

Brief Mindfulness Training Mitigates College Students' Mobile Phone Addiction: The Mediating Effect of the Sense of Meaning in Life

Fengbo Liu¹, Yue Xi², Ning Li³, Ming Wu⁴

¹School of Physical Education, Zhengzhou University of Light Industry, Zhengzhou, Henan Province, People's Republic of China; ²College of Physical Education and Health, East China Normal University, Shanghai, People's Republic of China; ³School of Physical Education, Putian University, Putian, Fujian Province, People's Republic of China; ⁴Zhengzhou University, Zhengzhou, Henan Province, People's Republic of China

Correspondence: Fengbo Liu, School of Physical Education, Zhengzhou University of Light Industry, Zhengzhou, Henan Province, People's Republic of China, Email lfbzzuli@126.com

Objective: To explore the impact of brief mindfulness training on college students' mobile phone addiction and the mediating effect of the sense of meaning in life between them.

Methods: This study has employed the mixed experimental design of 2 (experimental conditions) \times 2 (time points), randomly assigned 44 college students into a mindfulness training group and a control group (22 college students in each group), and selected the Freiburg Mindfulness Inventory (FMI), Mobile Phone Addiction Tendency Scale (MPATS), and Chinese Meaning in Life Questionnaire (C-MLQ) to conduct separate tests before and after mindfulness training.

Results: The results show that: (1) in the pretest, the differences between the mindfulness training group and the control group in the level of mindfulness, the level of mobile phone addiction, and the sense of meaning in life are not statistically significant; (2) in the posttest, compared with those of the control group, both the FMI score ($p=0.013$) and the C-MLQ score ($p<0.001$) of the mindfulness training group improve significantly, while the MPATS score ($p=0.008$) of the mindfulness training group declines significantly; and (3) the Bootstrap analysis of the mediating effect shows that after the change in C-MLQ (95% $CI [0.537, 11.630]$) enters the equation, the direct effect of mindfulness training is not significant (95% $CI [-3.254, 5.861]$).

Conclusion: The results of this study reveal the impact and mechanism of brief mindfulness training on college students' mobile phone addiction, and provide an empirical basis for intervening on mobile phone addiction.

Keywords: brief mindfulness, mobile phone addiction, sense of meaning in life, mediating effect

Introduction

Along with the ongoing development of science and technology and the advent of the information age, smart-phone use addiction has become a global phenomenon.¹ "Mobile phone addiction" refers to that the individuals who are excessively addicted to various activities mediated by mobile phones have strong and continuous dependence on and thirst for mobile phones, resulting in obvious social and psychological function damage.² Numerous studies have shown that mobile phone addiction has many adverse effects on young people. For example, due to excessive use of mobile phones, college students suffer from physical and mental health problems such as decreased sleep quality,³ impaired emotional regulation capability,⁴ and learning burnout and procrastination,⁵ which are usually accompanied by poorer academic performance⁶ and interpersonal communication disorder;⁷ serious cases even threaten their lives.² Therefore, how to effectively prevent and intervene on college students' mobile phone addiction has become an important research topic in the new era.

Both theory and practice have shown that cognitive behavioral therapy is effective in mitigating college students' mobile phone addiction.⁸ Currently, emerging cognitive behavioral therapy is represented by "mindfulness training". Mindfulness is a method by which an individual maintains experience by "paying attention in a particular way; on purpose, in the present moment, and non-judgmentally", and is aware of current psychological events,⁹ that is, focusing

on current events every moment, staying alert every minute, and being prepared to accept any circumstance that may occur without judgment.¹⁰ Similarly, mindfulness training is an intervention method by which an individual focuses his/her attention on current experience based on acceptance.¹¹ Some studies have proven that mindfulness training can significantly mitigate college students' mobile phone addiction. For examples, Li et al have employed the mindfulness-based cognitive behavioral group therapy to intervene on medical students, and found that mindfulness training can significantly mitigate medical students' smart-phone addiction;¹² Liu et al have employed the randomized controlled trial to examine the intervening effect of brief mindfulness training on mobile phone addiction, and found that brief mindfulness training can mitigate individuals' mobile phone addiction by improving their self-control.¹³ In addition, theoretical analysis has found that the cause of addiction is an automated connection between "craving" and "behavior", and an individual with a higher level of addiction generally shows weaker inhibitory function,¹⁴ while mindfulness training, by cultivating the individual to respond positively to cravings and achieve non-response to cravings, can act on the core loop of the formation of addictive behaviors, blocking such automated connection, which is ultimately reflected in a decrease in the level of the individual's craving for addictions, a decrease in his/her addictive behaviors, and an improvement in his/her inhibitory function. Therefore, this study proposes hypothesis 1: Mindfulness training mitigates college students' mobile phone addiction.

