile phone use, Gong Yanping et al. found that reliance on mobile phones can trigger mobile phone snub behavior, and affect the quality of interpersonal relationships, as well as the subjective well-being and the conduct of interpersonal objects (Gong, Chen, Xie, & Xie 2019, 1258–1267). Relying on cell phones for extended periods will cause the average interpersonal time of college students to decrease gradually, causing a deeper degree of interpersonal distress and proneness to feelings of loneliness, and even provoke interpersonal apathy, thus seriously affecting their normal interpersonal relationships during their college years and even after they entered society as adults (Song & Zhou 2020, 122–124).

This study proposes the following Hypothesis 1: Mobile phone addiction can significantly predict relationship distress.

While exploring the mechanism behind the effect of mobile phone addiction on interpersonal relationship distress, it is critical to examine whether different variables influence the relationship between addiction to mobile phones and interpersonal relationship distress. Additionally, the basic psychological needs and negative coping styles may be crucial mediating variables. The concept of basic psychological needs was developed by Deci and Ryan (2000) as part of the theory of self-determination in which "need" is defined as the "nourishment" essential for psychological growth, integration, and well-being (Deci & Ryan 2000, 227–268). Deci and Ryan claim that humans have three basic psychological needs: autonomy, competence and belonging. First, the autonomous need is the need to have a high degree of self-determination in a specific activity or behavior; next, the ability need is the need to be able to perform particular actions or tasks; lastly, while a relationship need is an individual's need for support, love, and understanding within their environment or from others. According to the self-determination theory, it is argued that the internet caters to the needs of self-determination, competence and relationships established by teenagers. Teenagers who are blocked from meeting their psychological needs in natural life turn to the online world for alternative gratification (Ryan, Rigby & Przybylski 2006, 347–364). Furthermore, internet game addiction has also affected the basic psychological needs of young people. Zhang Yongqiang et al. (2017) discovered that basic psychological needs play a mediating role in the effects of social support and internet addiction (Zhang, Liu & Zhou 2017, 15–18); Liang Qiao et al. (2019) found in their research that basic psychological needs play a mediating part in peer aggression and online game addiction among Chinese adolescents (Liang, Chen, Xie, & Wie 2019, 61–64). Simultaneously, other researchers found that it can improve the self-efficacy of their interpersonal relationships by fulfilling the psychological needs of college students (Gan 2015, 61–64). If the young person exhibits a sense of autonomy and competence and meets the requirements related to independence and competence, their interpersonal adaptability level will be improved (Li, Liu & Yao 2019, 827–833). Satisfying the basic

psychological needs of college students in the network holds an intermediary place in the self-disclosure of the network and the role of interpersonal network trust (Kuang 2018).

Further, this study proposes Hypothesis 2: The basic psychological needs of college students play an intermediary role between mobile phone addiction and interpersonal relationship distress.

A coping style refers to the process of cognition and hard action undertaken by an individual to mitigate the adverse effects of a disturbing situation. That can be spread into two types: negative coping and positive coping. College students' negative emotions and coping styles entirely mediate the effect of loneliness on mobile phone addiction (Xiong, Yuan, Zhang, & Li 2018, 1857–1861). Negative coping styles mediate and regulate college students' loneliness and mobile phone dependence (He, Wang & Hui 2018, 1222–1225). Qiu Zhiyan et al. (2021) asserted that a significant positive correlation existed between negative coping styles and mobile phone addiction. Negative coping type plays a mediating role concerning the effect of self-identity on mobile phone addiction (Qiu, Mao, Wu et al. 2021, 6–10). Studies on the relationship between negative coping styles and interpersonal relationships highlight a significant positive correlation between interpersonal distress and negative coping styles in college students' dormitories (Han, Hu, Zhang, Du et al. 2018, 134–135). The negative coping style of college students is positively correlated with their interpersonal relationship distress and mental health status (Hu, Xu, Ding, & Li 2017, 505–508).

We propose the following Hypothesis 3: Negative coping styles mediate between mobile phone addiction and interpersonal relationship distress among college students.

