

## Research Article

# The Effect of College Students' Boredom Proneness on Phubbing: The Chain-Mediating Effects of Fear of Missing Out and Online Vigilance

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**Purpose.** Phubbing not only affects the impression formation and communication quality of both sides of communication but also damages the quality of peer relationships among college students, reduces the happiness of interpersonal objects, and has a negative impact on the physical and mental development of college students. The boredom proneness of college students is an important influencing factor of phubbing, and we aim to investigate the mechanism of its internal influence on phubbing. **Design and Methods.** A short version of the boredom proneness scale, fear of missing out scale, online vigilance scale, and phubbing scale was used to survey 357 Chinese college students. Bootstrap method using SPSS Process macro developed by Hayes was used to test the chain-mediating effect of fear of missing out and online vigilance in the relationship between college students' boredom proneness and phubbing. **Results.** Boredom proneness, fear of missing out, online vigilance, and phubbing were significantly and positively correlated with each other ( $p < 0.05$ ). The test of mediated effects showed that college students' boredom proneness not only predicted phubbing but also there were three indirect paths: the separate mediated effect of fear of missing out; the separate mediated effect of online vigilance; and the chain mediated effect of fear of missing out and online vigilance. The effect of the three mediators accounted for 31.82% of the total effect. **Practice Implications.** College students' boredom proneness can directly and positively affect phubbing and also affect phubbing through the chain-mediating effects of fear of missing out and online vigilance. The prevention of phubbing among college students should not only reduce boredom proneness but also reduce the level of fear of missing out and online vigilance.

## 1. Introduction

With the ubiquitous utilization of Internet and mobile communication technologies around the globe, smartphones have become one of the most frequently used tools within college students' daily routines. The powerful functions of smartphones facilitate communication and interaction from a long distance, but also sadly disrupt offline communication in real-life settings [1]. Phubbing is a kind of behavior that arises with the widespread use of smartphones, in which individuals just play with their smartphones and ignore the people or things around them in social situations [2]. Studies have shown that phubbing not only damages

college students' peer relationships and reduces life satisfaction [3], but meanwhile poses a negative impact on physical and mental health [4]. Therefore, exploring the risking factors of phubbing among college students and how these factors affect phubbing is an issue that deserves focused attention in the community.

Boredom is a common phenomenon in college student populations [5]. Boredom proneness refers to an individual's inability to experience adequate satisfaction needs in scenarios where internal and external stimuli are scarce, showing persistent attentional difficulties, low arousal, and motivational deprivation [6]. With the widespread popularity of the Internet and smartphones, people have more

ways to fight boredom, such as mobile games, social media, and various entertainment apps. According to the research report, 91.2% of college students would play smartphone games because of boredom, and even 83.6% of college students play smartphone games during classes [7], and a large amount of college students' time is consumed in boring information in smartphone. In addition, some empirical studies have shown that in daily life, individuals with high boredom proneness tend to indulge in smartphone to debore the experience of boredom [8] and produce some deviant behaviors, such as phubbing. A qualitative study has also found that boredom is one of the predictors of phubbing [9]. Therefore, this study proposes hypothesis 1: college students' boredom proneness can positively predict phubbing.

Fear of missing out is a negative complex emotional experience that is dominated by anxiety, accompanied by worry, loss, fear, and frustration about the possibility of missing out on some important information or novel events [10]. It has been suggested that the fear of missing out is an external manifestation of individuals' blocked self-regulation [11] and that effective self-regulation depends on the satisfaction of three basic psychological needs: autonomy, competence, and relationship needs [12]. Individuals with boredom proneness are in scenarios where internal and external stimuli are lacking and their psychological experience needs are not met; they experience impaired self-regulation, which is manifested externally as fear of missing out. Under the anxiety stimulus of the fear of missing out, individuals may look for other channels or platforms to satisfy their psychological needs, and social media provided by smartphones happen to be the most convenient way to satisfy them. The convenient social nature of social media can build social networks for individuals to satisfy their relational needs; the anonymity of the online world facilitates individuals to express their opinions autonomously to meet their autonomy needs, and some group activities in the virtual world are more likely to make individuals feel competent [11], and the above three elements drive individuals to use smartphones as frequently and are prone to problematic social media behaviors [13], which have a negative impact on other ongoing activities and tasks, such as phubbing that occurs in offline social situations that ignores others. Furthermore, the integration model of cognitive failure suggests that individuals with a higher boredom proneness have higher levels of ego depletion, which can cause a decline in cognitive functions such as working memory, executive, metacognitive strategies, and attention, further making it difficult for individuals to effectively allocate and maintain available cognitive resources in tasks or situational activities, leading to cognitive failure or bias (e.g., fear of missing out [14]). This cognitive failure or bias (e.g., fear of missing out) is in turn a susceptibility variable for smartphone addictive behaviors and may further contribute to phubbing. Empirical studies have also found that boredom proneness is an important factor to fear of missing out, which can further contribute to phubbing [15]. Therefore, this study proposes hypothesis 2: boredom proneness influences phubbing through the mediating role of fear of missing out.

