



Social exclusion and mobile phone dependence: The mediating effect of self-esteem and the moderating role of rejection sensitivity

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Abstract: This study examined the role of self-esteem mediates and rejection sensitivity in the relationship between social exclusion and mobile phone dependence. A sample of 715 Chinese college students (females = 60.1%, mean age = 19.06, SD = 1.34 years) completed self-report measures of social exclusion, self-esteem, rejection sensitivity, and mobile phone dependence. Results following regression analysis indicate social exclusion is related to higher mobile phone dependence. Self-esteem plays a partial mediating role in the relationship between social exclusion and mobile phone dependence, higher levels of social exclusion are associated with lower levels of self-esteem, and lower self-esteem in turn leads to higher mobile phone dependence. Rejection sensitivity moderated the first half of the mediation path (social exclusion → self-esteem), to suggest higher phone dependence by individuals reporting higher in rejection sensitivity. The findings are consistent with the need to belong theory, which states that social exclusion threatens the fundamental need for social belonging, causing reduced self-esteem and motivating individuals to use mobile phones as a compensatory tool for real-world social connections. Interventions enhancing self-esteem and adaptive coping may help reduce mobile phone dependence risks, especially for individuals with high rejection sensitivity.

Keywords: social exclusion; mobile phone dependence; self-esteem; rejection sensitivity

Introduction

Mobile phone dependence, as a widely concerning social issue, refers to an individual's strong, persistent, and uncontrollable tendency to rely on their mobile phone, which can cause significant harm to physical and mental health (Elhai et al., 2018). Research finds that mobile phone dependence is more prevalent among college students, with a reported symptom rate of 25.70% (Huang et al., 2024). Mobile phone dependence is closely associated with daytime sleepiness and physical pain among college students (Ng et al., 2020); it shows significant positive correlations with negative emotions (Peng et al., 2024), depressive symptoms (Linh et al., 2026), and loneliness (Yang et al., 2022); it also directly predicts academic achievement (Kates et al., 2018), well-being, and life satisfaction (Chen et al., 2025; Zhu et al., 2025). Therefore, there is an urgent need to clarify the factors associated with mobile phone dependence among college students and reveal its underlying mediating and moderating psychological mechanisms.

Social exclusion and mobile phone dependence

Mobile phone dependence refers to a behavior that causes adverse physiological and psychological consequences due to excessive use of mobile phones (Choe & Yu, 2022). It encompasses two related yet distinct dimensions: (a) device-specific attachment, characterized by nomophobia (fear of being without one's phone) and constant proximity-seeking behaviors, and (b) content-focused engagement, particularly with online social and entertainment functions. Although these dimensions cannot

be completely disentangled using existing measurement tools, the present study focuses primarily on the latter. Specifically, we conceptualize mobile phone dependence as a compensatory behavioral tendency through which individuals seek to satisfy unmet belongingness needs via mobile phone-mediated social interactions, consistent with cognitive-behavioral models of problematic Internet use. As both mobile phone dependence and Internet addiction fall within the category of behavioral addictions, exhibiting high similarity and analogy in their formation mechanisms. Currently, this model has been widely applied in various studies related to mobile phone dependence (Wu et al., 2024). Interpersonal relationship issues, being related to both the external environment and individual characteristics, are considered important predictors of mobile phone dependence (He et al., 2024; Liang et al., 2024; Ye et al., 2025). Social exclusion, as a typical manifestation of interpersonal relationship problems, refers to the negative state where an individual experiences rejection or exclusion in social interactions, often regarded as a stressful event (Saylor et al., 2013). To alleviate the psychological pain caused by the deprivation of belongingness needs, individuals actively seek to establish alternative social connections. Mobile phones and their diverse social applications, characterized by high accessibility, anonymity, and low social risk, provide a convenient virtual source of belonging. Consequently, individuals often use mobile phones as a compensatory strategy to fill the void of real-world social connections-satisfying their belonging needs through online socializing (Chiou et al., 2015; David & Roberts, 2017). It is noteworthy



that, while we examine social exclusion as a predictor of mobile phone dependence based on theoretical precedence and temporal logic, we acknowledge that reciprocal relationships are plausible and discuss these as directions for future longitudinal research.

The mediation of self-esteem

On one hand, Sociometer Theory posits that self-esteem is an internal indicator of an individual's perceived social acceptance. When individuals perceive being excluded or ignored, they may doubt their own abilities or worth, leading to diminished self-worth and consequently lower self-evaluation (Leary et al., 1995). Self-determination theory similarly indicates that unmet belongingness needs disrupt an individual's experience of self-worth, leading to low or unstable self-esteem (Deci et al., 1994). Empirical research further confirms that experiencing social exclusion significantly reduces an individual's self-esteem levels (Lei et al., 2024; Zhang et al., 2024). On the other hand, low self-esteem has consistently been an important predictive factor in various addictive behaviors. The cognitive-behavioral model of Internet addiction posits that negative self-perceptions (such as low self-esteem, low self-efficacy) constitute core triggers for developing Internet addiction (Davis, 2001). Empirical research indicates that low self-esteem leads to a lack of confidence and loss of control, often making it difficult for individuals to effectively cope with real-world social pressures. They tend to adopt avoidance coping strategies, choosing indirect interpersonal interactions, which ultimately contributes to Internet addiction (Billieux, 2012; Wiederhold & Brenda, 2016; Yao et al., 2014).

The moderating of rejection sensitivity

Furthermore, the impact of social exclusion on individuals can be affected by individual traits such as rejection sensitivity (Leng et al., 2018). Rejection sensitivity is a psychological construct reflecting an individual's anxious anticipation, preparatory vigilance, and excessive cognitive-emotional processing in response to perceived rejection by others (Downey & Feldman, 1996). The social-cognitive model of rejection sensitivity indicates that rejection sensitivity is closely linked to the defensive motivational system in interpersonal interactions (Downey et al., 1998). Individuals with high rejection sensitivity exhibit heightened sensitivity to rejection cues and develop expectations that others will reject them. Consequently, when encountering social exclusion, highly rejection-sensitive individuals may detect rejection or exclusion more sensitively from ambiguous others' behaviors compared to low rejection-sensitive individuals. According to the self-verification theory of self-esteem (Swann, 1997), this anticipated rejection prompts individuals to maintain psychological consistency by lowering self-evaluations. In other words, compared to individuals with low rejection sensitivity, those with high rejection sensitivity may experience a more pronounced decline in self-esteem when subjected to the same level of social exclusion. Lei et al. (2024) found that high rejection sensitivity may help aggravate adolescents' self-esteem threaten perceive from ostracism, supporting the above perspective.

