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RESEARCH ARTICLE



# Gender differences in the pathways linking parental psychological control, emotion regulation, and psychological distress among university students with smartphone addiction

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## ABSTRACT

This research investigated gender disparities in parental psychological control and psychological distress among 1,276 Chinese undergraduates utilizing Partial Least Squares Structural Equation Modelling. Paternal psychological control had a positive correlation with reappraisal in males ( $t_{(\text{male})} = 3.420$ ;  $P = 0.001 < 0.05$ ), whereas no such correlation was observed in females ( $t_{(\text{female})} = 0.276$ ;  $P = 0.783 > 0.05$ ). Gender significantly mitigated this connection (Difference<sub>(male-female)</sub> = 0.298;  $P = 0.014 < 0.05$ ). The mediating effect of reappraisal on the relationship between paternal psychological control and psychological distress was significant for males but not for females (Difference<sub>(male-female)</sub> = 0.297;  $P = 0.006 < 0.05$ ). No significant gender differences were observed in maternal psychological control or inhibition ( $P > 0.05$ ). The findings endorse gender-sensitive models and highlight the need for interventions targeting parenting practices and emotional regulation, such as parental guidance programs and cognitive-behavioral training to strengthen adaptive regulation strategies.

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## KEYWORDS

Parental psychological control; emotion regulation; psychological distress; smartphone addiction; multi-group analysis

## Introduction

In recent years, smartphone addiction has gained recognition as a significant mental health and behavioral concern in China, with undergraduate students being particularly vulnerable due to their transitional phase of identity formation and social integration (Lu et al., 2024). Excessive smartphone use is consistently linked to higher levels of psychological distress, and existing evidence suggests that gender may moderate this association. For instance, Male students usually exhibit strong behavioral dependence accompanied by more severe internalizing symptoms, whereas female students are more prone to emotional strain (Pan et al., 2025). Recent empirical investigations suggest that when smartphone addiction centers on gaming activities, males tend to exhibit stronger addictive tendencies than females, highlighting potential gender-specific vulnerability pathways (Ahmed et al., 2024; Cho et al., 2025). Systematic reviews on gaming disorder further confirm a consistent male predominance in problematic gaming populations, underscoring the importance of examining gender-specific pathways in digital dependence (Liao et al., 2025).

## *Parental psychological control, emotion regulation, and psychological distress: a gendered perspective*

Psychological distress is increasingly prevalent in student populations worldwide, commonly manifested through anxiety, depression, and chronic fatigue (American Psychological Association, 2019). Although academic pressure is a recognized contributor, interpersonal dynamics and difficulties in emotion

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regulation are equally critical. In China, a large-scale survey found that over 90% of undergraduates experienced moderate to severe psychological distress, with female students reporting significantly higher levels than males (Zhang et al., 2018). Similar global patterns have been observed: rates of psychological distress among Norwegian undergraduates rose sharply between 2010 and 2018, while in Bangladesh, depression and anxiety affected 75% and 60% of university students, respectively (Knapstad et al., 2021; Siddik et al., 2024). Meta-analyses have further confirmed that among non-clinical university students, females consistently report more depressive symptoms than males, highlighting significant gender differences in mental health (Lin et al., 2025).

Divergent emotional regulation mechanisms may explain these disparities. In the normal population, women are more likely to internalize distress through suppression and rumination, heightening vulnerability to anxiety and depression, whereas men are more likely to externalize or disengage emotionally, which can manifest behaviorally (Lin et al., 2025; Matud et al., 2024). Importantly, research on interpersonal conflict resolution indicates that such gendered tendencies extend beyond emotion regulation to broader interpersonal contexts, with women more inclined toward relational strategies and men toward confrontational or avoidant behaviors (Zafirakis, 2013). The findings point to the critical role of gendered emotional and behavioral dynamics in shaping students' psychological adjustment in the era of pervasive digital technology. Empirical evidence has confirmed that gender moderates the pathways linking daily emotional experiences to smartphone addiction, with males and females relying on distinct emotional strategies that either buffer or exacerbate their risk (Cheng et al., 2024).

Beyond individual coping styles, environmental influences, particularly parenting, play a vital role. Parental psychological control, characterized by intrusive behaviors that undermine autonomy, has been consistently linked to psychological symptoms and digital dependency (Barberis et al., 2023; Wang et al., 2025). University students, despite their age, often remain reliant on their parents' guidance and support. Recent Chinese evidence demonstrates that dormitory interpersonal relationships predict non-suicidal self-injury through depressive symptoms, and that parent-child relationships moderate both direct and indirect pathways, suggesting that family support buffers the detrimental effects of poor peer interactions (Fan et al., 2025). This underscores the importance of considering family dynamics in conjunction with peer and digital environments.

