



OPEN The chain mediating effect of self-respect and self-control on peer relationship and early adolescent phone dependence

Shuyuan Guo¹, Jianhua Zhang²✉, Aolun Wang³, Tiancheng Zhang³, Yang Liu³✉ & Shiyuan Zhang⁴

This paper analyzes the influence of peer relationship on mobile phone dependence of middle school students, and probes into the chain mediating role of Self-respect and self-control. Using multi-stage random stratified cluster sampling method, 2311 middle school students in Wuling Mountain District were selected to explore the relationship between peer relationship and mobile phone dependence, Self-respect and self-control by using peer relationship scale, mobile phone dependence Scale, Self-respect scale and self-control scale. Correlation analysis showed that peer relationship, Peer relationship was positively correlated with Self-respect and self-control ($r = 0.399$, $r = 0.291$, $P < 0.01$), while peer relationship was negatively correlated with mobile phone dependence ($r = -0.227$, $P < 0.01$). Mobile phone dependence was negatively correlated with Self-respect and self-control ($r = -0.409$, $r = -0.629$, $P < 0.01$). Self-respect was positively correlated with self-control ($r = 0.519$, $P < 0.01$). The structural equation model shows that Self-respect and self-control play a partial mediating role in the relationship between peer relationship and mobile phone dependence, in which the mediating effect size of Self-respect is -0.098 (effect size 18.63%, 95%CI = $-0.140 \sim -0.059$), and the mediating effect size of self-control is -0.131 (effect size 24.90%, 95%CI = $-0.188 \sim -0.073$); The chain mediating effect size of Self-respect and self-control was -0.252 (effect size 47.91%, 95%CI = $-0.293 \sim -0.434$). We should actively intervene the problem of mobile phone dependence of middle school students, improve Self-respect and self-control ability through good peer relationship, effectively improve their health behavior, and promote mental health.

Keywords Peer relationship, Mobile phone dependence, Self-respect, Self-control

Teenagers are in the early stage of growth and development, and their physical and psychological development is not perfect. During this period, the individual cognitive ability is significantly improved, and they are full of curiosity and desire to explore new things, but they are easily affected by the surrounding environment and social culture. Emerging things such as the Internet and social media occupy an important position in their lives, but also bring problems such as information overload and Internet addiction¹. Mobile phone dependence, also known as mobile phone addiction or problematic mobile phone use, refers to the phenomenon that individuals cannot control their use of mobile phones, resulting in impaired physiological, psychological and social functions and addiction to mobile phones². According to the 48 th Statistical Report on the Development of Internet in China, by June 2021, the total number of Internet users in China has reached 1.007 billion, and the number of underage Internet users has reached 183 million³, and the incidence of mobile phone dependence is as high as 23.40%, and it is on the rise⁴. Excessive use not only affects sleep quality^{5,6}, academic performance⁷, and cognitive abilities⁸, but may also lead to psychological issues such as depression and anxiety^{9,10}. Middle school students are at a critical stage of growth and development, with their physical and psychological development still maturing¹¹. They are susceptible to the influence of internal and external environmental factors, and hence, the issue of mobile phone dependency requires attention.

¹Xiangxi National Vocational and Technical College, Jishou, China. ²School of Physical Education and Art, Hunan Medical University, Huaihua, China. ³School of Sports Science, Jishou University, Jishou, China. ⁴Faculty of Education, The University of Melbourne, Melbourne, Australia. ✉email: zjh828288@163.com; ldyedu@foxmail.com

Peer relationship is one of the important social relationships in adolescence, and it is also one of the important environmental factors that have an impact on individuals. It is a parallel and equal social relationship¹², built and developed by peers in the process of interaction. The behaviors and emotions among peers will affect individual behaviors and emotions. In the social activities of forming partnership, individuals will produce a series of evaluation and emotional experience related to communication. Positive social activities can bring about better self-cognition, thus affecting subsequent communication behaviors and reducing the occurrence of some addictive behaviors that are detrimental to physical and mental health¹³. If the partner's degree of dependence on mobile phones is high, the individual may also be affected and increase the dependence on mobile phones. Therefore, the research hypothesis H1 is proposed: peer relationship of middle school students can significantly negatively predict their mobile phone dependence problems.