How do basic psychological needs affect college students' interpersonal relationships negatively? Some researchers found that if individuals' basic psychological needs cannot be met, they are less likely to adopt positive coping styles; instead, they assume more negative coping techniques (Son, Thomas & Friedmann 2013, 1011–1025). College students with a high degree of mobile phone addiction may respond negatively to interpersonal relationships, causing interpersonal problems when their fundamental psychological needs cannot be realized. Research indicates that basic psychological needs significantly impact negative coping styles (Xia & Ye 2014, 1385–1391).

Following the above discussion, we propose Hypothesis 4: Basic psychological needs and negative coping styles mediate between mobile phone addiction and interpersonal relationships.

2. Research Design

2.1 Research participants

We took a convenient sampling and chose students from three universities in Guangdong province as our participants. A total of 1,782 people took part in the survey,

with 1,737 valid questionnaires submitted; the efficiency of the questionnaire is 97.47%, among them 741 males (42.7%), and 996 females (57.3%).

2.2 Research method

We used STAR to carry out Online questionnaire survey, grade 1–4 college students were randomly selected with the help of their counsellors. Using a uniform questionnaire, we asked the investigator to answer the questionnaire truthfully. The questionnaire entails basic information about an individual (grade, gender, place of origin, etc.).

2.3 Research instruments

2.3.1 Mobile Phone Addiction Scale

We utilized the mobile phone internet addiction scale (Hu, Xu, Ding, & Li 2017, 505–508) compiled by Hu Dandan et al. (2017), which includes four factors: social addiction, entertainment addiction, information addiction and shopping addiction, altogether 24 items. Likert's five-point scoring system was applied, and the higher the score, the more severe the addiction. In this study, the internal consistency coefficient of the scale for the data is 0.902.

2.3.2 Basic Psychological Needs Questionnaire

We used the basic psychological needs questionnaire (Liu, Lin, Lv, Wie et al. 2013, 791–795) compiled by Deci and Ryan and revised by Liu Junsheng et al. (2013). It entails three factors: autonomous, belonging and competence requirements, altogether 21 items. Likert's five-point scoring system was applied, and the higher the score, the higher the degree of satisfaction with basic psychological needs. The three data factors in this research are 0.727, 0.800 and 0.752. The internal consistency coefficient of the scale is 0.825.

2.3.3 Negative Coping Style Scale

We applied the simple coping style questionnaire compiled by Xie Yanning (1998, 114–115), which contains two factors: positive and negative coping styles, making up 20 items. The four-point scoring system was applied. The higher the score, the more negative the coping behaviors. The negative factor part of the scale was utilized in this research, and its internal consistency coefficient equaled 0.720.

2.3.4 Interpersonal Relationship Diagnosis Scale

We applied the interpersonal relationship diagnosis scale (Zheng 2005) compiled by Zheng Richang et al. to test college students' interpersonal relationship distress. The ranking entails four factors related to disturbance: conversational behavior,

communication, trouble with people and the opposite sex. We used the following scoring system: if the subject chooses ‘Yes’, they mark it as ‘1’; ‘No’ they mark as ‘0’; and then the sum. The higher the score, the more severely troubled the interpersonal relationship. If the score is 0–8, it suggests less trouble with friends; 9–14 indicates a specific degree of distress among friends; 15–28 highlights that the problem of getting along with friends is more critical; if the score is over 20, it indicates that the degree of interpersonal distress is severe, and there are more obvious psychological disorders to consider. The internal consistency coefficients of the four factors in this research are 0.842, 0.852, 0.885 and 0.865. Moreover, the internal consistency reliability coefficient of the scale is 0.893.

2.3.5 Data processing

We applied the statistical software SPSS27.0 and plug-ins process for data processing. When processing the data, The Harman Single Factor Test indicated that the problem of variation of standard methods in this study was not serious.

3. Results

The overall distribution of interpersonal relationships is presented in the table (see Table 1), which displays how many college students have serious problems with interpersonal relationships. In this research study, 1,737 college students scored between 0–28 on the interpersonal scale, with the average score being 8.37 ± 7.122 . The results indicate that the proportion of poor interpersonal relationships among college students in this survey group is 19.1%, suggesting that nearly one-fifth of college students have poor interpersonal relationships and severe interpersonal problems, including issues in interpersonal communication and friendship relationships, heterosexual interaction, etc.

