The Influence of Problematic Mobile Social Media Use on Adolescent Empathy and the Moderating Effect of Peer Attachment

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Abstract: Previous studies have found that the use of social media has an impact on adolescents' empathy. For example, uploading photos on WeChat, playing online games, and establishing two-way communication enable teenagers to have greater emotional support and can effectively reduce social anxiety, depression, and loneliness as well as enhance intimacy and happiness. To explore the influence of problematic mobile social media use on teenagers' empathy and the role of peer attachment in their relationship. In this study, the mobile social media use of 1,157 adolescents was measured through an adolescent problematic mobile social media use assessment questionnaire, an interpersonal response index questionnaire, and an adolescent peer attachment questionnaire. According to the theory of emotional sharing, a regulatory model was constructed, and the following conclusions were drawn: (1) problematic mobile social media use is significantly positively correlated with adolescents' empathy and peer attachment, between which there is a significant positive correlation; and (2) peer attachment plays a moderating role in the relationship between problematic mobile social media use and empathy. When peer communication is high, the positive predictive effect of problematic mobile social media use on empathy is enhanced. The concrete manifestation is that, For low peer attachment individuals, regardless of whether teenagers use mobile social media more or less, they have lower empathy scores, while for high peer attachment individuals, regardless of the mobile social media use, they have higher empathy scores. This result shows that high peer communication can increase teenagers' empathy ability.

Keywords: Problematic Mobile Social Media Use, Adolescent, Empathy, Peer Attachment

1. Introduction

Empathy is a psychological phenomenon of interpersonal interaction that is divided into emotional and cognitive empathy [1]. It is a psychological process in which the subject points their own emotions to the object or makes appropriate behavioral responses to others' situations [2]. Empathy can be regarded as a cognitive and emotional state, an emotional response, and an ability; it is also a psychological resonance phenomenon produced by imagination, inference, and observation [3]. Research shows that empathy is an important part of interpersonal communication and cooperation, and its effective use can promote mutual development and progress and the establishment of interpersonal relationships [4, 5]. A study also found that empathy is significantly related to a series of individual behaviors; for example, narcissists often show insufficient empathy in interpersonal communication and cannot produce appropriate altruistic reactions [6]. Empathy is positively correlated with prosocial and altruistic behavior and negatively correlated with aggressiveness. For teenagers, the development of empathy is particularly important [7]. Studies have found that empathy can predict the social ability of adults and affect their interpersonal relationships [8]. At present, many scholars have begun to pay attention to related research on youth empathy [4, 9]. A literature review reveals that empathy has an important impact on teenagers, and it is thus necessary to explore the influencing factors and mechanisms of empathy.

With the rapid development of society, social media has gradually become the most popular online social application for teenagers; it is a platform granting convenience, openness, and anonymity, allowing to show oneself and receive information [10, 11]. Individuals try their best to make a better impression on others in different ways, so that they can develop a greater sense of identity and similar emotional experiences [12], which have different impacts on psychological emotions when compared. It has been found that mutual emotional and informational social support can be provided on social media platforms, and emotional expression is conducive to establishing good communication, which can effectively improve individual social accomplishment, positive attention, and life satisfaction [13]. In addition, some studies have found that the use of mobile social media plays an important role in maintaining social relations, relieving anxiety, and communicating and contacting people. For example, emotional symbols in WeChat and QQ have a significant, positive predictive effect on teenagers' empathy, subjective well-being, and intimate relationships [13, 14]. At the same time, social media addiction can predict teenagers' affinity needs, have a negative impact on emotions and physical and mental health and even lead to depression and anxiety [13]; however, its virtual nature enables teenagers to get rid of the constraints of real group pressure and express their true emotions. Based on existing research, ritualized social media has a synergistic effect on teenagers' self-identity and also on negative emotions, emotional correspondence, and subjective emotional experiences such as loneliness and omission anxiety [13, 15], which is significantly related to teenagers' emotional experience [16], while individual emotional experience and its cognition are all part of empathy. Therefore, through a literature review, it was found that empathy, as an emotional phenomenon that teenagers often experience in interpersonal relationships, may be influenced by social media use. However, how social media use affects teenagers' empathy needs to be explored.