Theoretical foundations

The theory of belongingness posits that humans are social creatures with an innate desire to achieve a sense of belonging within groups and establish social connections (Bandura, 1977). When individuals experience social exclusion in real life, their need for belonging remains unmet, leading to negative emotional experiences such as anxiety, loneliness, and depression, and consequently avoidance of face-to-face communication (Baumeister & Tice, 1990). The loss compensation hypothesis similarly points out that when individuals encounter obstacles like interpersonal rejection during psychological development, they often resort to compensatory behaviors such as Internet use (Zhang et al., 2017).

Goal of the Study

This study explored the mediating role of self-esteem, and the moderating role of rejection sensitivity in the relationship between social exclusion and mobile phone dependence among college students. Based on the literature review, we proposed the following research model (Figure 1) and tested the following hypotheses:

Hypothesis 1: Social exclusion is associated with higher mobile phone dependence among college students.

Hypothesis 2: Self-esteem plays a significant mediating role in the relationship between social exclusion and mobile phone dependence for mobile phone addiction to be higher among college students with lower self-esteem.

Hypothesis 3: Rejection sensitivity partially moderates the mediating pathway of social exclusion → self-esteem → mobile phone dependence for elevated levels of mobile phone dependence.

Method

Participants and setting

Using the convenience sampling method, the study recruited 715 participants (86.25% valid response rate), which met the requirements of the aforementioned power analysis. The average age was 19.06 ± 1.34 years, comprising 285 males (39.9%) and 430 females (60.1%). Our sample exceeded thresholds for both components, providing >99% power for the interaction effect and >95% power for the indirect effect, assuming small-to-medium effect sizes (Cohen, 1988).

Measures

Adolescent social exclusion scale

The Ostracism Experience Scale for Adolescents (OES-A) translated by Niu et al. (2016) was employed. This 11-item scale employs a 5-point Likert scale (1 = Never to 5 = Often), including 6 reverse-scored items. The scale includes two dimensions: Neglect and Rejection. Higher scores indicate more frequent experiences of social exclusion in life. In this study, confirmatory factor analysis indicated that the two-factor model fitted the data well, with $\chi^2/df = 5.60$, CFI = 0.95, TLI = 0.94, and RMSEA = 0.08. The Cronbach alpha coefficient for OES-A social neglect and social rejection scores were 0.91 and 0.84, respectively, with the Cronbach alpha coefficient for the OES-A total scale scores was 0.81.

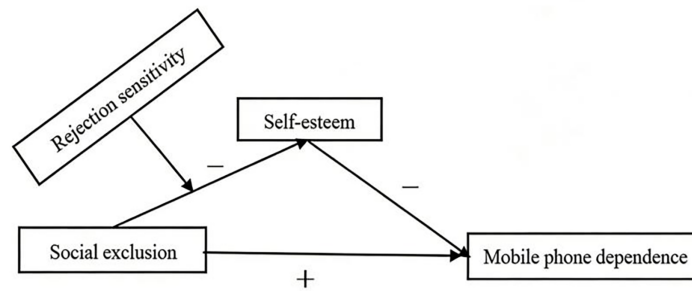


Figure 1. Hypothesized theoretical model

Mobile phone addiction tendency scale for college students

The Mobile Phone Addiction Tendency Scale (MPATS) compiled by Xiong et al. (2012) was adopted. This 16-item scale comprises four dimensions: Withdrawal Symptoms, Salient Behaviors, Social Comfort, and Mood Modification. It employs a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Higher scores indicate a greater level and tendency of mobile phone dependence among individuals. In this study, confirmatory factor analysis indicated that the four-factor model fitted the data well, with $\chi^2/df = 5.20$, CFI = 0.91, TLI = 0.89, RMSEA = 0.08. The Cronbach alpha coefficient for MPATS withdrawal symptoms, salience behavior, social comfort, and mood change scores were 0.78, 0.73, 0.83, and 0.59, with the Cronbach alpha coefficient for the MPATS total scale scores was 0.89.

Self-esteem scale

The Chinese version of the Rosenberg Self-Esteem Scale (RSES, Wang et al., 1999) was used. This scale consists of 10 items, rated on a 4-point Likert scale (1 = Strongly Disagree to 4 = Strongly Agree), including 4 reverse-scored items. Higher total scores indicate higher self-esteem levels. In this study, confirmatory factor analysis indicated that the one-factor model fitted the data well, with $\chi^2/df = 7.05$, CFI = 0.92, TLI = 0.89, RMSEA = 0.09. In this study, the Cronbach alpha coefficient for RSES scores was 0.82.

Rejection sensitivity scale

The “Expectation of Rejection Scale” (ERS) revised by Li (2007) based on Rebecca’s compilation was used. The scale consists of 18 items, rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), including 6 reverse-scored items. Higher total scores indicate stronger rejection sensitivity in individuals. In this study, confirmatory factor analysis indicated that the one-factor model fitted the data well, with $\chi^2/df = 4.94$, CFI = 0.83, TLI = 0.83, RMSEA = 0.07. In this study, the Cronbach alpha coefficient for ERS scores was 0.79.

Procedure

The Ethics Committee of Jiangnan University approved the study (reference number: JHDXKJLL2026–183), and participants provided individual informed consent prior to taking part in. Participation were the voluntariness of the study and their right to withdraw from the study without penalty. Additionally, they were reassured that

their responses would remain anonymous and confidential, and that the data collected would be used solely for research purposes.

Data were collected via an electronic questionnaire, which was completed online by the participants.

Data analysis

To test the hypothesized model proposed earlier and explore the underlying mechanism, all variables were standardized. The model posits that social exclusion is associated with mobile phone dependence through the mediation of self-esteem, with rejection sensitivity moderating the first half of this mediating pathway. Then, using Model 7 in Hayes’ (2013) SPSS macro PROCESS, a moderated mediation model test was conducted to simultaneously examine the hypothesized mediating and moderating effects. Additionally, considering that gender and age may both be associated with individuals’ self-esteem and mobile phone dependence (Lkamel & Assermouh, 2024; Rozgonjuk et al., 2023), they were incorporated as control variables in the model analysis. Specifically, in all hierarchical regression analyses, gender and age were entered as control variables in Step 1, followed by the predictor variables in subsequent steps.

Common method biases

This study implemented several procedural controls to address potential common method bias, including anonymous online participation, the inclusion of reverse-scored items, and randomized presentation of scale order. Specifically, the questionnaire was designed with varied item formats and incorporated reverse-scored items to reduce consistent response patterns; the order of different scales was partially randomized to control for order effects; and all data were collected anonymously via an online platform, which helped reduce evaluation apprehension and encouraged honest responses. After data collection, the Harman single-factor test (Zhou & Long, 2004) was used to test for common method bias. The unrotated factor solution yielded 13 factors with eigenvalues exceeding 1, with the first factor accounting for 16.90% of total variance—well below the 40% threshold suggesting substantial common method bias (Podsakoff et al., 2003). Thus, common method bias did not significantly affect the results of this study.

