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Article

The relationship of Mobile Phone Addiction and Irrational Procrastination in College Students: Mediating Effect of Perceived Stress

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Abstract

This study aimed to examine the mediating role of perceived stress in the relationship between mobile phone addiction and irrational procrastination. Recent studies have shown that mobile phone addiction can cause or aggravate irrational procrastination. 6220 Chinese college students completed the questionnaires about their information of demographic, mobile phone addiction, perceived stress and irrational procrastination (response rate of 91.6%). Statistical analyses were performed using SPSS 25.0 and PROCESS 3.5. The mediation model was tested using Model 4 in Hayes' Process and the percentile Bootstrap algorithm with deviation correction, repeat sampling 5000 times and calculate the 95% confidence interval. The results show that mobile phone addiction of college students has a significant positive predictive effect on irrational procrastination after controlling for age, tobacco and alcohol use. In addition, mediation analysis indicated significant mediation of perceived stress in the relationship between mobile phone addiction and irrational procrastination in both male and female students.

Keywords: Mobile Phone Addiction, Perceived Stress, Irrational Procrastination, Mediating Effect, College Students.

1.Introduction

With the growing development of network and electronic technology, nowadays, mobile phones are deemed as a necessity in human life, especially for young people aged 18 to 22 (Jiang & Zhao, 2016). However, excessive use of mobile phones, even addiction has become a new issue. Evidences showed that Mobile phone addiction (MPA) had a higher detection rate in young people (Leung, 2008; Liu et al., 2018), and MPA could lead to a range of physical, psychological and social problems (Jun, 2016; Oktan, 2011; Yen et al., 2009).

A survey conducted by the American Psychological Association (APA) in 2019 revealed that more than three-quarters of adults reported perceived stress (PS) (American Psychological Association, 2019). Stress in the normal range was considered as a normal response to external stimuli, but excessive stress was not since it could have detrimental effects on physical and mental health (Anastasiades et al., 2017). In line with the main population with MPA, college students were also dominated by individuals suffering from PS (DOU et al., 2019).

Another common situation in college students was Irrational procrastination (IP). IP refers to a non-adaptive behavior in which individuals delay a predetermined action without a clear reason unconsciously (Kandemir, 2014), and it was more common in college students (Onwuegbuzie, 2000) than other populations (Steel, 2007). In China, 85.9% of college students

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who suffered IP were detected (Zhong, 2013), and the increasing severity of IP was having a negative impact on their academic performance and life goals (Gareau et al., 2019; Steel & Ferrari, 2013).

Recently, the relationship among MPA, PS and IP has attracted attention. What has been examined is that IP could exert an impact on individuals' lifestyle, emotional state, cognition and behavior (Lukas & Berking, 2017; Rothblum et al., 1986; Zhang et al., 2019). Long-term procrastination could also trigger negative emotions such as anxiety, depression, guilt and self-blame (Sirois et al., 2015). There were unignorable links between PS and IP (Fathima, 2018). Some scholars proposed that PS was one important predictor of IP (Khalid et al., 2019; N. Kim & Seong, 2017), and PS could result in increasing incidence and severity of IP (Wartberg et al., 2021). However, other scholars thought that PS could be a result of IP (Sirois, 2014; Yang et al., 2020), only when IP was perceived as a personality. When IP was served as a behavior, the causality would be reversed, which meant IP could result from PS. (Tice et al., 2001; Wartberg et al., 2021). In light of MPA, some scholars believed that MPA, an action, could lead to IP, a behavioral manifestation of psychological outcomes (LIAN et al., 2021; XIE & ZOU, 2018). Similarly, MPA has been found to have a significant positive correlation with IP (Shi et al., 2021). We have come to the conclusion in previous studies that there is a significant correlation between MPA and IP. However, the mechanism underlying such an association is not fully understood. Based on our previous studies, this study attempts to discuss the influencing mechanism underlying among these factors.