3.1 The overall distribution of mobile phone addiction among college students

Given the 1,737 participants in this study, the total score of the mobile phone addiction scale is 120, which could be divided into three fractions, totalling 1,268 people whose scores are over 60, which makes up 72.9%, while there are 221 students whose scores are around 80, making it 12.8%, who could be regarded as severe mobile phone addicts.

3.2 The overall distribution of interpersonal relationships among college students

| | Scores | Indicating | N | % |
|-----------------------------|--------|-------------------------------------|-----|-------|
| Interpersonal relationships | 0-8 | Good interpersonal relationships | 968 | 55.7% |
| | 9-14 | Average interpersonal relationships | 438 | 25.2% |
| | 15-28 | Poor interpersonal relationships | 331 | 19.1% |

Table 1: The overall distribution of interpersonal relationships.

3.3 The correlation of various dimensions between mobile phone addiction and the interpersonal relationship distress of college students

The correlation analysis displayed a significant positive correlation between mobile phone addiction and the total score of conversational and social behavior disturbance, social interaction disturbance, troubled heterosexual interaction, and interpersonal relationships (see Table 2).

| Variables | M | SD | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------|-------|--------|---------|---------|---------|---------|---------|-----|
| 1.CBD | 2.16 | 2.054 | --- | | | | | |
| 2.SBD | 2.80 | 2.317 | 0.766** | --- | | | | |
| 3.SID | 1.30 | 1.706 | 0.694** | 0.614** | --- | | | |
| 4.THI | 2.10 | 2.063 | 0.681** | 0.717** | 0.615** | --- | | |
| 5.IRD | 8.37 | 7.122 | 0.901** | 0.901** | 0.818** | 0.867** | --- | |
| 6.MPA | 67.76 | 13.667 | 0.196** | 0.163** | 0.175** | 0.124** | 0.187** | --- |

Table 2: The correlation among various dimensions between mobile phone addiction and interpersonal relationship distress. Note: ** $P < 0.05$; *** $P < 0.01$, $N = 1737$. Abbreviations: CBD = Conversational Behavior Disturbance; SBD = Social Behavior Disturbance; SID: Social Interaction Disturbance; THI = Troubled Heterosexual Interaction; IRD = Interpersonal Relationship Disturbance; MPA = The Total Score of Mobile Phone Addiction.

3.4 Comparison of Interpersonal Relationship Distress between high and low mobile phone addicted groups

We ranked the total mobile phone addiction scores of college students based on their high and low scores, given a low score of 27% as a group of low scores (the total score ≤ 60) and a high score of 27% as a group of high scores (the total score ≥ 74). Next, a t-test was performed. The results indicate that there are significant differences in the total scores of interpersonal relationship distress and interpersonal conversation issues, interpersonal friendship disturbances, troubled interaction with people, and troubled heterosexual interaction among students with varying levels of mobile phone addiction (see Table 3).

| | Low score group ($N = 469$) | High score group ($N = 454$) | T |
|-------------------------------------|----------------------------------|-----------------------------------|-----------|
| Conversational Behavior Disturbance | 1.64 \pm 1.967 | 2.82 \pm 2.161 | -8.662*** |
| Social Behavior Disturbance | 2.28 \pm 2.215 | 3.45 \pm 2.402 | -7.725*** |
| Social Interaction Disturbance | 1.01 \pm 1.639 | 1.78 \pm 1.852 | -6.743*** |
| Troubled Heterosexual Interaction | 1.76 \pm 1.995 | 2.54 \pm 2.157 | -5.680*** |
| Interpersonal Relationship Distress | 6.68 \pm 6.927 | 10.59 \pm 7.531 | -8.200*** |

Table 3: Comparison of the differences between high and low groups of college students in mobile phone addiction and interpersonal relationship distress ($M \pm SD$). Note: ** $P < 0.05$; *** $P < 0.01$.