Although some studies have tentatively confirmed the effect of mindfulness training on mobile phone addiction, the detailed mechanism of action has not been fully revealed. After conducting literature review, this study has found that when discussing mindfulness training and mobile phone addiction by college students, it is frequently associated with the sense of meaning in life. "Sense of meaning in life" refers to individuals' perceptions when they feel that life can be understood, that they can be guided by meaningful goals, and that life is valuable.¹⁵ Several empirical studies have shown that mindfulness training can enhance individuals' sense of meaning in life, and brief mindfulness interventions are also effective.¹⁶ This is because the ideas of mindfulness include non-response, non-judgment, and always being aware of the present moment. In other words, mindfulness cultivates individuals' non-judgmental attitude about the environment in which they live. This process expands individuals' awareness of a wider range of external environments, enables us to discover positive values in ourselves and the world, and further triggers more positive emotions, enhancing the sense of meaning in life. Therefore, this study proposes hypothesis 2: Mindfulness training enhances college students' sense of meaning in life. Furthermore, previous theoretical studies have shown that the individuals with a low sense of meaning in life lack the motivation and goals for pursuing the meaning in life, so it is easy for them to make up for imperfections in life through addictive behaviors such as smart-phone addiction.¹⁷ In addition, individuals also tend to use smart-phones to conduct online activities for the purpose of escaping reality. In other words, when individuals feel empty and anxious due to lack of the sense of meaning in life, they indulge in mobile phone addiction for escaping a boring life and releasing negative emotions.¹⁸ Empirical research results also show that since there are inexhaustible videos and games in smart-phones, the individuals with a lower sense of meaning in life are more likely to become addicted to them.¹⁹ Correspondingly, when college students have enhanced their sense of meaning in life, it is expected that their mobile phone addiction can be further mitigated. Based on this, this study proposes hypothesis 3: The sense of meaning in life has a mediating effect on the relationship between mindfulness training and mobile phone addiction. In other words, mindfulness training mitigates college students' mobile phone addiction by enhancing their sense of meaning in life.

Previous studies have examined the changes in individuals' mobile phone addiction and their sense of meaning in life before and after mindfulness training. However, the mechanism by which mindfulness training mitigates college students' mobile phone addiction has rarely been discussed. Moreover, college students of different genders and ages have varying levels of mobile phone addiction.²⁰ By conducting literature review on relevant empirical studies, this study has found that mindfulness training has an impact on the addictive behavior and the sense of meaning in life; meanwhile, meaning in life also has a predicting effect on addictive behavior, which is in line with the paradigm that meaning in life may have a mediating effect on the relationship between mindfulness training and mobile phone addiction.²¹ Furthermore, previous studies on college students' mindfulness training mostly took a 7- or 8-week intervention approach, and the loss rate of the subjects selected from college students with heavy course tasks was usually high. Some studies have shown²² that even brief mindfulness training can effectively change individuals' mental state, and

brief training is more convenient, more widely applicable to various groups, and can help college students regulate their mental state in a short period of time. In summary, on the basis of controlling for unrelated variables such as gender and age, this study intends to explore the impacts of brief mindfulness training on college students' mobile phone addiction and their sense of meaning in life, while also investigating the mediating effect of mindfulness training on mitigating college students' mobile phone addiction.

Methods

Subjects

The minimum sample size required for this study was calculated using G*Power 3.1. In this study, ANOVA: Repeated measures was set in statistical test, the medium effect size $f=0.25$ was set, and the power of the statistical test took the default value of $1-\beta=0.85$. It was calculated that either the mindfulness training group or the wait-list control group required at least 19 samples. Assuming a loss rate of 10%-20%, it was finally determined that the number of people in either the group of receiving mindfulness training or the neutral control group was 24. An advertisement was posted at Zhengzhou University of Light Industry for recruiting the subjects, for which the method that was convenient for sampling was used. The criteria for selecting the subjects: (1) at least 16 years old; (2) having no mindfulness study experience; (3) having no medical history of mental disorders; and (4) non-sports or art major. A total of 48 college students were selected, all of them were told that they would participate in a study on psychological training, and they signed the *Informed Consent of the Subject*. The 48 college students were randomly assigned to the mindfulness training group ($n=24$) and the control group ($n=24$) by an on-site lottery. Of them, 3 college students failed to show up due to scheduling conflict with the exam, and 1 college student was removed for missing data. In the end, 44 valid subjects were selected.

Instruments

Freiburg Mindfulness Inventory

This study employs the Chinese-version survey instrument *Freiburg Mindfulness Inventory (FMI)* for measuring college students' mindfulness level, which was prepared by Walach et al and revised by Chen Yu.²³ The FMI consists of 14 items, and it uses the four-point scale, in which an evaluation of 1~4 points from "Rarely" to "Always" is given. The higher the total score is, the higher the level of college students' mindfulness is. In this study, the coefficient of internal consistency of FMI is 0.827.

