

Para-social Relationship and Social Media Dependency among Chinese K-pop Fans: Exploring the Mediating and Moderating Mechanisms

Abstract

This study aims to explore the relationship between the fan-idol para-social relationship (PSR) and fans' social media dependency. Based on the para-social compensation hypothesis and self-determination theory, the study examined the mediation effect of Fear of Missing Out (FoMO) and the moderator effect of loneliness and social anxiety. Through the online survey, a sample of 590 Chinese K-pop fans was included in this cross-sectional study.

The results show that: (1) After controlling gender, age, education, and romantic relations, fans' PSRs can positively predict fans' social media dependency. (2) The positive association between PSRs and social media dependency was mediated by FoMO. (3) The positive association between PSRs and social media dependency was moderated by loneliness, while the PSRs of individuals with low loneliness levels did not have a significant effect on their social media dependency. (4) The moderate effect of social anxiety is not significant. The results can contribute to the relevant literature on the para-social compensation hypothesis, which can also provide suggestions for preventing and intervening in fans' social media dependency.

Keywords

Para-social relationship; Para-social compensation hypothesis; Social media dependency; Fear of Missing Out (FoMO)

Introduction

Since globalization, the Internet and social media have the ability to transcend temporal and spatial limitations, leading to widespread and in-depth participation in cross-cultural and cross-regional fan cultures. K-pop culture (i.e., Korean popular culture) has evolved into a globally pervasive phenomenon with the support of various social media technologies (King-O'Riain, 2021). Numerous studies have found that non-Korean K-pop fans can utilize social media for cross-national online interaction, fostering the development of online communities and mobilization (Yoon, 2018).

The relationship between fans and idols is commonly described as a form of "para-social interaction" and "para-social relationship (PSR)" (Horton & Wohl, 1956), wherein audiences, through mediated interactions, imagine media figures such as celebrities as individuals with whom they share close interpersonal relationships, leading to emotional attachment and certain social behaviors towards them. PSRs are imaginary and unilateral, resembling interpersonal relationships to some extent. Hence, scholars suggest that PSRs, as an alternative form of interpersonal relationships, may compensate for deficiencies in social activities (such as loneliness and social anxiety) by fulfilling the need for social interaction (A. M. Rubin et al., 1985; R. B. Rubin & McHugh, 1987).

Due to the high reliance of K-pop culture on social media dissemination, the intensity of social media usage among transnational K-pop fans is noteworthy. A survey of Indonesian K-pop fans found that as many as 28% of fans spend over 6 hours surfing social media to seek information related to their idols (Fandia, 2016). Against this backdrop, scholars abroad have begun to examine the relationship between the social media usage patterns of K-pop fans and their psychological well-being. For instance, Gracella et al. (2022) found that the majority of Indonesian K-pop fans surveyed experience varying degrees of fear of missing out on idol-related information, with higher levels of fear of missing out associated with lower self-regulation abilities.

In China, K-pop fans constitute an important part of the star-chasing community. A survey conducted in 2020 on fan support groups on Weibo revealed that among the top 100 fan support accounts on Weibo, 51 were related to K-pop groups or artists, accounting for over half of the total (Fan, 2020). Given the strong influence of the Korean Wave in China, research on the practices of Chinese K-pop fans is not uncommon. However, existing studies mainly focus on fans' emotional labor and meaning production (e.g., Zhang & Negus, 2020; Zhu, 2017; Chen, 2018), leaving significant gaps in exploring the aspects of fan social media dependency from a psychological mechanism perspective.

Therefore, based on the para-social compensation hypothesis, this study aims to focus on Chinese K-pop fans, introducing three variables – FoMO, loneliness, and social anxiety – to examine the influence path of fans' PSRs on social media dependency.

Literature Review

Transnational K-Pop Culture: Practice of PSRs Based on Social Media

The concept of "para-social interaction" was proposed by psychologists Horton and Wohl to describe the "illusion of intimacy" that audiences develop towards media figures such as television characters or celebrities when interacting with them through mass media (Horton & Wohl, 1956, p. 217). It is generally considered as a transient immediate response. When this imagined interactive relationship with media figures

is perceived by the audience over an extended period, it develops into "para-social relationships". Therefore, PSRs also encompass para-social interactions. PSRs are widely used in audience research to explain the dependency relationships individuals form with other types of media figures, providing an important theoretical perspective for understanding the cognitive, emotional, and behavioral mechanisms underlying fan engagement.

With the development of media technology, interactions related to PSRs have expanded from mass media to the context of mediated interactions in other types of media. Regarding para-social interaction on social media, Kuang and Deng (2022) argue that social media provides fans and celebrities with a shared interactive medium, where the technological accessibility enables fans to engage with idols online and express emotions. Fans can constantly follow updates on idols' activities through social media, interact with idols through likes, comments, shares, and even deeply engage in the production of idols' images and career planning (Yan & Fu, 2021).

Furthermore, the mobility and social availability of social media allow people to share information, express opinions, and connect with others across spatial distances and language barriers, thus serving as a bridge for transnational K-pop fans to interact and communicate with idols (Novalika & Kartasasmita, 2022). As Elfving-Hwang (2018) described, the global popularity of K-pop culture heavily relies on fans' PSRs and participatory culture; the core of the Korean popular culture industry lies in establishing PSRs between idols and fans through social media to cultivate enduring fan loyalty (Gracella et al., 2022). For example, K-pop idols frequently interact with fans through platforms like Instagram or VLive, thereby narrowing the social distance between them and quickly fostering a sense of attachment from fans (King-O'Riain, 2021).

For transnational fans, most of their interactions with Korean idols occur through mediated interactions on social media. Especially against the backdrop of the COVID-19 pandemic, transnational mobility has been restricted by preventive measures, making social media virtually the only channel for Chinese K-pop fans to access idol information, participate in fan activities, and engage in discussions. Therefore, K-pop culture is also considered a participatory cultural practice conducted through digital media (Novalika & Kartasasmita, 2022).