### ***Emotion regulation as a mediator***

Emotion regulation serves as a key mechanism linking parental psychological control to psychological outcomes. Adaptive strategies such as cognitive reappraisal mitigate distress, whereas maladaptive strategies like suppression and inhibition exacerbate it (Duru & Balkis, 2024). Gender differences are consistently reported: female students tend to rely more on suppression, intensifying distress in the face of controlling parenting, while male students are more likely to disengage emotionally, with potentially different long-term implications (Peleg & Peleg, 2025). Recent studies confirm that regulation strategies mediate the impact of interpersonal stressors and insecure attachments on depressive and anxious symptoms (Mohammadkhani et al., 2023; O'Rourke & Egan, 2023). In Chinese populations, inhibition has been identified as a pathway linking parental control to diminished resilience (Ma et al., 2023).

### ***Gender as a moderator***

While numerous studies have investigated gender-related variations in psychological health, the overall picture remains inconclusive due to contradictory results across contexts. Despite these inconsistencies, gender continues to be recognized as an important moderating factor, particularly within culturally specific contexts such as China (Pan et al., 2025; Soraci et al., 2025). Cultural norms influence not only the preferred styles of emotion regulation but also how parental psychological control is perceived and internalized. In turn, social expectations shape gendered coping strategies and developmental outcomes (Zhu et al., 2023). For students struggling with smartphone addiction, the moderating role of gender in the interplay between

parental psychological control, emotion regulation, and psychological distress remains insufficiently understood and requires further empirical inquiry.

The present research is informed by Gender Socialization Theory and the gender-sensitive model, both of which provide a framework for examining gendered mechanisms in psychological processes. Gender Socialization Theory posits that males and females internalize distinct cultural expectations regarding emotion and coping throughout development (Gross & John, 2003). In collectivist contexts such as China, these processes are particularly salient, with males often encouraged to suppress emotions and females encouraged to seek support. These patterns shape how parental control is perceived and how regulation strategies are deployed, influencing vulnerability to distress. Complementing this view, the gender-sensitive model emphasizes the necessity of incorporating gender as an analytic lens in health-related research (Herrmann et al., 2024; World Health Organization, 2020). This framework highlights that gender not only moderates individual outcomes but also interacts with parental and cultural structures to shape mental health trajectories. Building on these perspectives, the present study explores whether parental psychological control predicts psychological distress among Chinese university students with smartphone addiction, whether emotion regulation mediates these relationships, and whether gender moderates the pathways involved.

### **Current study**

To extend prior research, this study centers on Chinese university students affected by smartphone addiction, analyzing the roles of parental psychological control and emotion regulation in psychological distress and assessing whether these associations function differently for males and females. By embedding parental and emotional variables into a unified framework, the present research seeks to advance a more nuanced understanding of psychological distress in university students struggling with smartphone addiction in the digital era. Based on this objective, three hypotheses are formulated:

H1: Higher levels of parental psychological control will be linked to greater psychological distress among students with smartphone addiction.

H2: Emotion regulation will serve as a mediating process in the association between parental psychological control and psychological distress.

H3: Gender will act as a moderator in these pathways, influencing the strength of the relationships between parental control, emotion regulation, and distress.

Guided by the PICO framework, the research question is as follows: Population (P): Chinese university students with smartphone addiction. Intervention (I): Parental psychological control. Comparison (C): Gender (male vs. female). Outcome (O): Psychological distress. Research Question: Among Chinese university students with smartphone addiction, do parental psychological control and predict psychological distress through emotion regulation, and are these relationships moderated by gender? The study's conceptual framework is illustrated in [Figure 1](#).