Online vigilance is a form of communication that provides Internet users with a sense of "permanent contact" while leaving their real-life peers alone [16]. Boredom is a typical negative emotion arising from unsatisfying psychological experiences [17], and adolescents often seek stimulation in the Internet to alleviate this negative emotion in an environment where the Internet is within their reach [18]. Research studies have shown that college students are willing to use online social software to maintain uninterrupted communication with others online and to satisfy their psychological needs for stimulation when they are bored [19]. Even in offline interpersonal scenarios, they are alert to external sources online and ignore real-life interactions. Therefore, this study proposes hypothesis 3: boredom proneness influences phubbing through the mediating role of online vigilance.

In addition, fear of missing out predicts individuals to be heavy "perpetual onlineers," i.e., it has a significant positive effect on online vigilance [20]. Social monitoring theory suggests that individuals use their own social monitoring system to speculate on the likelihood of rejection [21], and fear of missing out is active in this monitoring process for fear of rejection by the outside world, i.e., individuals want to know whether others' behavior threatens their social relationships, and this state of desire for social support and fear of social rejection leads individuals to maintain a monitoring state of online vigilance. As we can see, boredom proneness influences the fear of missing out, which in turn predicts online vigilance, and online vigilance causes individuals to stay "permanently connected" to online users while leaving their real peers behind. In daily life, we also see that many people feel anxious and annoyed about missing out on the exciting content on their smartphone, so they keep looking down and refreshing their smartphones regardless of the feelings of the people around them [22]. Therefore, this study proposes hypothesis study 4: there may be a chain-mediating role of fear of missing out and online vigilance between boredom proneness and phubbing, i.e., boredom proneness influences college students' phubbing through the mediating role of fear of missing out and fear of missing out through the mediating role of online vigilance.

## 2. Methods

*2.1. Data.* Using the whole-group sampling method, a total of 380 college students in 10 classes from four universities in Shandong Province, China, were selected as subjects. A total of 380 questionnaires were distributed and collected, and 357 valid questionnaires were obtained after eliminating invalid questionnaires. Among them, 134 were male and 223 were female; 179 were urban students and 178 were rural students; and 160 were freshmen, 103 were sophomores, and 94 were juniors. The survey was conducted with the informed consent of the subjects and approved by the Ethics Committee of Qingdao Harbor Institute of Technology. After each survey, all participants received a small gift as compensation.

## 2.2. Measure

**2.2.1. Boredom Proneness Scale, Short Form.** The scale was developed by foreign scholars Vodanovich et al. in 2005 [23] and domestic scholars Li et al. revised the Chinese version on the basis of this scale in 2016 [24]. The scale was divided into two dimensions, external stimuli and internal stimuli, with 12 items and a score range of 12–84, with higher scores indicating a higher degree of individual boredom proneness. Its Cronbach alpha coefficient was 0.80.

**2.2.2. Fear of Missing Out Scale.** The scale was developed as a unidimensional scale by scholars Przybylski et al. in 2013 [11] later revised as a two-dimensional scale by Wegmann et al. in 2017 [25] and finally revised as a Chinese version of the scale by scholars Xiao and Liu in 2019 [26]. The scale includes two dimensions, trait misplaced fear of missing out and state fear of missing out, with a total of 11 items and a score range of 11–55, with higher scores indicating higher levels of individual fear of missing out. In the present study, the Cronbach alpha coefficient of the scale was 0.85.

**2.2.3. Online Vigilance Scale.** The scale was developed by scholar Reinecke et al. in 2018 [16] and has been verified by Schneider as reliable and valid [20]. The scale includes three dimensions of salience, reactivity, and detectability, with a total of 12 items and a score range of 12–60, with higher total scores indicating a higher level of online vigilance. In this study, the Cronbach alpha coefficient of the scale was 0.91.

**2.2.4. Phubbing Scale.** The scale is a one-dimensional scale developed by scholar Qiu in 2020 [27] with 8 items, such as “When I am with my friends, I spend a lot of time on my smartphone” and “Sometimes, I don’t even notice when my friends leave because I am looking at my smartphone,” etc. The scale scores ranged from 8 to 40, and the higher the total score, the higher the degree of phubbing of the individual. In the present study, the Cronbach alpha coefficient of the scale was 0.89.