PSR and Social Media Dependency: The Mediation Role of FoMO

PSRs are believed to linearly develop through three stages: cognitive, emotional, and behavioral (Ge, 2013). The deeper the level of para-social interaction, the closer the audience perceives their relationship with media figures, the higher their attention to their information, and the more likely they are to exhibit corresponding social behaviors. For instance, research has found that para-social interaction has a significant positive impact on consumers' purchase intentions; fans may express their affection by purchasing products endorsed by celebrities (Gong et al., 2021).

In fan behavior research, many scholars have begun to discuss the relationship between PSRs and fan social media usage. From the perspective of use and gratification, some scholars believe that para-social interaction can to some extent satisfy people's interpersonal communication needs, thus potentially becoming a precursor to media usage (Zhou & Hao, 2021). Currently, studies have confirmed that the strength of fans' PSRs is positively correlated with the time spent on media usage (Kneisel & Sternadori, 2022). Additionally, research has found a positive relationship between the strength of fans' PSRs with celebrities and social media addiction (Baek et al., 2013; de Bérail et al., 2019). For example, de Bérail et al. (2019) found a positive correlation between the strength of the PSRs between viewers and content creators on YouTube and

the intensity of viewers' YouTube addiction.

In the era of social media, understanding the mechanism of the effects of PSRs and media dependency is crucial. The mediating pathway of fear of missing out (FoMO) may provide an answer. FoMO refers to the anxiety people experience about missing events and information (Chai et al., 2018), and is found widespread in various daily life situations and has significant impacts on people's psychology and behavior. With the development of media technology, this concept has also been used to understand individuals' excessive media usage. For example, numerous studies have found that individuals with high levels of FoMO are more likely to exhibit non-adaptive social media usage behaviors, such as social media addiction and smartphone addiction (Shi et al., 2022; Ye & Xu, 2020; Zhang et al., 2021; Zhang et al., 2019).

Existing research has found that many factors influence individuals' levels of FoMO, such as personality traits, psychological needs, and social media usage (Beyens et al., 2016; Cheng, 2021; Chai et al., 2018). From the perspective of psychological needs, FoMO is considered a manifestation of self-regulation obstruction when individuals' basic psychological needs are not met.

Self-determination theory suggests that effective self-regulation requires satisfying three needs: competence, autonomy, and relatedness (Deci & Ryan, 1985). Competence includes the ability of individuals to effectively act in their living environment, autonomy refers to actions being based on individuals' own initiative, and relatedness refers to individuals' attachment to other individuals. According to Gracella et al.'s (2022) study on Indonesian K-pop fans, respondents expressed a desire to continuously track the daily lives of K-pop idols and be the first to know about idol news, reflecting fans' needs for autonomy and competence; the need for relatedness is reflected in fans' attachment to idols. This also means that the level of fans' PSRs will affect individuals' levels of FoMO.

For transnational K-pop fans, social media is the primary tool for fans to access information about K-pop idols and stay connected with idols and other fan communities. The rapid flow of information may make fans worry about missing idol-related information. This FoMO will prompt fans to use social media as much as possible to obtain the latest information about idols (Gracella et al., 2022). Individuals' FoMO can be satisfied by information found through social media. This satisfaction leads individuals to immerse themselves in social media usage, eventually leading to addiction to social networks (Zhang et al., 2021).

The existence of FoMO thus provides an effective pathway for understanding fans' social media dependency. Based on this, this study proposes the following hypothesis:

H1: The strength of PSRs established with K-pop idols will positively predict fans' social media dependency (c), and FoMO will mediate the effect of PSR strength on fans' social media dependency (a, b).

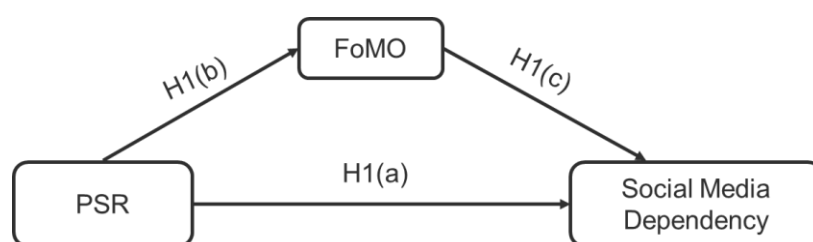


Figure 1: Mediation Model of FoMO

The Moderating Role of Loneliness and Social Anxiety: A Perspective of the Para-Social Compensation Hypothesis

Loneliness and social anxiety are broadly defined as subjective feelings that individuals experience due to deficiencies in social interactions (de Bérail et al., 2019). Specifically, social anxiety is an emotional state of excessive and persistent fear individuals feel during social situations, belonging to a subclass of anxiety. Loneliness, on the other hand, is defined as "a subjective psychological experience or feeling when individuals realize the gap between their desire for and the actual level of social interaction satisfaction" (Luo & Hu, 2021).

Although PSR is a one-sided and imaginary relationship between fans and idols, they are still considered a type of interpersonal relationship. Some scholars believe that the most important function of para-social interaction is its potential as a source of substitute companionship, which may compensate for individuals' lack of social relationships (Madison et al., 2016; Rosengren et al., 1976).

According to the para-social compensation hypothesis, individuals who feel lonely, socially isolated, or have social skills deficits (such as social anxiety) tend to seek more compensation from PSRs to satisfy their belongingness needs (de Bérail et al., 2019). For example, media psychology literature has found that lonely individuals may turn to PSRs with media figures to experience social companionship (A. M. Rubin et al., 1985).

