

Problematic Mobile Phone Use Increases with the Fear of Missing Out Among College Students: The Effects of Self-Control, Perceived Social Support and Future Orientation

Changkang Sun^{1,*}

Binghai Sun^{1,*}

Yishan Lin¹

Hui Zhou²

¹College of Teacher Education, Zhejiang Normal University, Jinhua, 321004, People's Republic of China; ²Jinhua Advanced Research Institute, Jinhua, 321004, People's Republic of China

*These authors contributed equally to this work

Introduction: Mobile phones bring much convenience to college students' lives, but they also cause problems. Few studies have explored the effect of the fear of missing out (FoMO) on problematic mobile phone use among college students. This study tested the mediating effect of self-control in the relationship between FoMO and problematic mobile phone use. It also explored the moderating roles of perceived social support and future orientation in the relationship between these variables.

Methods: A cross-sectional design was used in this study. Materials include the Fear of Missing Out Scale, Perceived Social Support Scale, Self-control Scale (Chinese version), Mobile Phone Addiction Index, and Consideration of Future Consequences Scale. Of 3606 participants, 3189 completed the questionnaire. SPSS 21 was used to analyze the mediation and moderation effects.

Results: The results showed that problematic mobile phone use was positively predicted by FoMO. The relationship between FoMO and problematic mobile phone use was partially mediated by self-control. When the scores of perceived social support and future orientation were high, the negative effect of FoMO on problematic mobile phone use was reduced.

Conclusion: The negative effect of FoMO on problematic mobile phone use through self-control was moderated by perceived social support and future orientation.

Keywords: fear of missing out, self-control, perceived social support, future orientation, problematic mobile phone use

Introduction

The rapid development of information technology brings a lot of convenience to college students' lives; however, it also causes a series of problems (eg, problematic mobile phone use) for college students. Problematic mobile phone use, defined as one's compulsive use of mobile phones, which generally gives rise to negative consequences in various aspects of life,^{1,2} has attracted increasing attention. Problematic phone use would not only have many adverse effects on college students' physical and psychological health, such as sleep quality and depression,^{3,4} but also have a negative impact on their life and study (eg, academic performance and interpersonal relationships).^{5,6} Thus, it is important to ascertain the mechanisms underlying problematic mobile phone use and the moderating variables that could alleviate its degree. Meanwhile, one notion that we should

Correspondence: Yishan Lin
College of Education and Human
Development, Zhejiang Normal
University, 688 Ying bin Road, Jinhua,
Zhejiang, People's Republic of China
Email psy013@163.com

Hui Zhou
Jinhua Advanced Research Institute,
Jinhua, 321004, People's Republic of China
Email zhouhui102@163.com

state is that this study used the term “problematic mobile phone use” rather than the terms “mobile phone addiction,” or “mobile phone use disorder.”^{7,8} Although some researchers declared that smartphones are addictive or take the existence of smartphone addiction for granted, some researchers suggested that the behavior could be better labeled as problematic or maladaptive mobile phone use^{9,10} because the consequences of excessive mobile phone use do not meet the severity levels of those caused by addiction. Thus, we chose to use the term “problematic mobile phone use” in this study.

Fear of missing out (FoMO), defined as an individual’s general anxiety about missing out on others’ positive experiences, is a stable trait.¹¹ It is considered as a factor that leads to problematic mobile phone use.^{3,12} For instance, the research conducted by Elhai et al³ found that problematic phone use was positively predicted by FoMO. Individuals with FoMO constantly care about knowing what others are doing, and the fear to miss out on information about others’ experiences,¹³ whereas mobile phones offer individuals a platform to communicate with friends in real time and pay attention to anything experienced by others, which leads individuals with FoMO to problematic mobile phone use. Furthermore, some research findings support this idea.^{14,15} The research conducted by Li et al¹⁴ has shown that FoMO increases individuals’ excessive use of smartphones and constantly makes them update with friends’ dynamic state, which finally leads to problematic mobile phone use.

The relationship between FoMO and problematic mobile phone use can be explained by the theory of “Use and Satisfy.”^{16,17} This theory posits that FoMO is derived from the lack of basic psychological needs. FoMO lets individuals use mobile phones to construct and maintain social relations, carry out asynchronous and controllable interpersonal interaction, and satisfy their psychological needs of relationship, autonomy, and competence, and then overuse and indulge in it.¹⁸ The mechanism underlying the relationship between FoMO and problematic mobile phone use might be explained using the limited resource model of self-control.¹⁹ This model puts forward that individuals’ self-control resources are limited.²⁰ After a period of activities requiring self-control resources (eg, FoMO), the resources will be consumed, and the individual will be in weak control.²¹ Research has shown that reduced self-control can lead to various maladaptive behaviors, such as problematic mobile phone use.^{22,23} Based on the model and empirical research, we proposed that the relationship between FoMO and problematic mobile phone use was mediated by self-control (H1).