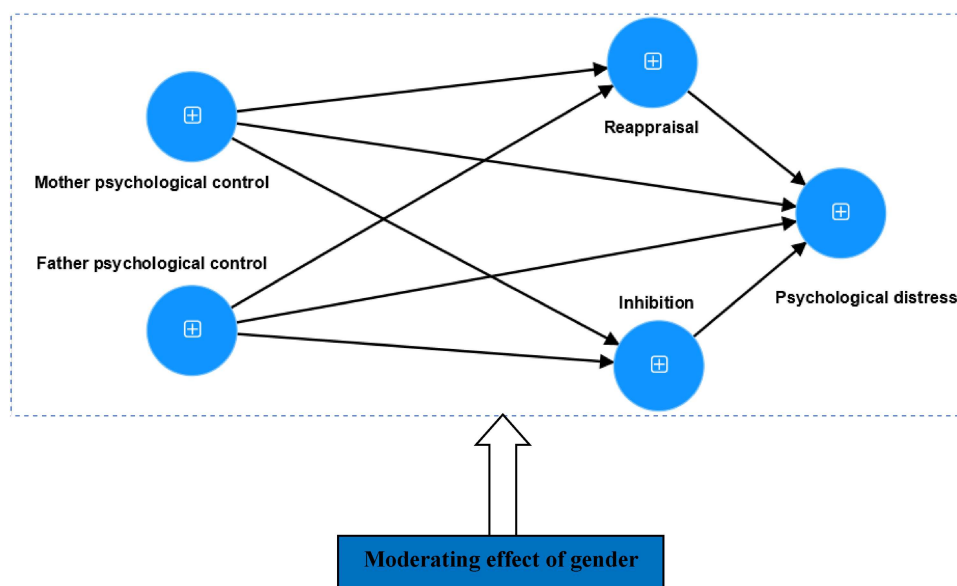
## **Methodology**

### **Research design**

This study adopted a quantitative cross-sectional approach to examine the mechanisms through which parental psychological control influences psychological distress among Chinese university students with smartphone addiction, while testing gender as a moderating factor. In the analytic model, parental psychological control was designated as the primary predictor, emotion regulation as the mediator, and psychological distress as the outcome variable. Data were analyzed using partial least squares structural equation modeling (PLS-SEM) in SmartPLS 4.0, and Harman's single-factor test was conducted to evaluate potential common method bias.

### **Sampling and participants**

Purposive sampling was used because the study targeted a specific group, students with smartphone addiction, rather than aiming for general population representativeness. Permission was obtained from two



**Figure 1.** Hypothesized conceptual framework.

**Table 1.** Basic information of participants.

Variable ( <i>n</i> = 1276)	Level	Frequency ( <i>n</i> )	Percentage (%)
Grade	Freshman	323	25.3
	Sophomore	455	35.7
	Junior	331	25.9
	Senior	167	13.1
Gender	Male	637	49.9
	Female	639	50.1
Age	18 to 19 years old	487	38.2
	20 to 21 years old	630	49.3
	over 22 years old	159	12.5

public universities in Henan Province to recruit participants. Due to institutional and ethical constraints, only these two universities were approved, and a control group of non-addicted students could not be included.

Permission was obtained from two public universities in Henan Province. A systematic purposive procedure was followed in five steps: (1) one urban and one suburban university were selected based on institutional willingness to participate; (2) students were informed about the study and invited to complete the Smartphone Addiction Scale (SAS-SV); (3) only those who met or exceeded the standardized gender-specific cutoff scores ( $\geq 31$  for males and  $\geq 33$  for females) were retained (Kwon et al., 2013); (4) stratification was applied to maintain balance across gender, academic year, and field of study; and (5) eligible participants provided informed consent and completed paper-based questionnaires under supervised conditions to ensure data accuracy. The data were collected in May 2024 during the semester at two public universities in China over the course of two weeks. Paper-based surveys were administered in classroom environments and completed under direct supervision.

The final sample consisted of 1,276 undergraduate students between the ages of 18 and 24 who met the criteria for smartphone addiction. A priori power analysis was conducted using G\*Power with an effect size of  $f^2$  equal to 0.15, a significance level of 0.05, and a statistical power of 0.95. The results indicated that a minimum of 138 participants would be sufficient. To strengthen the robustness of the study, the target sample size was set to exceed one thousand in accordance with the recommendations of Comrey and Lee (2013). Ultimately, 1,276 valid responses were collected, including 637 male and 639 female students, with a mean age of 19.94 years and a standard deviation of 1.34. Table 1 provides a summary of the demographic characteristics of the sample, including academic grade, gender, and age.

## ***Instruments***

Authorization was obtained from the original developer of the instrument, and the validated Chinese version of the scale was administered in the present study.

### ***Smartphone addiction***

The Smartphone Addiction Scale–Short Version (SAS–SV) consists of ten items rated on a six–point Likert scale (1 = strongly disagree to 6 = strongly agree) (Kwon et al., 2013). Higher scores indicate greater severity of smartphone addiction. Gender–specific cutoff points are 31 for males and 33 for females (Kwon et al., 2013). In the present study, the scale demonstrated good internal consistency with the full sample (Cronbach’s  $\alpha = 0.89$ ).

### ***Psychological distress***

The Kessler Psychological Distress Scale (K10) consists of ten items assessing symptoms of anxiety and depression experienced during the past month (Kessler, 1994). Responses are given on a five–point Likert scale (1 = none of the time to 5 = all of the time), with higher scores reflecting greater psychological distress. Reliability analysis indicated excellent internal consistency (Cronbach’s  $\alpha = 0.93$ ).

### ***Parental psychological control***

The Parental Psychological Control Scale (Barber, 1996) consists of eight items designed to measure perceived psychological control exerted by both mothers and fathers. Each item is rated on a five–point Likert scale, with higher scores reflecting greater levels of parental psychological control. In the current study, the scale demonstrated high internal consistency (Cronbach’s  $\alpha = 0.93$ ).

### ***Emotion regulation***

The Emotion Regulation Questionnaire (ERQ) was used to assess individuals’ capacity for emotion regulation through two core strategies: cognitive reappraisal and expressive suppression (Gross & John, 2003). The scale consists of ten items rated on a 7–point Likert scale (1 = strongly disagree to 7 = strongly agree), with higher scores reflecting greater use of each strategy. In the present study, the ERQ demonstrated good reliability, with Cronbach’s  $\alpha = 0.842$  for suppression and  $\alpha = 0.878$  for reappraisal.