Since social media can serve as a substitute for social interaction, loneliness and social anxiety have long been considered significant factors influencing media addiction (Li, 2022; Yang et al., 2022; Shen & Ran, 2018). Therefore, based on the para-social compensation hypothesis, the levels of loneliness and social anxiety in individuals may have a certain influence on the relationship between their PSRs and social media dependency, as confirmed in previous studies. For example, de Bérail et al. (2019) found that the more socially anxious individuals are, the greater the impact of their PSRs on their YouTube addiction. Han et al. (2021) found that the degree of para-social interaction with social robots reduces individuals' feelings of loneliness, but users are also more likely to develop media dependency on social robots.

Since para-social interaction between K-pop fans and idols is mainly mediated by social media, fans will rely more on social media usage to obtain this compensation. Therefore, this study believes that loneliness and social anxiety may play a moderating role in the pathway between fans' PSRs and their social media dependency. Compared to individuals with lower levels of loneliness and social anxiety, individuals with higher levels of loneliness and social anxiety may have a greater impact of their PSRs with idols on their social media dependency. Therefore, regarding the moderating role of loneliness and social anxiety, this study proposes the following hypothesis:

H2: The association between the strength of PSRs and social media dependency is moderated by fans' loneliness and social anxiety. In individuals with higher levels of loneliness and social anxiety, the relationship between PSRs and social media dependency will be stronger than in individuals with lower levels of loneliness (a) and social anxiety (b).

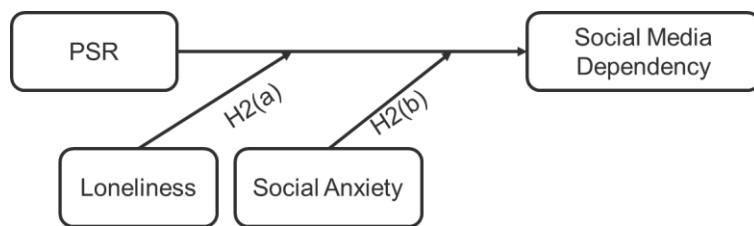


Figure 2: Moderation Model of Loneliness and Social Anxiety

Methodology

Sample

The study adopted a cross-sectional design and employed convenience sampling to recruit Chinese K-pop fan users from interest pages on Twitter-like Sina Weibo, interest groups on Reddit-like forum Douban, and fan groups on WeChat. An online questionnaire was distributed via the Tencent questionnaire platform from December 26, 2022, to January 1, 2023. A total of 610 questionnaires were collected. After removing invalid questionnaires based on completion time, repeated answers, and setting trap questions to exclude non-K-pop fan users, 590 valid questionnaires were obtained, resulting in an effective response rate of 96.72%.

The ages of the participants ranged from 11 to 32 years old, with an average age of 18.33 ± 3.41 years. Among them, there were 25 males (4.2%) and 565 females (95.8%). Regarding educational background, 86 participants (14.6%) had a junior high school education or below, 199 participants (33.7%) had a high school education, 243 participants (41.2%) had a bachelor's or associate degree, and 62 participants (10.5%) had a master's degree or above. A total of 545 participants (92.4%) were single, while 45 participants (7.6%) were in an intimate relationship. There were no significant differences observed in the distribution of participants' gender and educational background [$\chi^2(3) = 3.07, p = 0.381, p > 0.05$].

Measures

Demographics

The demographic variables in this study include age, gender, educational level, and emotional status.

Existing literature suggests that demographic factors such as age, gender, and educational level may have an impact on the level of PSRs, although results across studies vary (Giles, 2002; 晏青 & 付森会, 2021). Additionally, since PSRs themselves are a form of "imaginary intimacy" (Horton & Wohl, 1956), they may have some degree of substitution effect with other types of intimate relationships. Therefore, fans in different emotional states may also exhibit differences in their levels of PSRs with idols. Participants were also asked to report their current emotional status, which was transformed into a dummy variable and included in the analysis, with 1 representing "single" and 2 representing "in an intimate relationship."

PSR

This research adopted a modified version of the Chinese PSR Guttman scale developed by Ge (2017) within the context of K-pop. The scale comprises 10 statement items describing the linear progression of PSRs from cognitive, emotional, to behavioral stages, with responses scored on a scale of 0 (disagree) to 1 (agree).

The uni-dimensionality of the Guttman scale was examined using the Coefficient of Reproducibility (CR),

with a general acceptance threshold above 0.90. In Ge's (2017) study, the scale demonstrated a CR of 0.895. In this study, the CR was found to be 0.876. Removing item 6 or 9 resulted in an increase in the CR to 0.904, and removing both items 6 and 9 raised the CR to 0.93. According to Ge (2017), given the influence of sample heterogeneity on the CR, a slightly lower CR than 0.90 can be acceptable in complex sample environments. Given the wide age range and educational diversity of the sample in this study, it was decided to retain all items of the scale.

FoMO on Social Media

Within the context of K-pop, this research adapted the FoMO scale in Chinese developed by Li et al. (2019) and Song et al. (2017). The initial questionnaire comprised 12 statement items, which were revised to 9 items. Participants rated each item on a scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating a higher level of FoMO in the social media environment. In this study, the Cronbach's α coefficient for this scale was found to be 0.85.

The reliability of the questionnaire was assessed through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The sample was randomly divided into two groups of equal size. Sample 1 underwent the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity, resulting in a KMO coefficient of 0.88 and a significant Bartlett's test, indicating suitability for factor analysis. Using principal axis factoring with oblique rotation, a rotated factor loading matrix was obtained, revealing communalities less than 0.3 for items 6, 7, and 12, which were subsequently removed. After item deletion, a total of 2 factors with eigenvalues greater than 1 were obtained. The cumulative explained variance was 50.8%, and all item factor loadings exceeded 0.4. Subsequently, based on data from sample 2, confirmatory factor analysis was conducted on the remaining 9 items according to the structure obtained from exploratory analysis. The results indicated an acceptable model fit ($\chi^2 = 96.237$; $df = 26$; $\chi^2/df = 3.70$; $p < .001$; CFI = 0.906; RMSEA = 0.096; TLI = 0.870; NFI = 0.877; GFI = 0.933), with item factor loadings ranging from 0.39 to 0.85.