Table 1. Means (M), standard deviations (SD), and correlations among the variables

Variables	<i>M</i>	<i>SD</i>	1	2	3	4
1. Social exclusion	29.19	5.53	1			
2. Self-esteem	29.18	3.80	−0.48***	1		
3. Rejection sensitivity	57.42	8.64	0.13***	−0.18***	1	
4. Mobile phone dependence	42.54	11.12	0.26***	−0.27***	0.38***	1

Note. *N* = 715. ****p* < 0.001.

Table 2. Regression analysis of the mediating role of self-esteem and the moderating role of rejection sensitivity

Regression equation		Overall fit indices		Significance of regression coefficients			
Outcome variable	Predictor variable	<i>R</i> ²	<i>F</i>	β	<i>SE</i>	<i>t</i>	95% CI
Mobile phone dependence		0.10	20.53***				
	Gender			−0.01	0.04	−0.39	[−0.08, 0.06]
	Age			0.09	0.04	2.45*	[0.02, 0.16]
	Social exclusion			0.17	0.04	4.18***	[0.09, 0.25]
	Self-esteem			−0.19	0.04	−4.68***	[−0.27, −0.11]
Self-esteem		0.25	47.04***				
	Gender			0.05	0.03	1.39	[−0.02, 0.11]
	Age			0.01	0.03	0.31	[−0.06, 0.08]
	Social exclusion			−0.44	0.03	−12.86***	[−0.50, −0.37]
	Rejection sensitivity			−0.13	0.03	−3.97***	[−0.30, −0.07]
	Social exclusion × Rejection sensitivity			−0.07	0.03	−2.40*	[−0.13, −0.01]

Note. Bootstrap 95% confidence intervals not containing 0 indicate significant coefficients; **p* < 0.05, ****p* < 0.001.

Results

Descriptive statistics and correlation analysis

The descriptive statistics and correlation analysis results for each variable are presented in Table 1. Specifically, social exclusion was significantly negatively correlated with self-esteem, and significantly positively correlated with both rejection sensitivity and mobile phone dependence; self-esteem was significantly negatively correlated with both rejection sensitivity and mobile phone dependence; rejection sensitivity was significantly positively correlated with mobile phone dependence. It is evident that there are relatively close relationships among the variables, supporting the feasibility of further in-depth analysis.

Social exclusion and mobile phone dependence

A simple linear regression analysis was conducted to examine the main effect of social exclusion on mobile phone dependence. The results showed that social exclusion significantly and positively predicted mobile phone dependence ($B = 0.53$, $SE = 0.07$, $\beta = 0.26$, $t = 7.24$, $p < 0.001$), explaining 6.7% of the total variance ($R^2 = 0.067$). Therefore, hypothesis 1 was supported.

Mediation effect of self-esteem

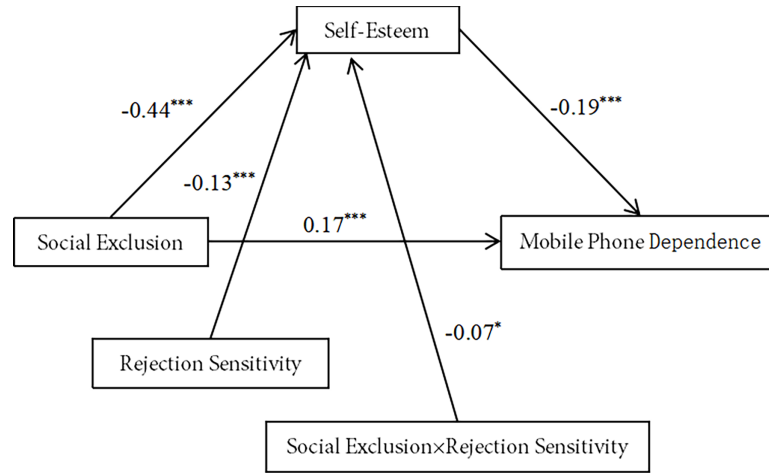
Prior to testing the mediation model, confirmatory factor analysis was conducted to examine the measurement model. The present study included four latent variables: social exclusion (comprising two indicators: social neglect

and social rejection), mobile phone dependence (comprising four indicators: withdrawal symptoms, salience behavior, social comfort, and mood change), self-esteem (comprising three parceled indicators), and rejection sensitivity (comprising three parceled indicators). The results indicated that the measurement model fitted the data well, with $\chi^2/df = 4.38$, CFI = 0.95, TLI = 0.93, and RMSEA = 0.07.

The specific regression analysis results are shown in Table 2. After controlling for gender and age, social exclusion had a significant positive predictive effect on mobile phone dependence ($\beta = 0.17$, $t = 4.18$, $p < 0.001$), social exclusion had a significant negative predictive effect on self-esteem ($\beta = -0.44$, $t = -12.86$, $p < 0.001$), and self-esteem had a significant negative predictive effect on mobile phone dependence ($\beta = -0.19$, $t = -4.68$, $p < 0.001$). Both the direct and indirect effects were significant based on confidence interval tests. The proportion of the total effect explained by the mediation effect was 34.62% (Table 3). In summary, self-esteem partially mediated the predictive effect of social exclusion on mobile phone dependence. Furthermore, rejection sensitivity had a significant negative predictive effect on self-esteem ($\beta = -0.13$, $t = -3.97$, $p < 0.001$), and the interaction term between social exclusion and rejection sensitivity also had a significant negative predictive effect on self-esteem ($\beta = -0.07$, $t = -2.40$, $p < 0.05$), indicating that rejection sensitivity can moderate the effect of social exclusion on self-esteem. Gender was not significantly associated

Table 3. Bootstrap analyses of mediation effects tests

	Estimated effect	SE	Boot CI low	Boot CI upper	Effect ratio
Total effect	0.26	0.04	0.19	0.33	
Direct effect	0.17	0.04	0.09	0.25	65.38%
Indirect effect	0.09	0.02	0.05	0.14	34.62%

**Figure 2.** Path diagram of the moderated mediation model. Note. * $p < 0.05$, *** $p < 0.001$.**Table 4.** The mediating effect of self-esteem at different levels of rejection sensitivity

Rejection sensitivity level	Mediation effect	Boot SE	Boot CI low	Boot CI upper
M – 1SD	0.07	0.02	0.03	0.12
M $\pm$ 1SD	0.08	0.02	0.04	0.13
M + 1SD	0.10	0.03	0.05	0.15

