

A study on adolescent mobile phone dependence, psychological flexibility, and social support

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Abstract: Using stratified sampling, 800 students from two vocational colleges in Shandong Province were surveyed with the Mobile Phone Addiction Tendency Scale (MPATS), Social Support Rating Scale (SSRS), the Chinese version of the Acceptance and Action Questionnaire-II (AAQ-II), and the Chinese version of the Cognitive Fusion Questionnaire (CFQ). The study found that females scored higher than males on indicators of mobile phone addiction tendency, withdrawal symptoms, and salience ($t = 2.153-3.134$, all $P < 0.05$). Secondary vocational students scored higher than higher vocational students on mobile phone addiction tendency, withdrawal symptoms, social comfort, and mood modification ($t = 2.842-5.252$, all $P < 0.01$). All indicators of social support were negatively correlated with all indicators of mobile phone dependence ($r = -0.072$ to -0.208 , all $P < 0.01$), while psychological inflexibility and cognitive fusion were positively correlated with all indicators of mobile phone dependence ($r = 0.344-0.420$, all $P < 0.01$). Cognitive defusion showed a significant partial correlation with mobile phone addiction tendency ($r = 0.138$, $P < 0.01$). Psychological inflexibility, cognitive fusion, cognitive defusion, and objective support had direct predictive effects on mobile phone dependence, with social support playing a partial mediating role between mobile phone dependence and psychological flexibility. Mobile phone dependence behavior is closely related to psychological flexibility and social support. Enhancing psychological flexibility and social support can effectively reduce mobile phone dependence behavior.

Keywords: Mobile phone dependence, Social support, Psychological flexibility

1. Introduction

Mobile phone dependence is a new form of addiction that has emerged alongside the rapid development of information and communication technology and the widespread adoption of mobile phones, particularly smartphones, following internet addiction. Psychiatrists predict that mobile phone dependence will become one of the most significant types of non-drug dependencies in the 21st century [1]. Excessive use of mobile phones can easily trigger physiological illnesses [2] and impair normal psychological and social functioning [3-6]. Studies have shown that interpersonal interactions and social support also exert a certain influence on the development and progression of mobile phone use behaviors [7].

Psychological flexibility is a crucial aspect of mental health. Existing research indicates that psychological flexibility and its components (psychological inflexibility, cognitive fusion) play a significant role in altering psychopathological symptoms such as anxiety, depression, pain, and psychosis [8,9]. Studies related to mobile phone dependence have demonstrated a close association between mobile phone dependence and factors such as anxiety, loneliness, and lack of social support [10,11].

This study focuses on vocational college students, aiming to analyze and discuss the relationships among social support, psychological flexibility, and mobile phone dependence. Furthermore, it seeks to examine whether social support mediates the relationship between psychological flexibility and mobile phone dependence. The findings are intended to provide a theoretical basis for developing rational and scientific interventions and preventive measures for mobile phone dependence. A questionnaire survey was conducted among 800 adolescent students in Shandong Province from October to November 2014. The results are reported as follows.

2. Subjects and methods

2.1. Subjects

A stratified sampling method was used to select students from two vocational colleges as survey subjects. A total of 800 questionnaires were distributed, with 789 valid questionnaires collected, resulting in a response rate of 98.63%. Among the respondents, 639 were male (80.99%), and 150 were female (19.01%). There were 382 only children (48.42%) and 407 non-only children (51.58%). In terms of residence, 128 were from urban areas (16.22%), and 661 were from rural areas (83.78%). Regarding student categories, 287 were higher vocational students (36.38%), and 502 were secondary vocational students (63.62%). The age range was 14 to 23 years, with an average age of (18.0 ± 1.8) years.

2.2. Methods

2.2.1. Survey method

Trained instructors, using standardized instructions, explained the purpose and precautions of the survey. After obtaining informed consent from the participants, anonymous questionnaires were administered and collected on-site.