Social Media Dependency

This research used scale adapted from the Mobile Social Media Dependency Scale developed by Wu (2014), which comprises 30 statement items. Participants rate each item on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), with higher scores indicating a greater level of social media dependency. The Cronbach's α coefficient for this scale was 0.93.

Social Anxiety

The Interaction Anxiousness Scale, developed by Leary and Kowalski (1993) and translated by Wang et al. (1999) into Chinese, was utilized to measure participants' level of social anxiety. This scale consists of 15 statement items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Items 3, 6, 10, and 15 are reverse-coded, with higher scores indicating a greater degree of social anxiety. The Cronbach's α coefficient for this scale was 0.89.

Loneliness

The ULS-8 Loneliness Scale (Hays & DiMatteo, 1987), a simplified version of the UCLA Loneliness Scale (Russell et al., 1978) was used in its Chinese version as translated by Zhou et al. (2012). This scale comprises 8 items rated on a 4-point scale (1 = never to 4 = always). Items 3 and 6 are reverse-coded, and higher scores indicate greater feelings of loneliness.

In this study, removing items 3 and 6 resulted in an increase in the total scale's Cronbach's α coefficient from 0.80 to 0.83. According to Zhou et al. (2012), the ULS-6 maintains good test-retest reliability, internal consistency reliability, structural validity, and empirical validity even after removing items 3 and 6. Therefore, the remaining 6 items' scores were used for subsequent

Analytical Strategy

SPSS 26.0 is used for descriptive statistics, exploratory factor analysis, and regression analysis. Confirmatory factor analysis is conducted by fitting a structural equation model using the lavaan package in R (Rosseel, 2012). Mediation analysis is performed using the Process macro developed by Hayes (2022).

Results

Testing Common Method Bias

The Harman single-factor method was used to test for common method bias in the research data. Exploratory factor analysis was conducted on the variables without any conditional restrictions, resulting in the extraction of 17 factors with eigenvalues greater than 1. The first factor accounted for only 17.9% of the variance, far below the critical threshold of 40%, indicating that there is no severe common method bias in this study.

Descriptive statistics

The means, standard deviations, and Pearson correlation coefficients of each variable are shown in Table 2. PSR is significantly positively correlated with FoMO ($r = 0.44, p < 0.001$) and social media dependency ($r = 0.15, p < 0.001$). There are significant positive correlations among social media dependency, FoMO, loneliness, and social anxiety. After controlling for gender, age, education level, and emotional status differences, it was found that the correlation between FoMO and social anxiety was no longer significant ($r = 0.06, p = 0.133, p > 0.05$), while the correlations among the other variables remained stable.

Table 2 Means, standard deviations and correlations for all study variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. PSR	6.02	1.94	1	0.44***	0.05	-0.01	0.15***
2. FoMO	2.80	0.86	0.38***	1	0.15***	0.10*	0.33***
3. Lonliness	2.36	0.61	0.01	0.11**	1	0.36***	0.23***
4. Social Anxiety	3.59	0.75	-0.05	0.06	0.34***	1	0.32***
5. SMD	3.76	0.68	0.14***	0.32***	0.23***	0.32***	1

Note: SMD: social media dependency. The upper right corner shows the zero-order correlations between variables, and the lower left corner shows the correlations between variables after controlling for gender, age, education level, and emotional status.

PSR and Social Media Dependency: Through a Moderated mediation model

Mediation Analysis of FoMO

Firstly, Model 4 (simple mediation model) from the SPSS macro developed by Hayes (2022) was employed to test the mediating effect of FoMO between PSR and social media dependency, while controlling for gender, age, education level, and emotional status. The results are presented in Table 3.

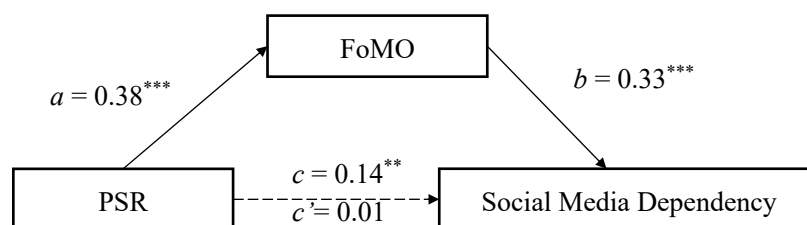
Table 3 Regression Analysis of the Mediating Effect of FoMO (N=590)

Dependent Variables	Independent Variables	<i>R</i>	<i>R</i> ²	<i>F</i>	β	95% LL CI	95% UL CI	<i>t</i>
SMD	Gender	0.18	0.03	3.88**	-0.08	-0.16	0.00	-1.90
	Age				-0.10	-0.26	0.06	-1.28
	Education				0.08	-0.08	0.24	0.99
	IR				-0.04	-0.12	0.05	-0.88
	PSR				0.14	0.06	0.22	3.31**
FoMO	Gender	0.48	0.23	35.19***	-0.03	-0.10	0.04	-0.82
	Age				-0.25	-0.39	-0.10	-3.38***
	Education				0.04	-0.10	0.18	0.54
	IR				-0.01	-0.08	0.06	-0.28
	PSR				0.38	0.30	0.45	10.00***
SMD	Gender	0.34	0.12	12.97***	-0.07	-0.14	0.01	-1.73
	Age				-0.02	-0.18	0.13	-0.29
	Education				0.07	-0.09	0.22	0.87
	IR				-0.03	-0.11	0.05	-0.83
	PSR				0.01	-0.07	0.10	0.32
	FoMO				0.33	0.25	0.42	7.52***

Note: SMD: social media dependency. IR: intimate relationships. β : standardized coefficient. LL: lower Limit. UL: upper limit. CI: percentile-based confidence intervals. All variables in the model have been standardized.