## ***Statistical analysis***

Data were analyzed in two stages. First, descriptive statistics, frequencies, and reliability tests were conducted using SPSS 27.0, and Harman’s single–factor test assessed common method variance. Second, SmartPLS 4.0 was used to estimate the structural model via PLS–SEM. Multi–group analysis (MGA) tested whether gender moderated the structural relationships.

## **Results**

### ***Common method variance***

To assess potential common method variance (CMV), Harman’s single–factor test was conducted. Results indicated that the first unrotated factor accounted for 37.17% of the total variance, which is well below the conventional 50% cutoff. These findings suggest that common method bias is unlikely to pose a serious threat to the validity of the data, confirming its suitability for subsequent statistical analyses.

## Model estimation

This study employed Partial Least Squares Structural Equation Modeling (PLS–SEM) using SmartPLS to investigate how gender moderates the associations among parental psychological control, emotion regulation, and psychological distress in university students with smartphone addiction. The variance–based technique was chosen because it can handle complex models and different measurement scales.

With a total of 36 items, the measuring model encompassed five latent variables. The reliability test for internal consistency, using Cronbach's alpha, was 0.60 for all structures. Composite reliability (CR), average variance extracted, and factor loadings were used to investigate convergent validity. According to the Fornell–Larcker criterion, discriminant validity was confirmed when the square root of each construct's AVE was greater than its correlations with other components. Discriminant validity was confirmed by the fact that all HTMT ratios were less than 0.90. There was no evidence of multicollinearity since all of the VIF values were less than 2.732. By representing all constructs as reflecting indicators, a robust analytical framework was established from a methodological perspective.

## Direct effects

The structural model was evaluated through a bootstrapping procedure with 5,000 resamples to test the hypothesized relationships. Results of hypothesis testing are summarized in Table 2, showing that both paternal and maternal psychological control exerted significant direct influences on students' psychological distress. Specifically, mother's psychological control also demonstrated a significant positive relationship ( $\beta = 0.162$ ,  $t = 3.943$ ,  $p < 0.001$ , 95% CI [0.079, 0.241]), and father's psychological control was positively associated with psychological distress ( $\beta = 0.319$ ,  $t = 7.601$ ,  $p < 0.001$ , 95% CI [0.238, 0.402]).

With regard to mediating variables, emotion regulation strategies exhibited distinct effects. Expression inhibition emerged as a maladaptive mechanism, being positively related to psychological distress ( $\beta = 0.299$ ,  $t = 10.826$ ,  $p < 0.001$ , 95% CI [0.243, 0.352]). In contrast, cognitive reappraisal showed a modest negative association with psychological distress ( $\beta = -0.074$ ,  $t = 2.845$ ,  $p < 0.05$ , 95% CI [-0.124, -0.023]), although its mediating contribution appeared limited. Additional analyzes indicated that father's psychological control was positively related to both reappraisal ( $\beta = 0.130$ ,  $p < 0.05$ , 95% CI [0.017, 0.240]) and inhibition ( $\beta = 0.233$ ,  $p < 0.05$ , 95% CI [0.130, 0.333]). Mother's psychological control was positively associated with inhibition ( $\beta = 0.106$ ,  $p < 0.05$ , 95% CI [0.009, 0.205]) but showed no significant relationship with reappraisal ( $\beta = -0.038$ ,  $p > 0.05$ , 95% CI [-0.152, 0.079]). For ease of presentation, the study variables were coded as follows, as shown in Table 2. Psychological distress (PD), mother psychological control (MPC), father psychological control (FPC), reappraisal (RE), and inhibition (IN).

## Indirect effects

The mediating role of emotion regulation was further examined using bootstrap analysis. As presented in Table 2, father's psychological control indirectly increased psychological distress via inhibition ( $\beta = 0.070$ ,  $t = 4.219$ ,  $p < 0.001$ , 95% CI [0.037, 0.103]). Mother's psychological control similarly displayed a significant

