

Factors that Influence Mobile Phone Addiction among Chinese Middle School Students

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Abstract

In recent years, the widespread use of mobile phones has significantly impacted daily life, particularly among younger populations. In China, the increasing reliance of middle school students on mobile phones has raised concerns about addiction and its adverse effects on academic performance, social interactions, and mental health. Various psychological, social, and environmental factors contribute to this addiction, emphasizing the need for effective interventions. This study aimed to investigate: 1) factors correlating with mobile phone addiction among Chinese middle school students and 2) factors influencing mobile phone addiction. The study involved 1,342 middle school students from Chongqing Agricultural School, using a scale with discrimination ranging from 0.22 to 0.80 and a reliability coefficient of 0.89. Statistical analyses included Pearson product-moment correlation coefficients and multiple regression analyses.

The research results were found as follows: 1) General factors, family factors, and mobile phone use factors correlated to mobile phone addiction with statistical significance of .05 level. 2) General factors, family factors, and mobile phone use factors predicted the power of mobile phone addiction was significant at the .05 level at 29.00 percent as follows: sex (X_1) age (X_2) GPA 0.00–1.50 (X_3) GPA 1.51–2.50 (X_4) GPA 2.51–3.50 (X_5) eldest child (X_7) middle child (X_8) youngest child (X_9) authoritarian (X_{11}) authoritative (X_{12}) permissive (X_{13}) reflect personality (X_{17}) and lower 1 hours (X_{20}) were increased, affecting mobile phone addiction, On the other hand, interpersonal communication needs (X_{15}) kill time (X_{16}) entertainment (X_{18}) and 1–2 hours (X_{21}) were decreased, affecting mobile phone addiction. This study offers insights for educators and parents to combat

mobile phone addiction among middle school students. It suggests integrating findings into educational principles, implementing practical measures for student well-being and academic success, and promoting healthy tech habits at home through tailored interventions, academic support, parenting classes, and awareness campaigns on responsible phone use.

Keywords: Factor; Mobile Phone Addiction; Middle School Students

Introduction

Mobile phones are becoming more and more common in the digital age, especially among young people. It has led to worries about the possible harm they might do to several facets of life, particularly the addictive habits that come with using them (Raut, 2021). Data from the 2023 National Research Report on Internet Usage of Teenager shows that 87.0% of teenagers own Internet devices. Furthermore, 91.3% of teenagers use mobile phones to access the Internet, with 62.8% of them using mobile phones specifically for playing games. (China Internet Network Information Center, 2023) Teenagers, especially middle school students, are in a critical period of physical and mental development. They experience mental vulnerability, weak self-control, and susceptibility to temptations. Prolonged engagement in the virtual realm of mobile phones can lead to the development of mobile phone addiction. Mobile phone addiction not only results in certain psychological and social issues among middle school students but also leads to a series of physical problems. Prolonged use of mobile phones can cause severe neck muscle strain, while extended periods of sitting or lying down to watch mobile phones can result in uncoordinated vision of both eyes and myopia. (Liang et al, 2023) Therefore, understanding the reasons for middle school students' mobile phone addiction has important practical significance for guiding them to use mobile phones rationally and advocating for the importance of mobile phone use norms in society. In previous research, numerous scholars have examined factors that influence mobile phone addiction among students. Prasittichok et al. (2023) explored the influence of personal factors such as new media literacy and self-regulation, as well as environmental factors such as social support and family upbringing on mobile phone addiction. Based on a survey of 140 students. Liu et al. (2024) examined the impact of family dynamics on mobile phone addiction among adolescents. The research specifically focused on investigating the influence of variables such as the father-child relationship, parental relationships, maternal support for the father-son relationship, and perceived father involvement on mobile phone addiction. Chen (2022) found that the environment of Chinese middle

schools is distinct, influenced by cultural, family, and educational elements that can have a big impact on how this group of students feel and act when using mobile phones.

While previous research has explored various aspects influencing smartphone addiction among adolescents, particularly middle school students, there has been a lack of comprehensive investigation into the variables involved. As the issue of mobile phone addiction among Chinese middle school students becomes increasingly severe. This study intends to fill the existing research gap by conducting a detailed investigation into the diverse factors that impact mobile phone addiction among middle school students in China. Through quantitative analysis of the interaction among general factors, family factor and mobile phone use factors to investigate the variables that correlating and affecting mobile phone addiction among middle school students, illuminating the complex interactions between general factors such as sex, age, academic performance, family factors such birth order and parenting style, and mobile phone use factors that contribute to this condition.

This research paper presents valuable insights that can be utilized to shape educational policies, provide guidance to parents, and develop intervention programs focused on nurturing a positive and balanced connection with technology among adolescents in China. By gaining a thorough understanding of the factors contributing to mobile phone addiction, efforts can be directed towards establishing an environment that promotes the holistic development of middle school students in the era of digital technology.

Research Objectives

1. To study factors correlating mobile phone addiction among Chinese middle school students.
2. To study factors affecting mobile phone addiction among middle school students.

Literature Review

Factors of Mobile Phone Addiction

According to the literature review, the factors contributing to mobile phone addiction can be summarized as follows:

General Factors: Age, Sex, and Academic Performance

Age: Teens are more likely to become addicted to cell phones than any other age group. adolescents under 20 years old are the most at-risk for cell phone addiction because this age group

is more likely to experience behavioral problems. (De-Sola et al., 2016) Bianchi and Phillips (2005) investigated age and sex in demographic variables as independent variables and mobile phone addiction behavior as dependent variables, and showed that age factors had a strong predictive effect on mobile phone addiction behavior.