Mobile Phone Addiction Tendency Scale

This study employs the *Mobile Phone Addiction Tendency Scale (MPATS)* prepared by Xiong Jie et al.²⁴ The MPATS includes four subscales for withdrawal symptoms, salient behaviors, social comfort, and mood changes. The MPATS consists of 16 items, and it uses the five-point scale, in which an evaluation of 1~5 points from "Strongly Disagree" to "Strongly agree" is given. The higher the total score is, the higher the level of college students' mobile phone addiction is. In this study, the coefficients of internal consistency of four subscales and MPATS are 0.821, 0.758, 0.873, 0.654, and 0.908, respectively.

Chinese Meaning in Life Questionnaire

This study employs the *Chinese Meaning in Life Questionnaire (C-MLQ)*, which was prepared by Steger et al and revised by Wang Mengcheng et al.²⁵ The C-MLQ includes two subscales for the experience of meaning in life and the pursuit of meaning in life. The C-MLQ consists of 10 items, and it uses the seven-point scale, in which an evaluation of 1~7 points from "Strongly Disagree" to "Strongly agree" is given. The higher the total score, the higher the sense of meaning in life. In this study, the coefficients of internal consistency of two subscales and C-MLQ are 0.569, 0.863 and 0.836, respectively.

Intervention Methods

The experiment began on March 6, 2023, which adopted a double-blind design. The two groups of test subjects did not interfere with each other during the intervention period. The researchers were not allowed to tell the scale surveying

experimenters and the subjects about the research hypothesis, study design, or research methods. Before the experiment, the research procedure was introduced to the subjects, and the principle of privacy protection was explained.

The mindfulness training group listened to 40 minutes of mindfulness practice recordings, which were recorded in advance by a mindfulness instructor with more than 10 years of mindfulness intervention experience. After listening to the recordings, they shared their own feelings and then the practice was finished. The content of mindfulness practice is body scanning, which requires participants to focus their attention on different parts of the body. By perceiving the sensations of different parts of their body, it aims to better control their attention and feel the external environment. And the control group listened to 40 minutes of neutral news recordings. The FMI, MPATS, and C-MLQ were employed to conduct surveys on college students at baseline and after intervention.

Statistical Methods

The statistical software SPSS 25.0 was used to conduct descriptive statistics of the demographic characteristics of the subjects. The independent sample *t*-test was used to compare the pretest scores of the mindfulness training group and the control group. The repeated measures ANOVA of 2 (groups: mindfulness training group and control group) \times 2 (dates of test: pretest and posttest) was used to compare the level of mindfulness, the level of mobile phone addiction, and the sense of meaning in life, and simple effect analysis was used for those with significant differences. In addition, in this study, Andrew Hayes' Process macro for SPSS²⁶ was used to examine the mediating effect of the sense of meaning in life between mindfulness training and the mitigation of mobile phone addiction. The Bootstrap sample size was 5000. Under the 95% confidence interval, the posttest result of mobile phone addiction were used as the dependent variable, the group was used as the independent variable, and the change in the sense of meaning in life (post-test minus pre-test) was used as the mediating variable. Meanwhile, the pretest results of mobile phone addiction were controlled as concomitant variables, because the posttest results of mobile phone addiction were impacted by the pretest results. In addition, although there was no significant difference in gender and age between the two groups, in order to avoid their potential impact, the gender and age were controlled as concomitant variables, too.

Results

There were 44 valid subjects in this experiment. Among them, there were 9 men and 13 women in the mindfulness training group, while there were 4 men and 18 women in the control group, and the difference did not reach a significant level ($p>0.05$). The age range of the mindfulness training group was 17 ~ 22 years old, with an average age of (18.6 ± 1.0), while the age range of the control group was 17 ~ 20 years old, with an average age of (17.8 ± 1.8), and the difference did not reach a significant level ($p>0.05$). See Table 1.

Descriptive Statistics of the Scores in the Subscales

The scores of the pretest and posttest of the two groups on the subscales are as shown in Table 2. The results show that it is not statistically significant in terms of the differences between the mindfulness training group and the control group in the index scores of FMI ($p=0.740$), MPATS ($p=0.463$), and SCS ($p=0.065$).

The Impact of Mindfulness Training on College Students' Mental State

The results of the 2×2 variance analysis of the FMI scores show that the interaction effect between grouping and surveying time is statistically significant [$F(1, 42) = 6.68, p = 0.013, \text{partial}\eta^2 = 0.137$] (Table 3). In other words, there is

Table 1 Analysis of Differences in Demographics ($\bar{X} \pm s$) of the Two Groups of Subjects

Variable	Mindfulness Training Group (n=22)	Control Group (n=22)	t	p
Gender	1.59 \pm 0.50	1.82 \pm 0.39	-1.67	0.103
Age	18.64 \pm 0.95	17.82 \pm 1.84	0.61	0.071