**Table 2.** Hypotheses verification.

Relationship	Coefficient	t-Value	p-value	95% CI
<b>Direct effects</b>				
MPC -> PD	0.162	3.943	<0.001	[0.079, 0.241]
FPC -> PD	0.319	7.601	<0.001	[0.238, 0.402]
RE -> PD	-0.074	2.845	0.004	[-0.124, -0.023]
IN -> PD	0.299	10.826	<0.001	[0.243, 0.352]
MPC -> RE	-0.038	0.635	0.526	[-0.152, 0.079]
FPC -> RE	0.130	2.264	0.024	[0.017, 0.240]
MPC -> IN	0.106	2.103	0.035	[0.009, 0.205]
FPC -> IN	0.233	4.496	<0.001	[0.130, 0.333]
<b>Indirect effects</b>				
MPC -> RE -> PD	0.003	0.593	0.553	[-0.006, 0.014]
FPC -> RE -> PD	-0.010	1.705	0.088	[-0.022, -0.001]
MPC -> IN -> PD	0.032	2.047	0.041	[0.003, 0.063]
FPC -> IN -> PD	0.070	4.219	<0.001	[0.037, 0.103]

indirect pathway through inhibition ( $\beta = 0.032$ ,  $t = 2.047$ ,  $p < 0.01$ , 95% CI [0.003, 0.063]). By contrast, cognitive reappraisal did not mediate the relationship between fathers' psychological control and psychological distress. For father's psychological control, the indirect effect through reappraisal was non-significant ( $\beta = -0.010$ ,  $t = 1.705$ ,  $p > 0.05$ , 95% CI [-0.022, -0.001]), and the indirect pathway from mother's control through reappraisal was also non-significant ( $\beta = 0.003$ ,  $t = 0.593$ ,  $p > 0.05$ , 95% CI [-0.006, 0.014]).

### **Moderation effect analysis**

To investigate whether gender moderates the structural relationships within the model, multi-group analysis (MGA) was employed using SmartPLS. When the moderating variable is categorical, such as gender, multi-group analysis is considered an appropriate and robust method.

### **Data preparation**

To ensure sufficient statistical power, the sample was stratified by gender prior to conducting the multi-group analysis (MGA). According to the G\*Power analysis, a minimum of 138 participants per group was required. The present study included 637 male students (49.92%) and 639 female students (50.08%), thereby meeting the statistical requirements and providing balanced group sizes for MGA.

In addition to having adequate construct validity and internal reliability, the dataset did not have any missing values. In the fields of social science and behavioral research, PLS-MGA provides a strong method for examining group moderation. Using a three-stage procedure, Cheah et al. (2024) underlined the significance of MGA in investigating group-specific effects like gender or culture differences:

MGA was conducted in SmartPLS following the three-step procedure suggested by Cheah et al. (2024). First, path coefficients were estimated separately for male and female groups. Second, permutation tests were performed to compare the equality of path coefficients across groups, with significant differences determined when  $p$ -values fell below 0.05. Third, confidence intervals were examined to assess differences in latent variable means and variances. Statistical significance in either the variance or the mean between groups is shown when the confidence interval for the group difference does not contain zero.

Table 3 presents the suggested structural model's interpretation of gender-specific moderating effects, which is strengthened by this multi-step investigation.

The analysis was conducted separately for male and female groups. The corresponding models are presented in Figures 2 and 3.

### **Path coefficients and moderation results**

Table 4 reports the estimated path coefficients from the structural model. The findings show that gender had a limited impact on most associations among the study variables. An exception emerged in the pathway linking paternal psychological control and reappraisal, where a significant moderating effect of gender was observed.

Table 4 reports the path coefficients for both male and female groups, as well as the differences across groups. The multi-group analysis (MGA) results demonstrated several significant path relationships between parental psychological control, emotion regulation, and psychological distress across male and female students.

For male students, mother's psychological control positively predicted psychological distress ( $\beta = 0.198$ ,  $t = 3.236$ ,  $p < 0.05$ ), while for female students the effect was weaker but still significant ( $\beta = 0.123$ ,  $t = 2.147$ ,  $p < 0.05$ ). The path coefficient difference between genders (0.075) was not statistically significant ( $p > 0.05$ ). Similarly, father's psychological control significantly predicted psychological distress for both males ( $\beta = 0.294$ ,  $t = 4.61$ ,  $p < 0.001$ ) and females ( $\beta = 0.337$ ,  $t = 5.901$ ,  $p < 0.001$ ), with no significant difference between genders (path coefficient difference = -0.043,  $p > 0.05$ ).

With regard to emotion regulation, inhibition significantly predicted psychological distress among males ( $\beta = 0.290$ ,  $t = 6.863$ ,  $p < 0.001$ ) and females ( $\beta = 0.288$ ,  $t = 8.230$ ,  $p < 0.001$ ). By contrast, reappraisal

**Table 3.** Results of invariance measurement testing using permutation.

Constructs	Configurational invariance (Step 1)		Compositional invariance (Step 2)		Partial measurement invariance	Equal mean assessment (Step 3a)		Equal variance assessment (Step 3b)		Full measurement invariance
	Yes	No	Original Correlation	5.0%		Original Differences	Confidence Interval	Original Differences	Confidence Interval	
PD	Yes		1.000	1.000	Yes	0.384	[-0.094, 0.088]	0.278	[-0.113, 0.106]	No/No
IN	Yes		0.998	0.997	Yes	0.549	[-0.093, 0.096]	0.174	[-0.136, 0.147]	No/No
RE	Yes		0.960	0.925	Yes	0.251	[-0.089, 0.092]	0.242	[-0.122, 0.121]	No/No
MPC	Yes		1.000	0.999	Yes	0.245	[-0.095, 0.093]	0.257	[-0.116, 0.114]	No/No
FPC	Yes		1.000	0.999	Yes	0.309	[-0.089, 0.095]	0.247	[-0.123, 0.121]	No/No