Studies have found that the use of social media does have an impact on teenagers' empathy; for example, uploading photos on WeChat, playing online games, and establishing two-way communication enable teenagers to find emotional support. It can effectively reduce social anxiety, depression, and loneliness and enhance intimacy and happiness. Problematic mobile social media use has a significant correlation with adolescents' emotional experience and personality traits [16], and the relationship between problematic mobile social media use and empathy may be affected by a third variable; for example, the demand motivation of social media is affected by gender, resulting in different emotional expression and control. Katz's uses and gratification theory provides a reasonable theoretical framework for the indirect effect of problematic mobile social media use on empathy [17]. Katz believes that from the perspective of the audience's psychological motivation and needs, people's satisfaction through active use of media can be explained. According to the uses and gratification

theory, social media, as a common social platform for teenagers, is a source of satisfaction; especially when individual needs are not met in offline situations, individuals are more eager to seek satisfaction from social media [18]. Its use can bring psychological or interpersonal satisfaction to teenagers—such as social, content, and process satisfaction—which in turn affects individual emotions.

At present, an increasing number of studies have begun to explore the interaction between social networks, peer attachment, and personality characteristics. For example, teenagers can enhance their connection and closeness through social media, and peer alienation is also significantly related to internet addiction [19]. In addition, teenagers with high levels of peer communication are more confident in their social acceptance and prefer to use social services and internet information. Current teenagers are more willing to build online friendships through social media than real friendships, and they often have advantages in interpersonal communication and are more popular among others [20].

On the one hand, social media may be influenced by peer attachment, which has an impact on teenagers' personality characteristics. Some studies have found a significant positive correlation between problematic mobile social media use and peer attachment, and there are significant differences in the performance of different attachment types on social media. For example, unsafe teenagers share more things related to themselves on social media than safe teenagers [21]. At the same time, some psychological and behavioral variables, such as neurotic personality, lack of social support, and social skills, can easily involve teenagers in "pathological internet use" [22], and close peer attachment has a positive impact on teenagers' personality development [20]. Both high friendliness and high extroversion are beneficial to adolescents' interpersonal development, and extroversion is positively correlated with peer attachment. In addition, the attachment quality of teenagers also has an important impact on their antisocial personality formation and emotional adaptability, which indirectly affects adolescents' aggressive personality [23]. Conversely, social media may also be affected by peer attachment, which influences teenagers' emotional experience. Some studies have found that adolescents' peer attachment has a positive predictive effect on friends' social support and daily positive emotional experience [24], which is positively correlated with parent-child attachment. Peer relationships among adolescents have always maintained a high level, and a significant positive correlation between positive peer relationship and adolescents' emotional expression has been found. Based on previous studies and empirical evidence, this study suggests that peer attachment may play a moderating role between problematic mobile social media use and friendliness [25] and between problematic mobile social media use and empathy.

In summary, based on the theory of uses and gratification, this study explores the mechanism of problematic mobile social media use on empathy, and it is thus necessary to examine the mediation and regulation of the social

environment (problematic mobile social media use and peer attachment) from a holistic perspective. Therefore, this study proposes research hypotheses H1: problematic mobile social media use has a positive predictive effect on empathy, and H2: peer attachment moderates the relationship between problematic mobile social media use and empathy.

2. Method

2.1. Participants

This study adopted the cluster sampling method. A total of 1,157 adolescents (504 boys and 653 girls) were included in the study. The average age was 16.11 years (SD=0.967).

2.2. Measures

2.2.1. Problematic Mobile Social Media Use Questionnaire

This study adopted Jiang Yongzhi's Problematic Mobile Social Media Usage Assessment Questionnaire [13], which consisted of 20 items. Exploratory factor analysis found that the questionnaire included five factors: increased stickiness, physiological injury, omission anxiety, cognitive failure, and guilt. Using a 5-point scale (with 1 meaning "completely inconsistent" and 5 meaning "completely consistent") can effectively evaluate teenagers' problematic mobile social media use. In this study, the scale's Cronbach's α coefficient was 0.95.

2.2.2. Interpersonal Response Index Questionnaire

In this study, the Chinese version of the Interpersonal Reactivity Index-C (IRI-C), which was a tool for measuring empathy ability developed by Davis on the basis of the multi-dimensional theory of empathy [26], was used to measure empathy. The scale comprised 28 items divided into four dimensions—opinion taking, fantasy, empathy, and personal sadness—among which empathy concern and personal sadness represented emotional empathy, while viewpoint selection reflected cognitive empathy. A 5-point Likert scale was used to score the questionnaire, with 1 indicating "completely inconsistent" and 5 indicating "completely consistent." In this study, the Cronbach's α coefficient for this scale was 0.90.