3.5 Mean, standard deviation, and correlation coefficient of each variable

We used the average mobile phone addiction score, basic psychological needs, negative coping styles and interpersonal relationship problems to perform the correlational analysis. The results indicate a negative correlation between mobile phone addiction and basic psychological needs and a positive correlation between mobile phone addiction, negative coping styles, and social behavior disturbance. In addition, basic psychological needs are negatively correlated with negative coping styles and social behavior disturbance. However, positive correlation exists between negative coping styles and social behavior disturbance (see Table 4).

| Variables | M | SD | 1 | 2 | 3 | 4 |
|-----------|-------|--------|----------|----------|---------|---|
| 1.MPA | 67.76 | 13.667 | --- | | | |
| 2.BPN | 9.89 | 1.271 | -0.299** | --- | | |
| 3.NCS | 9.04 | 4.520 | 0.393** | -0.242** | --- | |
| 4.IRD | 8.37 | 7.122 | 0.187** | -0.442** | 0.301** | — |

Table 4: Descriptive statistical results and correlation matrix of each variable. Note: N=1737, **P<0.01. Abbreviations: MPA = Mobile Phone Addiction; BPN = Basic Psychological Needs; NCS = Negative Coping Styles, and IRD = Interpersonal Relationship Distress.

4. Intermediary Effect Testing

We utilize the nonparametric percentile Bootstrap method suggested by Hayes to test mediating effects with specific applications of the SPSS macro program that he compiled. First, given the conditions of controlling gender and grade, we use mobile phone addiction as a predictor, interpersonal distress as an outcome variable, and basic psychological needs and negative coping styles as mediating variables. Then, we choose Model 6 in the Process to test the mediating chain effect. The regression analysis indicates that mobile phone addiction significantly foreshadows interpersonal relationship distress ($\beta=0.1897$; $P<0.001$). The results of the mediation effect analysis suggest that mobile phone addiction considerably affects basic psychological needs ($\beta=-0.2995$; $P<0.001$). When mobile phone addiction and basic psychological needs enter the regression equation, mobile phone addiction powerfully predicts negative coping styles ($\beta=0.3531$; $P<0.001$), and basic psychological needs significantly predict negative coping styles ($\beta=-0.1367$; $P<0.001$). When mobile phone addiction, basic psychological needs, and negative coping styles enter the regression equation simultaneously, basic psychological needs significantly predict social behavior disturbance ($\beta=-0.3962$; $P<0.001$), and negative coping styles remarkably indicate social behavior disturbances ($\beta=0.2104$; $P<0.001$). Table 5 exemplifies that basic psychological needs and negative coping styles mediate the link between mobile phone addiction and interpersonal relationship distress.

| Regression Equations | | Index of Overall Fit | | | Significance of Regression Coefficient | |
|----------------------|----------------------|----------------------|----------------|-------------|--|-------------|
| Result Variables | Predictive Variables | R | R ² | F | β | t |
| BPN | Gender | 0.3039 | 0.0924 | 58.7828*** | 0.0564 | 2.3178 |
| | Grade | | | | 0.0002 | 0.0067 |
| | MPA | | | | -0.2995 | -13.0663*** |
| NCS | Gender | 0.4145 | 0.1718 | 89.8459*** | -0.0022 | -0.0956 |
| | Grade | | | | -0.0200 | -0.8590 |
| | MPA | | | | 0.3531 | 15.3820*** |
| | BPN | | | | -0.1367 | -5.9547*** |
| IRD | Gender | 0.4876 | 0.2377 | 107.9723*** | 0.0319 | 1.4280 |
| | Grade | | | | -0.0433 | -1.9386 |
| | MPA | | | | -0.0118 | -0.5036 |
| | BPN | | | | -0.3962 | -17.8081*** |
| | NCS | | | | 0.2104 | 9.1244*** |

Table 5: Regression analysis of variable relationships in mediation models. Note: **P<0.01; ***P<0.001. Abbreviations: MPA = Mobile Phone Addiction; BPN = Basic Psychological Needs; NCS = Negative Coping Styles; IRD = Interpersonal Relationship Distress.