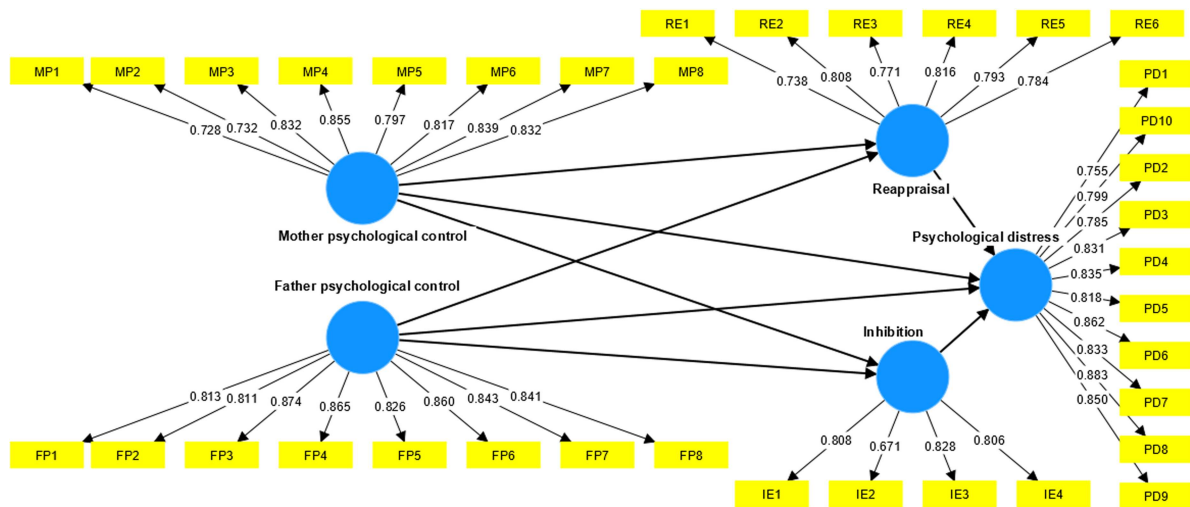


Figure 2. The male model.

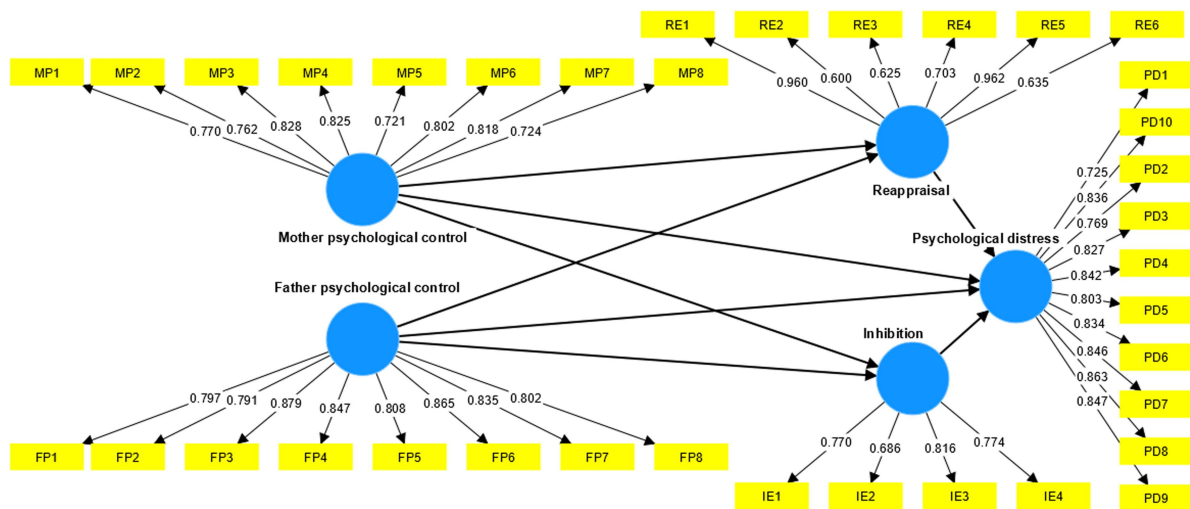


Figure 3. The female model.

Table 4. Shows the path strengths between the model factors based on MGA.