Note. M + 1SD, M $\pm$ 1SD, M – 1SD represent rejection sensitivity scores at one standard deviation above the mean, and one standard deviation around the mean, and one standard deviation below the mean, respectively; Boot SE, Boot CI Lower, and Boot CI Upper refer to the standard error, lower limit, and upper limit of the 95% confidence interval for the indirect effect estimated using the bias-corrected percentile Bootstrap method.

with mobile phone dependence ($\beta = -0.01$, $t = -0.39$, $p > 0.05$) or self-esteem ($\beta = 0.05$, $t = 1.39$, $p > 0.05$). In contrast, age showed a positive association with mobile phone dependence ($\beta = 0.09$, $t = 2.45$, $p < 0.05$), while its association with self-esteem was not significant ($\beta = 0.01$, $t = 0.31$, $p > 0.05$). Integrating the above results and following the testing framework proposed by Wen and Ye (2014), hypothesis 2 and hypothesis 3 of the present study were supported. That is, social exclusion contributes to mobile phone dependence through the mediating role of self-esteem, and the first half of this mediation path is moderated by rejection sensitivity (Figure 2). The mediating effect of self-esteem between social exclusion and mobile phone dependence along with its 95% Bootstrap confidence intervals, is presented in Table 4 across three levels of rejection sensitivity scores: one standard deviation below the mean, one standard deviation above the mean, and around the mean within one standard deviation.

Moderated mediation effect of rejection sensitivity

Hypothesis 3 of the present study was supported, to more clearly visualize and intuitively moderating the effect of

rejection sensitivity on the mediation effect, participants were divided into a high rejection sensitivity group (above the mean score) and a low rejection sensitivity group (below the mean score) based on whether their rejection sensitivity score was above or below the average. The predictive effect of social exclusion on self-esteem was examined separately within these two groups. The results of the simple effect analysis are shown in Figure 3: For participants with lower rejection sensitivity levels, their social exclusion level had a significant negative predictive effect on self-esteem ($\beta = -0.37$, $t = -7.25$, $p < 0.001$); for participants with higher rejection sensitivity levels, their social exclusion level also had a significant negative predictive effect on self-esteem, and this predictive effect was relatively larger ($\beta = -0.51$, $t = -12.98$, $p < 0.001$). It is evident that as an individual's rejection sensitivity level increases, the negative predictive effect of social exclusion on self-esteem gradually strengthens, meaning the mediating effect of self-esteem will also gradually increase.

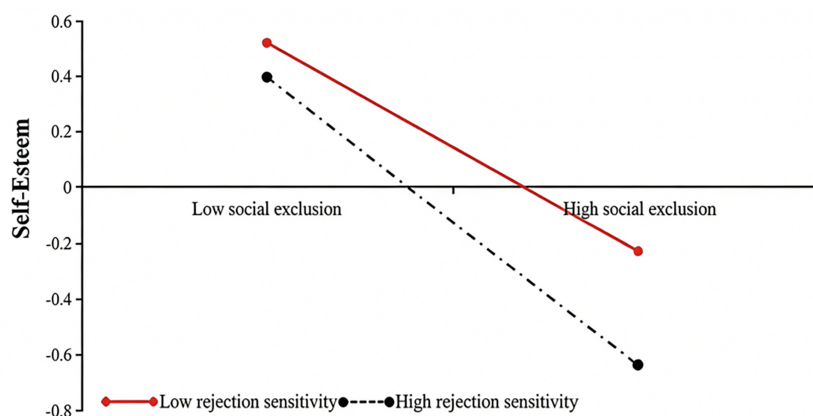


Figure 3. The moderating role of rejection sensitivity in the effect of social exclusion on self-esteem

Discussion

The results indicate that social exclusion can significantly predict mobile phone dependence among college students. This finding is consistent with previous research findings (Xu et al., 2021). Similarly, researchers have found that social exclusion was significantly positively correlated with problematic mobile phone use (Huang et al., 2023) and positively correlated with mobile phone addiction (Yue et al., 2022). The need-threat temporal model of social exclusion posits that after experiencing social exclusion, individuals sequentially progress through reflection, reconsideration, and withdrawal stages (Williams, 2009). In the reconsideration stage, individuals typically take action to alleviate the pain caused by social exclusion, aiming to restore their sense of belonging, self-esteem, and meaningful existence. The online social interaction, gaming, instant messaging, and other functions provided by mobile phones can offer individuals a low-threshold, highly efficient alternative channel for satisfaction. For instance, individuals can post statuses on social media and receive likes and comments, thereby compensating for damaged self-esteem, or gain a sense of belonging through interactions with NPCs or other players in games. Therefore, when individuals use mobile phones to cope with the pain of social exclusion, they may be reinforced by immediate positive feedback, ultimately leading to dependent behavior. This also validates the loss compensation hypothesis (Yue et al., 2022; Zhang et al., 2017), suggesting that mobile phone dependence is a pathological compensatory behavior when an individual's psychological development process is hindered after experiencing social exclusion. Notably, in collectivist cultures, individuals tend to develop an interdependent self-construal, perceiving themselves as part of a web of social relations and placing high value on group belongingness and interpersonal harmony (Markus & Kitayama, 1991). Based on this theoretical framework, it can be proposed that social exclusion may exert a stronger psychological impact in collectivist cultures due to the emphasis on group harmony, filial piety, and relational interdependence. This further underscores the importance of investigating the relationship between social exclusion and mobile phone dependence within the Chinese cultural context. The reason mobile phones become the choice for individuals suffering from

social exclusion to alleviate pain and compensate for psychological needs may lie in their unique social and entertainment functional attributes. When real-world interpersonal relationships are damaged or difficult to maintain, individuals tend to turn to the cyberspace constructed by mobile phones to seek alternative social connections and emotional support. Furthermore, mobile phones have functions such as online gaming and shopping; individuals experiencing social exclusion may also use their phones for consumption behaviors to dispel negative emotions (Mert & Tengilimoğlu, 2023). Previous research has also found that social exclusion can lead to self-destructive behaviors (Jean et al., 2002) and diminish individuals' self-regulatory abilities (Baumeister et al., 2005). Therefore, mobile phone dependence may also be a result of self-control failure. Consequently, individuals subjected to social exclusion often resort to mobile phones to rebuild connections and seek emotional outlets in virtual spaces.

However, it is noteworthy that the model explained 10% of the variance in mobile phone dependence ($R^2 = 0.10$), indicating that while statistically significant, the effects are modest in magnitude. This suggests that mobile phone dependence is associated by numerous factors beyond those examined here, and that social exclusion represents one of multiple risk pathways.