According to attachment theory, peer relationship, as an external environmental factor, may affect an individual's behavior by influencing his or her self-respect level¹⁴. Self-respect is an internal emotional experience based on an individual's self-evaluation, manifested as self-respect, self-love and self-esteem, and the expectation of respect from others, the collective and the society. It plays a key mediating role in the psychological development of adolescents¹⁵. Good peer relationship can effectively prevent and reduce the mental health problems of middle school students through its positive impact on self-respect¹⁶. Meanwhile, there is a negative correlation between self-respect and mobile phone dependence¹⁷, that is, the higher the self-respect of an individual, the lower the degree of mobile phone dependence¹⁸. Therefore, in order to explore the internal mechanisms of peer relationship, self-respect and mobile phone dependence, the research hypothesis H2 is proposed: self-respect plays a mediating role in peer relationship and mobile phone dependence relationship respectively.

On the other hand, self-control ability is also a significant factor influencing mobile phone dependency. Self-control refers to an individual's capacity to regulate and inhibit their behaviors and emotions¹⁹, enabling them to better cope with challenges and stress. Studies indicate that individuals with lower self-control lack the ability to manage their behaviors and emotions, making them prone to becoming engrossed in the virtual world of mobile phones and subsequently developing mobile phone dependency²⁰. General theories of crime suggest that low self-control is a primary cause of problem behaviors in adolescents, with self-control mediating the impact of interpersonal relationships on individual problem behaviors²¹. That is, different levels of interpersonal relationships can affect an individual's self-control ability, and poor interpersonal relationships may lead to lower self-control in children²², thereby resulting in issues such as mobile phone dependency. Peer relationships are a crucial component of interpersonal relationships; therefore, to investigate the intrinsic mechanisms among peer relationships, self-control, and mobile phone dependency, the research hypothesis H3 is proposed: Self-control serves as a mediating factor in the relationship between peer relationships and mobile phone dependency.

Self-respect and self-control are two interrelated concepts. Studies have shown that an individual's self-respect has a direct impact on self-control²³. Individuals with high self-respect usually have a higher level of self-control, while individuals with low self-respect also have a lower level of self-control^{24,25}. They promote each other and jointly affect individual psychology and behavior²⁶. A higher level of self-respect helps individuals to better control their behavior and emotions, and conversely, people with stronger self-control are more likely to maintain confidence and self-respect in the face of challenges. The two influence each other and act together, playing an important role in individual psychological development and behavior²⁷. self-respect and self-control may play a simultaneous role in the relationship between peer relationship and mobile phone dependence. Therefore, in order to explore the internal mechanism of peer relationship, self-respect, self-control and mobile phone dependence, the research hypothesis H4 is proposed: self-respect and self-control play a chain mediating role in the relationship between peer relationship and mobile phone dependence.

In summary, existing research has discussed the interconnections between peer relationships, mobile phone dependency, Self-respect, and self-control in pairs, but there is a lack of in-depth and systematic analysis of the intrinsic links and interrelationships among these four variables. Drawing on Wen Zhonglin's characteristics for determining the sequential relationship of variables in questionnaire research, this study intends to use a sample of middle school students, with peer relationships as the independent variable, mobile phone dependency as the dependent variable, and Self-respect and self-control as mediating variables, to explore the relationship between peer relationships and mobile phone dependency, as well as the chain mediating role of Self-respect and self-control. This will further clarify the mechanisms underlying mobile phone dependency among middle school students, with the aim of providing insights for intervention and correction strategies. The preliminary model hypothesis is depicted in Fig. 1.

Object and method

Participates

From May to June 2024, a multi-stage stratified cluster random sampling method was employed to select the study participants, which was conducted in three stages: In the first stage, four cities (or prefectures) including Xiangxi Tujia and Miao Autonomous Prefecture, Enshi Tujia and Miao Autonomous Prefecture, Tongren City, and Chongqing City were randomly selected from the Wuling Mountain area spanning Hunan Province, Hubei Province, Guizhou Province, and Chongqing Municipality, using a lottery method. In the second stage, two middle schools (one junior and one senior) were randomly chosen from each city (or prefecture) using a random number table, totaling eight middle schools. This selection process strictly follows the principle of randomness. In practice, all eligible secondary schools in each city (state) are numbered first, and then the selected schools are determined through a random number table. We chose one middle school and one high school, respectively, because middle school and high school students differ in physical and mental development, mobile phone usage habits and other aspects. The joint inclusion of the study will help to more comprehensively explore the relationship between mobile phone dependence and peer relationship and other variables of middle school students of different ages. In the third stage, to make sure that every class is drawn equally, one class was