Path relationship	Path coefficient Male	Path coefficient Female	Stdev (male)	Stdev (female)	t value (male)	t value (female)	p-value (male)	p-value (female)	Path coefficient difference	p
MPC -> PD	0.198	0.123	0.061	0.057	3.236	2.147	0.001	0.032	0.075	0.185
FPC -> PD	0.294	0.337	0.064	0.057	4.610	5.901	<0.001	<0.001	-0.043	0.308
IN -> PD	0.290	0.288	0.042	0.035	6.863	8.230	<0.001	<0.001	0.003	0.480
RE -> PD	-0.093	-0.095	0.037	0.044	2.530	2.132	0.011	0.033	0.002	0.462
MPC -> IN	0.115	0.095	0.070	0.071	1.650	1.330	0.099	0.183	0.020	0.424
FPC -> IN	0.245	0.160	0.072	0.073	3.418	2.211	0.001	0.027	0.084	0.204
MPC -> RE	-0.080	-0.073	0.078	0.120	1.025	0.610	0.305	0.542	-0.007	0.491
FPC -> RE	0.269	-0.028	0.079	0.103	3.420	0.276	0.001	0.783	0.298	0.014

negatively predicted psychological distress in both males ( $\beta = -0.093$ ,  $t = -2.530$ ,  $p < 0.05$ ) and females ( $\beta = -0.095$ ,  $t = -2.132$ ,  $p < 0.05$ ), though no gender differences emerged (difference = 0.002,  $p > 0.05$ ).

In terms of parental influence on emotion regulation, mother psychological control positively predicted inhibition in males ( $\beta = 0.115$ ,  $t = 1.330$ ,  $p > 0.05$ ) and females ( $\beta = 0.095$ ,  $t = 1.330$ ,  $p > 0.05$ ). Similarly, father's psychological control significantly predicted inhibition in both groups (males:  $\beta = 0.245$ ,  $t = 3.418$ ,  $p < 0.05$ ; females:  $\beta = 0.160$ ,  $t = 2.211$ ,  $p < 0.05$ ), with no significant gender difference (difference = 0.084,

$p > 0.05$ ). For reappraisal, father psychological control positively predicted reappraisal for males ( $\beta = 0.269$ ,  $t = 3.420$ ,  $p < 0.05$ ), but not for females ( $\beta = -0.028$ ,  $t = 0.276$ ,  $p > 0.05$ ). The difference between males and females in this path was statistically significant (difference = 0.298,  $p < 0.05$ ). In contrast, mother psychological control was not significantly related to reappraisal in either group (males:  $\beta = -0.080$ ,  $t = 1.025$ ,  $p > 0.05$ ; females:  $\beta = -0.073$ ,  $t = 0.610$ ,  $p > 0.05$ ).

Results based on Table 5. The mediating model based on MGA revealed that the indirect effects were mostly small and non-significant. For male students, the indirect effect of father psychological control on psychological distress through inhibition was  $\beta = 0.071$  ( $p > 0.05$ ), and for females it was  $\beta = 0.046$  ( $p > 0.05$ ); the difference was not significant. Similarly, the indirect effect of mother psychological control on psychological distress through inhibition was  $\beta = 0.033$  ( $p > 0.05$ ) for males and  $\beta = 0.027$  ( $p > 0.05$ ) for females.

For the reappraisal pathway, mother psychological control did not significantly predict psychological distress via reappraisal in either group (males:  $\beta = 0.007$ ,  $p > 0.05$ ; females:  $\beta = 0.007$ ,  $p > 0.05$ ). However, father's psychological control showed a significant gender difference in its indirect effect through reappraisal: for males, the effect was negative and non-significant ( $\beta = -0.025$ ,  $p > 0.05$ ), while for females it was positive and significant ( $\beta = 0.003$ ,  $p < 0.05$ ). The difference between males and females was statistically significant (path coefficient difference =  $-0.028$ ,  $p < 0.05$ ).

## Discussion

The present study investigated gender variations in the associations among parental psychological control, emotion regulation, and psychological distress in university students with smartphone addiction. Results indicated that cognitive reappraisal attenuated the adverse impact of paternal psychological control on distress, with this protective effect being more pronounced among males. While gender exerted little influence on most pathways, it significantly moderated the link between paternal control and reappraisal, highlighting the distinctive role of fathers in shaping emotion regulation processes in male students. These findings suggest gender-specific mechanisms: female students appear more vulnerable and less likely to use cognitive reappraisal to offset parental psychological control, whereas male students with higher smartphone addiction more frequently employ reappraisal, reducing its negative effects (Zhang et al., 2023).

The multi-group analysis indicated that the association between paternal psychological control and cognitive reappraisal was stronger for male than for female students. This pattern is consistent with gendered pathways of emotional socialization. Within collectivist contexts such as China, fathers frequently assume disciplinary roles, particularly toward sons, which may intensify internal conflicts and foster reliance on compensatory strategies such as excessive smartphone use (Barberis et al., 2023; Li & Liu, 2025). Moreover, males are generally discouraged from expressing vulnerability and are more inclined to suppress emotions, rendering reappraisal a particularly salient regulatory mechanism. When this strategy proves insufficient, it may elevate the likelihood of behavioral dependency. The findings further support recent evidence that emotional processes and smartphone addiction are intertwined differently by gender, highlighting the necessity of gender-sensitive models to capture these distinct regulatory pathways (Cheng et al., 2024).