Sex: Moser (1993) mention that sex pertains to the biological traits that distinguish individuals as either female or male. Tian et al. (2017) found that there are significant differences in Internet addiction behaviors between men and women. Men spend more time online each week than women, and use online games more than women, which may be caused by different interest points of different genders. Male college students are more likely to seek new and different experiences brought by online games. Studies have shown that gender has a certain impact on mobile phone addiction in middle school students. There are significant differences between boys and girls in the dimensions and total scores of mobile phone addiction in middle school students. Specifically, boys are significantly higher than girls in the positive expectation dimension, while girls are significantly higher than boys in the other four dimensions and total score, indicating that girls are more serious than boys in the overall and multi-dimensional mobile phone addiction. Therefore, gender has a certain impact on middle school students' mobile phone addiction, but at the same time, there are other factors such as academic performance will also have an impact on mobile phone addiction.

Academic performance: Academic performance, a widely employed gauge of success in educational settings, is defined as the degree to which a student completes their studies and associated tasks (Aminu & Timothy, 2014). The impact of academic performance on mobile phone addiction for middle school students is a complex problem. On the one hand, some studies have shown a negative correlation between mobile phone addiction and academic performance. Cell phone addiction may distract students and reduce their motivation and efficiency, thus affecting their academic performance. In addition, mobile phone addiction may also lead to a waste of time, making it difficult for students to effectively plan and use their study time, leading to a lack of focus in learning, and thus affecting their academic performance. On the other hand, academic performance is not the only factor affecting mobile phone addiction for middle school students. Other factors can also affect mobile phone addiction. For example, some students may overuse their mobile phones due to lack of self-control or pursuit of stimulation, while others may be prone to addiction to their mobile phones because of improper family supervision or education methods.

Family Factors: Birth Order, Parenting Style

Birth order: Birth order means that the numerical order of a child's birth within a family (Paulhus, 2008). There is no clear scientific research proving that birth order has a direct impact on mobile phone addiction among middle school students. However, birth order may influence a child's upbringing and family status, thus further influencing their mobile phone use. For example, the first child may be more watched and regulated by parents, so they may have less likely to overuse their phones. Conversely, later children may get less regulation and more freedom, which may make them more addicted to their mobile phones. Furthermore, different birth order may influence a child's psychological traits and social status and thus their use of the phone. For example, the first-born child may be more responsible and disciplined, while the later child may be more likely to feel lonely and anxious, and thus more likely to use mobile phones for social support and comfort.

Parenting style: Parenting style denotes the parenting methods employed by the parents (Nancy, 1999). The influence of parental education style on the mobile phone addiction of middle school students is a topic of much attention. Some studies suggest that inappropriate parenting practices may increase the risk of cell phone addiction in children. First, both overprotection and over strict parenting practices can lead to problems with mobile phone use. Overprotected parents may limit too much of their children's freedom and make them feel lack of autonomy and desire to explore, while excessively strict parents may make their children have a rebellious mentality and instead seek entertainment and social interaction through mobile phones. Secondly, the lack of fatherly love or maternal love family environment may also affect children's mobile phone use behavior. In this environment, children may be insecure and become over-dependent on their mobile phones to seek emotional satisfaction. In addition, a neglected parenting style may also increase the risk of mobile phone addiction. Such parents may be too busy with work or other things to care about their children's emotional needs, and their children may use their mobile phones excessively because of their lack of companionship. In contrast, democratic parenting practices can help reduce their children's risk of mobile phone addiction. Such parents can give their children enough care and support, but also give them appropriate freedom and independence. Children who grow up in this environment tend to have better control over their mobile phone use behavior. In conclusion, the impact of parenting style on mobile phone addiction in middle school students is a complex problem. Parents should pay attention to their parenting style, give their children enough care and support

and also appropriately limit their mobile phone use behavior. Only in this way can we help children establish healthy habits of using mobile phones and avoid the occurrence of mobile phone addiction.

Mobile Phone Use Factors: Use motivation and Frequency of Use

Mobile phone use factors refer to the motivations and frequency of use associated with middle school students' engagement with their mobile phones. These factors include the desire for social interaction, information acquisition, and entertainment, as well as the regularity with which students use their mobile phones to fulfill these needs. The combination of these elements contributes to understanding the various aspects and influences shaping mobile phone usage patterns among middle school students (Choi & Lee, 2015). The influence of the motivation on mobile phone addiction in middle school students is an important topic. The motivation of middle school students to use mobile phones mainly includes the following aspects:

Social motivation: One of the main motivations for middle school students to use their mobile phones is social interaction. They can keep in touch with friends, family and classmates through their mobile phones, share their lives and feelings, and learn about others. This social motivation can meet the social needs of middle school students and enhance their social support and sense of belonging.

Motivation for information acquisition: Another important motivation for middle school students to use mobile phones is to obtain information and knowledge. They can access the information and knowledge they need by surfing the Internet, checking information, watching news, listening to music and watching videos. This kind of information acquisition motivation can satisfy the middle school students' thirst for knowledge and the desire to explore.

Entertainment motivation: the mobile phone can also provide entertainment and recreation functions for middle school students. They can relax themselves and relieve stress and fatigue by playing games, watching movies, listening to music and checking microblogs. This recreational motivation can meet the entertainment needs of middle school students and provide the experience of relaxation and enjoyment.