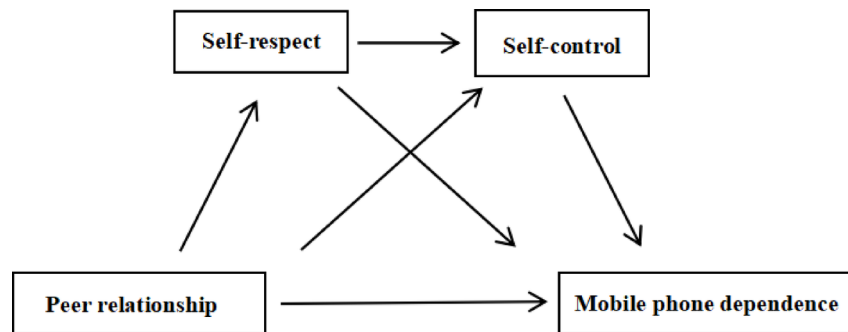


Fig. 1. A hypothesized chain mediation model of Self-respect and self-control between peer relationship and mobile phone dependence.

randomly selected from each grade (seventh to twelfth) in each middle school using a lottery method, amounting to 48 classes. All students in the selected classes who met the survey criteria were included as participants. A total of 2434 questionnaires were distributed, with 2311 valid responses collected, yielding a response rate of 94.94%.

Prior to the dissemination of the questionnaire, all investigators underwent rigorous training to ensure a standardized approach. Upon official distribution, the investigators meticulously briefed participants on the survey's objectives and components, emphasizing the confidentiality and anonymity of their responses. They clarified the ultimate destination and utilization of the collected data, ensuring transparency and trust. The survey was conducted on a voluntary basis, with participants contributing without any form of compensation, and they were granted the autonomy to withdraw their participation at any juncture. The entire survey was designed to be concise, with the completion time estimated at approximately 20 min, thereby balancing thoroughness with respect for the participants' time. Informed consent forms were signed by all participants. Ethical approval was obtained from the institutional medical ethics committee before commencement. The study was conducted in accordance with the Declaration of Helsinki.

Tools

Peer relationship scale

The partnership questionnaire compiled by RAJA et al.²⁸ was applied, which included three dimensions of trust, communication and alienation. This survey focuses on the two dimensions of trust and communication (since this study focuses on the positive dimensions of peer relationship (such as trust and communication), and "alienation" mainly reflects the negative dimension, so it is not included in the measurement scope). A total of eight questions are involved, using a five-level scoring scale ("very inconsistent" score 1, "somewhat inconsistent" score 2, "neutral" score 3, "somewhat consistent" score 4, "very consistent" score 5), the total range of 8–40 points, the higher the score, the better the quality of the partnership. For example, projects involving the dimension of trust such as "When I am in trouble, my partner will sincerely help me"; Items that involve the communication dimension, such as "My partner and I can easily share our thoughts and feelings," provide insight into the quality of the peer relationship. In this survey, confirmatory factor analysis showed that each fitting index was $\chi^2/df = 2.65$, RMSEA = 0.06, GFI = 0.90, NFI = 0.91, CFI = 0.94, indicating that the scale had good structural validity. Cronbach's α coefficient of the scale was 0.83.

Mobile phone dependence scale

The Mobile Phone Addiction Index (MPAI)²⁹ was used, which consists of 17 items covering four aspects: withdrawal, loss of control, inefficiency, and escapism. The scale used a five-point rating system: "Never" = 1 point, "Occasionally" = 2 points, "Sometimes" = 3 points, "Frequently" = 4 points, "Always" = 5 points. The total score range for the 17 items was 17–85 points, with higher scores indicating a more severe level of mobile phone dependence. In the project example, the withdrawal dimension is such as "I feel anxious when my cell phone is out of battery or signal"; Out-of-control dimensions such as "I have trouble controlling how much time I use my phone"; Inefficiency dimensions such as "My study or work efficiency has decreased because of playing mobile phone"; Avoidant dimensions such as "I use my cell phone to escape my troubles in reality." In this survey, confirmatory factor analysis showed that each fitting index was $\chi^2/df = 8.85$, RMSEA = 0.08, GFI = 0.92, NFI = 0.97, CFI = 0.97, indicating that the scale had good structural validity, the Cronbach's α coefficient for this scale was 0.90.