We utilized the Bootstrap Method to estimate the confidence interval, repeating it 1,000 times and then calculating a confidence interval of 95%. The results indicate a significant mediating effect of fundamental psychological needs and negative coping styles between mobile phone addiction and interpersonal relationship distress. They are made up of three paths, namely: Indirect effect 1: mobile phone addiction-basic psychological needs-social behavior disturbance and its confidence interval of 95%, being [0.050; 0.073]; Indirect effect 2: mobile phone addiction-negative coping styles-social behavior disturbance, and its confidence interval of 95%, being [0.029; 0.050]; Indirect effect 3: mobile phone addiction-basic psychological needs-negative coping styles-social behavior disturbances and its confidence interval of 95%, being [0.003; 0.007]. None of the three paths contains 0, implying that they are all statistically significant (see Table 6).

| Intermediary Path | Effect Value | Confidence Intervals of 95% | | Relative Mediating Effect |
|-------------------|--------------|-----------------------------|-------------|---------------------------|
| | | Lower limit | Upper limit | |
| MPA-BPN-IRD | 0.062 | 0.050 | 0.073 | 62% |
| MPA-NCS-IRD | 0.039 | 0.029 | 0.050 | 39% |
| MPA-BPN-NCS-IRD | 0.005 | 0.003 | 0.007 | 5% |

Table 6: Confidence intervals of Bootstrap 95% for mediating effect paths. Note: Abbreviations: MPA = Mobile Phone Addiction; BPN = Basic Psychological Needs; NCS = Negative Coping Styles; IRD = Interpersonal Relationship Distress.

5. Discussion

5.1 The negative case of mobile phone addiction among college students

Cell phones play a critical role in Chinese college students' studies and everyday life. There are no objections to the necessary use of mobile phones, but some students' focus on the devices has gone beyond the average. Among 1,737 college students, 1,047 people have general problems with cell phones, accounting for 60%, which is a significant proportion. This is primarily because most respondents were born around 2000, grew up with cell phones, come into contact with them earlier, use them more often, and see them almost as necessity. As mobile phones grow in popularity and have more functions, the problems related to students using mobile phones will continue to increase; for instance, they get anxious without their cell phone, they get nervous without a cell phone signal, and therefore, they take their cell phones with them wherever they go. They even suffer from acousma on their cell phones. These problems affect college students' everyday life and mental health; therefore, early attention should be paid to controlling the development of mobile phone addiction within student groups. Some of the more severe cases of mobile phone addiction in the study amount to 221 participants, or 18%. These students cannot control the extent of their mobile phone usage, they are addicted to mobile phone games, mobile social networking, mobile shopping, etc. They feel anxious and lonely when they cannot use their cell phones, build their worlds in them and become unable to face their real life. Failure to intervene can lead to more serious psychological problems.

5.2 The interpersonal relationships of college students need to be improved

The results indicate that 19.1% of students had severe interpersonal relationship problems. These serious problems may be due to environmental factors. Compared with high schools, there are more forms and contents of interpersonal communication at universities. Thus, some students need help adapting to the diversity of their communication partners and the complexity of their communication content. It takes a variety of coping styles and communication skills to make friends and have mutual conversations. Still, college students may be influenced by their previous fixed thinking and behavior patterns during their growth. Hence, they must better adapt to the university's interpersonal communication, leading to more interpersonal problems. Additionally, they must develop a higher level of autonomy and independence during college. When students feel emotional needs, they can get support through various channels, for example, parents, old friends, online, etc., and the improvement of autonomous personal offline interpersonal skills are not taken seriously. Therefore, they are likely to be troubled when they face real-life situations.

5.3 The relationship between mobile phone addiction and interpersonal relationship distress among college students

The correlation analysis results highlight a significant positive correlation between the dimensions and the total score of the relationship distress and mobile phone addiction. This indicates that mobile phone addiction is closely related to the quality of interpersonal relationships; the higher the degree of mobile phone addiction, the more difficulties college students encounter with interpersonal relationships. The T-test results display significant differences in the total score and each dimension among college students with various levels of mobile phone addiction.

The regression analysis discovered that mobile phone addiction could predict interpersonal relationship distress, confirming Hypothesis 1. Mobile phone addiction affects college students' physical and mental health; the more addicted a student is to a mobile phone, the more likely they are to have troubled relationships. The higher the degree of college students' dependence on mobile phones, the higher their dependence on mobile internet. Thus, they are more likely to become addicted to mobile social networking, entertainment, information sharing, shopping. As such, more perplexities will appear for college students in real-life interpersonal relations, embodied in aspects such as conversation, communication, dealing with people, heterosexual communication, etc.