Based on the Self-Regulatory Failure Theory (SRFT), when individuals are affected by maladaptive factors, the failure on self-regulation of mental activities and negative affect will be the key to procrastinate of individuals (Pychyl & Flett, 2012; Rebetez et al., 2016), that is, when MPA generates negative psychological outcomes, the negative outcomes will be the key to IP. What's more, according to what has been discussed above, we speculated that PS might be the negative psychological outcome, and be served as a mediation. Considering the different characteristics between males and females, gender will be considered as an influencing factor and different mediation models will be distinguished (Valenzuela et al., 2020).

Taken together, the aim of the research was to explore the relationship of mobile phone addiction (MPA), perceived stress (PS) and irrational procrastination (IP) and the mediating role of perceived stress (PS) between MPA and IP among college students in China. It will contribute to understanding the underlying risk factors of IP, the influences of MPA and the potential mental mechanisms on the process from MPA to IP. Also, suggestions could be given to college students to prevent IP. The Hypothesis was that PS could play a mediating role in the correlation between MPA and IP.

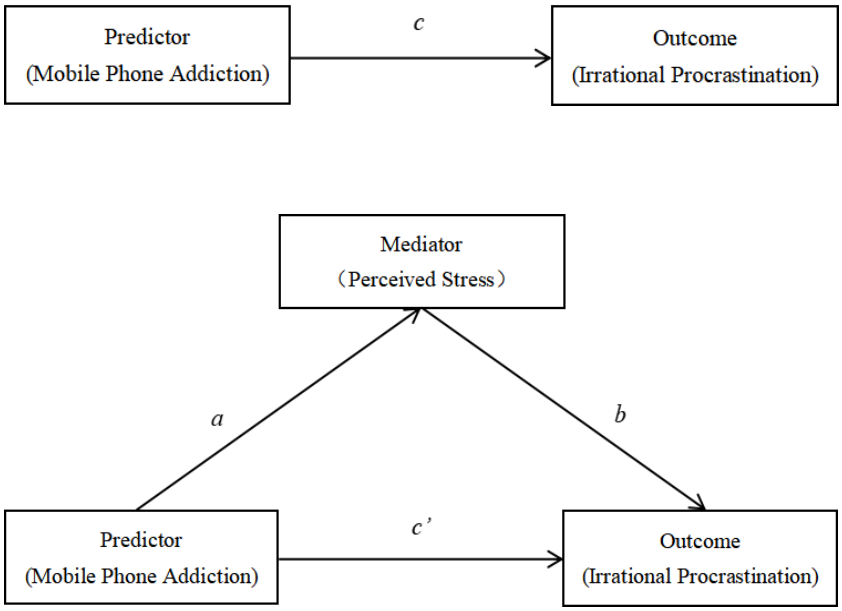

Figure 1. Conceptual model of the mediating role of perceived stress on association between mobile phone addiction and irrational procrastination.

2.Methods

Participants and collection

This study was conducted at Shanghai Jiao Tong University in November 2020, approved by the Ethics Committee of Shanghai Jiao Tong University (NO.H2020043I) on October 14th 2020. Participants were recruited following the

voluntary principle from freshman and sophomore students who enrolled at three public universities in Shanghai, China were recruited with voluntary principle QR code for self-reported questionnaires was scanned by them voluntarily. 6788 students were enrolled in this study, 568 (8.4%) of them were excluded due to incomplete information. There were 6220 (91.6%) valid questionnaires in the end. The mean age of them was 18.71±0.87, with 4257 males (18.74±0.90) and 1963 females (18.64±0.80).

Measures and questionnaires

Mobile phone addiction (MPA) was measured by the Mobile Phone Addiction Index Scale (MPAI) (Leung, 2008) with 17 items. Cronbach's α in Chinese university students was 0.86, which means great reliability and validity of MPAI (LIAN et al., 2018). The five degrees Likert scales (1=completely inconsistent; 5=completely consistent) was used for scoring. The higher the score, the more severity of MPA. In the scale, item3, 4, 5, 6, 8, 9, 14, and 15 were for screening addictive behavior, participants who responded more than three times on those items were categorized as mobile phone addicts.