Self-respect scale

The questionnaire developed by Rosenberg³⁰ in 1965 was adopted, which contains 10 questions and uses a four-point rating scale ("Completely unlike" = 1 point, "Somewhat unlike" = 2 points, "Fairly like" = 3 points, "Completely like" = 4 points). The total score range was 10–40 points, with higher scores indicating a higher level of Self-respect. Item examples, such as "I think I have a lot of good qualities", "I am satisfied with myself", etc., can measure the level of self-esteem of individuals through these statements. In this survey, confirmatory factor analysis showed that each fitting index was $\chi^2/df = 3.72$, RMSEA = 0.07, GFI = 0.94, NFI = 0.99, CFI = 1.00, indicating that the scale had good structural validity, the Cronbach's α coefficient for this scale was 0.82.

Self-control scale

The Self-Control Scale (SCS) developed by Tangney et al.³¹ and revised by Tan Shuhua and Guo Yongyu was used. The scale consists of 19 items and employs a five-point rating scale (“Completely unlike” = 1 point, “Somewhat unlike” = 2 points, “Neutral” = 3 points, “Somewhat like” = 4 points, “Completely like” = 5 points). The higher the score, the greater the self-control. Items such as “I can resist the temptation of delicious food and stick to a healthy eating plan” and “I can complete tasks on time even when I don’t like them” can measure an individual’s ability to regulate and control their own behavior and emotions. In this survey, confirmatory factor analysis showed that each fitting index was $\chi^2/df = 3.24$, RMSEA = 0.06, GFI = 0.92, NFI = 0.92, CFI = 0.93, indicating that the scale had good structural validity, the Cronbach’s α coefficient for this scale was 0.83.

Statistical analysis

The Harman single-factor method was employed to examine potential common method bias; Pearson correlation analysis was used to explore the association between two variables; the SPSS macro program PROCESS version 3.4.1, model 6, developed by Haynes, was utilized to test the chain mediating effects; and the Bootstrap method (with 5000 resamples) was applied to assess the significance of the mediating effects, with a significance level of $\alpha = 0.05$.

Quality control

The survey was conducted by researchers from the School of Sports Science at Jishou University. Questionnaires were distributed and collected within the classrooms, using uniform instructions. Invalid questionnaires were excluded to ensure data quality.

Results

Common method variance test

The Harman’s single-factor test was employed to detect potential common method variance. The analysis revealed 22 factors with eigenvalues greater than 1, and the first common factor had an eigenvalue of 11.264, accounting for 15.224% of the variance, which is below the threshold of 40%. Consequently, this study does not exhibit significant common method variance.

Correlation analysis of peer relationships, mobile phone dependence, self-respect, and self-control

Pearson correlation analysis indicated that peer relationships, Self-respect, and self-control were positively intercorrelated ($P < 0.01$). Mobile phone dependence was negatively correlated with peer relationships, Self-respect, and self-control ($P < 0.01$). Specifically, peer relationships were positively correlated with Self-respect ($r = 0.399$, $P < 0.01$) and self-control ($r = 0.291$, $P < 0.01$), and negatively correlated with mobile phone dependence ($r = -0.227$, $P < 0.01$). Mobile phone dependence was negatively correlated with Self-respect ($r = -0.409$, $P < 0.01$) and self-control ($r = -0.629$, $P < 0.01$). Additionally, Self-respect and self-control were positively correlated ($r = 0.519$, $P < 0.01$). See Table 1 for details.

Analysis of the chain mediation effects of self-respect and self-control in the relationship between peer interaction and mobile phone dependence

This study employed the mediation effect testing method developed by Wen et al.³², while controlling for variables such as gender, grade, and only child status. Peer relationships were operationalized as the independent variable (X), mobile phone dependence as the dependent variable (Y), and Self-respect (M1) and self-control (M2) were considered as mediating variables to conduct the mediation effect analysis. See Fig. 2 for details.