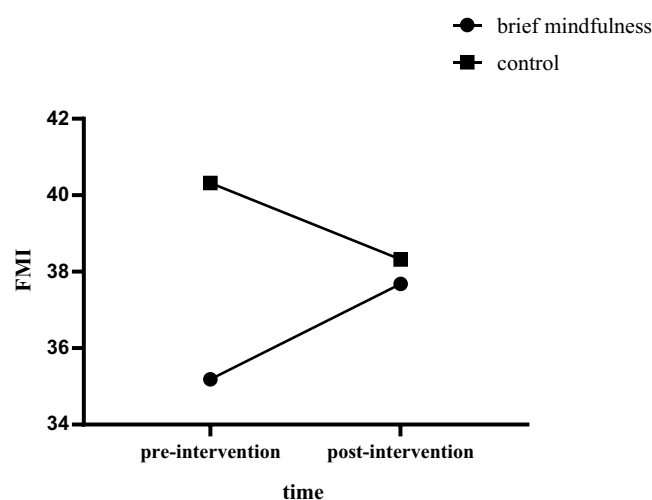
Table 2 Scores of the Two Groups in the Subscales ($\bar{X} \pm s$) and Pretest-Posttest Comparison

Variable	Mindfulness Training Group (n=22)		Control Group (n=22)		Pretest-Posttest Comparison	
	Pretest	Posttest	Pretest	Posttest	t	p
FMI	35.2±6.3	37.7±7.8	40.3±5.2	38.3±5.6	-2.94	0.740
Withdrawal symptom	16.8±5.1	13.6±4.4	16.2±4.9	16.0±5.9	0.39	0.929
Salient behavior	9.2±3.9	8.5±3.3	9.0±2.8	9.5±3.6	0.13	0.152
Social comfort	8.9±3.7	7.2±3.1	8.5±3.1	8.5±2.8	0.36	0.401
Mood change	7.9±3.3	6.5±2.4	7.1±2.8	7.3±2.6	0.84	0.414
MPATS	42.7±12.7	35.8±11.1	40.9±11.2	41.3±13.2	0.52	0.463
Experience of meaning in life	22.95±3.82	29.14±2.80	23.64±3.36	24.14±2.96	-0.63	0.533
Pursuit of meaning in life	26.32±5.91	29.68±2.66	25.23±5.14	25.59±5.52	0.65	0.157
C-MLQ	49.27±8.85	58.82±5.22	48.86±7.43	49.73±7.56	0.17	0.869

Table 3 Results of Repeated Measures ANOVA of the Subscale of the Two Groups

Variable	Within the Main Body						Between the Main Bodies		
	Time			Time × Group			F	p	Partial η^2
	F	p	Partial η^2	F	p	Partial η^2			
FMI	0.08	0.775	0.002	6.68	0.013	0.137	2.89	0.097	0.064
Withdrawal symptom	9.54	0.004	0.185	7.16	0.011	0.146	0.38	0.541	0.009
Salient behavior	0.23	0.633	0.005	2.96	0.093	0.066	0.19	0.662	0.005
Social comfort	8.15	0.007	0.163	9.08	0.004	0.178	0.30	0.587	0.007
Mood change	4.78	0.035	0.102	9.36	0.004	0.182	0.00	0.978	0.000
MPATS	8.54	0.006	0.169	11.10	0.002	0.209	0.28	0.599	0.007
Experience of meaning in life	54.46	<0.001	0.565	39.38	<0.001	0.484	6.12	0.017	0.127
Pursuit of meaning in life	9.19	0.004	0.180	5.96	0.019	0.124	3.59	0.065	0.079
C-MLQ	30.79	<0.001	0.423	21.42	<0.001	0.338	5.54	0.023	0.116

a trend in mindfulness levels that change over time, and mindfulness intervention affects this trend. The results of further simple effect analysis show that the posttest FMI score of the control group is lower than that of the pretest, but the difference is not significant ($p=0.112$), while the posttest FMI score of the mindfulness training group is significantly higher than that of the pretest ($p=0.049$). In summary, compared with that in the control group, the level of college students' mindfulness in the mindfulness training group improves significantly. See Figure 1.

**Figure 1** FMI scores of two groups in pre- and post- intervention.

The results of the 2×2 variance analysis of the MPATS scores show that the interaction effect between grouping and surveying time is statistically significant [$F(1, 42) = 11.10, p=0.002$, partial $\eta^2 = 0.209$] (Table 3). In other words, there is a trend in mobile phone addiction levels that change over time, and mindfulness intervention affects this trend. The results of further simple effect analysis show that the posttest MPATS score of the control group is higher than that of the pretest, but the difference is not significant ($p=0.774$), while the posttest MPATS score of the mindfulness training group is significantly lower than that of the pretest ($p<0.001$). In summary, compared with that in the control group, college students' mobile phone addiction in the mindfulness training group mitigates significantly. Thus, hypothesis 1 is verified. See Figure 2.