2.2.2. Survey instruments

Mobile Phone Addiction Tendency Scale (MPATS): The MPATS, developed by Xiong Jie et al. [12] from Central China Normal University, was used to assess mobile phone addiction among adolescent students. The scale consists of 16 items scored on a 5-point Likert scale, with higher scores indicating a higher degree of mobile phone dependence. In this study, the scale's internal consistency coefficient was 0.883. Social Support Rating Scale (SSRS): The Chinese version of the SSRS, revised by Xiao Shuiyuan et al. [13], was used to measure social support among adolescent students. The scale includes 10 items, with higher total scores indicating greater social support received by the individual. The revised scale demonstrated a test-retest reliability of 0.92, and internal consistency among items ranged from 0.89 to 0.94. Chinese Version of the Acceptance and Action Questionnaire-II (AAQ-II): The AAQ-II, revised by Cao Jing et al. [14] from the Institute of Psychology, Chinese Academy of Sciences, consists of 7 items scored on a 7-point Likert scale. Higher scores indicate a higher degree of experiential avoidance. In this study, the scale's internal consistency coefficient was 0.883. Chinese Version of the Cognitive Fusion Questionnaire (CFQ): The CFQ, revised by Zhang Wei Chen et al. [15] from the Institute of Psychology, Chinese Academy of Sciences, includes 13 items, each scored on a 7-point Likert scale. Empirical validation showed that the internal consistency coefficients were 0.936 for the Cognitive Fusion subscale (CFQ-F) and 0.764 for the Cognitive De fusion subscale (CFQ-D). The total CFQ score was significantly positively correlated with depression ($r = 0.568$, $P < 0.01$) and anxiety ($r = 0.603$, $P < 0.01$), indicating good reliability and validity of the scale.

2.2.3. Statistical analysis

Data were analyzed using SPSS 17.0 software for descriptive analysis, correlation analysis, and regression analysis. Path analysis was performed using AMOS 17.0, with $P < 0.05$ considered statistically significant.

3. Results

3.1. Descriptive statistical analysis

The analysis revealed significant differences in mobile phone addiction tendency, withdrawal symptoms, social comfort, and mood modification across gender ($P < 0.05$), with female students scoring significantly higher than male students on these indicators. No significant differences were found in mobile phone addiction indicators based on whether the students were only children or their place of origin. Regarding student categories, significant differences were observed in mobile phone addiction tendency, withdrawal symptoms, social comfort, and mood modification, with secondary vocational students scoring significantly higher than higher vocational students. See Table 1.

Table 1 Differential Analysis of Mobile Phone Addiction Tendency by Gender and Student Category (Score, $\bar{x} \pm s$)

Item	Gender		t-value	Student Category		t-value
	Male (n=639)	Female (n=150)		Secondary Vocational (n=502)	Higher Vocational Students (n=287)	
Mobile Phone Addiction Tendency	2.75±0.76	2.90±0.74	-2.153 ^a	2.86±0.79	2.64±0.69	3.960 ^b
Withdrawal Symptoms	2.93±0.84	3.11±0.83	-2.270 ^a	3.03±0.87	2.85±0.79	2.842 ^b
Salience	2.46±0.84	2.70±0.83	-3.134 ^b	2.54±0.90	2.46±0.74	1.343
Social Comfort	2.77±0.93	2.81±0.85	-0.479	2.90±0.94	2.57±0.83	5.215 ^b
Mood Modification	2.74±0.92	2.83±0.86	-1.038	2.88±0.94	2.54±0.83	5.252 ^b

3.2. Correlation analysis of phone dependence, support, and flexibility

The results of the study indicate a certain degree of correlation between mobile phone dependence, social support, and psychological flexibility. Specifically, all indicators of mobile phone addiction showed a significant negative correlation with all indicators of social support. All indicators of mobile phone addiction demonstrated a significant positive correlation with psychological inflexibility and cognitive fusion. All indicators of social support exhibited a significant negative correlation with psychological inflexibility and cognitive fusion. Cognitive defusion showed no significant correlation with any indicators of mobile phone dependence ($P > 0.05$). After controlling for psychological inflexibility and cognitive fusion, a partial correlation analysis was conducted between cognitive defusion and mobile phone addiction tendency, revealing a significant partial correlation ($r = 0.138, P < 0.01$). See Table 2.