The relationship between FoMO and self-control could be moderated by perceived social support. Social support is defined as the perception or actual experience that one is cared for and valued by others.²⁴ Buffering the hypothesis of social support²⁵ posits that social support from relatives and friends can buffer people from the impacts of some risk factors (eg, negative emotion and stress). In this study, FoMO is a stressor that can weaken individuals’ self-control by consuming limited resources.²⁵ Research has shown that individuals with a high level of FoMO experience more stress, which could lead to problematic social website use.²⁶ Furthermore, although no direct evidence supporting that perceived social support moderated the relationship between FoMO and self-control, research has shown that the relationship between anxiety and problematic smartphone use could be moderated by social support.²⁷ Besides, the relationship between self-control and problematic mobile phone use can be moderated by future orientation, which is defined as an individual’s thinking and planning for the future.²⁸ Neuroscience research has shown that self-control ability is closely related to the intertemporal selection.²⁹ Individuals with a high level of future orientation can think more rationally and control themselves in intertemporal choices, are more likely to make long-term choices, and tend to behave in a healthier way.³⁰ Research has shown that indirect evidence supports that future orientation moderates the relationship between self-control and problematic mobile phone use.³¹ Based on the theory and empirical evidence, this study proposed that when the scores of perceived social support and future orientation are high, the negative effect of fear of missing out on problematic mobile phone use through self-control reduced [H2].

As discussed above, this study aimed to investigate the mechanism underlying FoMO and problematic mobile phone use and explore the positive effects of perceived social support and future orientation on weakening problematic mobile phone use. The logic of this study was that FoMO, as a negative emotion, could be regarded as a risk factor for problematic mobile phone use. The relationship between FoMO and problematic mobile phone use could be mediated by self-control because negative emotions would consume resources that were used to control behavior. Furthermore, this study explored the roles of protective factors in the relationship between FoMO and problematic mobile phone use from the perspective of the individual (ie, future orientation) and environment (ie, perceived social support). A hypothesized model is presented in [Figure 1](#).

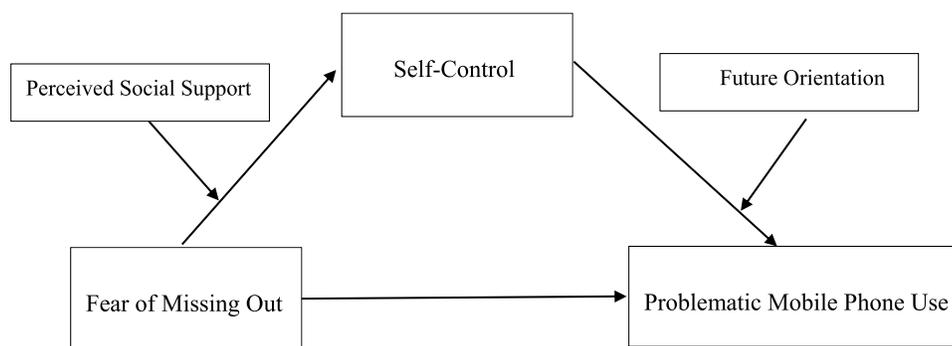


Figure 1 Hypothesized model of processes linking fear of missing out and problematic mobile phone use, mediated by self-control and moderated by perceived social support and future.

Materials and Methods

Procedure and Participants

This study used online questionnaires to collect data, and the survey was conducted in the classroom. Before collection, all participants were informed that the investigation was conducted anonymously and their information would be kept confidential. Thereafter, the informed consent form was provided to participants (if students' age was under 18, we had to obtain informed consent from their parents). Next, our research assistant introduced the survey guidelines to participants, and the survey link was sent to them via a platform called SO JUMP. The Ethics Committee of Zhejiang Normal University approved this research.

Altogether, 3606 college students participated in the survey. However, 417 participants who had not complete the survey were excluded, resulting in a total of 3189 valid samples for further analysis (response rate: 88%). The sample included 1994 male (62.5%) and 1195 female (37.5%) respondents, with an average age of 19 years ($M_a=19$, $SD=3.70$). A total of 1980 (62.1%) participants were from the countryside, while 1209 (37.9%) were from the city. Furthermore, 1032 (32.4%) participants were from an only child family, whereas 2157 (67.6%) had siblings. The average time that participants had been using smartphones was six years.