The strength of PSR significantly positively predicted the level of social media dependency ($\beta = 0.14$, $p < 0.01$). After including the mediator variable FoMO, PSR significantly positively predicted FoMO ($\beta = 0.38$, $p < 0.001$). When both PSR and FoMO simultaneously predicted social media dependency, FoMO had a significant predictive effect on social media dependency ($\beta = 0.33$, $p < 0.001$), while the predictive effect of PSR on social media dependency was not significant ($\beta = 0.01$, $p = 0.746$, $p > 0.05$).

The results of the mediation analysis indicate that FoMO plays a fully mediating role in the influence of PSR on social media dependency (see Figure 3), supporting H1. The indirect effect size of PSR on social media dependency through FoMO was 0.1262, accounting for 89.82% of the total effect, with a 95% confidence interval of [0.0852, 0.1718]. This model explains 11.8% of the total variance in the level of social media dependency.

**Figure 3: Mediation Model of FoMO**

Moderation Analysis of Loneliness and Social Anxiety

The moderation effects of loneliness and social anxiety were tested using hierarchical regression analysis (Fang et al., 2015), controlling for gender, age, education level, and emotional status, to examine their moderation effects on the relationship between PSR and social media dependency.

The results of the moderation analysis for loneliness are presented in Table 4. Both PSR ($\beta = 0.14, p < 0.001$) and loneliness ($\beta = 0.23, p < 0.001$) significantly positively predicted social media dependency, with the two variables together accounting for 7% of the variance in social media dependency. The interaction between PSR and loneliness also significantly positively predicted the dependent variable ($\beta = 0.09, p < 0.05$), contributing 0.8% to the total variance of the dependent variable. These results indicate that the influence of PSR on social media dependency is moderated by loneliness.

Table 4: Testing Moderator Effects of Loneliness Using Multiple Regression

		Step 1			Step 2			Step 3		
		<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
L1	Gender	-0.28	0.14	-0.08*	-0.24	0.13	-0.07	-0.26	0.13	-0.08
	Age	-0.03	0.02	-0.13	-0.01	0.02	-0.05	-0.02	0.02	-0.09
	Education	0.06	0.06	0.07	0.04	0.06	0.05	0.06	0.06	0.08
	IR ¹	-0.09	0.11	-0.03	-0.17	0.11	-0.07	-0.16	0.11	-0.06
L2	PSR				0.05	0.01	0.14***	0.05	0.01	0.14***
	Loneliness				0.26	0.04	0.23***	0.25	0.04	0.23***
L3	PSR $\times$ Loneliness							0.05	0.02	0.09*
	R^2		0.014			0.084			0.092	
	ΔR^2		0.014			0.070			0.008	
	<i>F</i>		2.070			8.956***			8.472***	

¹ IR: Intimate relationships

Note: Interactions were computed after centering the independent and moderator variables.

For the loneliness, simple slope analysis was conducted by categorizing participants into high and low loneliness groups based on the mean score plus and minus one standard deviation, respectively. The results are depicted in Figure 4. The findings indicate the following: (1) For the high loneliness group, with an increase in PSR, there was a significant increase in social media dependency (*simple slope* = 0.079, $t = 4.002$, $p < 0.001$); (2) For the low loneliness group, there was no significant increase in social media dependency with an increase in PSR (*simple slope* = 0.020, $t = 1.073$, $p = 0.284$, $p > 0.05$). The results of the simple slope analysis demonstrate that the positive predictive effect of PSR on social media dependency is only applicable to the high loneliness group but not to the low loneliness group, thus partially supporting H2(a).

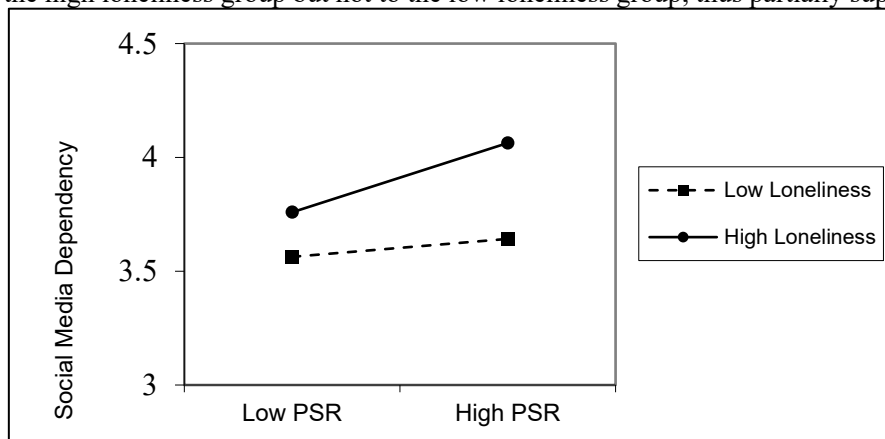


Figure 4: Interaction Plot of PSRs × Loneliness

The results of the moderation analysis for social anxiety are presented in Table 5. Although PSR ($\beta = 0.16$, $p < 0.001$) and social anxiety ($\beta = 0.33$, $p < 0.001$) both significantly positively predicted social media dependency, the interaction of PSR and social anxiety did not significantly predict the dependent variable ($\beta = 0.03$, $p = 0.111$, $p > 0.05$). The results indicate that the influence of PSR on social media dependency is not moderated by social anxiety, thus rejecting H2(b).