This study further revealed that self-esteem plays a mediating role in the relationship between social exclusion and mobile phone dependence. Specifically, an individual's mobile phone dependence but also leads to decreased self-esteem in the excluded individual, thereby increasing mobile phone usage frequency and fostering dependence. This finding could be by the fact that social exclusion hinders the satisfaction of an individual's basic psychological needs, threatens their sense of self-worth, leading to a decline in self-esteem (Williams, 2009). To alleviate the resulting cognitive discomfort and emotional pain, individuals may use their mobile phones as a convenient compensatory strategy—the social interaction and achievement feedback functions of mobile phones can substitutively satisfy their need for respect, which is unattainable in the real world. This reinforces mobile phone use behavior, leading to dependence (He et al., 2020). Previous empirical studies have also found that social exclusion can trigger self-denial and self-worth

doubts in the excluded, thereby lowering their self-esteem (Lei et al., 2024; Park & Lee, 2025). Individuals with low self-esteem tend to avoid real-life interpersonal interactions, choosing to maintain their self-esteem and satisfy their needs for belonging and social connection through mobile phone-based online social interactions (Casale et al., 2022; Chen et al., 2023).

The results also indicate that rejection sensitivity partially moderates the “social exclusion → self-esteem → mobile phone dependence” pathway. Specifically, higher levels of individual rejection sensitivity strengthen the damaging predictive effect of social exclusion on self-esteem, increasing the individual’s risk of mobile phone dependence. This may be explained by the fact that individuals with high rejection sensitivity have higher risk for social exclusion if with lower self-esteem. According to the social-cognitive model of rejection sensitivity, rejection sensitivity is a defensive motivational system formed by the pain of rejection experienced in early childhood. In later interpersonal situations, it becomes vigilant to rejection signals from others, serving a self-defense function to protect the individual from rejection harm (Romero-Canyas et al., 2010). However, this defensive mechanism does not always provide protection. Individuals with high rejection sensitivity, due to defense, are keenly aware of rejection cues from peers. But when facing social exclusion, they are more prone to anxiety and overreaction (Leng et al., 2018). Evidently, individuals with high rejection sensitivity, compared to those with low rejection sensitivity, have a lower threshold for perceiving exclusion and a higher intensity of psychological reaction. They are more sensitive to exclusion cues, more easily perceive being rejected by others, and their self-esteem is consequently more threatened.

Implications for research and practice

Recent studies have revealed multiple psychosocial mechanisms underlying the formation of problematic mobile phone use. In terms of family factors, parental alienation not only directly exacerbates mobile phone dependence but also exerts an indirect effect through perceived social support among rural left-behind junior middle school students (Zhang & An, 2026). Meanwhile, helicopter parenting indirectly promotes the increasing trajectory of mobile phone dependence by undermining the basic psychological needs of first-year college students (Ling et al., 2025). At the peer and individual levels, negative peer relationships among adolescents can trigger smartphone dependence by reducing their level of self-compassion (Liu et al., 2020; Xiong et al., 2024). Additionally, mental health literacy and emotional factors play significant roles: among higher vocational students, mental health literacy influences mobile phone dependence through negative emotions, with trait mindfulness moderating the impact of these negative emotions (Peng et al., 2024). Furthermore, a bidirectional predictive relationship exists between mobile phone dependence and anxiety and depression among college students, with anxiety demonstrating a particularly strong predictive effect on mobile phone dependence (Wang et al., 2025). In today’s information society, college students increasingly rely on mobile phones, yet this

dependence may have many negative predictive effects on their physical and mental health. By exploring the predictive effect of social exclusion on mobile phone dependence and its underlying mechanism, this study not only deepens the understanding of how mobile phone dependence is related to various factors but also provides a new perspective for preventing and intervening in mobile phone dependence behavior among college students. The results emphasize the need to pay attention to the risks brought by negative interpersonal issues such as social exclusion experienced by college students. Addressing social exclusion may require group-level and family-systems approaches rather than purely individual strategies. When helping individuals who have experienced social exclusion alleviate mobile phone dependence behavior, attention should be paid to the perceptual lens of low self-esteem and high rejection sensitivity. Reducing rejection sensitivity and enhancing individual self-esteem can mitigate the negative predictive effects of social exclusion and the occurrence of mobile phone dependence. In addressing the relationship between social exclusion and mobile phone dependence, intervention strategies should extend beyond individual-level self-esteem enhancement to establish a multi-tiered support system. Specifically, university-based social inclusion programs can be implemented to reduce experiences of exclusion and foster a sense of belonging through initiatives such as peer mentoring and community-building activities. Concurrently, peer support mechanisms should be established to strengthen social support networks for at-risk students via targeted training programs. Additionally, psychosocial strengthening interventions aimed at building resilience, particularly in addressing rejection sensitivity, should be developed. In implementing these strategies, special attention must be given to socially vulnerable youth populations, especially those exhibiting heightened rejection sensitivity and intensified responses to exclusion, ensuring that intervention resources are prioritized for this most vulnerable group.

Notably, within the Chinese cultural context, the function of self-esteem is more strongly tied to relational value and social approval than to individual achievement, which may amplify the threat of social exclusion to self-esteem and thus strengthen the aforementioned mediating pathway. Additionally, this study found a significant positive correlation between age and mobile phone dependence, which may be attributed to older individuals exhibiting greater life autonomy, more complex social networks to maintain, and greater real-life pressures. However, given the relatively small effect size, this finding merely suggests that age is an accompanying factor rather than a decisive risk factor.

Although self-esteem plays a meaningful role, a substantial portion of the variance remains unexplained by the current model, suggesting the likely involvement of other unmeasured factors. Moreover, attention should also be paid to the potential bidirectional relationships among variables. For instance, Lee et al. (2024), using a cross-lagged panel model, found that the “daily life disturbance” and “tolerance” dimensions of mobile phone dependence consistently associated subsequent negative peer relationships (a form of social exclusion), and that low self-esteem

may heighten perceptions of social exclusion (Leary, 2006). These processes demonstrate a cyclical nature over time. Therefore, future research should employ longitudinal designs to further clarify the causal directions among these variables and explore other potential mediating or moderating factors.

In summary, researchers should not only focus on the direct predictive effect of social exclusion on mobile phone dependence but also consider the mediating role of low self-esteem, as well as aspects associated with cultural context, developmental characteristics, and dynamic interrelationships among variables.