2.2.3. Adolescent Peer Attachment Scale

This study used the peer attachment scale developed by Armsden and Greenberg [27] to evaluate the peer attachment level of individuals. The peer attachment scale comprised 25 items. There are three subscales including peer trust, peer communication and peer alienation. When the total scores are added, peer alienation needs to be scored in reverse. These were measured on a 5-point scale from 1 ("completely inconsistent") to 5 ("completely consistent"). The higher the total score, the higher the peer attachment level. In this study, the Cronbach's α coefficient of peer attachment was 0.89.

2.3. Procedure

This study adopted a network questionnaire. After obtaining informed consent from the school leaders and students themselves, a centralized test was conducted, and all questionnaires were filled out anonymously. SPSS22.0 and Hayes' PROCESS macro program were used to collate and analyze the data. The bootstrap method was used to test the significance of the regression coefficients. Model 1 and Linear regression was used to analyze the moderating effect of peer attachment on empathy in problematic mobile social media use. In this study, 5,000 samples were constructed, and each sample size was 1,157, from which the standard error and confidence interval of parameter estimation were obtained. If the confidence interval does not include zero, the statistical results are significant.

3. Results

To explore the relationship between problematic mobile social media use, empathy, and peer attachment, descriptive statistics and a correlation analysis were conducted on these three variables. Table 1 shows that problematic mobile social media use is positively correlated with adolescent empathy and peer attachment ($p<0.001$, $r=0.255 \sim 0.311$)), and adolescent empathy is positively correlated with peer attachment ($p<0.001$, r=0.385). In addition, gender is significantly correlated with empathy ($p<0.001$, r=0.232); thus, it was treated as a control variable in the follow-up analysis.

Table 1. Descriptive statistics and correlation coefficients of the key study variables (n=1, 157).

Variable	1	2	3	4
1. Gender	_			
2. Problematic mobile social media use	-0. 021	_		
3. Peer attachment	-0.025	0.311[***]	_	
4. Empathy	-0.232[***]	0.255[***]	0.385[***]	_
M	.43	62.749	79.045	95.147
SD	.495	15.921	13.091	12.161

Note: [***]$p<0.001$, Gender is dummy variable, girls=0, boys=1.

The moderating role of peer attachment in the relationship between problematic mobile social media use and empathy was examined. As shown in Table 2, problematic mobile social media use has a positive predictive effect on empathy (β=0.147, $p<0.001$), and peer attachment also has a positive predictive effect on empathy (β=0.334, $p<0.001$). Further, the interaction items of problematic mobile social media use and peer attachment have a negative predictive effect on empathy (β=-0.727, $p<0.001$). The results confirm that peer attachment plays a moderating role in the relationship

between problematic mobile social media use and empathy. To understand the expressive function of peer attachment more clearly, its scores were divided into high and low groups according to the positive and negative standard deviation of the average, and a simple effect analysis chart of the effect of problematic mobile social media use on empathy was drawn (Figure 1). When the peer attachment level is below one standard deviation, problematic mobile social media use has a positive predictive effect on empathy (β=0.175, p<0.001), and it also positively predicts empathy when the peer attachment level is higher than one standard deviation (β=0.063, p<0.05).

Table 2. *Main and interactive effects of Problematic mobile social media use and Peer attachment on Empathy (n=1, 157).*

	Empathy					
	b	*SE*	*95%CI*	*β*	*ΔR²*	*ΔF*
Step 1					0.053	65.889[**]
Sex	−5.695[***]	0.702	[−7.072, −4.319]	−0.232		
Step 2					0.215	120.219[***]
Problematic mobile social media use (PMSMU)	1.783[***]	0.333	[1.129, 2.437]	0.147		
Peer attachment (PA)	4.060[***]	0.333	[03.406, 4.714]	0.334		
Step 3					0.224	14.444[***]
PMSMU × PA	−0.727[***]	0.191	[−1.102, −0.352]	−0.100		

Note: *b*=unstandardized coefficients. *β*=standardized coefficients, *SE*=standard error. [**]p<0.01, [***]p<0.001.
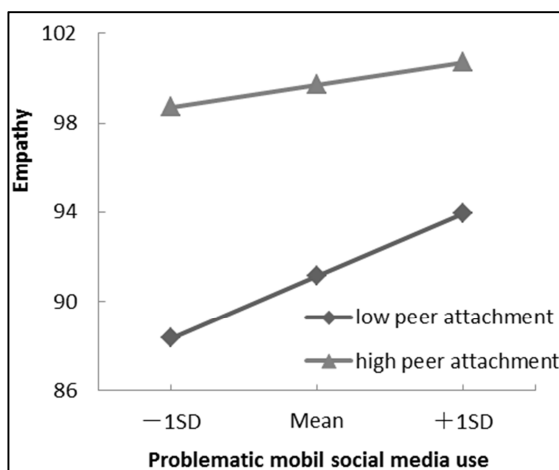