Table 2 Correlation Analysis Between Adolescent Mobile Phone Dependence, Social Support, and Psychological Flexibility (r)

	Mobile Phone Addiction	Withdrawal Symptoms	Salience	Social Comfort	Mood Modification
Total Support Score	-0.208 ^b	-0.174 ^b	-0.198 ^b	-0.215 ^b	-0.139 ^b
Objective Support	-0.164 ^b	-0.142 ^b	-0.164 ^b	-0.149 ^b	-0.113 ^b
Subjective Support	-0.192 ^b	-0.160 ^b	-0.185 ^b	-0.196 ^b	-0.131 ^b
Support Utilization	-0.122 ^b	-0.096 ^b	-0.100 ^b	-0.170 ^b	-0.072 ^b
Psychological Inflexibility	0.420 ^b	0.371 ^b	0.364 ^b	0.373 ^b	0.354 ^b
Cognitive Fusion	0.405 ^b	0.352 ^b	0.348 ^b	0.369 ^b	0.344 ^b
Cognitive Defusion	-0.051	-0.059	-0.037	-0.049	-0.022

3.3. Regression analysis of mobile phone dependence, support, and flexibility

To further examine the magnitude of the influence of each variable on mobile phone dependence, a stepwise regression analysis was conducted with total social support, objective support, subjective support, support utilization, psychological inflexibility, cognitive fusion, and cognitive defusion as independent variables, and the mobile phone addiction tendency score as the dependent variable. The analysis revealed that psychological inflexibility, cognitive fusion, cognitive defusion, and objective support entered the regression equation. The multiple regression coefficient (R) was 0.465, the coefficient of determination (R^2) was 0.216, and the adjusted coefficient of determination (R^2) was 0.212. The regression equation was tested and found to be significant, with $F(4, 788) = 53.984, p < 0.000$. The t-tests for psychological inflexibility, cognitive fusion, cognitive defusion, and objective support reached highly significant levels. The regression analysis results indicate that psychological inflexibility, cognitive fusion, cognitive defusion, and objective support have predictive effects on mobile phone dependence. The joint explained variance was 21.6%,

meaning these variables collectively predict 21.6% of the variance in mobile phone addiction tendency. See Table 3.

The multiple regression equation is: $y = 17.95 + 0.23x_1 + 0.28x_2 + 0.14x_3 - 0.07x_4$ (where y represents mobile phone addiction tendency, x_1 represents psychological inflexibility, x_2 represents cognitive fusion, x_3 represents cognitive defusion, and x_4 represents objective support).

Table 3 Regression Analysis of Social Support and Psychological Flexibility on Mobile Phone Dependence

Predictor Variable	R ²	F	B	SE	β	t-value
Psychological Inflexibility	0.216	53.984	0.41	0.08	0.23	4.86b
Cognitive Fusion			0.42	0.08	0.28	5.47b
Cognitive Defusion			0.45	0.12	0.14	2.37b
Objective Support			-0.21	0.10	-0.07	-2.07a

3.4. Mediating effect of social support on flexibility and phone dependence

To further examine the underlying mechanisms among psychological flexibility, social support, and mobile phone dependence in adolescent students, a mediating effect test was conducted following the aforementioned steps. Experiential avoidance, cognitive defusion, and cognitive fusion were used as independent variables, mobile phone addiction tendency as the dependent variable, and various dimensions of social support as mediating variables.

Table 4 presents the results of the mediating effect analysis for each dimension of social support. Here, X1 represents experiential avoidance, X2 represents cognitive fusion, X3 represents cognitive defusion, Y represents mobile phone addiction tendency, M1 represents objective support, M2 represents subjective support, and M3 represents support utilization. The stepwise test results indicate that experiential avoidance, cognitive fusion, and cognitive defusion have a direct effect on mobile phone addiction tendency, while also indirectly influencing mobile phone addiction tendency through objective support. When social support variables were included, the regression coefficients of experiential avoidance, cognitive fusion, and cognitive defusion on mobile phone addiction significantly decreased (from 0.24 to 0.23), indicating that social support plays a partial mediating role between psychological flexibility and mobile phone dependence ($c' = 0.435, p < 0.001$). Experiential avoidance, cognitive fusion, and cognitive defusion have a direct effect on mobile phone dependence, while also indirectly influencing mobile phone dependence through social support.