Limitations and future directions

However, this study also has several limitations. First, the cross-sectional design precludes conclusions about temporal precedence or causal direction. While our theoretical model posits that social exclusion precedes mobile phone dependence, reverse or reciprocal causal pathways are equally plausible. Therefore, future research should employ longitudinal cross-lagged panel designs or experimental manipulations to disentangle temporal precedence and reciprocal influences. Second, the online questionnaire survey was conducted only among students from selected universities in Hubei and Hunan provinces, limiting the representativeness of the sample and the generalizability of the findings. Future research could expand the sampling range to improve ecological validity. Furthermore, we explicitly contrast our findings with studies conducted in individualistic cultural contexts and call for cross-cultural validation to test whether the observed mechanisms generalize across cultures. Third, the social exclusion situations individuals face are complex and may involve various types of exclusion from different sources (e.g., exclusion from strangers vs. family members). Compared to family members, strangers may have lower importance and influence on the individual. Future research could explore whether the effects of social exclusion on mobile phone dependence differ depending on the source and context of exclusion. Fourth, although the scores for social exclusion in this study were not high, they still significantly predicted mobile phone dependence. This may be related to weakened perception of real-world exclusion or the interactive effects of real-world and online social exclusion. This finding aligns with Sun et al. (2017), who reported a significant positive correlation between real-world and online social exclusion. Thus, further research is needed to explore the relationship between these two forms of exclusion and how they jointly shape the mechanisms underlying mobile phone dependence. measurement limitations should be noted. Finally, the OES-A, originally designed for adolescents, may not fully capture exclusion experiences unique to university students. Additionally, the MPATS does not distinguish between device attachment (e.g., nomophobia) and content engagement. Future research should employ measures tailored to university populations and multi-dimensional tools to disentangle these components.

Conclusion

This study's findings indicate that social exclusion can significantly and positively predict mobile phone dependence among college students, even after controlling for gender and age. However, self-esteem plays a key mediating role in this relationship, partially explaining how social exclusion leads to increased mobile phone dependence. Importantly, this mediating pathway is moderated by rejection sensitivity, which specifically strengthens the first half of the "social exclusion → self-esteem → mobile phone dependence" chain. That is, for individuals with higher rejection sensitivity, social exclusion more strongly reduces self-esteem, thereby exacerbating its indirect effect on mobile phone dependence. Accordingly, interventions aimed at mitigating social exclusion and fostering healthy self-esteem—especially among students with high rejection sensitivity—may help reduce risky patterns of mobile phone dependence in college populations.

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Ethics Approval: The study involving human participants was reviewed and approved by the Ethics Committee of Jiangnan University (reference number: JHDXKJLL2026–183). All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. To ensure participant privacy and ethical compliance, all participants were informed of the purpose and procedures of the study and provided their signed informed consent.

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References

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Baumeister, R. F., Dwall, C. N., Ciarocco, N. J., & Twenge, J. M. (2005). Social exclusion impairs self-regulation. *Journal of Personality and Social Psychology*, 88(4), 589–604. <https://doi.org/10.1037/0022-3514.88.4.589>
- Baumeister, R. F., & Tice, D. M. (1990). Point-counterpoints: Anxiety and social exclusion. *Journal of Social and Clinical Psychology*, 9(2), 165–195. <https://doi.org/10.1521/jscp.1990.9.2.165>
- Billieux, J. (2012). Problematic use of the mobile phone: A literature review and a pathways model. *Current Psychiatry Reviews*, 8(4), 299–307. <https://doi.org/10.2174/157340012803520522>
- Casale, S., Fioravanti, G., Bocci Benucci, S., Falone, A., Ricca, V., et al. (2022). A meta-analysis on the association between self-esteem and problematic smartphone use. *Computers in Human Behavior*, 134, 107302. <https://doi.org/10.1016/j.chb.2022.107302>
- Chen, C., Shen, Y., Lv, S., Wang, B., & Zhu, Y. (2023). The relationship between self-esteem and mobile phone addiction among college students: The chain mediating effects of social avoidance and peer relationships. *Frontiers in Psychology*, 14, 1137220. <https://doi.org/10.3389/fpsyg.2023.1137220>
- Chen, Y., Zhang, W., Xu, X., & Wei, W. (2025). Relationship between mobile phone addiction and subjective well-being among Chinese students: A 3-level meta-analysis. *Medicine*, 104(32), e43689. <https://doi.org/10.1097/MD.00000000000043689>
- Chiou, W. B., Lee, C. C., & Liao, D. C. (2015). Facebook effects on social distress: Priming with online social networking thoughts can alter the perceived distress due to social exclusion. *Computers in Human Behavior*, 49, 230–236. <https://doi.org/10.1016/j.chb.2015.02.064>
- Choe, C., & Yu, S. (2022). Longitudinal cross-lagged analysis between mobile phone dependence, friendships, and depressive symptoms among Korean adolescents. *Cyberpsychology, Behavior and Social Networking*, 25(7), 450–457. <https://doi.org/10.1089/cyber.2022.0015>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ, USA: Erlbaum.
- David, M. E., & Roberts, J. A. (2017). Phubbed and alone: Phone snubbing, social exclusion, and attachment to social media. *Journal of the Association for Consumer Research*, 2(2), 155–163. <https://doi.org/10.1086/690940>
- Davis, R. A. (2001). A cognitive-behavioral model of pathological Internet use. *Computers in Human Behavior*, 17(2), 187–195. [https://doi.org/10.1016/S0747-5632\(00\)00041-8](https://doi.org/10.1016/S0747-5632(00)00041-8)
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, 62(1), 119–142. <https://doi.org/10.1111/j.1467-6494.1994.tb00797.x>
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70(6), 1327–1343. <https://doi.org/10.1037/0022-3514.70.6.1327>
- Downey, G., Lebolt, A., Rincon, C., & Freitas, A. L. (1998). Rejection sensitivity an children's interpersonal difficulties. *Child Development*, 69, 1074–1091. <https://doi.org/10.1111/j.1467-8624.1998.tb06161.x>
- Elhai, J. D., Tiamiyu, M., Weeks, J., & Cheung, C. (2018). Depression and social anxiety in relation to problematic smartphone use: The prominent role of rumination. *Internet Research*, 28(2), 315–332. <https://doi.org/10.1108/IntR-01-2017-0019>
- Hayes, A. (2013). Introduction to mediation, moderation, and conditional process analysis. *Journal of Educational Measurement*, 51(3), 335–337. <https://doi.org/10.1111/jedm.12050>
- He, Q., Hu, X., Chen, Y., Li, Y., Zhao, Y., et al. (2024). Depression severity mediates the relationships between parenting styles, peer-victimization and mobile phone dependence in adolescents. *Psychology Research and Behavior Management*, 17, 4281–4290. <https://doi.org/10.2147/PRBM.S489357>
- He, Q., Wang, Z. H., & Wang, M. L. (2020). The influence of adolescent interpersonal relationship on the tendency of mobile phone addiction: The chain mediating effect of self-esteem and anxiety. *Psychological Research*, 13(5), 474–480.
- Huang, Y. Q., Li, J. H., Tan, H. P., & Zuo, M. F. (2024). The mediating role of bedtime procrastination between mobile phone dependence and sleep quality among college students. *Preventive Medicine Tribune*, 30(9), 694–697. (In Chinese). <https://doi.org/10.16406/j.pmt.issn.1672-9153.2024.9.011>
- Huang, L. J., Peng, L. L., Zheng, X. L., Xie, Y. M., & Xie, Z. H. (2023). Social exclusion and problematic mobile phone use among Chinese college students: Mediating role of basic psychological needs satisfaction. *Current Psychiatry Research and Reviews*, 20(1), 59–69. <https://doi.org/10.2174/2666082219666230106123926>
- Jean, M. T., Kathleen, R. C., & Baumeister, R. F. (2002). Social exclusion causes self-defeating. *Journal of Personality and Social Psychology*, 83(3), 606–615. <https://doi.org/10.1037/0022-3514.83.3.606>
- Kates, A. W., Wu, H., & Coryn, C. L. S. (2018). The effects of mobile phone use on academic performance: A meta-analysis. *Computers & Education*, 127, 107–112. <https://doi.org/10.1016/j.compedu.2018.08.012>
- Leary, M. R. (2006). Sociometer theory and the pursuit of relational value: Getting to the root of self-esteem. *European Review of Social Psychology*, 16(1), 75–111. <https://doi.org/10.1080/10463280540000007>
- Leary, M. R., Tambor, E. S., Terdal, S. K., & Downs, D. L. (1995). Self-esteem as an interpersonal monitor: The sociometer hypothesis. *Journal of Personality and Social Psychology*, 14(3), 518–530. <https://doi.org/10.1037/0022-3514.68.3.518>
- Lee, H.-S., Choi, M., & Na, E.-Y. (2024). Reciprocal longitudinal effects among Korean young adolescent's negative peer relationships, social withdrawal, and smartphone dependence. *Heliyon*, 10(3), e25188. <https://doi.org/10.1016/j.heliyon.2024.e25188>
- Lei, Y., Li, M., Lin, C., Zhang, C., & Yu, Z. (2024). The effect of ostracism on social withdrawal behavior: The mediating role of self-esteem and the moderating role of rejection sensitivity. *Frontiers in Psychology*, 15, 1411697. <https://doi.org/10.3389/fpsyg.2024.1411697>
- Leng, Y., Qian, X., & Zhu, Y. M. (2018). Modulation of brain response to peer rejection by rejection sensitivity: An exploratory study. *Neuropsychologia*, 117, 389–397. <https://doi.org/10.1016/j.neuropsychologia.2018.07.003>