Measures

FoMO

It was measured by the Fear of Missing Out Scale that was revised by Xia, Duan, and Huang,³² and compiled by Przybylski et al.³³ The scale included 10 items (eg, I feel anxious when I do not know what my friends are doing). All items were scored on a five-point Likert scale (1= Not at all true of me, 5= Extremely true of me), with higher

scores indicating a higher level of the FoMO. In this study, Cronbach's α for the scale in this study was 0.84.

Self-Control

This was measured using the Self-control Scale (Chinese version) compiled by Tangney et al.³⁴ The scale includes 13 items (eg, "I refuse things that are bad for me."). All items were scored on a five-point Likert scale (1=not at all, 5=very much), with higher scores indicating a higher level of self-control. In this study, Cronbach's α for the scale was 0.81.

Problematic Mobile Phone Use

This was measured by MPPI, which includes 17 items (eg, "You can never spend enough time on your mobile phone") designed by Leung.³⁵ Items were scored on a 5-point Likert scale (1=never, 5=always), with higher scores indicating a higher problematic mobile phone use. Cronbach's α for the scale was 0.92.

Future Orientation

It was measured by using the Consideration of Future Consequences scale designed by Strathman et al.³⁶ This single dimension scale consists of seven items (eg, "It is pleasant to think about the future"), to which participants rated on a 5-point Likert scale (1=extremely uncharacteristic, 5= extremely characteristic), with higher scores indicating a higher level of future orientation. Cronbach's α for the scale was 0.70.

Perceived Social Support

This was measured by the scale compiled by Zimet et al.³⁷ The scale includes 12 items (eg, I can talk about my problems with my friends). The response options ranged from 1 (very strongly disagree) to 7 (very strongly agree), with higher scores indicating a higher level of perceived social support. The Cronbach's alpha coefficient for the scale was 0.96.

Results

Correlational Analysis

The results of the correlation analysis of the study variables are presented in Table 1. The results show that FoMO is positively and significantly correlated with problematic mobile phone use and negatively and significantly correlated with self-control and perceived social support. Furthermore, self-control has a negative and significant relationship with problematic mobile phone use and a positively significant correlation with future orientation. In addition, problematic mobile phone use was negatively and significantly correlated with perceived social support and future orientation.

Mediation Analysis

For the mediation analysis, Model 4 (PROCESS macro in SPSS)³⁸ was chosen to test the mediating effect of self-control in the relationship between FoMO and problematic mobile phone use in this study. The results are shown in Figure 2. The results found that FoMO had a negatively significant effect on self-control ($B=-0.33$, $p < 0.001$, 95% CI = [-0.36, -0.31]) and self-control had a negative significant effect on problematic mobile phone use ($B=-0.47$, $p < 0.001$, 95% CI = [-0.50, -0.44]). Meanwhile, FoMO also had a positively significant effect on problematic mobile phone use ($B=0.33$, $p < 0.001$, 95% CI = [0.31, 0.36]), suggesting that only partial mediation occurred in this study. The indirect effect accounted for 33.65% of the total effect.

Moderated Mediation Analysis

For the moderated mediation analysis, Model 21 (PROCESS macro in SPSS)³⁸ was used to test the moderated mediation effect. The PROCESS macro for SPSS is software used to conduct mediation, moderation, and conditional process analysis by offering some models. Model 4 was used to test the mediating effect of a single variable

among these models, whereas Model 21 was used to perform moderated mediation. In this model, variable W moderated the relationship between X and M, and variable V moderated the relationship between M and Y. As shown in Table 2, the results found that self-control was significantly affected by the interaction of FoMO and perceived social support, and problematic mobile phone use was significantly predicted by the interaction of self-control and future orientation, indicating that perceived social support and future orientation have a moderating effect on the link between FoMO and self-control and the relationship between self-control and problematic mobile phone use, respectively. Combined with the whole model, the results indicated that the negative effect of FoMO on problematic mobile phone use through self-control would be alleviated effectively when the scores of perceived social support and future orientation were high.

Discussion

This study aimed to provide an understanding of the mechanism of problematic mobile phone use and provide related interventions. This research tested the mediation effect of self-control on the relationship between FoMO and problematic mobile phone use and the moderation effect of perceived social support in the relationship between FoMO and self-control and the moderation effect of future orientation on the relationship between self-control and problematic mobile phone use.