Table 5: Testing Moderator Effects of Social Anxiety Using Hierarchical Multiple Regression

		Step 1			Step 2			Step 3		
		<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
L1	Gender	-0.28	0.14	-0.08*	-0.18	0.13	-0.05	-0.20	0.13	-0.06
	Age	-0.03	0.02	-0.14	-0.01	0.02	-0.07	-0.02	0.02	-0.09
	Education	0.06	0.06	0.07	0.06	0.06	0.07	0.07	0.06	0.09
	IR	-0.09	0.11	-0.04	-0.22	0.10	-0.09*	-0.23	0.10	-0.09*
L2	PSR				0.06	0.01	0.16***	0.06	0.01	0.16***
	Social Anxiety				0.30	0.04	0.33***	0.30	0.04	0.33***
L3	PSR × Social Anxiety							0.03	0.02	0.06
	R^2		0.014			0.138			0.142	
	ΔR^2		0.014			0.124			0.004	
	F		2.070			15.568***			13.743***	

Conclusions

Based on self-determination theory and the para-social compensation hypothesis, this study observed Chinese K-pop fans as samples to construct both an intermediary model and a moderation model with loneliness and social anxiety as moderating variables, and FoMO as the intermediary variable.

Firstly, the study found significant correlations between PSRs with idols among Chinese K-pop fans and FoMO, as well as the degree of social media dependency. Regarding the mechanism, the study revealed that the strength of PSRs between Chinese K-pop fans and idols significantly predicted fans' social media dependency, and this effect was primarily mediated by FoMO. Furthermore, the analysis of the moderating effects of loneliness and social anxiety also found that under conditions of higher loneliness, the influence of PSRs on social media dependency was more significant, whereas it was not significant when loneliness was low. Social anxiety did not significantly moderate the relationship between PSRs and social media dependency. These findings to some extent support the para-social compensation hypothesis, suggesting that individuals with higher levels of loneliness may rely more on para-social interactions for compensation, thus leading to excessive use of social media.

This study deepens the understanding of the relationship between PSRs with idols and social media usage from an empirical perspective, and expands the application of para-social interaction theory to audience behavior. Additionally, the study can provide guidance for promoting healthy social media use among fans and related psychological health services, thus holding practical significance.

Limitations

Though this study may abundant the current literature on discussing the PSR and social media use among

fans – especially within the context of transnational digital fandom – the research has the following limitations.

Firstly, since this study collected cross-sectional data, it can only roughly discuss the relationship between PSRs and social media dependency based on the para-social compensation hypothesis, rather than making causal inferences. Future research could consider longitudinal studies by collecting longitudinal panel data and using methods such as cross-lagged models to more accurately assess the mediation mechanisms and causal relationships between PSRs, social media dependency, and FoMO (Fang et al., 2021; Yuan et al., 2021).

Additionally, since PSRs have been shown to be positively correlated with the duration of media usage (Schiappa et al., 2007), the duration of social media usage should have been included as a covariate in the analysis. Although this study required participants to report their usage duration on social media platforms like Weibo, Bilibili, Xiaohongshu, and Douban over the past week, due to the large number of items in the online questionnaire, it created a burden on the participants, resulting in a high rate of errors in responding to this item. Therefore, the scores for this variable were not included in the analysis. Subsequent studies should consider the contribution of this variable to the variation of other variables in the model.

Another limitation of the study is the lack of consideration for how Chinese K-pop fans interpret their own PSRs, which may introduce certain errors in the measurement of their PSRs (Ge, 2017). Future research could consider integrating qualitative methods by conducting semi-structured interviews with fan groups to better understand the potential influences of different characteristics of PSRs between fans and idols.

References

- Baek, Y. M., Bae, Y., & Jang, H. (2013). Social and Parasocial Relationships on Social Network Sites and Their Differential Relationships with Users' Psychological Well-Being. *Cyberpsychology, Behavior, and Social Networking*, 16(7), 512–517. <https://doi.org/10.1089/cyber.2012.0510>
- Beyens, I., Frison, E., & Eggermont, S. (2016). “I don’t want to miss a thing”: Adolescents’ fear of missing out and its relationship to adolescents’ social needs, Facebook use, and Facebook related stress. *Computers in Human Behavior*, 64, 1–8. <https://doi.org/10.1016/j.chb.2016.05.083>
- Chai, H., Niu, G., Chu, X., Wei, Q., Song, Y., & Su, X. (2018). Fear of missing out: What have I missed again? [in Chinese], *Advances in Psychological Science*, 26(03), 527–537.
- Cheng, P. (2021). The Relationship between Loneliness and Adolescents' Fear of Missing Out: The Mediating Effect of Social Media Use Intensity [in Chinese]. *Chinese Journal of Clinical Psychology*, 29(01), 187–190. <https://doi.org/10.16128/j.cnki.1005-3611.2021.01.038>
- Chen, L. (2018). Affective Labor and Incorporation: A Study on Fundraising in Baidu Tieba's K-pop Fandom [in Chinese]. *Cultural Studies*, 3, 123–134.
- de Bérail, P., Guillon, M., & Bungener, C. (2019). The relations between YouTube addiction, social anxiety and parasocial relationships with YouTubers: A moderated-mediation model based on a cognitive-behavioral framework. *Computers in Human Behavior*, 99, 190–204. <https://doi.org/10.1016/j.chb.2019.05.007>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior* (1st ed.). Plenum. <https://doi.org/10.1007/978-1-4899-2271-7>
- Elfvig-Hwang, J. (2018). K-pop idols, artificial beauty and affective fan relationships in South Korea. In

Routledge Handbook of Celebrity Studies (1st ed., pp. 190–201). Routledge.

<https://doi.org/10.4324/9781315776774-12>

Fan, Z. (2020, July 21). *After analyzing 977 fan support groups for celebrities, we have discovered the truth of Chinese fandom [in Chinese]*. https://www.thepaper.cn/newsDetail_forward_8362985

Fandia, M. (2016, November 2). *The Fandom for Idols – A Survey Report on Kpop Fans in Indonesia*.