The literature reviewed above underscores the impact of age, sex, and academic performance on mobile phone addiction among middle school students, with studies by De-Sola et al. (2016), Bianchi and Phillips (2005), and Aminu & Timothy (2014) highlighting these factors. However, further exploration is needed to understand their dynamic interactions and developmental implications for addiction progression. Gender-specific addiction patterns across diverse socio-cultural

contexts also warrant systematic analysis. Additionally, the influence of family factors like birth order and parenting styles, as discussed by Paulhus (2008) and Nancy (1999), requires clarification regarding their mechanisms and comparative impacts on mobile phone use habits. Choi & Lee (2015) emphasize motivations such as social interaction, information acquisition, and entertainment as pivotal drivers, yet comprehensive demographic variations and longitudinal studies are lacking to fully grasp how these motivations evolve and impact addiction development. Overall, while current research offers valuable insights, integrated and systematic analyses are needed across these dimensions to provide a holistic understanding of mobile phone addiction and guide effective intervention strategies.

This research will utilize established theories as a framework to investigate the factors contributing to mobile phone addiction among middle school students, particularly focusing on Chinese adolescents. By examining these factors, it aims to uncover broader implications for this demographic. Understanding these influences is essential for developing effective strategies to address and mitigate mobile phone addiction among adolescents.

Conceptual Framework

This study aimed to study the factors correlating and affecting mobile phone addiction among middle school students. The figure below describes the conceptual framework of the study.

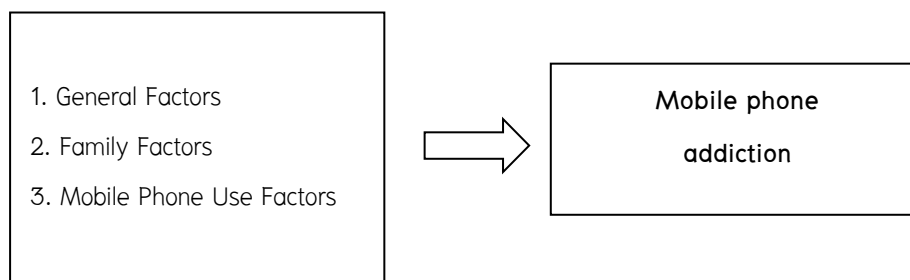


Fig. 1 Conceptual Framework

Research Methodology

Population and Sample

A questionnaire survey was conducted at Chongqing Agricultural School, involving middle school students from Grade 1, 2, and 3. The study population comprised 2,236 middle school students at Chongqing Agricultural School, from which a sample group of 1,342 students was selected through simple random sampling, with sixty percent of classes randomly chosen from each grade.

Research Instrument

The research instrument utilized in this study was a questionnaire, tailored in accordance with the established research framework. The researcher developed this questionnaire with the aim of exploring what factors correlating and affecting mobile phone addiction among Chinese middle school students. These include general factors such as sex, age, academic performance, family-related factors like birth order and parenting style, mobile phone use factors and mobile phone addiction. The IOC scores for all of the variables all fell within 0.67 and 1.00. The results indicated that the questionnaire passed the content validity test, signifying that the items are considered appropriate for use in the research. The Cronbach's alpha value for all items is 0.93, indicating a high level of reliability. The items in survey on student mobile phone addiction (15 items) was rated by 5 level as shown in Table 1 and Table 2.

Table 1 Positive item

Item number	Answer				
	Rarely	Occasionally	Sometimes	Often	Always
	1	2	3	4	5
12,14,15	Score				
	1	2	3	4	5

Table 2 Negative item

Item number	Answer				
	Rarely	Occasionally	Sometimes	Often	Always
	1	2	3	4	5
1,2,3,4,5,6,7,8,9,10,11,13	Score				
	5	4	3	2	1

Data Collection

After coordinating with the school, the questionnaire distribution occurred between October 13 and November 11. At the designated time, a standardized questionnaire was disseminated on-site for the survey. Subsequently, a unified collection of questionnaires was conducted, during which invalid questionnaires were excluded from the dataset.

Data Analysis

After data collection, the researcher input the data sequentially into the SPSS software. Utilize SPSS for conducting data analysis, employing Pearson's product-moment correlation

coefficient (r) to identify correlations between variables. Input the variables showing significant correlations one at a time into the regression equation, and examine the predictions between these variables.

Symbols Used in Data Analysis

Data analysis and mean of result of data analysis researcher determine symbol used data analysis.

n	Replace	Sample Size
p	Replace	p-value
b	Replace	Raw Scores Linear Regression
SE	Replace	Standard Error
β	Replace	Standard Scores Linear Regression
R^2	Replace	Square Multiple Correlation Coefficient
R^2_{adj}	Replace	Adjust Square Multiple Correlation Coefficient
df	Replace	Degree of Freedom
F	Replace	F-Test
t	Replace	t-test
p	Replace	p-value

Abbreviation Used in Data Analysis

Researcher determine abbreviation used data analysis.