The Perceived Stress Scale (PSS-10), which has been conducted in Chinese college students extensively, was adopted to assess perceived stress (PS)(Cohen et al., 1983). The scale has been proven to have fairly acceptable reliability and validity in Chinese college students(Lu et al., 2017, p. 10). Ten items were included in the scale, among which four items were about positive outcomes with revering scores. The five degrees Likert scale (0=never; 4=very often) was conducted, and total scores ranged from 0 to 40. The higher the scores, the more pressure (Bastianon et al., 2020; Chan & La Greca, 2013).

The Irrational Procrastination Scale (IPS) with nine items was used for measuring irrational procrastination (IP). The IPS has been demonstrated great reliability and validity among Chinese college students (NI et al., 2012). Cronbach's alpha of IPS was 0.79 in this research. The five degrees Likert scale (0= complete disagreement; 4= complete agreement) was conducted, and total scores ranged from 0 to 36. The higher the scores, the more severity of IP.

Confounding factors (i.e. age, tobacco use and alcohol use) were measured by self-reported questions, for example, *"Have you ever smoked/ had alcohol?"* Three options (always; rarely; never) were for the answers. Anyone who answered "Always" for those questions was categorized as a smoker and/or a drinker.

Statistical analysis

Statistical analyses were performed using SPSS 25.0 (IBM Inc., Chicago, IL, USA) and PROCESS 3.5 (IBM Inc., Chicago, IL, USA). First of all, means, standard deviations (SD) and percentages were for descriptive statistics on demographics. Then, T-test and chi-square tests were for differences examinations. Cohen's d and Cramér's phi were used to calculate the effect size of t-tests and Chi-square, respectively(Muller, 1989; Wen, 2011). Later, correlations between each variable were examined using Pearson correlation coefficients. The last but the most important, the mediation model was structured as Model 4 of Hayes' Process in SPSS. 5000 times percentile Bootstrap and 95% confidence interval (CI) were conducted for testing mediating effect since Bootstrap has greater statistical power(Preacher & Hayes, 2008).

3.Results

Table 1. Demographic and characteristics of participating students in the survey

Participant Characteristics	Mean±SD or n (%)						p-value	*Effect Size
	total（n=6220）		male (n=4257)		female (n=1963)			
Age (year)	18.71	0.87	18.74	0.90	18.64	0.80	<0.01	0.12
Mobile Phone Addiction							<0.01	0.18
MPAI scores	29.17	12.56	28.45	12.69	30.72	12.15		
Perceived stress							<0.01	0.12
PSS-10 scores	17.24	6.71	16.99	6.68	17.79	6.74		
Irrational procrastination							0.63	0.01
IPS scores	17.32	5.84	17.34	5.82	17.27	5.90		
Alcohol use							<0.01	0.14
Always	46	0.7%	32	0.8%	14	0.7%		
Rarely	1930	31.0%	1504	35.3%	426	21.7%		
Never	4244	68.2%	2721	63.9%	1523	77.6%		
Tobacco use							0.05	0.31
Always	19	0.3%	14	0.3%	5	0.3%		

Rarely	67	1.1%	55	1.3%	12	0.6%
Never	6134	98.6%	4188	98.4%	1946	99.1%

Note: SD, standard deviation; MPAI, Mobile Phone Addiction Index Scale; PSS, Perceived Stress Scale; IPS, Irrational Procrastination Scale. *Effect Size: Cohen's d for T-test; Cramér's phi (φ_c) for chi-square.

Participant Characteristics

*D*emographics and characteristics of participants were shown in *Table 1*. 6220 students were recruited in this survey. Compared with the males, more MPA, PS and less IP were reported by females.

Pearson Correlation

Correlation coefficients were presented in *Table 2*. There were positive correlations between MPA and PS among males ($r = 0.438$, $p < 0.01$) and females ($r = 0.436$, $p < 0.01$) respectively; positive correlations between MPA and IP among males ($r = 0.549$, $p < 0.01$) and females ($r = 0.561$, $p < 0.01$) respectively; positive correlations between PS and IP among males ($r = r = 0.495$, $p < 0.01$) and females (0.465, $p < 0.01$) respectively.