The results of the study indicate that the total effect of peer relationships on mobile phone dependence is -0.526 , with a direct effect of -0.044 , accounting for 8.37% of the variance ($P = 0.001$). Self-respect and self-control act as partial mediators between peer relationships and mobile phone dependence. The mediating effect of Self-respect is -0.098 , representing 18.63% of the variance, while the mediating effect of self-control is -0.131 , accounting for 24.90% of the variance. The chain mediating effect of Self-respect and self-control is -0.252 , which constitutes 47.91% of the variance. The 95% confidence intervals for each path do not include zero, indicating that the mediating effects are statistically significant ($P < 0.05$). See Table 2 for details.

Discussion

Analysis of the correlation between peer relationships and mobile phone dependence

The study results reveal a significant negative correlation between peer relationships and mobile phone dependence, supporting Hypothesis H1, which is consistent with the findings of Zhang Cai’s research³³. According to ecological systems theory, peer relationships are a vital component of the ecological system³⁴. As

| Variable name | M ± SD | Peer Relationship | Mobile phone dependence | Self-respect | Self-control |
|-------------------------|----------------|-------------------|-------------------------|--------------|--------------|
| Peer Relationship | 29.61 ± 6.545 | - | | | |
| Mobile phone dependence | 40.56 ± 15.158 | - 0.227** | - | | |
| Self-respect | 27.53 ± 5.412 | 0.399** | - 0.409** | - | |
| Self-control | 60.47 ± 13.619 | 0.291** | - 0.629** | 0.519** | - |

Table 1. Correlation analysis matrix. Note: **. $p < 0.01$

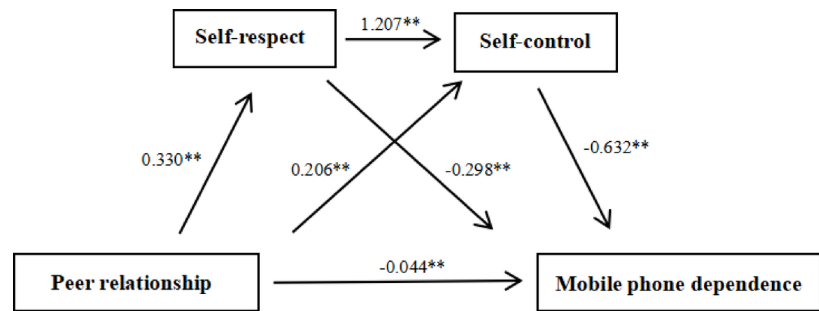


Fig. 2. A chain-mediated model of Self-respect and self-control between peer relationship and mobile phone dependence.

| Effect | Path | Effect size | Effective dose | Se | 95%CI | |
|-----------------|--|-------------|----------------|-------|-------------|-------------|
| | | | | | Upper limit | Lower limit |
| Total effect | Peer Relationship→Mobile phone dependence | − 0.526 | 100.00% | 0.047 | − 0.618 | − 0.434 |
| Direct effect | Peer Relationship→Mobile phone dependence | − 0.044 | 8.37% | 0.041 | − 0.124 | − 0.036 |
| Indirect effect | Peer Relationship→ Self-respect→Mobile phone dependence | − 0.098 | 18.63% | 0.021 | − 0.140 | − 0.059 |
| Indirect effect | Peer Relationship→ Self-control→Mobile phone dependence | − 0.131 | 24.90% | 0.029 | − 0.188 | − 0.073 |
| Indirect effect | Peer Relationship→ Self-respect→Self-control→Mobile phone dependence | − 0.252 | 47.91% | 0.020 | − 0.293 | − 0.214 |

Table 2. Path analysis and effect decomposition of the chain mediation model between peer relationships and mobile phone dependence, with Self-respect and Self-Control as mediators.

an important part of the interpersonal ecological system, the more harmonious and close the peer relationships, the more time individuals are likely to spend on face-to-face communication, thereby substituting for other forms of interaction such as online communication³⁵. Mobile phone dependence often manifests as unpleasant or painful internal experiences due to interpersonal deficits³⁶. When individuals are exposed to a poor peer relationship environment for extended periods, they may seek psychological comfort from the virtual world to alleviate their inner distress, leading to less interaction with peers and consequently an increased association with mobile phone dependence. Therefore, there is a close relationship between peer relationships and mobile phone dependence. On one hand, positive peer relationships can help individuals establish a stable social support system, thereby reducing the risk of mobile phone dependence. On the other hand, negative peer relationships may lead to emotional and psychological issues, thereby increasing the likelihood of mobile phone dependence.