X_1	Replace	Sex
X_2	Replace	Age
X_3	Replace	GPA 0.00–1.50
X_4	Replace	GPA 1.51 – 2.50
X_5	Replace	GPA 2.51 – 3.50
X_6	Replace	GPA 3.51 – 4.00
X_7	Replace	Eldest Child
X_8	Replace	Middle Child
X_9	Replace	Youngest Child
X_{10}	Replace	Only Child
X_{11}	Replace	Authoritarian
X_{12}	Replace	Authoritative

X ₁₃	Replace	Permissive
X ₁₄	Replace	Uninvolved
X ₁₅	Replace	Interpersonal Communication Needs
X ₁₆	Replace	Kill Time
X ₁₇	Replace	Reflect Personality
X ₁₈	Replace	Entertainment
X ₁₉	Replace	Study or Work Needs
X ₂₀	Replace	Lower 1hours
X ₂₁	Replace	1–2 Hours
X ₂₂	Replace	3–4 Hours
X ₂₃	Replace	5–6 Hours
X ₂₄	Replace	Upper 7 Hours
Y	Replace	Mobile Phone Addiction

Research Result

This research sample consists of 1,342 students who answered the questionnaire. The demographic data of the respondents, divided by gender, age, and studying level, are as follows:

Table 3 Number and percentage of Middle school students classified by general characteristics (n = 1342 persons)

General Characteristics	number	Percentage
Gender		
Male	746	55.6
Female	596	44.4
Age (years)		
13	251	18.7
14	410	30.6
15	439	32.7
16	242	18
Level		
Middle school level 1	463	34.5
Middle school level 2	437	32.6
Middle school level 3	442	32.9

The Relationship between Factors and Mobile Phone Addiction among Chinese Middle School Students

Researcher studied relationship between factors and mobile phone addiction among Chinese middle school students by Pearson Product–Moment Correlation Coefficient as table 3.

Table 4 Correlation Coefficient of the factors and mobile phone addiction among Chinese middle school students

Factors	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂
X ₁	1.00											
X ₂	0.02	1.00										
X ₃	0.09	0.00	1.00									
X ₄	0.08*	-0.18*	-0.51*	1.00								
X ₅	-0.12*	-0.01	-0.30*	-0.41*	1.00							
X ₆	-0.10*	0.30*	-0.22*	-0.30*	-0.17*	1.00						
X ₇	-0.12*	0.14*	-0.05*	-0.04	0.02	0.11*	1.00					
X ₈	0.09*	-0.10*	-0.03	0.16*	-0.09*	-0.08*	-0.40*	1.00				
X ₉	0.32*	0.08*	0.07*	-0.02	-0.12*	0.08*	-0.44*	-0.29*	1.00			
X ₁₀	-0.32*	-0.17*	0.03	-0.09*	0.21*	-0.16*	-0.34*	-0.23*	-0.25**	1.00		

Table 4 (Cont.)

X_{22}	X_{21}	X_{20}	X_{19}	X_{18}	X_{17}	X_{16}	X_{15}	X_{14}	X_{13}	X_{12}	X_{11}
0.03	0.15*	-0.29*	0.02	0.04	-0.02	0.05*	-0.05*	-0.09*	-0.07*	-0.08*	0.22*
0.10*	0.04	0.00	-0.01	0.17*	0.10*	-0.13*	-0.14*	-0.01	-0.01	0.04	-0.01
0.18*	-0.06*	0.03	0.02	0.05*	-0.07*	0.05*	-0.02	0.11*	-0.10*	-0.14*	0.10*
-0.04	0.03	-0.01	0.02	-0.12*	-0.02	0.08*	0.06*	-0.08*	-0.04	0.08*	0.05
-0.09*	0.06*	0.00	-0.03	0.00	0.10*	-0.06*	-0.04	0.06*	0.02	-0.06*	-0.02
-0.07*	-0.03	-0.02	-0.04	0.11*	0.01	-0.12*	-0.01	-0.10*	0.18*	0.15*	-0.19*
-0.01	0.12*	-0.22*	0.04	-0.03	0.14**	-0.15*	-0.00	-0.00	0.15*	-0.09*	-0.07*
-0.10*	0.03	0.05*	-0.03	0.02	-0.14*	0.08*	0.05*	-0.02	-0.14*	0.08*	0.08*
0.04	-0.07*	0.02	-0.01	0.00	0.06*	-0.05*	-0.01	-0.04	-0.04	-0.02	0.10**
0.07*	-0.12*	0.20*	0.00	0.02	-0.10**	0.16**	-0.03	0.08*	0.00	0.05	-0.11*
0.12*	-0.02	-0.12*	0.00	0.01	-0.03	-0.10*	0.09*	-0.20*	-0.50*	-0.35*	1.00
-0.09*	-0.14*	0.17*	0.00	0.15*	-0.15*	0.01	-0.00	-0.13*	-0.32*	1.00	

Table 4 (Cont.)

Factors	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	Y
X_{13}	1.00												
X_{14}	-0.18*	1.00											
X_{15}	-0.09*	0.02	1.00										
X_{16}	0.02	0.05	-0.31*	1.00									
X_{17}	0.13*	0.02	-0.46*	-0.21*	1.00								
X_{18}	-0.05	-0.08*	-0.42*	-0.19*	-0.28*	1.00							
X_{19}	0.04	-0.03	-0.10*	-0.04	-0.07*	-0.06*	1.00						
X_{20}	-0.01	0.01	0.08*	-0.02	-0.17*	0.11*	-0.04	1.00					
X_{21}	0.08*	0.05*	0.01	0.00	0.17*	-0.19*	-0.02	-0.37*	1.00				
X_{22}	-0.13*	0.06*	-0.04	-0.07*	-0.06*	0.19*	-0.02	-0.12*	-0.12*	1.00			
X_{23}	0.17*	-0.08*	-0.094*	0.15*	0.07*	-0.08*	-0.03	-0.32*	-0.33*	-0.10*	1.00		
X_{24}	-0.19*	-0.01	0.01	-0.10*	-0.05*	0.08*	0.13*	-0.29*	-0.30*	-0.10*	-0.26*	1.00	
Y	-0.03	-0.06*	-0.10*	-0.06*	0.10*	0.05*	0.02	-0.08*	-0.11*	0.26*	0.10*	-0.01	1.00

Note: * $p < .05$

The results showed that the relationship between general factors and mobile phone addiction among Chinese middle school students had positive correlation coefficient between 0.06 to 0.26 sex (X_1) and mobile phone addiction (Y) had the highest positive correlation coefficient to 0.26 age (X_2) and mobile phone addiction (Y) had the lowest positive correlation coefficient to 0.06 and GPA 3.51 – 4.00 (X_6) and mobile phone addiction had negative correlation coefficient to -0.25 .