**2.3. Statistical Analysis.** Data entry was performed using SPSS 26.0 with reliability tests, common method deviation tests, descriptive statistics, and correlation analysis, and the Bootstrap method of SPSS Process macro developed by Hayes was used to test the chain-mediating effect of fear of missing out and online vigilance in the relationship between college students’ boredom proneness and phubbing (Bootstrap sample size was 5000), and  $p < 0.05$  was considered a statistically significant difference.

## 3. Results

**3.1. Common Method Deviation.** Because the data for this study were derived from the same measurement environment and item context, among other factors, covariation between predictor and calibration variables may result, which can confound the findings and yield biased results.

The Harman one-way test for common method bias was used in this study. The results of exploratory factor analysis without pivoting showed that there were eight factors with characteristic roots greater than one and the cumulative variance explained by the first factor was 27.54%, which was less than the critical criterion of 40%, indicating the absence of serious common method bias [28].

**3.2. Correlation Analysis.** The total item scores and standard deviations of boredom proneness, fear of missing out, online vigilance, and phubbing among college students are shown in Table 1.

**3.3. Chain-Mediating Model Analysis.** Using SPSS Process macro developed by Hayes, the chain-mediating role of fear of missing out and online vigilance between college students’ boredom proneness and phubbing was examined, and the results of the model analysis are shown in Table 2. Boredom proneness positively predicted fear of missing out ( $\beta = 0.19$ ,  $p < 0.05$ ); boredom proneness positively predicted online vigilance ( $\beta = 0.13$ ,  $p < 0.05$ ); fear of missing out positively predicted online vigilance ( $\beta = 0.73$ ,  $p < 0.05$ ); boredom proneness positively predicted phubbing ( $\beta = 0.15$ ,  $p < 0.05$ ); fear of missing out positively predicted phubbing ( $\beta = 0.13$ ,  $p < 0.05$ ); and online vigilance positively predicted phubbing ( $\beta = 0.19$ ,  $p < 0.05$ ) among college students.

The bias-corrected bootstrap method was used to test the mediating effect to see if the mediating effect of each path was significant, and the results of the mediating effect test are presented in Figure 1 and Table 3 shows that the bootstrap 95% confidence intervals of the mediating effects of fear of missing out and online vigilance do not contain 0 and are statistically significant, indicating that fear of missing out and online vigilance are the mediating variables of the effect of boredom proneness on phubbing mediating variables; the total effect value (95% CI) for the mediating effect was 0.07 (0.04,0.10), accounting for 31.82% of the total effect. The mediating effect had three pathways of indirect effects: (1) The first pathway was boredom proneness-fear of missing out-phubbing, with an effect value of 0.02 (95% CI: 0.01–0.04), accounting for 9% of the total effect. (2) The second pathway was boredom proneness-online vigilance-phubbing, with an effect value of 0.02 (95% CI: 0.01–0.04), accounting for 9% of the total effect. (3) The third path was boredom proneness-fear of missing out-online vigilance-phubbing, with an effect value of 0.03 (95% CI: 0.01–0.04), accounting for 13.64% of the total effect. In addition, the direct path effect of college students’ boredom proneness on phubbing was significant, with an effect value of 0.15, accounting for 68.18% of the total effect.

## 4. Discussion

The results of this study showed a significant positive correlation between college students’ boredom proneness and fear of missing out, online vigilance, and phubbing, which indicates that the higher the degree of college students’ boredom proneness, the higher their levels of fear of missing

TABLE 1: Correlation analysis between variables ( $r$ ).

Variable	$M$	$SD$	Boredom proneness	Fear of missing out	Online vigilance	Phubbing
Boredom proneness	40.71	10.24	1			
Fear of missing out	28.34	6.78	0.28 **	1		
Online vigilance	28.7	8.05	0.34 **	0.66 **	1	
Phubbing	15.97	5.43	0.42 **	0.40 **	0.47 **	1

Annotation: \*\* $p < 0.05$ , \*\*\* $p < 0.001$ .

TABLE 2: Chain-mediating model analysis.

Variable	Fear of missing out			Online vigilance			Phubbing		
	$\beta$	$SE$	$t$	$\beta$	$SE$	$t$	$\beta$	$SE$	$t$
Boredom proneness	0.19	0.03	5.51 **	0.13	0.03	4.14 **	0.15	0.03	6.05 **
Fear of missing out				0.73	0.05	15.15 **	0.11	0.05	2.35 **
Online vigilance							0.19	0.04	4.56 **
$R^2$		0.08			0.46			0.31	
$F$		30.38 **			153.00 **			51.68 **	

Annotation: \*\* $p < 0.05$ .