Table 2. Descriptive statistics and correlation coefficients

Variables		Mean	SD	1	2	3
Male (n=4257)	1.MPAI	28.5	12.7	1.000		
	2.PSS	17.0	6.7	0.438**	1.000	
	3.IPS	17.3	5.8	0.549**	0.495**	1.000
Female (n=1963)	1.MPAI	30.7	12.2	1.000		
	2.PSS	17.8	6.7	0.436**	1.000	
	3.IPS	17.3	5.9	0.561**	0.465**	1.000

Note: SD, standard deviation; MPAI, Mobile Phone Addiction Index Scale; PSS, Perceived Stress Scale; IPS, Irrational Procrastination Scale. *P<0.05, **P<0.01.

Mediation Models

The Mediation Models were structured as Model 4 in PROCESS, and the 5000 times BOOTSTRAP was for testing indirect mediation effects. *Table 3* for details showed that MPA could positively predict IP with controlling confounding factors among males (0.546, $p < 0.01$) and females ($\beta = 0.556$, $p < 0.01$). After adding PS as a mediation variable, MPA was still an important predictor of IP among males ($\beta = 0.409$, $p < 0.01$) and females ($\beta = 0.440$, $p < 0.01$). Furthermore, in path *a*, PS could be positively predicted by MPA among males ($\beta = 0.436$, $p < 0.01$) and females ($\beta = 0.428$, $p < 0.01$); and in path *b*, IP could be positively predicted by PS among males ($\beta = 0.314$, $p < 0.01$) and females ($\beta = 0.271$, $p < 0.01$).

Mediation effects existed based on the 5000 times *BOOTSTRAP*. Indirect effect was significant and there was no 0 in 95% CI (see *Table 4*). For males, the direct effect (0.188) and the mediating effect (0.063) accounted for 74.9% and 25.1% of the total effect (0.250) respectively. For females, the direct effect (0.214) and the mediating effect (0.056) accounted for 79.2% and 20.8% of the total effect (0.270) respectively.

Table 3. Mediation model analyses: association between mobile phone addiction and irrational procrastination via perceived stress.

Outcomes	Variable	males					females				
		R^2	F	β	Boot SE	t	R^2	F	β	Boot SE	t
Irrational Procrastination		0.303	461.200				0.316	226.332			
	Tobacco Use			0.009	0.473	0.715			0.009	0.891	0.481
	Alcohol Use			0.023	0.153	1.752			0.024	0.262	1.238
	Age			0.030	0.083	2.287*			0.019	0.140	1.029
	Mobile Phone Addiction			0.546	0.006	42.331**			0.556	0.009	29.417**
Perceived Stress		0.193	254.627				0.194	118.138			
	Tobacco Use			-0.021	0.584	-1.467			-0.013	1.104	-0.629
	Alcohol Use			0.015	0.189	1.067			0.066	0.325	3.122**
	Age			0.032	0.103	2.294*			-0.003	0.174	-0.145
	Mobile Phone Addiction			0.436	0.007	31.424**			0.428	0.011	20.858**
Irrational procrastination		0.382	525.826				0.375	235.169			
	Tobacco Use			0.016	0.445	1.285			0.013	0.852	0.697
	Alcohol Use			0.018	0.144	1.478			0.006	0.251	0.333
	Age			0.020	0.079	1.606			0.020	0.134	1.121
	Mobile Phone Addiction			0.409	0.006	30.353**			0.440	0.010	22.030**
	Perceived Stress			0.314	0.012	23.395**			0.271	0.017	13.613**

Note: Boot SE, Boot standard error; All values are rounded to two decimal places, as follows. *P<0.05, **P<0.01.

Table 4. Total, direct, and indirect effects: perceived stress as a mediator between mobile phone addiction and irrational procrastination.

		Effect	Boot SE	p	LLCI	ULCI	PM (%)
Male	Indirect effect	0.063	0.004	<0.001	0.055	0.071	25.1%
	Direct effect	0.188	0.007	<0.001	0.174	0.201	74.9%
	Total effect	0.250	0.006	<0.001	0.239	0.262	—
Female	Indirect effect	0.056	0.006	<0.001	0.046	0.067	20.8%
	Direct effect	0.214	0.010	<0.001	0.195	0.233	79.2%
	Total effect	0.270	0.009	<0.001	0.252	0.288	—

Note: LLCI, lower of bootstrap95%CI; ULCI, upper of bootstrap95%CI;