Figure 1. *Plot of problematic mobile social media use and peer attachment on empathy.*

4. Discussion

The use of social media is directly affected by empathy, which is consistent with the conclusions of previous studies. On this basis, according to the theory of use and satisfaction, this study proposes a moderated model to further study the regulatory role of peer attachment in the relationship between problematic mobile social media use and empathy, to explore the mechanism of the former's influence on the latter, and to provide a basis for understanding the influence of problematic mobile social media use on adolescents. Studies have shown that problematic mobile social media use not only directly predicts empathy, but it is also regulated by peer attachment.

Consistent with previous studies, the level of peer attachment is affected by social media use. Peer attachment refers to the relationship between teenagers and their peers, in which they share intimate feelings, warmth, and mutual support [28, 29].

Studies have shown that teenagers addicted to social media are prone to many adverse consequences, such as regression in academic performance and loss of interest in offline activities, and they may even have interpersonal communication barriers, which may lead to peer attachment barriers such as peer alienation and reduction of peer attachment [21]. Among the adolescent personality types, resilient adolescents have significantly higher peer attachment than uncontrolled and over-controlled adolescents, as well as higher social support and friendship satisfaction. According to the attachment theory, safe attachment can result in teenagers having higher self-worth, better ability to cope with stress, and more kindness and trust in others. Adolescents with high attachment anxiety have more intimate exposure and communication, but this anxiety has no predictive effect on overall friendship quality. Emotional symbols in social media also influence individual emotional experience, such as cognitive and emotional empathy. Teenagers with high neurotic scores are more likely to have interest preferences for social interaction, entertainment, and trading on the internet [21]. Empathy is at the core of promoting the establishment and development of interpersonal relationships, which can effectively promote and enhance teenagers' communication skills and have a positive predictive effect on them [5]. Some scholars have indicated that the negative impact of network dependence or the internet on individuals is mainly due to the lack of self-regulation ability and active peer involvement in offline life [23].

It appears that the regulating effect of peer attachment can affect the personality-shaping and emotional experience brought by social media use to a certain extent. In the process of parental attachment, communication, and mental health education, parents and teachers should pay more attention to children with low peer attachment levels and to the shaping of teenagers' personality characteristics. They need to guide them in the correct understanding and use of social media to avoid addiction, so that teenagers' personality traits and emotional experiences can develop appropriately.

5. Conclusion

This study found that problematic mobile social media use has a positive predictive effect on empathy, which shows that

mobile social media also has a positive impact on individuals. The study also found that p Peer attachment plays a moderating role in the relationship between problematic mobile social media use and empathy. When peer communication is high, the positive predictive effect of problematic mobile social media use on empathy is enhanced. The concrete manifestation is that, For low peer attachment individuals, regardless of whether teenagers use mobile social media more or less, they have lower empathy scores, while for high peer attachment individuals, regardless of the mobile social media use, they have higher empathy scores. This result shows that high peer communication can increase teenagers' empathy ability.

6. Limitation and Recommendations

This study has several limitations: first, the sampling is limited by the scope, which may influence the universality of the research results, and it is hoped that more diverse samples will be selected for future research. Second, this study verifies the applicability of the uses and gratification theory, but whether peer attachment only regulates some personality traits needs to be studied further, with the aim to improve the explanatory power of the uses and gratification theory on problematic mobile social media use. Third, since the use of social media is closely related to empathy, there may be a circular relationship between them, that is, the relationship between the social media use and empathy may be a two-way one. As this study only focuses on the influence of problematic mobile social media use on empathy, future studies could explore the influence of empathy on problematic mobile social media use and further compare the similarities and differences between the two mechanisms to continuously improve their circular model.

This study provides a new perspective for the study of improving adolescent empathy, and has practical significance. First of all, problematic mobile social media use not only has a negative effect, but also has a positive effect, if it is used reasonably. This study found that the problematic mobile social media use has a positive predictive effect on empathy. Therefore, parents and teachers can correctly guide teenagers to use social media. Secondly, we can pay more attention to the important role of peer attachment in improving adolescent empathy, and help teenagers establish good peer attachment.

Funding

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