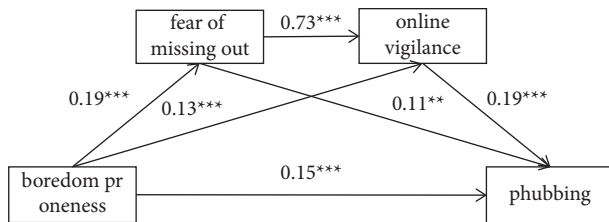


FIGURE 1: Diagram of chain mediating. Annotation: \*\* $p < 0.05$ , \*\*\* $p < 0.001$ .

TABLE 3: Path analysis.

	Effect	Boot SE	95% CI	Effect ratio (%)
Direct effect	0.15	0.03	[0.10, 0.20]	68.18
Indirect effect 1	0.02	0.01	[0.01, 0.04]	9
Indirect effect 2	0.02	0.01	[0.01, 0.04]	9
Indirect effect 3	0.03	0.01	[0.01, 0.04]	13.64
Total indirect effect	0.07	0.01	[0.04, 0.10]	31.82
Total effect	0.22	0.03	[0.17, 0.27]	

Annotation: indirect effect 1: boredom proneness-fear of missing out-phubbing; indirect effect 2: boredom proneness-online vigilance-phubbing; indirect effect 3: boredom proneness-fear of missing out-online vigilance-phubbing.

out, online vigilance, and phubbing, which is consistent with previous research findings [9, 19]. Boredom proneness as a negative personality trait affects individuals' perception of environmental stimuli. Individuals with high boredom proneness have a stronger need to crave environmental stimuli [6] and are more likely to immerse themselves in stimulating behaviors that give them pleasure and satisfy their needs, e.g., being addicted to the Internet and phubbing [29]. Similar studies have confirmed that college students with high boredom proneness have symptoms of frequent and excessive smartphone use [30], leading to the development of phubbing. Therefore, colleges and universities should actively focus on college students' leisure time, enrich extracurricular activities, and reduce students' boredom to reduce their phubbing.

The present study found that boredom proneness can influence college students' phubbing through the mediator of fear of missing out. Boredom proneness is a psychological feeling and experience of individuals that can predict fear of missing out to some extent, which is consistent with previous studies [31]. The fact that college students have more free time can exacerbate boredom leading to higher levels of fear of missing out. Individuals with a fear of missing out tend to have an attentional bias, and individuals with higher levels of fear of missing out are more worried about missing out on important information, which they alleviate through smartphone use. When the functionally diverse mobile social media satisfies individuals' psychological needs, individuals will gradually form such dependence on it and neglect to communicate with their real-life peers, resulting in the emergence of phubbing.

This study also found that boredom proneness can influence phubbing through online vigilance as a mediator. Individuals with high boredom proneness will be hypervigilant to stay online in order to satisfy a certain need for psychological stimulation [16] and show high online vigilance by being hypervigilant to dynamic updates of information from the outside world on mobile social media. Strong online vigilance can prompt the need for individuals to be prepared to respond quickly to cues received from online communication, which implies interrupting other important offline peer communication activities to exhibit phubbing. Therefore, boredom proneness influences phubbing through online vigilance.

In addition, college students' boredom proneness can influence phubbing through the chain-mediating effect of fear of missing out-online vigilance. As mentioned above, the higher the boredom proneness of college students, the more likely they are to develop the fear of missing out. Fear of missing out causes individuals to manifest a desire to understand the experiences of others and the real-time dynamics of what is going on in the outside world and fear of missing out on exciting information, individuals will think more frequently and deeply about their personal online

domain of online vigilance [16], and, in a state of high online vigilance, individuals actively observe and monitor their online communication environment while engaging in offline activities [16], leading to excessive use of offline social situations. The phenomenon of excessive use of smartphones and leaving others alone in offline social situations is known as phubbing.

As mentioned above, fear of missing out and online vigilance play a chain-mediating effect between college students' boredom proneness and phubbing, which has theoretical implications for how to reduce college students' phubbing. The limitation of this study is that a cross-sectional study was used, and it was not possible to trace the data of each variable and verify its stronger causal relationship. A self-report method was used, which suffers from the subjective nature of the subjects and the results may be somewhat biased. In the future, longitudinal tracking data will be used to conduct the study by collecting data in multiple ways to compensate for these shortcomings and obtain more robust findings.

## 5. Conclusion

College students' boredom proneness is significantly correlated with fear of missing out, online vigilance, and phubbing, and boredom proneness can positively predict phubbing.

Boredom proneness of college students not only directly predicted phubbing but also influenced phubbing through the mediating effect of fear of missing out and online vigilance. The mediating effect was generated through three paths: through the independent mediating effect of fear of missing out; through the independent mediating effect of online vigilance; and through the chain-mediating effect of fear of missing out and online vigilance.

## Data Availability

The data that support the findings of this study are available on request from the corresponding author Wang. The data are not publicly available due to them containing information that could compromise research participant privacy.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

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