Table 4 Test of the Mediating Effect of Social Support on Psychological Flexibility and Mobile Phone Dependence (n=789)

Step	Standardized Regression Equation	Standard Error	t-value	p-value
Step1	Y=0.24X1	0.01	5.03	0.000
	+0.30X2	0.01	5.67	0.000
	+0.14X3	0.01	3.91	0.000
Step2	M1=-0.20X1	0.02	-5.61	0.000
	M2=-0.24X1	0.08	-4.96	0.000
	-0.11X2	0.01	-4.30	0.003
	-0.12X3	0.02	-2.96	0.019
	M3=-0.28X1	0.01	-8.03	0.000
Step3	Y=0.23X1	0.01	4.84	0.000
	+0.28X2	0.01	5.47	0.000

Step	Standardized Regression Equation	Standard Error	t-value	p-value
	+0.13X3	0.01	3.74	0.000
	-0.07M1	0.01	-2.07	0.039

To make the relationships between variables more intuitive and clear, a path diagram of psychological flexibility, social support, and mobile phone dependence was constructed based on the above regression analysis, as shown below:

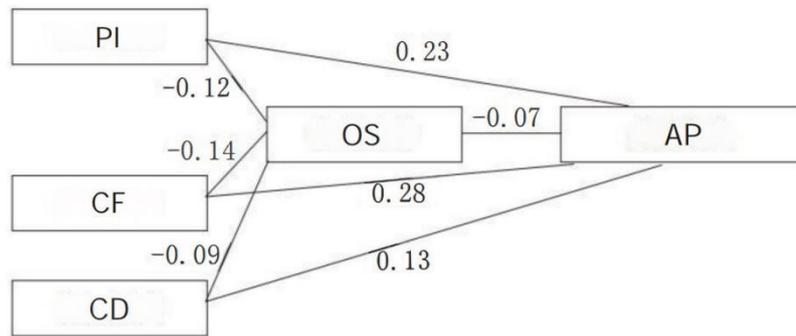


Figure 1. Path diagram of psychological flexibility, social support, and mobile phone dependence.

4. Discussion

The study results indicate that female students exhibit a higher degree of mobile phone dependence compared to male students. This may be related to the higher levels of depression and anxiety observed in females [16]. Previous studies have shown a significant positive correlation between mobile phone dependence and anxiety [17]. Earlier research also found a significant positive correlation between mobile phone dependence and attachment anxiety, suggesting that individuals with high attachment anxiety are more likely to develop mobile phone dependence behaviors, as they tend to exhibit more pronounced anxiety and emotional traits [18]. The study further revealed that secondary vocational students have a significantly higher degree of mobile phone dependence than higher vocational students, consistent with earlier findings [10].

Correlation analysis results demonstrate a significant negative correlation between the degree of mobile phone dependence and social support. Individuals with lower social support scores are more prone to excessive mobile phone use and dependence behaviors, aligning with prior research [10]. All indicators of mobile phone dependence showed a significant positive correlation with psychological inflexibility and cognitive fusion, reflecting psychological flexibility. This suggests that individuals with poorer psychological flexibility are more likely to develop mobile phone dependence behaviors. While no studies directly examining the relationship between psychological flexibility and addictive behaviors have been identified, existing research indicates that psychological inflexibility and cognitive fusion are associated with various psychopathological indicators, such as anxiety and depression [9, 10, 19, 20]. Moreover, mobile phone dependence is closely linked to anxiety and depression.

This survey also found that psychological inflexibility, cognitive fusion, cognitive defusion, and objective support entered the regression equation for mobile phone dependence. This indicates that the three indicators negatively reflecting psychological flexibility, along with objective support, are effective predictors of mobile phone addiction among adolescent students, significantly predicting mobile phone dependence behaviors. Further analysis revealed that psychological flexibility indicators—psychological inflexibility, cognitive fusion, and cognitive defusion—not only have a direct impact on mobile phone dependence but also indirectly influence mobile phone dependence behaviors through social support.

5. Conclusion

In summary, psychological flexibility and social support are closely related to mobile phone dependence. Psychological flexibility directly affects mobile phone dependence while also indirectly influencing dependence behaviors through social support. This insight suggests that when developing intervention programs for mobile phone dependence, implementing measures to enhance objective support for individuals and improve their psychological flexibility can effectively reduce the occurrence of mobile phone dependence behaviors.

6. References

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