Family factors and mobile phone addiction (Y) had positive correlation coefficient between 0.08 to 0.09 authoritarian (X_{11}) and mobile phone addiction (Y) had the highest positive correlation coefficient 0.09 eldest child (X_7) and mobile phone addiction (Y) had the lowest positive correlation coefficient to 0.08. Family Factors and mobile phone addiction (Y) had negative correlation coefficient between -0.16 to -0.06 only child (X_{10}) and mobile phone addiction (Y) had the negative highest correlation coefficient to -0.16 uninvolved (X_{14}) and mobile phone addiction (Y) had the negative lowest correlation coefficient to -0.06 .

Mobile phone use factors and mobile phone addiction had positive Correlation coefficient between 0.05 to 0.26 3–4 hours (X_{22}) and mobile phone addiction (Y) had the positive highest correlation coefficient to 0.26 entertainment (X_{18}) and mobile phone addiction (Y) had the positive highest correlation coefficient to 0.05 Mobile phone use factors and mobile phone addiction had negative correlation coefficient between -0.11 to -0.06 1–2 hours (X_{21}) and mobile phone addiction had negative correlation coefficient to -0.11 kill time (X_{16}) and mobile phone addiction (Y) had the negative lowest Correlation coefficient to -0.06 .

Factors Affecting Mobile Phone Addiction among Chinese Middle School Students

Before researcher analyzed factors affecting of mobile phone addiction among Chinese middle school students. Researcher had verified relationships between factors affecting and mobile phone addiction by Tolerance and VIF. After that researcher analyzed Multiple Regression Analysis by enter method as table 5.

Table 5 Verified relationships between factors affecting of mobile phone addiction among Chinese middle school students (n=1,342)

The Factors Affecting	Tolerance	VIF
Sex (X_1)	0.66	1.51
Age (X_2)	0.79	1.26
GPA 0.00–1.50 (X_3)	0.30	3.30
GPA 1.51 – 2.50 (X_4)	0.29	3.47
GPA 2.51 – 3.50 (X_5)	0.37	2.67
Eldest Child (X_7)	0.38	2.63
Middle Child (X_8)	0.45	2.20
Youngest Child (X_9)	0.37	2.68
Authoritarian (X_{11})	0.40	2.49
Authoritative (X_{12})	0.43	2.30
Permissive (X_{13})	0.39	2.54
Interpersonal Communication Needs (X_{15})	0.06	6.66
Kill Time (X_{16})	0.12	8.36
Reflect Personality (X_{17})	0.08	2.97
Entertainment (X_{18})	0.09	1.73
Lower 1hours (X_{20})	0.47	2.13
1–2 Hours (X_{21})	0.48	2.08
3–4 Hours (X_{22})	0.79	1.27
5–6 Hours (X_{23})	0.42	2.35

The results showed that the factors affecting of mobile phone addiction among Chinese middle school students had Tolerance between 0.06 to 0.79 which has not exceeded 3 and VIF between 1.26 to 8.36 which has not exceeded 10. The table show that Tolerance and VIF had consistency can summary the factors affecting of mobile phone addiction among Chinese middle school students not Collinearity .Researcher analyzed Multiple Regression Analysis.

Table 6 Multiple regression analysis the factors affecting of mobile phone addiction among Chinese middle school students (n=1,342)

The Factors Affecting	b	SE	β	t	p
Sex (X_1)	0.32	0.04	0.25	8.78*	.00
Age (X_2)	0.05	0.01	0.09	3.34*	.00
GPA 0.00–1.50 (X_3)	0.62	0.06	0.45	10.67*	.00
GPA 1.51 – 2.50 (X_4)	0.56	0.05	0.44	10.26*	.00
GPA 2.51 – 3.50 (X_5)	0.76	0.06	0.48	12.72*	.00
Eldest Child (X_7)	0.34	0.05	0.26	7.04*	.00
Middle Child (X_8)	0.31	0.05	0.20	5.88*	.00
Youngest Child (X_9)	0.13	0.06	0.09	2.36*	.02
Authoritarian (X_{11})	0.13	0.05	0.10	2.75*	.01
Authoritative (X_{12})	0.26	0.06	0.16	4.56*	.00
Permissive (X_{13})	0.19	0.05	0.14	3.86*	.00
Interpersonal Communication Needs (X_{15})	-0.11	0.12	-0.09	-0.91	.36
Kill Time (X_{16})	-0.15	0.13	-0.08	-1.22	.22
Reflect Personality (X_{17})	0.09	0.12	0.06	0.75	.46
Entertainment (X_{18})	-0.09	0.12	-0.06	-0.75	.45
Lower 1hours (X_{20})	0.10	0.05	0.07	2.04*	.04
1–2 Hours (X_{21})	-0.16	0.05	-0.11	-3.42*	.00
3–4 Hours (X_{22})	0.92	0.08	0.28	10.88*	.00
5–6 Hours (X_{23})	0.18	0.05	0.12	3.38*	.00
(Constant)	1.21	0.28	–	4.34*	.00