This study found that self-control mediated the relationship between FoMO and problematic phone use, supporting H1. This result was similar to that of previous studies.^{39,40} For example, Li et al³⁹ found that self-control mediates the relationship between loneliness and problematic phone use among Chinese college students. Like loneliness, FoMO is also a predisposing factor that could lead to problematic mobile phone use.¹¹ As for the mediation effect of self-control, one possible explanation is that FoMO may cause ego depletion, which finally leads to lower self-control, supporting the limited resource model of self-control.¹⁹ Some researchers believe that FoMO is the manifestation of the individual's blocked self-regulation. As a kind of self-control behavior, self-regulation will consume control resources and produce self-depletion.^{20,33} Another possible explanation is that negative emotion would reduce self-control.⁴¹ FoMO, as a kind of negative emotion, will lead to higher levels of ego depletion compared to positive emotion. Ego depletion further weakens self-control and ultimately leads to problematic behaviors.

Table 1 Descriptive Statistics and Correlation Coefficients for the Study Variables

Variables	M	SD	FoMO	PSS	SC	FO	PMPU
FoMO	2.42	0.76	–				
PSS	5.32	1.21	-0.05*	–			
SC	3.35	0.65	-0.39**	0.34**	–		
FO	3.30	0.43	-0.13**	0.24**	0.44**	–	
PMPU	2.01	0.71	0.53**	-0.18**	-0.57**	-0.28**	–

Notes: * $p < 0.05$; ** $p < 0.01$.

Abbreviations: FoMO, Fear of Missing Out; PSS, Perceived Social Support; SC, Self-control; FO, Future Orientation; PMPU, Problematic Mobile Phone Use.

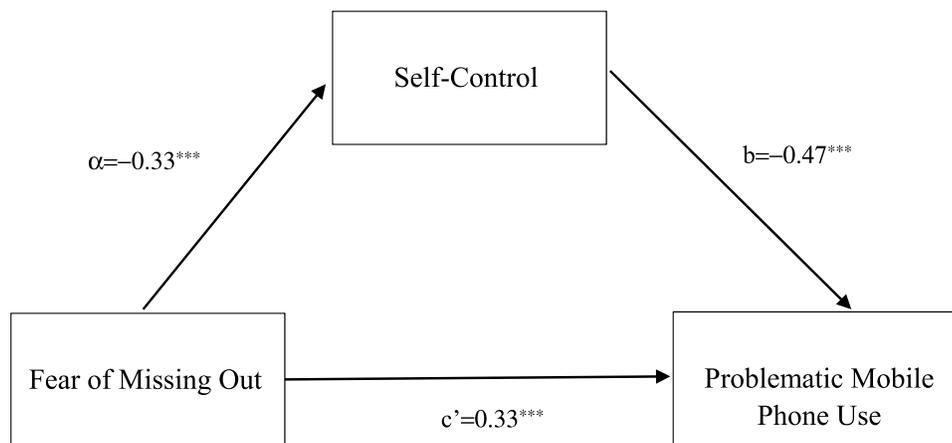


Figure 2 Results of mediation analysis of self-control. ***p<0.001.

This study found that perceived social support moderates the relationship between FoMO and self-control and future orientation moderates the relationship between self-control and problematic mobile phone use. When scores of perceived social support and future orientation are high, the negative effect of FoMO on problematic mobile phone use through self-control reduced, which supports H2. As for the moderation effect of perceived social support, the present study found that when the score of perceived social support was high, the negative effect of FoMO on

self-control was reduced. This result was consistent with other studies.^{27,42} For example, the study conducted by Hou et al²⁷ found that perceived social support alleviates the negative effect of anxiety on problematic mobile phone use. One explanation for the moderating role of perceived social support is that it alleviates the negative effect of FoMO on self-control. Research has shown that FoMO lowers individuals' self-control.⁴³ For individuals, FoMO is a kind of stress, which consumes resources that are used to control their behavior. According to the buffering model