The results of the 2×2 variance analysis of the C-MLQ scores show that the interaction effect between grouping and surveying time is statistically significant [$F(1, 42) = 21.42, p<0.001$, partial $\eta^2 = 0.338$] (Table 3). In other words, there is a trend in the sense of meaning in life that changes over time, and mindfulness intervention affects this trend. The results of further simple effect analysis show that the posttest C-MLQ score of the control group is higher than that of the pretest, but the difference is not significant ($p=0.519$), while the posttest C-MLQ score of the mindfulness training group is significantly higher than that of the pretest ($p<0.001$). In summary, compared with that in the control group, college students' sense of meaning in life in the mindfulness training group improves significantly. Thus, hypothesis 2 is verified. See Figure 3.

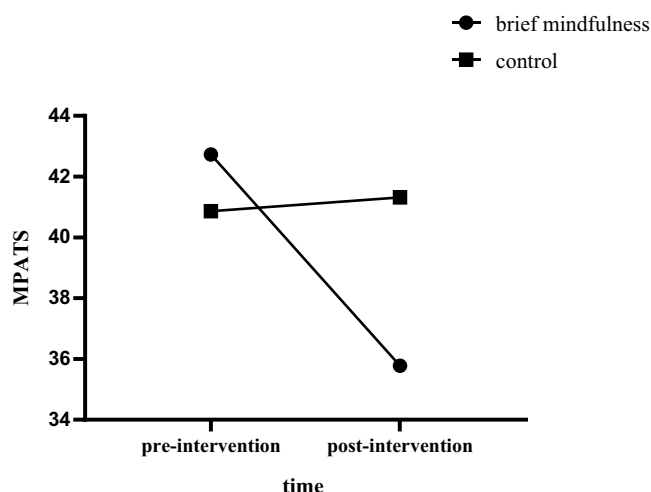


Figure 2 MPATS scores of two groups in pre- and post- intervention.

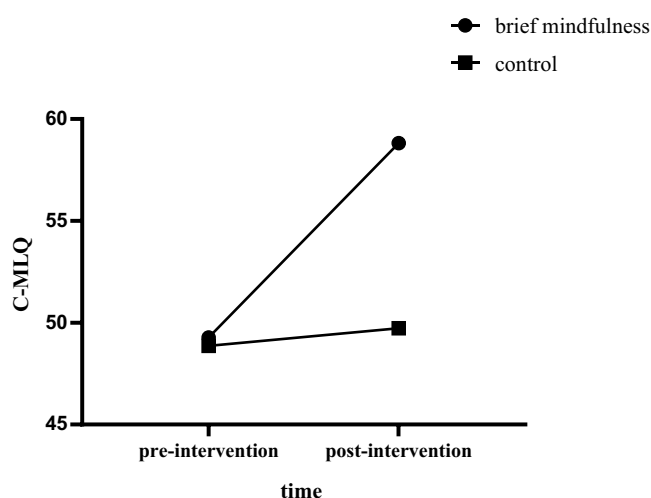


Figure 3 C-MLQ scores of two groups in pre- and post- intervention.

Table 4 Analysis of the Mediating Effect of Meaning in Life

Dependent Variable: MPATS Posttest	coeff/Effect	boot se	95% CI Lower Limit	95% CI Upper Limit
Independent variables:				
Gender	−0.33	2.38	−5.140	4.474
Age	−1.69	0.73	−3.172	−0.208
MPATS pretest	0.83	0.09	0.652	1.011
Change in C-MLQ	−0.60	0.16	−0.929	−0.281
Direct effect	1.30	2.25	−3.254	5.861
Indirect effect	4.48	2.46	0.537	11.630
Total effect	5.79	2.21	1.308	10.266

Notes: For group category, 1=mindfulness training group, 2=control group; the Bootstrap result is specified to three decimal places.

Analysis of the Mediating Effect of the Sense of Meaning in Life

In this study, Andrew Hayes' Process macro for SPSS is employed to examine the mediating effect of the sense of meaning in life. The results show that after having controlled the gender, age, and MPATS pretest, the total effect of grouping on MPATS posttest is significant ($t=2.21$, 95% CI [1.308, 10.266]); the change in C-MLQ has a significant predicting effect on MPATS posttest results ($t=-0.60$, 95% CI [−0.929, −0.281]). Further analysis has found that when the mediating variable enters the equation, the 95% Bootstrap confidence interval [0.537, 11.630] for the indirect effect does not include 0, indicating that the sense of meaning in life has a mediating effect between mindfulness training and mobile phone addiction; in addition, the 95% Bootstrap confidence interval [−3.254, 5.861] for the direct effect includes 0 (Table 4), indicating that the impact of mindfulness training on mobile phone addiction is fully explained by the mediating effect of the sense of meaning in life. In other words, the sense of meaning in life has a full mediating effect between mindfulness training and mobile phone addiction. Thus, hypothesis 3 is verified.