Note: *p<.05

$$R = 0.55 \quad R^2 = 0.30 \quad R^2_{adj} = 0.29 \quad F=30.10 \quad df= 19, 1322 \quad p<0.01$$

Multiple regression Analysis of factors affecting of mobile phone addiction among Chinese middle school students had significantly at .05 levels)F=30.10 df=19, 1322 p<0.01) showed that sex (X_1) age (X_2) GPA 0.00–1.50 (X_3) GPA 1.51–2.50 (X_4) GPA 2.51–3.50 (X_5) eldest child (X_7) middle child (X_8) youngest child (X_9) authoritarian (X_{11}) authoritative (X_{12}) permissive (X_{13}) interpersonal communication needs (X_{15}) kill time (X_{16}) reflect personality (X_{17}) entertainment (X_{18}) lower 1 hours (X_{20}) 1–2 hours (X_{21}) 3–4 hours (X_{22}) and 5–6 hours (X_{23}) can predict 29% variation of mobile phone addiction.

General factors affecting of mobile phone addiction among Chinese middle school students had significantly relationships at .05 levels in descending order as follows:

GPA 2.51–3.50 (X_5) had the highest standard scores linear regression 0.48, GPA 0.00–1.50 (X_3) had the standard scores linear regression 0.45, GPA 1.51–2.50 (X_4) had the standard scores linear regression 0.44 sex (X_1) had the standard scores linear regression 0.25 and age (X_2) had the lowest standard scores linear regression 0.09.

Family factors affecting of mobile phone addiction among Chinese middle school students had significantly relationships at .05 levels in descending order as follows: eldest child (X_7) had the highest standard scores linear regression 0.26, middle child (X_8) had the standard scores linear regression 0.20, authoritative (X_{12}) had the standard scores linear regression 0.16, permissive (X_{13}) had the standard scores linear regression 0.14, authoritarian (X_{11}) had the standard scores linear regression 0.10 and youngest child (X_9) had the lowest standard scores linear regression 0.09.

Mobile phone use factors affecting of mobile phone addiction among Chinese middle school students had significantly relationships at .05 levels in descending order as follows: 3–4 hours (X_{22}) had the highest standard scores linear regression 0.28, 5–6 hours (X_{23}) had the standard scores linear regression 0.12, lower 1 hours (X_{20}) had the standard scores linear regression 0.07 and 1–2 hours (X_{21}) had the standard scores linear regression –0.11 except that interpersonal communication needs (X_{15}) kill time (X_{16}) reflect personality (X_{17}) and entertainment (X_{18}) had not significantly at .05 levels.

Summary: when sex (X_1) age (X_2) GPA 0.00–1.50 (X_3) GPA 1.51–2.50 (X_4) GPA 2.51–3.50 (X_5) eldest child (X_7) middle child (X_8) youngest child (X_9) authoritarian (X_{11}) authoritative (X_{12}) permissive (X_{13}) reflect personality (X_{17}) and lower 1 hours (X_{20}) were increased affecting mobile phone addiction, On the other hand interpersonal communication needs (X_{15}) kill time (X_{16}) entertainment (X_{18}) and 1–2 hours (X_{21}) were decreased affecting mobile phone addiction.

Discussion

Based on the results of the data analysis, the discussion on the results were as follows:

The correlation between independent variables and mobile phone addiction

The significant positive correlation between sex and mobile phone addiction may imply that one gender is more likely to be at risk for mobile phone addiction among Chinese secondary school students. This may be influenced by social interactions, usage habits, or psychological differences between genders, and warrants further study. Moreover, the results showed that students with higher GPAs (GPA 3.51–4.00) were negatively correlated with mobile phone addiction, while

students with lower GPAs (GPA 0.00–1.50; 2.51–3.50) were positively correlated with mobile phone addiction. This finding may reflect the fact that high GPA students are more academically focused, have better self-control, and are therefore less likely to be affected by mobile phone addiction. On the contrary, students with lower GPAs may face problems such as academic stress and lack of motivation to study and are more likely to fall into mobile phone addiction. This is consistent with the findings of Sunday et al. (2021), who found that students who demonstrated better performance in their academics indicated that they had high levels of concentration and self-regulation, helping to avoid mobile phone addiction.

The influence of independent variables on mobile phone addiction

For the general factors, the results of multiple regression analysis revealed that all of the general factors significantly contribute to mobile phone addiction among Chinese middle school students. GPA emerged as a key determinant, with the relatively high standard scores observed. This suggested a positive impact of academic performance on mobile phone addiction. This is consistent with the findings of Rathakrishnan et al. (2021), where the study revealed that higher levels of smartphone addiction were associated with lower academic performance among university students. Additionally, gender exerted a significant influence on mobile phone addiction, albeit to a lesser extent than GPA. The impact of age was relatively weak, suggesting that mobile phone addiction may manifest across various age groups. Horwood et al. (2021) also supported that children of all ages are prone to mobile phone addiction.