5.4 The mediating role of basic psychological needs and negative coping styles in mobile phone addiction and interpersonal relationship distress

The results show that basic psychological needs mediate between mobile phone addiction and interpersonal relationship distress, which confirms Hypothesis 2. Mobile phone addiction could predict an individual's basic psychological needs, and individual's basic psychological needs could indicate the degree of disturbance in interpersonal relationships. Our research highlights that college students are more likely to use the internet to satisfy the eight psychological desires like their power, identity, meeting challenges, interpersonal communication, escapism, autonomy, cognition and achievement. Some research indicates that the leading motive for college students to use mobile phones is the need for interpersonal communication and, secondly, entertainment (Fan 2021, 131–133). Thus, when college students become addicted to mobile phones and immerse themselves in the virtual world of the Internet, their needs for interpersonal communication, autonomy and achievement in real life fail to be satisfied. When the individual's basic psychological needs become blocked, it will weaken their need for regular communication with people. When they enter the actual society again, the lack of offline social skills will cause them to have interpersonal problems.

At the same time, the results establish that negative coping styles play a mediating role between mobile phone addiction and interpersonal relationship distress. Therefore, this confirms Hypothesis 3. Mobile phone addiction can predict negative coping styles,

and individuals' negative coping styles can also expect a degree of interpersonal relationship distress. When faced with novel stimuli on the Internet, college students are more willing to adopt negative coping styles like an escape. The higher the degree of mobile phone addiction among college students in real life, the more inclined they are to handle problems by applying negative coping styles. They tend to choose negative ways to deal with interpersonal relationships, expressed as withdrawal, tolerance, self-blame, fantasy, etc., leading them to be more prone to a lack of interpersonal communication, missing conversation and heterosexual interaction skills, lacking mental attitude, as well as other interpersonal problems. Negative coping styles allow college students to suppress deep negative emotions. As negative emotions accumulate to a certain extent, they can intensify potential conflicts and new ones, seriously affecting college students' studying and everyday life.

The research has also found that basic psychological needs and negative coping styles mediate between mobile phone addiction and interpersonal relationships among college students, confirming Hypothesis 4. When an individual's basic psychological needs cannot be met, they will develop a strong desire to meet those needs. Moreover, once basic psychological needs are not satisfied for long, the individual will turn his attention to something else (Zhang, Zeng, Ye, Hu, & Li 2012, 83–90). For instance, if college students have a high degree of mobile phone addiction, like being addicted to the mobile phone and the internet world, then their basic psychological needs for interpersonal communication cannot be met at this time, they will choose more negative coping styles to deal with interpersonal problems, leading them to interpersonal issues.

This study considered the relationship between mobile phone addiction and interpersonal relationship distress among college students. Furthermore, it explored the mediating role of basic psychological needs and negative coping styles. The results indicate that not only can cell phone addiction predict interpersonal relationship distress, but it can also indirectly influence interpersonal relationships utilizing the single mediation role of basic psychological needs and negative coping styles, establishing a chain role of mediation between the two, further explaining the mechanism behind the influence of mobile phone addiction on college students' interpersonal relationships. The results of this research complement previous studies and supports further research on intervention in college students' mobile phone addiction and interpersonal relationships.

Conclusions

Given with the results reported above, we have come to the following conclusions: First of all, the mobile phone addiction of college students can significantly predict the interpersonal relationship distress of college students, because every college student has their own basic psychological needs among which interpersonal relationship is of great importance in their college life. And our research found that the basic

psychological needs are the mediating variables between mobile phone addiction and the interpersonal relationships of college students.

Secondly, college students usually use the negative coping styles to deal with the cell phone addiction, which make their mental problems more serious. Our research found that the negative coping styles are the mediator between mobile phone addiction and the interpersonal relationships of college students, and so the basic psychological needs and negative coping styles establish a mediating chain effect between mobile phone addiction and the interpersonal relationships distress of college students. Later on, we should make some targeted intervention research to reduce their mobile phone addiction, so as to change their coping styles positively.

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