The mediating role of self-respect and self-control between peer relationships and mobile phone dependence

The findings of this study indicate that Self-respect plays a partial mediating role between peer relationships and mobile phone dependence, confirming Hypothesis H2. This is in line with previous research findings³⁷. Positive peer relationships can assist middle school students in expressing their needs more effectively, leading to greater emotional companionship and encouragement from peers, as well as some material support³⁸. Such relationships also facilitate greater recognition and acceptance within society, thereby enhancing Self-respect levels. Individuals with low Self-respect and a lack of social support are more prone to mobile phone dependence³⁹, as those with high Self-respect typically possess stronger psychological resilience and are better equipped to handle stress and setbacks, while those with low Self-respect are more susceptible to the influence of negative emotions, leading to mental health issues. Good peer relationships can provide emotional, social, and Self-respect support, thereby reducing the risk of mobile phone dependence. Conversely, poor peer relationships may lead to social and emotional difficulties, affecting Self-respect levels and increasing the likelihood of mobile phone dependence due to a fear of real-world interactions. Therefore, Self-respect levels influence an individual's psychological state within peer relationships, thereby affecting the degree of mobile phone dependence.

The results of this study also show that self-control plays a partial mediating role between peer relationships and mobile phone dependence, supporting Hypothesis H3. Good peer relationships provide adolescents with positive role models and social support, which helps them to improve their self-control. In a harmonious peer atmosphere, teenagers can learn how to effectively manage their own behaviors and emotions by observing and imitating the self-discipline behaviors of peers²². For example, the positive influence of peers monitoring each other's study time and resisting the temptation of mobile phones can help teenagers better control the impulse to use mobile phones and reduce dependence. On the contrary, bad peer relationships can easily lead to negative emotions and bad behavior patterns, and reduce adolescents' self-control ability. For example, in an environment where playing mobile phones is prevalent among peers, it is difficult for teenagers to stick to self-discipline and easily fall into the state of excessive use of mobile phones^{40,41}. Good self-control ability enables individuals to

manage interpersonal relationships more effectively within peer interactions and to communicate and resolve problems efficiently⁴². When faced with the temptation of mobile phones, individuals with strong self-control are better able to resist and avoid excessive usage. Thus, by improving self-control abilities, individuals can better manage their mobile phone usage behavior, reducing excessive dependence on mobile phones. Individuals can also find a balance between peer relationships and mobile phone dependence, achieving a healthier lifestyle.

The chain mediation role of self-respect and self-control between peer relationships and mobile phone dependence

The findings of this study reveal that Self-respect significantly and positively predicts self-control, supporting Hypothesis H4, which is consistent with existing research⁴³. Individuals with higher Self-respect exhibit stronger self-control abilities, whereas those with lower Self-respect demonstrate weaker self-control. This is because individuals with high Self-respect have greater confidence and motivation to achieve their goals and more perseverance in overcoming difficulties, making it easier for them to exercise self-control⁴⁴. Conversely, individuals with low Self-respect may struggle to control their behaviors due to feelings of inferiority and negative emotions, making them more susceptible to external temptations and influences. This provides a theoretical basis for the main effect hypothesis model of this study, suggesting that an individual's level of Self-respect can effectively alter their self-control abilities. High levels of Self-respect can be effectively enhanced through positive peer relationships, with proper guidance leading to improved self-control abilities and a subsequent reduction in the level of mobile phone dependence. In other words, when peer relationships are sufficiently intimate, middle school students receive more recognition and support from their peers, resulting in higher Self-respect levels, establishing correct guidance, and thereby strengthening self-control abilities, enhancing social adaptability, improving interpersonal relationships, and comprehensively reducing mobile phone dependence. In contrast, poor peer relationships may lead to a decrease in companionship and support from peers, resulting in lower Self-respect and self-control abilities. Individuals may turn to mobile phones as a medium for seeking comfort, leading to an increase in the level of mobile phone dependence and potentially resulting in psychological issues such as academic disengagement, rebelliousness, depression, and anxiety.