Discussion

Mindfulness is a complex mental state related to attention ability. Mindfulness can not only promote the cognitive reappraisal of individuals, but also reduce individuals' response to the surrounding environment and make them live in the present. This study expands the function of brief mindfulness training in the field of addictive behavioral therapy, enriches the mechanism of action of mindfulness training, and focuses on examining the impacts of mindfulness training on the level of mobile phone addiction and sense of meaning in life which are closely intertwined with the mental health and future development of college students. The results reveal that brief mindfulness training can not only directly mitigate college students' mobile phone addiction and enhance their sense of meaning in life, but also indirectly reduce their mobile phone addiction behaviors by enhancing their sense of meaning in life. The findings support the three hypotheses proposed in this study.

The Impacts of Mindfulness Training on Mobile Phone Addiction and Sense of Meaning in Life

First of all, the results of this study show that in terms of FMI scores, the interaction effect between time and group is significant. Subsequent simple effect analysis results show that compared with that of the control group, the mindfulness level of college students who have received 40 minutes of mindfulness training improves significantly. In other words, brief mindfulness training can also effectively improve individuals' mindfulness levels. Secondly, brief mindfulness training is conducive to mitigating college students' mobile phone addiction. In other words, through brief mindfulness training, college students can reduce their cravings and attention to addictions, thereby blocking the automated connection between addiction and addictive behavior and creating a harmonious and inherently positive state. This result once again verifies the positive effect of mindfulness training on negative events. Khanna et al have also suggested that addictive behavior, in which a sense of emptiness leads individuals to satisfy themselves with substances such as alcohol, nicotine or mobile phones, is the emotional and social problem caused by "mindfulness deficits".²⁷ Through mindfulness

training, most college students can take an objective view on smart-phones and gradually remain unresponsive to their cravings to smart-phones. This is reflected in that they spend less time on mobile phones, and have a lower evaluation in the importance of mobile phones to life, etc., thus mitigating their mobile phone addiction.

The results of this study also show that brief mindfulness training is conducive to enhancing college students' sense of meaning in life. In other words, brief mindfulness training can improve the system of their own meaning in life, to avoid being negatively affected by mental and behavioral impulses. These are consistent with the results of previous studies.²⁸ Previous studies have suggested that the idea of mindfulness originated in Eastern religions and philosophies.²⁹ When conducting mindfulness training, because individuals do not judge and respond to negative emotions, mindfulness training can enhance individuals' awareness of positive events in the external environment.³⁰ Such awareness is related to a high sense of meaning in life.¹⁶ In addition, the Mindfulness-to-Meaning Path Model proposed by Garland et al indicates that mindfulness helps individuals focus on positive experiences in life, thereby helping individuals develop a positive reappraisal of the meaning in life.³¹ This path model explains from a different dimension why brief mindfulness training enhances college students' sense of meaning in life.

The Mediating Effect of the Sense of Meaning in Life in the Process of Mitigating Mobile Phone Addiction Through Mindfulness Training

More importantly, this study has revealed the mechanism of action of brief mindfulness training on college students' mobile phone addiction. The results show that the sense of meaning in life has a full mediating effect in the process of mitigating mobile phone addiction through mindfulness training. In other words, brief mindfulness training can not only directly mitigate college students' mobile phone addiction, but also act indirectly on addictive behavior through the sense of meaning in life. The proportional analysis of direct and indirect effects shows that the effect of mindfulness training on mobile phone addiction is mainly the indirect effect, that is, the indirect effect of mindfulness training on mobile phone addiction through the sense of meaning in life accounts for 77% of the total effect. The result is conducive to thoroughly revealing the relationship between mindfulness training and mobile phone addiction from the perspectives of non-judgment and non-response associated with mindfulness, which is more pertinent to the reality of the psychology and behavior of contemporary college students. Firstly, mindfulness emphasizes the psychological characteristics of not judging the past and not worrying about the future. In other words, mindfulness training can help individuals not be affected by negative emotions, explore the positive meaning contained in negative events, and incorporate it into the system of their own sense of meaning in life. This helps individuals maintain a high sense of meaning in life and promote self-growth.³² Secondly, when an individual maintains his/her sense of meaning in life at a high level, he/she would have clear life goals and focus on future long-term life content. Even being in an environment of negative events, he/she would not have a negative attitude towards life or feel empty and boring. On the contrary, he/she would give more meaning to his/her life and continue to improve himself/herself, thus greatly mitigating the risk of mobile phone addiction.³³ This is why the sense of meaning in life fully mediates the effect of mindfulness training on mobile phone addiction in this study.

Research Limitations and Prospects

This study has employed the empirical research method to verify the impact and mechanism of brief mindfulness training on college students' mobile phone addiction, but there are still the following limitations: First, this study has used convenient sampling methods when recruiting the subjects, while there are more female participants recruited in this study, so caution should be exercised when making causal inferences involving gender; Second, this study has examined the mediating effect of the sense of meaning in life, but it has not thoroughly examined whether there are latent mediating variables such as self-concept³⁴ or anxiety;³⁵ Finally, although the number of participants in the experiment has met statistical requirements, due to the experimental conditions, this study has not used a large sample size to validate the mediation model. In future research, it is possible to expand the number of females in the participants, analyze whether college students' self-concept and anxiety, etc. have effects on the impact of mindfulness training, understand the mechanism of action of mindfulness training in more detail, use a large sample size to validate the hypothesis mediating model, and promote the application of mindfulness training in conquering addictive behaviors.