In contrast, female students are more likely to seek support from peers and employ a broader repertoire of emotion regulation strategies, which facilitates more adaptive adjustment (Duru & Balkis, 2024). These gendered patterns underscore the need for interventions that acknowledge distinct emotional and relational vulnerabilities, with particular attention to males experiencing elevated levels of paternal psychological control (Barberis et al., 2023; Li & Liu, 2025). In line with recent work demonstrating that parental psychological control directly predicts problematic digital behaviors in Chinese student

**Table 5.** Shows the path strengths the mediating model based on MGA.

Path relationship	Path coefficient Male	Path coefficient Female	Path coefficient difference	<i>p</i> value
FPC -> IN -> PD	0.071	0.046	0.025	0.208
MPC -> IN -> PD	0.033	0.027	0.006	0.452
MPC -> RE -> PD	0.007	0.007	0.001	0.471
FPC -> RE -> PD	-0.025	0.003	-0.028	<b>0.006</b>

populations, the results highlight the family's central role in shaping the developmental risks associated with smartphone addiction (Wang et al., 2025).

These findings resonate with broader evidence that males are disproportionately represented in high-risk smartphone use profiles characterized by gaming and streaming, which are strongly associated with addictive behaviors (Ahmed et al., 2024; Cho et al., 2025). Reviews of gaming disorder also indicate that male students are more likely to develop behavioral dependence, reinforcing the need for gender-sensitive frameworks in interventions (Liao et al., 2025).

Additional analyses revealed that gender moderated the indirect pathway linking paternal psychological control to psychological distress through cognitive reappraisal. For male students, reappraisal significantly alleviated distress, whereas this mediating effect was absent in females. By contrast, no gender differences emerged in mediating processes involving maternal psychological control or inhibition.

These results are consistent with gender socialization theory, which posits that men are typically encouraged to exhibit emotional restraint, while women are socialized to express their feelings more openly (Gross & John, 2003). Consequently, cognitive reappraisal, a strategy that involves reframing emotional experiences, assumes greater relevance for males. In contexts where paternal authority is perceived as both restrictive and identity-defining, male students may experience heightened pressure to regulate emotions through reappraisal in order to preserve psychological balance. Prior research further suggests that reappraisal is particularly effective among men, who are generally less inclined to employ emotion-focused approaches such as seeking social support (Duru & Balkis, 2024; Mohammadkhani et al., 2023). Effective use of reappraisal may therefore protect male students from heightened distress and reduce the likelihood of compensatory behaviors such as excessive smartphone use.

Taken together, these findings underscore the importance of conceptualizing emotion regulation as both culturally embedded and developmentally contingent. Preventive and therapeutic interventions should prioritize strengthening adaptive strategies like reappraisal, especially for male students experiencing high levels of paternal psychological control. Integrating these findings with recent gender-sensitive evidence (Cheng et al., 2024; Wang et al., 2025; Zhang et al., 2023) underscores the value of tailoring preventive and therapeutic models not only to cultural contexts but also to the distinct emotional and relational profiles of male and female students.

### ***Limitations and future directions***

Although this investigation contributes to the comprehension of gender-specific affective processes in smartphone addiction, it is not without its constraints. Bias may be present in self-reported data. Causal inference is restricted by the cross-sectional design. In addition, the sample was drawn from two universities in Henan Province, which may restrict generalizability.

Future investigations would benefit from employing longitudinal designs in combination with mixed-method strategies, such as qualitative interviews and behavioral observations, to capture a more nuanced understanding of gender-specific patterns in emotion regulation. Such studies could clarify how cultural and familial contexts shape emotional resilience and the effectiveness of regulatory strategies.

### **Conclusion**

Two central conclusions can be drawn. First, gender moderated the association between paternal psychological control and cognitive reappraisal, with this linkage appearing more pronounced in males. Second, reappraisal functioned as a more effective mediator of the relationship between paternal psychological control and psychological distress for male students. Collectively, these findings emphasize the relevance of gender-sensitive frameworks and point to the value of targeted interventions—particularly those focusing on parenting practices and emotion regulation. Examples include parental guidance initiatives and cognitive-behavioral training, which may strengthen adaptive regulation strategies and provide more effective approaches to addressing smartphone addiction in university populations.

## Disclosure statement

The authors declare no competing interests.

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## Data availability statement

Access the generated datasets from the corresponding author upon reasonable request.

## Ethics approval and consent to participate

The University Ethics Committee gave its approval to this study (Ref. No.: JKEUPM–2023–1426). By means of paper-based questionnaires, each participant provided written informed consent.

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