For the family factors, the analysis indicated birth order had significant influence on mobile phone addiction. Specifically, the eldest child had the highest influence on mobile phone addiction and middle child ranked second. The youngest child, on the other hand, displayed the lowest standard scores linear regression. This implies a comparatively weaker influence on mobile phone addiction. This finding aligns with Hawi & Samaha (2016) that suggests older children may experience different parenting styles and expectations, potentially impacting their mobile phone usage patterns. The researcher also looked into factors pertaining to trends of mobile phone usage. The amount of time spent using a mobile phone each day was found to be a major factor; 3–4 hours of usage was linked to the highest standard scores. This implies that students who use their phones more frequently are more likely to become addicted to anything. Interestingly, a negative standard score was seen after 1–2 hours of consumption, suggesting that there may be a threshold below which the risk of addiction declines. Gangadharan et al. (2022) in their study noted that the average time dedicated to mobile phone usage was notably elevated among individuals with addiction.

Knowledge from Research

This study reveals that age, gender, GPA, birth order, parenting styles, and mobile phone use significantly impact mobile phone addiction among Chinese middle school students as follows.

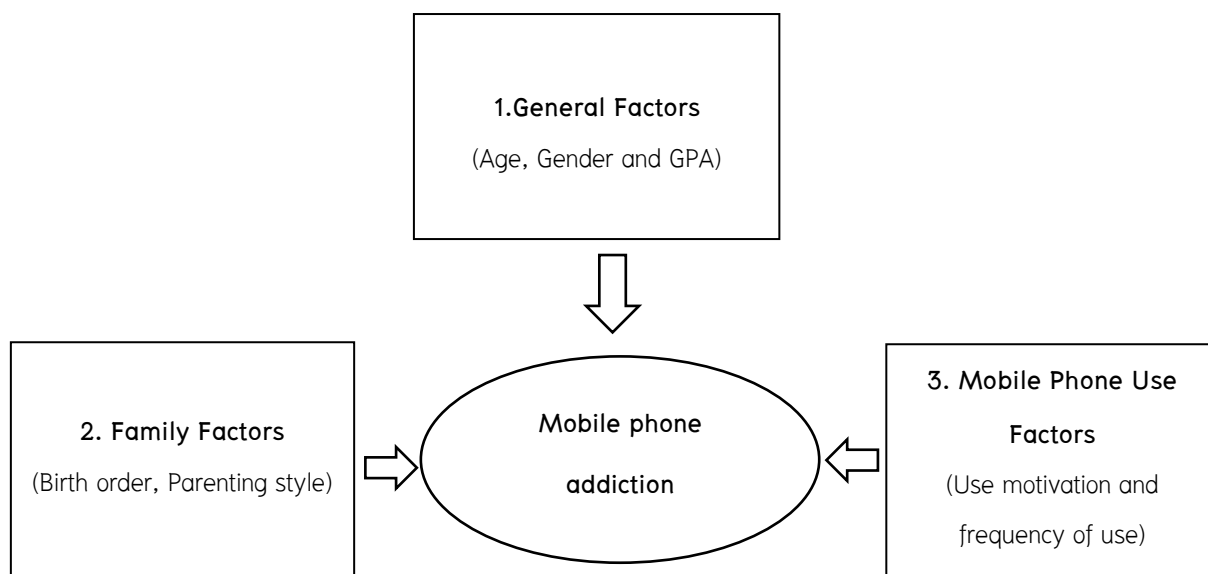


Fig.2 knowledge from research

Conclusion

This study examined the Chongqing Agricultural School as a case study in order to study the factors correlating with mobile phone addiction among middle school students and investigate the factors affecting mobile phone addiction among middle school students. The target population of this study were the middle school students at Chongqing Agricultural School. The sample group consisted of 1342 middle school students at the school. With the use of a questionnaire given to the intended target population, this study used a quantitative analytic technique to collect data. Prior to questionnaire distribution, assessments of content validity and reliability were conducted. The level of mobile phone addiction among middle school students and the factors influencing mobile phone addiction were assessed using the Pearson Product–Moment Correlation Coefficient and Multiple Regression Analysis.

The research results could be summed up as follows based on the statistical analysis's findings:

Relationship between factors and mobile phone addiction among Chinese middle school students.

In examining the correlation between general factors and mobile phone addiction, positive correlation coefficients between 0.06 and 0.26 were identified. Notably, **sex X_1** exhibited the highest positive correlation at 0.26, suggesting a noteworthy influence on mobile phone addiction. Conversely, **age X_2** demonstrated the lowest positive correlation (0.06), indicating a relatively weaker association. Surprisingly, **GPA 3.51 – 4.00 X_6** revealed a negative correlation (–0.25), implying a potential protective effect against mobile phone addiction among high-achieving students.

For the family factors, positive correlation coefficients ranging from 0.08 to 0.09 were observed. **Authoritarian parenting X_{11}** displayed the highest positive correlation (0.09), hinting at a potential link between stricter parenting styles and mobile phone addiction. On the contrary, **eldest child X_7** status showed the lowest positive correlation (0.08), suggesting a comparatively weaker association. Noteworthy negative correlations were identified for **only child X_{10}** status and **uninvolved parenting X_{14}** , indicating a potential protective influence against mobile phone addiction.

The examination of mobile phone use factors uncovered positive correlation coefficients between 0.05 and 0.26. **Spending 3–4 hours on the phone X_{22}** displayed the highest positive correlation (0.26), suggesting a robust association with increased addiction. **Entertainment-related phone use X_{18}** also exhibited a positive correlation (0.05), emphasizing its role in contributing to mobile phone addiction. In contrast, **spending 1–2 hours on the phone X_{21}** demonstrated a negative correlation (–0.11), suggesting a potential moderation effect on mobile phone addiction. **Kill time X_{16}** displayed the lowest negative correlation (–0.06), implying a mild protective effect against mobile phone addiction.