<https://blog.jakpat.net/the-fandom-for-idols-a-survey-report-on-kpop-fans-in-indonesia/>

Fang, J., Wen, Z., Liang, D., & Li, N. (2015). Moderation Effect Analyses Based on Multiple Linear Regression [in Chinese]. *Journal of Psychological Science*, 38(03), 715–720.

<https://doi.org/10.16719/j.cnki.1671-6981.2015.03.001>

Fang, J., Wen, Z., & Qiu, H. (2021). Mediation Analysis of Longitudinal Data [in Chinese]. *Journal of Psychological Science*, 44(04), 989–996. <https://doi.org/10.16719/j.cnki.1671-6981.20210431>

Ge, J. (2013). Advances in Western Parasocial Interaction Research [in Chinese]. *Journal of Zhejiang University of Media & Communications*, 20(01), 96–100.

<https://doi.org/10.13628/j.cnki.zjcmxb.2013.01.014>

Ge, J. (2017). Development of a Guttman Scale for Parasocial Relationship [in Chinese]. *Statistics & Decision*, 08, 19–22. <https://doi.org/10.13546/j.cnki.tjyjc.2017.08.004>

Giles, D. C. (2002). Parasocial Interaction: A Review of the Literature and a Model for Future Research. *Media Psychology*, 4(3), 279–305. https://doi.org/10.1207/S1532785XMEP0403_04

Gong, X., Ye, Z., & Yu, S. (2021). The Relationship between the Vlogger Attraction and Consumers' Purchase Intention in Vlog Context: The Role of Parasocial Interaction and Fear of Missing Out [in

Chinese]. *Collected Essays on Finance and Economics*, 12, 92–102.

<https://doi.org/10.13762/j.cnki.cjlc.2021.12.007>

Gracella, E. A., Arifin, M., & Susanti, S. (2022). The Contribution of Fear of Missing Out to Self-Regulation Among K-Pop Fans in Makassar. *Proceedings of the Interdisciplinary Conference of Psychology, Health, and Social Science (ICPHS 2021)*, 191–198.

<https://doi.org/10.2991/assehr.k.220203.030>

Han, X., Zhang, H., He, K., & Ma, S. (2021). The Suppressing Effect of Media Dependency: Does the More Parasocial Interaction between Users and Social bots They Have, the More Lonely They Feel? [in Chinese]. *Chinese Journal of Journalism & Communication*, 43(09), 25–48.

<https://doi.org/10.13495/j.cnki.cjjc.2021.09.002>

Hayes, A. F. (2022). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach* (3rd ed.). The Guilford Press. <http://afhayes.com/introduction-to-mediation-moderation-and-conditional-process-analysis.html>

Hays, R. D., & DiMatteo, M. R. (1987). A Short-Form Measure of Loneliness. *Journal of Personality Assessment*, 51(1), 69–81. https://doi.org/10.1207/s15327752jpa5101_6

Horton, D., & Wohl, R. R. (1956). Mass Communication and Para-Social Interaction: Observations on Intimacy at a Distance. *Psychiatry*, 19(3), 215–229. <https://doi.org/10.1080/00332747.1956.11023049>

King-O’Riain, R. C. (2021). “They were having so much fun, so genuinely . . .”: K-pop fan online affect and corroborated authenticity. *New Media & Society*, 23(9), 2820–2838.

<https://doi.org/10.1177/1461444820941194>

Kneisel, A., & Sternadori, M. (2022). Effects of parasocial affinity and gender on live streaming fans' motivations. *Convergence: The International Journal of Research into New Media Technologies*, 135485652211144. <https://doi.org/10.1177/13548565221114461>

Kuang, W. & Deng, Y. (2022). Media Availability: Empowering Fan Communities' Emotional Expression on Social Platforms [in Chinese]. *Jiangxi Social Sciences*, 42(07), 168–176.

Leary, M. R., & Kowalski, R. M. (1993). The Interaction Anxiousness Scale: Construct and criterion-related validity. *Journal of Personality Assessment*, 61(1), 136–146.

https://doi.org/10.1207/s15327752jpa6101_10

Li, H. (2022). *Social Anxiety and Internet Interpersonal Addiction in Adolescents and Countermeasures* [in Chinese]. <https://doi.org/10.27159/d.cnki.ghzsu.2022.000075>

Li, Q., Wang, J., Zhao, S., & Jia, Y. (2019). Validity and reliability of the Chinese version of the Fear of Missing Out scale in college students [in Chinese]. *Chinese Mental Health Journal*, 33(04), 312–317.

Luo, X. & Hu, C. (2021). Influence of sleep problems on mobile social media dependence in college students: Mediating effect of loneliness [in Chinese]. *China Journal of Health Psychology*, 29(05), 776–781. <https://doi.org/10.13342/j.cnki.cjhp.2021.05.028>

Madison, T. P., Porter, L. V., & Greule, A. (2016). Parasocial Compensation Hypothesis: Predictors of Using Parasocial Relationships to Compensate for Real-Life Interaction. *Imagination, Cognition and Personality*, 35(3), 258–279. <https://doi.org/10.1177/0276236615595232>

Novalika, G., & Kartasasmita, S. (2022). The Correlation between Fear of Missing Out (FoMO) with Quality of Life (QoL) in K-pop Fans. *Proceedings of the 3rd Tarumanagara International Conference*

on the Applications of Social Sciences and Humanities (TICASH 2021), 1484–1490.

<https://doi.org/10.2991/assehr.k.220404.238>

Rosengren, K. E., Windahl, S., Hakansson, P.-A., & Johnsson-Smaragdi, U. (1976). Adolescents' TV Relations: Three Scales. *Communication Research*, 3(4), 347–366.