- Li, X. (2007). *A study on the correlates of rejection sensitivity* [master's thesis]. Nanchang, China: Jiangxi Normal University. (In Chinese).
- Liang, Y., Huang, H., Ding, Y., & Chen, C. (2024). The relationship between self-esteem and mobile phone addiction among mainland Chinese adolescents: A meta-analysis. *Psychological Reports*, 127(1), 5–39. <https://doi.org/10.1177/00332941221109115>
- Ling, Y., Li, J. Q., Hu, X. J., Chen, Y. L., & Li, D. Y. (2025). The effect of parental helicopter parenting on college students' mobile phone dependence: The longitudinal mediating role of basic psychological needs. *Psychological Development and Education*, 41(3), 448–456. (In Chinese). <https://doi.org/10.16187/j.cnki.issn1001-4918.2025.03.15>
- Linh, H. N., Tam, N. T., Thang, T. Q., Huong, N. T. L., Nguyet, N. B., et al. (2026). Smartphone and internet addiction, social support, and mental health among health science students: A structural equation modeling approach. *Clinical Neuropsychiatry*, 23(1), 69–76. <https://doi.org/10.36131/cnfioritieditore20260107>
- Liu, Q.-Q., Yang, X.-J., Hu, Y.-T., & Zhang, C.-Y. (2020). Peer victimization, self-compassion, gender and adolescent mobile phone addiction: Unique and interactive effects. *Children and Youth Services Review*, 118, 105397. <https://doi.org/10.1016/j.childyouth.2020.105397>
- Lkamel, K., & Assermouh, J. (2024). Exploring the relationship between smartphone addiction, psychological distress, stress, and self-esteem among Moroccan high school students: A regression equation modeling study. *Journal of Child and Adolescent Psychopharmacology*, 34(6), 296–297. <https://doi.org/10.1089/cap.2024.0029>
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98(2), 224–253.
- Mert, M., & Tengilimoğlu, D. (2023). The mediating role of FoMO and the moderating role of narcissism in the impact of social exclusion on compulsive buying: A cross-cultural study. *Psicologia: Reflexão E Crítica*, 36, 33. <https://doi.org/10.1186/s41155-023-00274-y>
- Ng, K. C., Wu, L. H., Lam, H. Y., Lam, L. K., Nip, P. Y., et al. (2020). The relationships between mobile phone use and depressive symptoms, bodily pain, and daytime sleepiness in Hong Kong secondary school students. *Addictive Behaviors*, 101, 105975. <https://doi.org/10.1016/j.addbeh.2019.04.033>
- Niu, G. F., Sun, X. J., Tian, Y., Fan, C. Y., & Zhou, Z. K. (2016). Resilience moderates the relationship between ostracism and depression among Chinese adolescents. *Personality & Individual Differences*, 99, 77–80. <https://doi.org/10.1016/j.paid.2016.04.059>
- Park, W.-K., & Lee, S.-B. (2025). A longitudinal study on the impact of subjective exclusion on changes in self-esteem: The mediating effect of perceived income inequality. *PLoS One*, 20(4), e0321271. <https://doi.org/10.1371/journal.pone.0321271>
- Peng, Y. M., Yang, Q., Ling, R., & Yang, X. B. (2024). The influence of mental health literacy on mobile phone dependence among vocational college students: A moderated mediation model. *Chinese Journal of Clinical Psychology*, 32(4), 794–798. (In Chinese). <https://doi.org/10.16128/j.cnki.1005-3611.2024.04.014>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Romero-Canyas, R., Downey, G., Berenson, K., Ayduk, O., & Kang, N. J. (2010). Rejection sensitivity and the rejection-hostility link in romantic relationships. *Journal of Personality*, 78, 119–148. <https://doi.org/10.1111/j.1467-6494.2009.00611.x>
- Rozgonjuk, D., Blinka, L., Löchner, N., Faltýnková, A., Husarova, D., & et al. (2023). Differences between problematic internet and smartphone use and their psychological risk factors in boys and girls: A network analysis. *Child and Adolescent Psychiatry and Mental Health*, 17, 69. <https://doi.org/10.1186/s13034-023-00620-z>
- Saylor, C. F., Williams, K. D., Nida, S. A., McKenna, M. E., Twomey, K. E., et al. (2013). Ostracism in pediatric populations: Review of theory and research. *Journal of Developmental Behavioral Pediatrics*, 34(4), 279–287. <https://doi.org/10.1097/DBP.0b013e3182874127>
- Sun, X. J., Tong, Y. T., & Fan, C. Y. (2017). Social exclusion and cyberostracism on depression: The mediating role of self-control. *Studies of Psychology and Behavior*, 15(2), 169–174.
- Swann, Jr, W. B. (1997). The trouble with change: Self-verification and allegiance to the self. *Psychological Science*, 8(3), 177–180. <https://doi.org/10.1111/j.1467-9280.1997.tb00407.x>
- Wang, X. D., Wang, X. L., & Ma, H. (1999). Rating scales for mental health. *China Journal of Mental Health*, 318–320. (In Chinese).
- Wang, J., Zhao, Z., Hu, W. W., & Ke, Y. B. (2025). The relationship between depression, anxiety and mobile phone dependence among higher vocational college students: Based on a cross-lagged model. *China Journal of Health Psychology*, 33(10), 1586–1591. (In Chinese). <https://doi.org/10.13342/j.cnki.cjhp.2025.10.027>
- Wen, Z. L., & Ye, B. J. (2014). Different methods for testing moderated mediation models: Competitors or backups? *Acta Psychologica Sinica*, 46(5), 714–726. <https://doi.org/10.3724/sp.j.1041.2014.00714>
- Wiederhold, & Brenda, K. (2016). Low self-esteem and teens' internet addiction: What have we learned in the last 20 years? *Cyberpsychology, Behavior, and Social Networking*, 19(6), 359. <https://doi.org/10.1089/cyber.2016.29037.bkw>
- Williams, K. D. (2009). Ostracism: A temporal need-threat model. *Advances in Experimental Social Psychology*, 41, 275–314. [https://doi.org/10.1016/S0065-2601\(08\)00406-1](https://doi.org/10.1016/S0065-2601(08)00406-1)
- Wu, X. Y., Yin, S. Y., Zhao, X. F., Li, J. S., Lan, X. J., et al. (2024). The effect of cognitive-behavioral model based group psychological intervention on improving mobile phone dependence in college students. *China Journal of Health Psychology*, 32(2), 277–283. (In Chinese). <https://doi.org/10.13342/j.cnki.cjhp.2024.02.022>
- Xiong, S., Xu, Y., Zhang, B., & Chen, Y. (2024). Gender differences in the longitudinal association between cumulative ecological risk and smartphone dependence among early adolescents: A parallel mediation model. *Computers in Human Behavior*, 151, 108044. <https://doi.org/10.1016/j.chb.2023.108044>
- Xiong, J., Zhou, Z. K., Chen, W., You, Z. Q., & Zhai, Z. Y. (2012). Development of the mobile phone addiction tendency scale for college students. *Chinese Mental Health Journal*, 26(3), 222–225.
- Xu, L., Zhang, Q. Q., Niu, G. F., Chen, J. J., Wu, L., et al. (2021). The effect of social exclusion on mobile phone dependence: The mediating roles of social self-efficacy and social anxiety. *Chinese Journal of Clinical Psychology*,