Conclusion

The following conclusions are drawn from this study: Brief mindfulness training can effectively mitigate college students' mobile phone addiction and enhance their sense of meaning in life; the sense of meaning in life has a mediating effect in the process of mitigating mobile phone addiction through mindfulness training.

Ethical Statement

The study was approved by the Ethics Committee of Zhengzhou University of Light Industry, and was registered in a publicly accessible primary register that participates in the WHO International Clinical Trial Registry Platform (The date of the registration: 31/5/2023; The registration number: ChiCTR2300079296). This study complies with the Declaration of Helsinki. All methods were performed in accordance with the relevant guidelines and regulations, and all participants completed an informed consent form before filling out the questionnaire. The participants were asked to sign an informed consent before the experiment, and were approved to provide informed consent on their own behalf. The original data presented in the study are now included in the ResMan IPD (<http://www.medresman.org.cn>), further inquiries can be directed to the corresponding author.

Funding

This study was supported by Research of Educational Science Planning in Henan Province "A Study on Brief Psychological Intervention for Mental Health of College Students in Henan Province", (2023YB0105). The funders provided support for the preparation and publication of this paper.

Disclosure

The authors have declared that no competing interests exist.

References

- Long J, Liu TQ, Liao YH, et al. Prevalence and correlates of problematic smartphone use in a large random sample of Chinese undergraduates. *BMC Psychiatry*. 2016;16(1):408. doi:10.1186/s12888-016-1083-3
- De-Sola Gutiérrez J, Rodríguez de Fonseca F, Rubio G. Cell-Phone Addiction: a Review. *Frontiers in Psychiatry*. 2016;7:article 175. doi:10.3389/fpsyt.2016.00175
- Hong FY, Chiu SI, Huang DH. A model of the relationship between psychological characteristics, mobile phone addiction and use of mobile phones by Taiwanese university female students. *Computers Human Behav*. 2012;28(6):2152–2159. doi:10.1016/j.chb.2012.06.020
- Gao T, Li J, Zhang H. The influence of alexithymia on mobile phone addiction: the role of depression, anxiety and stress. *J Affective Disorders*. 2018;225:761–766. doi:10.1016/j.jad.2017.08.020
- Li W, Zhang X, Chu M, Li G. The Impact of Adverse Childhood Experiences on Mobile Phone Addiction in Chinese College Students: a Serial Multiple Mediator Model. *Frontiers in Psychology*. 2020;11:article 834. doi:10.3389/fpsyg.2020.00834
- Seo DG, Park Y, Kim MK. Mobile phone dependency and its impacts on adolescents' social and academic behaviors. *Computers Human Behav*. 2016;63:282–292. doi:10.1016/j.chb.2016.05.026
- Misra S, Cheng L, Genevieve J, Yuan M. The iPhone effect: the quality of in-person social interactions in the presence of mobile devices. *Environment and Behavior*. 2014;48(2):1–24.
- Liu FB, Zhang ZQ, Liu SQ, Zhang N. Examining the Effects of Brief Mindfulness Training on Athletes' Flow: the Mediating Role of Resilience. *Evid Based Complement Alternat Med*. 2021;2021:6633658. doi:10.1155/2021/6633658
- Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. *Clin Psychol Sci Practice*. 2003;10(2):144–156. doi:10.1093/clipsy.bpg016
- Bishop SR, Lau M, Shapiro S, Carlson L. Mindfulness: a proposed operational definition. *Clin Psychol Sci Pract*. 2004;11(3):230–241.
- Lutz A, Slagter HA, Dunne JD, Davidson RJ. Attention regulation and monitoring in meditation. *Trends Cognitive Sci*. 2008;12(4):163–169. doi:10.1016/j.tics.2008.01.005
- Li L, Niu ZM, Mei SL. The Mindfulness Cognitive-Behavioral Group Therapy of Medical Students' Smartphone Addiction in Group Counseling Course. *China Acad J Electron Publishing House*. 2017;5:37–38.
- Liu FB, Zhang ZQ, Liu SQ, Feng ZT. Effectiveness of brief mindfulness intervention for college students' problematic smartphone use: the mediating role of self-control. *PLoS One*. 2022;17(12):e0279621. doi:10.1371/journal.pone.0279621
- Wang HB, Tao YK, Xu HT. Inhibition control characteristics in college students with different mobile phone addiction. *Chin Mental Health J*. 2015;29(3):226–229.
- Yek MH, Olendzki N, Kekecs Z, Patterson V, Elkins G. Presence of Meaning in Life and Search for Meaning in Life and Relationship to Health Anxiety. *Psychol Rep*. 2017;120(3):383–390. doi:10.1177/0033294117697084
- Chu STW, Mak WWS. How Mindfulness Enhances Meaning in Life: a Meta-Analysis of Correlational Studies and Randomized Controlled Trials. *Mindfulness*. 2019;11(1):177–193. doi:10.1007/s12671-019-01258-9