<https://doi.org/10.1177/009365027600300401>

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48, 1–36. <https://doi.org/10.18637/jss.v048.i02>

Rubin, A. M., Perse, E. M., & Powell, R. A. (1985). Loneliness, Parasocial Interaction, and Local Television News Viewing. *Human Communication Research*, 12(2), 155–180.

<https://doi.org/10.1111/j.1468-2958.1985.tb00071.x>

Rubin, R. B., & McHugh, M. P. (1987). Development of parasocial interaction relationships. *Journal of Broadcasting & Electronic Media*, 31(3), 279–292. <https://doi.org/10.1080/08838158709386664>

Russell, D., Peplau, L. A., & Ferguson, M. L. (1978). Developing a Measure of Loneliness. *Journal of Personality Assessment*, 42(3), 290–294. https://doi.org/10.1207/s15327752jpa4203_11

Schiappa, E., Allen, M., & Gregg, P. B. (2007). Parasocial Relationships and Television: A Meta-Analysis of the Effects. In *Mass Media Effects Research: Advances Through Meta-Analysis* (pp. 301–314). Lawrence Erlbaum Associates Publishers.

Shen, X. & Ran, G. (2018). The influence of social anxiety on excessive smartphone use: The mediating effect of loneliness and motivation [in Chinese]. *Psychological Research*, 11(06), 570–576.

Shi, Z., Guan, J., Chen, H., Huang, S., Liu, B., & Chen, X. (2022). The Relationship between Trait Fear of

- Missing Out and Smartphone Addiction in College Students: A Mediating and Moderating Model [in Chinese]. *Chinese Journal of Clinical Psychology*, 30(03), 663–668.
<https://doi.org/10.16128/j.cnki.1005-3611.2022.03.033>
- Song, X., Zhao, Y., & Zhang, X. (2017). Developing a Fear of Missing Out (FoMO) Measurement Scale in the Mobile Social Media Environment [in Chinese]. *Library and Information Service*, 61(11), 96–105.
<https://doi.org/10.13266/j.issn.0252-3116.2017.11.012>
- Wang, X., Wang, X., & Ma, H. (1999). *Psychological Health Assessment Scale Manual (Revised Edition)* [in Chinese]. *Chinese Mental Health Journal*.
- Wu, Z. (2014). *A Study on Questionnaire Design and Characteristics of College Students' mobile Phone Social Media Dependence* [in Chinese].
- Yan, Q. & Fu, S. (2021). Research on Influencing Factors and Mechanism of Fan-Star Relationship Perception: Based on the Mixed Method [in Chinese]. *Chinese Journal of Journalism & Communication*, 43(10), 6–28. <https://doi.org/10.13495/j.cnki.cjjc.2021.10.002>
- Yang, X., Bai, Y., Yu, Y., Wang, X., Lv, J., & Cao, X. (2022). The Relationship Among Loneliness, Social Anxiety and Mobile Phone Dependence in College Students: A Cross-lag Analysis [in Chinese]. *Chinese Journal of Clinical Psychology*, 30(01), 64–67. <https://doi.org/10.16128/j.cnki.1005-3611.2022.01.013>
- Ye, F. & Xu, X. (2020). Motivation and Addiction of Adolescents' Mobile Social Media: The Mediating Effects of FoMO [in Chinese]. *Information Studies: Theory & Application*, 43(10), 108–114.
<https://doi.org/10.16353/j.cnki.1000-7490.2020.10.019>

- Yoon, K. (2018). Global Imagination of K-Pop: Pop Music Fans' Lived Experiences of Cultural Hybridity. *Popular Music and Society*, 41(4), 373–389. <https://doi.org/10.1080/03007766.2017.1292819>
- Yuan, S., Cao, W., Zhang, M., Wu, S., & Wei, X. (2021). The Road to a More Accurate Causal Analysis: New Advances in Cross-lagged Panel Models [in Chinese]. *Human Resources Development of China*, 38(02), 23–41. <https://doi.org/10.16471/j.cnki.11-2822/c.2021.2.002>
- Zhang, Q., & Negus, K. (2020). East Asian pop music idol production and the emergence of data fandom in China. *International Journal of Cultural Studies*, 23(4), 493–511. <https://doi.org/10.1177/1367877920904064>
- Zhang, Y., Che, Y., Jin, J., & Yu, G. (2021). The Relationship between Fear of Missing Out and Social Media Addiction: A Cross-Lagged Analysis [in Chinese]. *Chinese Journal of Clinical Psychology*, 29(05), 1082–1085. <https://doi.org/10.16128/j.cnki.1005-3611.2021.05.039>
- Zhang, Y., Jiang, W., Ding, Q., & Hong, M. (2019). Social Comparison Orientation and Social Network Sites Addiction in College Students: The Mediating Role of Fear of Missing Out [in Chinese]. *Chinese Journal of Clinical Psychology*, 27(05), 928-931+936. <https://doi.org/10.16128/j.cnki.1005-3611.2019.05.015>
- Zhou, Y. & Hao, J. (2021). Embeddedness and Detachment: Parasocial Interaction between Live Streaming Users and Hosts [in Chinese]. *News and Writing*, 12, 41–49.
- Zhou, L., Li, Z., Hu, B., & Xiao, S. (2012). Reliability and validity of ULS-8 loneliness scale in elderly samples in a rural community [in Chinese]. *Journal of Central South University (Medical Science)*, 37(11), 1124–1128.

Zhu, S. (2017). *Imagination and Performance: Studies on the Daily Practice of K-pop Fans and Its*

Significance. [in Chinese].

<https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CMFD&dbname=CMFD201801&filename=101>

7145437.nh&uniplatform=NZKPT&v=tN_s57X4OeoBSvJlGUCwsHHqbgeYjCV6LIsXBKpdfWo6

WwiFdWn1nqNn77Q7r-J