- 29(2), 323–327. (In Chinese). <https://doi.org/10.16128/j.cnki.1005-3611.2021.02.021>
- Yang, X., Bai, Y., Yu, Y., Wang, X., Lv, J., et al. (2022). The relationship among loneliness, social anxiety and mobile phone dependence in college students: A cross-lag analysis. *Chinese Journal of Clinical Psychology*, 30(1), 64–67. (In Chinese). <https://doi.org/10.16128/j.cnki.1005-3611.2022.01.013>
- Yao, M. Z., He, J., Ko, D. M., & Pang, K. (2014). The influence of personality, parental behaviors, and self-esteem on internet addiction: A study of chinese college students. *Cyberpsychology Behavior & Social Networking*, 17(2), 104–110. <https://doi.org/10.1089/cyber.2012.0710>
- Ye, Y., Zhu, N., Su, J., Zhao, J., & Kong, F. (2025). Childhood maltreatment and problematic smartphone use: A multilevel, meta-analytic review. *Journal of Behavioral Addictions*, 14(2), 644–659. <https://doi.org/10.1556/2006.2025.00050>
- Yue, H., Yue, X. W., Zhang, X. M., Liu, B., & Bao, H. (2022). Exploring the relationship between social exclusion and smartphone addiction: The mediating roles of loneliness and self-control. *Frontiers in Psychology*, 13, 945631. (In Chinese). <https://doi.org/10.3389/FPSYG.2022.945631>
- Zhang, N., & An, Q. (2026). The impact of parent-child alienation on mobile phone dependence among rural left behind middle school students: A chain mediation model. *Chinese Journal of Clinical Psychology*, 34(1), 47–51. (In Chinese). <https://doi.org/10.16128/j.cnki.1005-3611.2026.01.007>
- Zhang, Y. Y., Jiang, T., Ye, Z. Q., Wang, L. S., & Ye, Y. D. (2024). The relationship between social exclusion, self-esteem, parent-child attachment and depression among migrant children: A longitudinal study. *China Journal of Health Psychology*, 32(3), 475–480. (In Chinese). <https://doi.org/10.13342/j.cnki.cjhp.2024.03.027>
- Zhang, Y. Q., Liu, Y. C., Zhang, H., & Zhou, X. Z. (2017). The relationship between social support and internet addiction under the decompensation theory: A chain mediating effect of basic psychological needs and coping styles. *Engineering Technology Research*, 11, 15–18. (In Chinese). <https://doi.org/10.19537/j.cnki.2096-2789.2017.11.005>
- Zhou, H., & Long, L. R. (2004). Statistical remedies for common method biase. *Advances in Psychological Science*, 12(6), 942–950. (In Chinese). <https://doi.org/10.3969/j.issn.1671-3710.2004.06.018>
- Zhu, C., Li, S., & Zhang, L. (2025). The impact of smartphone addiction on mental health and its relationship with life satisfaction in the post-COVID-19 era. *Frontiers in Psychiatry*, 16, 1542040. <https://doi.org/10.3389/fpsy.2025.1542040>