Factors affecting of mobile phone addiction among Chinese middle school students.

After confirming that the factors affecting of mobile phone addiction among Chinese middle school students had Tolerance between 0.06 to 0.79 which has not exceeded 3 and VIF between 1.26 to 8.36 which has not exceeded 10. The researcher applied multiple regression analysis to investigate the factors affecting mobile phone addiction among Chinese middle school students.

The results reveal significant influences of various predictive factors, including gender (X_1), age (X_2), GPA categories (X_3 , X_4 , X_5), birth order variables (X_7 , X_8 , X_9), parenting styles (X_{11} , X_{12} , X_{13}), and mobile phone usage patterns (X_{20} , X_{21} , X_{22} , X_{23}) on mobile phone addiction. While Interpersonal Communication Needs (X_{15}), Kill Time (X_{16}), Reflect Personality (X_{17}), Entertainment (X_{18}) had no significant influence on mobile phone addiction. Variations in these independent variables explained 29% of the observed variability in the dependent variable (mobile phone addiction) based on statistical analysis.

To be specific, General factors influencing mobile phone addiction among Chinese middle school students demonstrated significant relationships at the 0.05 significance level, arranged in descending order as follows: GPA 2.51–3.50 (X_5) exhibited the highest standard scores in linear regression, with a value of 0.48. GPA 0.00–1.50 (X_3) followed with a standard scores linear regression of 0.45, and GPA 1.51–2.50 (X_4) showed a standard scores linear regression of 0.44. Sex (X_1) had a standard scores linear regression of 0.25, and age (X_2) displayed the lowest standard scores linear regression at 0.09.

Family factors also significantly influencing mobile phone addiction among Chinese middle school students exhibited relationships at the 0.05 significance level, ranked in descending order as follows: Eldest child (X_7) had the highest standard scores in linear regression at 0.26, followed by the middle child (X_8) with a standard scores linear regression of 0.20. Authoritative parenting (X_{12}) showed a standard scores linear regression of 0.16, permissive parenting (X_{13}) had a standard scores linear regression of 0.14, authoritarian parenting (X_{11}) exhibited a standard scores linear regression of 0.10, and the youngest child (X_9) displayed the lowest standard scores linear regression at 0.09.

Moreover, Mobile phone use factors significantly influencing mobile phone addiction among Chinese middle school students exhibited relationships at the 0.05 significance level, ranked in descending order as follows: Except for interpersonal communication needs (X_{15}), kill time (X_{16}), reflect personality (X_{17}), and entertainment (X_{18}), which did not show significant influence at the 0.05 level, the factors were ranked from high to low based on standard scores in linear regression. Spending 3–4 hours on the phone (X_{22}) had the highest standard scores with a linear regression of 0.28, followed by 5–6 hours (X_{23}) with a standard scores linear regression of 0.12. Lower 1 hour (X_{20}) had a standard scores linear regression of 0.07, and 1–2 hours (X_{21}) had a standard scores linear regression of 0.11.

Regarding the impacts of independent variables on mobile phone addiction, both positive and negative effects were considered. The variables such as sex (X_1), age (X_2), GPA 0.00–1.50 (X_3), GPA 1.51–2.50 (X_4), GPA 2.51–3.50 (X_5), eldest child (X_7), middle child (X_8), youngest child (X_9), authoritarian parenting (X_{11}), authoritative parenting (X_{12}), permissive parenting (X_{13}), reflect personality (X_{17}), and lower 1 hour of phone use (X_{20}) were associated with an increase in mobile phone addiction. Conversely, a decrease in factors like interpersonal communication needs (X_{15}), kill time activities (X_{16}), entertainment-related phone use (X_{18}), and spending 1–2 hours on the phone (X_{21}) were associated with a decrease in mobile phone addiction.

In summary, this study delved into factors contributing to mobile phone addiction among middle school students, analyzing correlations and predictive influences. Significant findings include gender (highest correlation for males), GPA (with GPA 3.51–4.00 showing a negative correlation), and parenting styles (authoritarian parenting exhibiting a strong positive correlation). Mobile phone usage patterns, notably spending 3–4 hours daily, were strongly linked to higher addiction levels. The research underscores the importance of tailored interventions addressing these factors to mitigate addiction risks and promote healthier technology habits among students.

Suggestions

Based on the results of this study, there are several practical suggestions for addressing the issue of mobile phone addiction among middle school students.

Firstly, it is necessary to create intervention programs specifically suited to the demands and obstacles experienced by all sexes, given the considerable positive link shown between sex and addiction to mobile phones. These initiatives can focus on understanding and reducing the social, psychological, and usage habit variables that lead to sex disparities in mobile phone addiction.

Secondly, considering the inverse relationship between a high GPA and mobile phone addiction, educational establishments should consider offering academic assistance services to students with lower GPAs. These programs can address issues such as motivational deficits, school-related stress, and other factors contributing to dependency on mobile phones.

Thirdly, the study identified relationships between parenting philosophies, mobile phone addiction, and birth order. It is suggested to hold parenting classes to assist parents in understanding the potential influence of their children's mobile phone usage due to factors such as birth order and

parenting methods. Reducing the risk of mobile phone addiction can be achieved in part by offering advice on how to create a stable and harmonious home environment.

Finally, both parents and students must be made aware of the possible dangers of excessive phone use, especially considering the link between the duration of phone use and addiction. Awareness-raising efforts might emphasize the value of striking a balance between screen time and other activities, promoting responsible usage, and establishing reasonable daily phone usage limitations.

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