In summary, there is a chain mediating effect of Self-respect and self-control between peer relationships and mobile phone dependence. To reduce the issue of mobile phone dependence among middle school students, we should actively intervene in adolescents' Self-respect and self-control abilities while also attending to the influence of peer relationships. Specific measures include conducting mental health education activities to help adolescents establish correct values and self-perception; providing psychological counseling and support services to help adolescents improve their self-control abilities and capacity to cope with stress; and fostering positive peer relationships to offer support and encouragement, thereby reducing their dependence on mobile phones.

Research significance, future study and limitation

This study analyzes the influence of peer relationships on mobile phone dependence among middle school students and explores the chain mediating roles of self-esteem and self-control. It reveals that positive peer relationships can effectively reduce mobile phone dependence by enhancing self-esteem and self-control, thereby promoting the mental health of adolescents. However, adolescent psychological and behavioral health is also influenced by a variety of other factors, such as adverse childhood experiences, bullying victimization, family support, anxiety and depression, alexithymia, cognitive function, experiential avoidance, physical activity, and sleep quality. Adverse childhood experiences and bullying victimization may indirectly increase the risk of mobile phone dependence by damaging self-esteem and weakening self-control, while family support may alleviate anxiety and depression by providing emotional security and enhancing self-efficacy, thereby reducing mobile phone dependence. Additionally, alexithymia and experiential avoidance may make it difficult for adolescents to effectively express and manage emotions, further exacerbating mobile phone dependence, while declines in cognitive function may impair their self-regulation abilities, increasing reliance on mobile phones. At the same time, physical activity and sleep quality, as important health behaviors, are closely related to self-esteem and self-control. Good physical activity and sleep quality help enhance psychological resilience and reduce mobile phone dependence. Therefore, schools should strengthen mental health education, foster a positive peer relationship environment, and reduce bullying behaviors; families should provide emotional support, pay attention to adolescents' emotional changes, and cultivate healthy lifestyle habits; and individuals should enhance self-awareness and emotional management skills, actively participate in physical activity, and improve sleep quality, thereby comprehensively improving psychological and behavioral health.

There are also some shortcomings in this study. First of all, the use of horizontal data for multiple intermediary effect analysis, although the results are significant, but can not conclusively judge the causal relationship between variables. Future studies may use longitudinal data for similar effect analysis to validate the results of this study. Secondly, the influencing factors of peer relationship and mobile phone dependence of middle school students are complex and diverse, and this study has not explored all of them. Future studies can continue to explore relevant influencing factors and action mechanisms, so as to provide more ways for effective intervention of mobile phone dependence of middle school students.

Conclusion

This study investigated the impact of peer relationships on middle school students' mobile phone dependence and the chain mediating role of self-respect and self-control. The results showed that peer relationships were negatively correlated with mobile phone dependence but positively correlated with self-respect and self-control. Mobile phone dependence was negatively correlated with both self-respect and self-control, and self-respect was positively correlated with self-control. Self-respect and self-control played partial mediating roles in the relationship between peer relationships and mobile phone dependence, and their chain mediating effect was

significant. Specifically, positive peer relationships could enhance self-respect and self-control, thereby reducing mobile phone dependence. To address the issue of mobile phone dependence among middle school students, it is crucial to intervene in their self-respect and self-control abilities while promoting positive peer relationships. This can be achieved through mental health education, psychological counseling, and creating a favorable peer environment. However, this study has limitations, such as using cross-sectional data. Future research could use longitudinal data to further explore the causal relationships and additional influencing factors.

Data availability

The datasets generated and/or analysed during the current study are not publicly available due [our experimental team's policy] but are available from the corresponding author on reasonable request.

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Author contributions

Shuyuan Guo¹²³⁴⁵, Jianhua Zhang¹²³⁵, Aolun Wang¹²³⁵, Tiancheng Zhang¹²³⁵⁶, Yang Liu¹²³⁵⁶, Shiyuan Zhang¹²³⁵. 1 Conceptualization; 2 Methodology; 3 Data curation; 4 Writing - Original Draft; 5 Writing - Review & Editing; 6 Funding acquisition.

Declarations

Ethics approval and consent to participate

The study was approved by the Biomedicine Ethics Committee of Jishou University before the initiation of the project (Grant number: JSDX– 2024 – 0086). And informed consent was obtained from the participants before starting the program.

Competing interests

The authors declare no competing interests.

Additional information

Correspondence and requests for materials should be addressed to J.Z. or Y.L.

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