Table 2 Results of the Moderated Mediation Analysis

	M: SC			Y: PMPU		
	B	SE	95% CI	B	SE	95% CI
X: FoMO	-0.31***	0.01	-0.34, -0.29	0.33***	0.01	0.31, 0.36
W: PSS	0.18***	0.01	0.17, 0.20	-	-	-
X×W	0.03	0.01	0.02, 0.05	-	-	-
M:SC	-	-	-	-0.45***	0.02	-0.48, -0.42
V:FO	-	-	-	-0.11***	0.02	-0.16, -0.06
M×V	-	-	-	0.13***	0.03	0.08, 0.19
Constant	0.00	0.01	-0.02, 0.02	1.99***	0.01	1.97, 2.01
	R ² = 0.26			R ² = 0.44		
	F (3, 3185) = 371.97***			F (4, 3184) = 632.89***		
	Conditional indirect effect of X on Y					
	W:M-1SD	V:M-1SD	B	SE	95% CI	
		V:M+1SD	0.18	0.01	0.16, 0.20	
	W: M+1SD	V:M-1SD	0.14	0.01	0.12, 0.16	
		V:M+1SD	0.14	0.01	0.11, 0.16	
		V:M+1SD	0.11	0.01	0.09, 0.13	

Note: ***p<0.001.

Abbreviations: FoMO, Fear of Missing Out; PSS, Perceived Social Support; SC, Self-control; FO, Future Orientation; PMPU, Problematic Mobile Phone Use.

of perceived social support,²⁵ perceived social support from their friends and relatives would help them cope with the stress they faced and provide emotional support to them, which would alleviate the negative effect of FoMO on self-control. Another possible explanation for the moderating role of perceived social support is that social support from relatives and friends provides the resources that are used to execute self-control. FoMO is a kind of negative emotion that has a negative effect on self-control by consuming limited resources,³ whereas social support from relatives and friends can supplement the resources that are used for self-control.²⁰ Thus, when the score of perceived social support was high, the negative effect of FoMO on problematic mobile phone use reduced.

As for the moderation effect of future-orientation, this study found that when the score of future orientation was high, self-control could reduce problematic mobile phone use behavior to a greater extent. One explanation for the moderation effect of future orientation might be that self-control depends on temporal distance.⁴⁴ Research has shown that self-control information persuades individuals to exercise self-control in the present but tends to orient them toward indulgence in the future.⁴⁵ For individuals with high future orientation, they not only apply self-control resources to the present, but also to the future. Thus, a high level of future orientation could help individuals strengthen their self-control, thereby reduce problematic mobile phone use. Another explanation could be that future orientation affected construal levels. The theory of Construal Level posits that there are two construct levels (ie, low-level and high-level).⁴⁶ At low-level construct, individuals focus more on the present, whereas people who are at high-level construct pay more attention to the future.⁴⁷ The increase of future orientation may help individuals transit from low-level construct to high-level construct. Hence, individuals with high levels of future orientation are more likely to anticipate negative outcomes of mobile phone addiction; thus, future orientation may strengthen self-control, thus reducing problematic mobile phone use.

An important result of this study is that when both perceived social support and future orientation were high, the negative effect of FoMO on problematic mobile phone use through self-control was reduced. Therefore, this result indicates that perceived social support and future orientation are protective factors that prevent individuals from problematic behaviors. However, this result also indicates

that behavior is influenced by the interaction between individual and environmental factors. Future interventions should consider both factors simultaneously when reducing individuals' problematic mobile phone use.

The findings of this research have implications for theories and practice. Theoretically, this research stated that future models should consider individual and environmental factors simultaneously when explaining problematic behaviors. Practically, our research provides implications for problematic mobile phone use interventions among college students. During the intervention, social support from relatives and friends should be provided to college students with FoMO, which could help them strengthen their self-control. Meanwhile, professional educators should encourage students with FoMO to take a future-oriented view of things, which can help them reduce the degree of problematic mobile phone use.

Several limitations should be noted in this study. Firstly, a cross-sectional study design was used, which could not determine the causal relationship. A longitudinal study design might be used to explore the causal relationship between the FoMo and problematic mobile phone use in future research. Secondly, participants in this study were from the same university, so we could not determine the overall degree of problematic mobile phone use among Chinese college students. Future research should conduct a more comprehensive survey. Thirdly, the information was collected by self-reported measures, so the accuracy of individual reports cannot be guaranteed, although the measures used in this study are widely applied and have demonstrated adequate psychometric properties. The experimental design can be considered to manipulate these variables in future research.

Conclusion

This study found that the relationship between FoMO and problematic mobile phone use was partially mediated by self-control among Chinese college students. When the scores of perceived social support and future orientation were high, the negative effect of FoMO on problematic mobile phone use was reduced. This study provides some implications for future interventions on problematic mobile phone use.

Ethics Statement

This study was conducted in accordance with the Declaration of Helsinki. The local Ethics Committee approved the study.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

All authors declare that they have no conflicts of interest.

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