17. Zhang Y, Mei S, Li L, Chai J, Li J, Du H. The Relationship between Impulsivity and Internet Addiction in Chinese College Students: a Moderated Mediation Analysis of Meaning in Life and Self-Esteem. *PLoS One*. 2015;10(7):e0131597. doi:10.1371/journal.pone.0131597
18. Chen LS, Bao JW, Huang R. Relationship between meaning in life, pathological internet use and time management in college student. *China J Health Psychol*. 2019;27(6):919–923.
19. Zhao H, Song TJ, Zhang LC. Impact of life meaning and school adjustment on mobile phone addiction female college students. *China J School Health*. 2020;41(8):60–62.
20. Jiang HB, Liang HY, Li B, Tuo A. Alexithymia and mobile phone addiction among college students: mediation by boredom proneness and anxiety. *J Psychol Afr*. 2023;33(2):132–137. doi:10.1080/14330237.2023.2190223
21. Li WW, Xie G. Personality and job satisfaction among Chinese health practitioners: the mediating role of professional quality of life. *Health Psychol Open*. 2020;7(2):205510292096505. doi:10.1177/2055102920965053
22. Dickenson J, Berkman ET, Arch J, Lieberman MD. Neural correlates of focused attention during a brief mindfulness induction. *Soc Cognit Affective Neurosci*. 2013;8(1):40–47. doi:10.1093/scan/nss030
23. Chen Y. *Revision and Reliability and Validity Test of Freiburg Mindfulness Inventory (FMI) Among Chinese College Students*. Beijing: Beijing Normal University; 2011.
24. Xiong J, Zhou ZK, Chen W, You ZQ, Zhai ZY. Development of the Mobile Phone Addiction Tendency Scale for College Students. *China Mental Health J*. 2012;26(3):222–225.
25. Wang MC. Chinese Meaning in Life Questionnaire Revised in College Students and Its Reliability and Validity Test. *Chin J Clin Psychol*. 2008;16(5):459–461.
26. Hayes AF. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: The Guilford Press; 2013.
27. Khanna S, Greeson JM. A narrative review of yoga and mindfulness as complementary therapies for addiction. *Complementary Ther Med*. 2013;21(3):244–252. doi:10.1016/j.ctim.2013.01.008
28. Garland EL, Thielking P, Thomas EA, Coombs M, White S, Lombardi J. Linking dispositional mindfulness and positive psychological processes in cancer survivorship: a multivariate path analytic test of the mindfulness-to-meaning theory. *Psycho-Oncology*. 2017;26(5):686–692. doi:10.1002/pon.4065
29. Firth A, Sütterlin S, Lugo G. The role of trait and state mindfulness in cognitive performance of male adolescents. *Psychol Res Behav Manage*. 2023;16:3939–3948. doi:10.2147/PRBM.S409737
30. Boden MT, Irons JG, Feldner MT. An Investigation of Relations Among Quality of Life and Individual Facets of Emotional Awareness and Mindfulness. *Mindfulness*. 2015;6(4):700–707. doi:10.1007/s12671-014-0308-0
31. Garland EL, Farb NA, Goldin P, Fredrickson BL. Mindfulness broadens awareness and builds eudaimonic meaning: a process model of mindful positive emotion regulation. *Psychol Inq*. 2015;26(4):293–314. doi:10.1080/1047840X.2015.1064294
32. Zhang RW, Li D. How to experience a meaningful life: based on the integration of theoretical models on meaning in life. *Adv Psychol Sci*. 2018;26(4):744–760. doi:10.3724/SP.J.1042.2018.00744
33. Zhang XG, Qin J, Huang WY. Self-control mediates the relationship between the meaning in life and the mobile phone addiction tendency of Chinese college students. *Studies Psychol Behav*. 2019;17(4):536–545.
34. Yang HL, Huang X, Zhao XH, Lu AT. Trait mindfulness and cell phone addiction in adolescents: a moderated mediation model. *Social Behav Personality*. 2023;51(2):e11984. doi:10.2224/sbp.11984
35. Yang XJ, Zhou ZK, Liu QQ, Fan CY. Mobile Phone Addiction and Adolescents' Anxiety and Depression: the Moderating Role of Mindfulness. *J Child Family Stud*. 2019;28(3):822–830. doi:10.1007/s10826-018-01323-2

Psychology Research and Behavior Management

Dovepress

Publish your work in this journal

Psychology Research and Behavior Management is an international, peer-reviewed, open access journal focusing on the science of psychology and its application in behavior management to develop improved outcomes in the clinical, educational, sports and business arenas. Specific topics covered in the journal include: Neuroscience, memory and decision making; Behavior modification and management; Clinical applications; Business and sports performance management; Social and developmental studies; Animal studies. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/psychology-research-and-behavior-management-journal>