4.Discussion

It is common for college students suffering Mobile phone addiction (MPA) and irrational procrastination (IP) (Geng et al., 2018), and has posed an impact on their study and lives (Stead et al., 2010; Steel, 2007). Based on previous researches and the Self-Regulatory Failure Theory, this study was to explore the relationship of mobile phone addiction (MPA), perceived stress (PS) and irrational procrastination (IP) and the mediating role of perceived stress (PS) between MPA and IP among college students in China. In recent years, an increasing amount of young people were with PS. PS, as a normal response, was ubiquitous, whereas excessive PS might give rise to a series of negative psychological outcomes, such as anxiety, fear and depression (Anastasiades et al., 2017). Consistent with our hypothesis, this study confirmed that MPA could positively predict IP through PS among college students. Consistent with previous research, there was a correlation between stress and maladaptive behaviors. (Cho et al., 2017; Sirois et al., 2003). We hold the opinion that IP, as a typical maladaptive coping strategy (Kim & Seo, 2015), might be used for escaping from reality and the pressure, and that might account for the fact that IP was influenced by PS. Evidence showed that there was a positive association between MPA and PS (LIAN et al., 2018). Therefore, it could be inferred that the more time spent on mobile phones, the more negative emotions would be generated, and the more severe IP to cope with those psychological maladjustments. Unluckily, a vicious cycle would exist that IP might lead to time-waste and/or task-incompletion, and then accumulated work would produce more negative psychological outcomes, like anxiety and stress, and more severe maladaptive behaviors, like IP, would come out. Thus, it is very important for college students to prevent IP.

According to our previous research on the relationship of MPA and IP(Shi et al., 2021), this study further explored and confirmed the mediating role of perceived stress (PS) in the relationship between mobile phone addiction (MPA) and irrational procrastination (IP) among college students.

Theoretically, not only it revealed the negative effects of MPA on individuals' psychology and behavior, but also it could help to uncover the mechanism of the IP formation process from a perspective of emotional health. Practically, the results suggest that campus workers can supervise and guide the irrational procrastination of college students through improving and alleviating the perceived stress of students. The research results have certain theoretical and practical significance for deepening the research on the relationship between mobile phone addiction and individual psychological and behavioral maladjustment, and guiding college students to use mobile phone rationally for their good psychological adaptation and social behavior.

However, there were some limitations in this study. First of all, no causal inference could be explored because of cross-sectional study design. Our direction that we predicted when we built the mediation model is based on the standpoint when irrational procrastination is seen as a behavior. In that case, IP was more likely to be a coping strategy of individuals for maladjustment and would be affected by other behaviors and emotions (Ferrari, 2012; Kandemir, 2014). In addition,, since there was little subjects had alcohol and/or tobacco experience, no significant difference between them and other people statistically was found, even though previous study showed that there was a connection between dysfunctional behaviors (e.g. alcohol abuse and tobacco abuse) and IP(Sirois & Kitner, 2015). In addition, there is a bias in the gender ratio of sample in our study cause the gender bias of students at these three universities. In order to make up this bias, we calculate the effect size of t-test and chi-square tests to compare gender differences. In the future, the researchers should put dysfunctional behaviors into consideration and investigate the differences of them.

5. Conclusions

In a word, MPA could positively predict IP through PS among college students even after adjusting covariates including age, smoking and drinking situation. For educators, this study provides new ideas about improving irrational procrastination among Chinese college students. Practically, the IP brought by MPA could be attenuated by improving and alleviating PS on students.

Author Contributions

X.F. was the principal investigator; he designed the study and oversaw the implementation of the project. M.S. drafted the manuscript and completed the data analyses. J.Q. participated in the revision of the manuscript and improved its quality. S.L. and Y.S. participated in data collection and the discussion of statistical methods. X.Z. offered the suggestions of statistical methods. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Shanghai Jiao Tong University (NO.H2020043I) on 14 October 2020.

Informed Consent Statement

Informed consent was obtained from all the subjects involved in the study.

Data Availability Statement

The data in the study are not publicly available in order to protect privacy of the participants.

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Conflicts of Interest

The authors declare no conflict of interest.

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