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Smartphone Addiction Proneness, Mastery, Perceived Cohesion and School Burnout Among Vietnamese Adolescents: A Moderated Mediation Model

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Abstract

Background/ problem: Smartphone addiction proneness is associated with academic and psychological difficulties among adolescents, yet mechanisms linking it to school burnout remain underexamined in Vietnam. Drawing on conservation of resources (COR) theory, smartphone addiction proneness may undermine mastery, thereby increasing vulnerability to school burnout.

Objective/ purpose: This study examined whether mastery mediated the association between smartphone addiction proneness and school burnout and whether perceived classroom cohesion moderated this association.

Design and Methodology: A cross-sectional of 375 secondary and high school students in Hanoi and Ho Chi Minh City, Vietnam employed convenience sampling. Participants completed measures of smartphone addiction proneness, school burnout, mastery, and perceived classroom cohesion. A moderated mediation path model was estimated using standardized scores and 5,000 bootstrap resamples.

Results: Smartphone addiction proneness negatively predicted mastery ($\beta = -.20, p < .001$), while mastery negatively predicted school burnout ($\beta = -.19, p < .001$). The indirect effect through mastery was significant ($\beta = .04, p = .03, 95\% \text{ CI } [.01, .08]$), and the direct effect remained significant ($\beta = .33, p < .001$). Perceived classroom cohesion negatively predicted school burnout ($\beta = -.17, p < .001$), whereas its interaction with smartphone addiction proneness was positive ($\beta = .10, p = .04$).

Conclusion and Implications: Smartphone addiction proneness was linked to higher school burnout directly and through lower mastery. Perceived classroom cohesion was associated with lower burnout overall but strengthened the positive association between smartphone addiction proneness and school burnout. School-based interventions should strengthen mastery and promote healthier peer connection norms.

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The widespread adoption of smartphones has changed how people function in daily life, but it has also introduced notable psychological and behavioral challenges, including smartphone addiction (Allred & Atkin, 2020; He et al., 2018). Adolescents are particularly vulnerable to problematic smartphone use, with high levels of smartphone use and problematic use reported in this population (Lu et al., 2024), primarily because they represent the first generation raised with constant access to digital media (Skierkowski & Wood, 2012). This issue is highly visible in developing countries such as Vietnam, where rapid economic growth and cheaper devices have led to a massive rise in phone ownership, resulting in active smartphone subscriptions reaching 100.1 million in early 2023 (Ministry of Science and Technology, 2024). Among internet-using Vietnamese youth, 98 percent access it through smartphones, making the

device central to their school, social, and personal lives (UNICEF, 2022). Excessive smartphone use has been associated with a range of adverse health and academic outcomes, including poor sleep, anxiety, and procrastination (Al Battashi et al., 2021; Zhao et al., 2025), and, notably, school burnout (Salmela-Aro et al., 2009). Internal and external resources have shown potential to mitigate the influence of smartphone addiction on school burnout; however, limited studies have explicitly investigated the role of mastery and perceived cohesion on the relationship. In Vietnam, recent studies have reported substantial levels of problematic digital use among adolescents and associations with poorer psychological well-being, including anxiety, depressive symptoms, and stress-related outcomes (Dam et al., 2023; Dien et al., 2023). Adolescents who lack a strong sense of personal mastery or who are embedded in peer networks organized primarily around constant digital contact may be particularly vulnerable to this pathway, whereas those with greater personal agency or healthier offline peer connections may be comparatively protected (Wang et al., 2025).

The primary purpose of this research is to examine a moderated mediation model using a sample of Vietnamese secondary and high school students. Specifically, this study aims to examine the indirect effect of smartphone addiction on school burnout through the mediating mechanism of personal mastery, while evaluating whether perceived classroom cohesion acts as an environmental boundary condition that alters the direct impact of smartphone addiction on school burnout. By unraveling these internal and external resource dynamics, this manuscript seeks to clarify the psychological pathways of technology-driven strain and discuss practical, evidence-based ways schools can leverage these findings to design superior student support and mental health intervention programs. This gap is not only empirical but also theoretical as conservation of resources theory generally predicts that social resources such as peer cohesion buffer the effects of stressors, yet it remains untested whether this buffering assumption holds when peer connection itself is enacted mainly through the same digital channels implicated in the stressor.

Literature Review

To better understand the mechanisms linking smartphone addiction proneness to school burnout, this section reviews the relevant theoretical foundations and empirical evidence. Based primarily on conservation of resources (COR) theory, the review first discusses mastery as a personal resource and the relationship between smartphone addiction proneness and school burnout. It then examines perceived classroom cohesion as a social resource and considers these relationships within the Vietnamese school context before integrating them into the proposed research hypotheses and conceptual framework.

The Conservation of Resources Theory and Mastery as a Personal Resource

The conservation of resources (COR) theory might help explain the psychological process underlying this relationship (Hobfoll, 1989). This theory states that stress and burnout may occur when individuals lose or risk of losing valuable personal and social resources. At school, students rely on these internal resources to manage academic stress, while excessive smartphone use may contribute to their depletion. One key personal resource is sense of mastery, defined as the belief that one can control the important outcomes in life (Pearlin & Schooler, 1978). High mastery is linked to better mental health, lower depression, and higher self-esteem (Gisch et al., 2022) suggesting that it represents an important psychological resource for coping with stress. From a COR perspective, repeated difficulties in regulating smartphone use may contribute to a loss of perceived control over one's attention, time, and behaviour, which may in turn weaken one's sense of mastery. Recent studies similarly suggest that smartphone addiction proneness is associated with academic burnout through reduced psychological resources such as self-efficacy, hope, and resilience (Hu et al., 2024; Li & Zhou, 2025).

Smartphone Addiction Proneness and School Burnout

School burnout is characterized by feeling completely exhausted by school demands, having a negative or detached attitude toward schoolwork, and feeling like an inadequate student (Salmela-Aro et al., 2009). Adolescents are highly vulnerable to burnout because they have to navigate developmental challenges alongside substantial academic pressures (Bilgiz & Peker, 2021). In response to these stressors,

many students turn to smartphones as a coping strategy. However, excessive reliance on smartphones may inadvertently exacerbate rather than alleviate stress (Tomaszek & Muchacka-Cymerman, 2021). Several mechanisms may explain this association. Smartphone use during class, particularly for messaging, can disrupt attention and impair studying and homework completion (Amez & Baert, 2020). In addition, smartphone dependence has been shown to negatively influence school adjustment, which in turn contributes to burnout (Chen et al., 2023; Wang et al., 2025). Collectively, these findings suggest that problematic smartphone use depletes the cognitive and emotional resources necessary for effective academic functioning, thereby increasing susceptibility to school burnout.

Perceived Classroom Cohesion as a Social Resource

While mastery is an internal personal resource, social resources also play a major role in how students handle stress according to the COR theory (Hobfoll, 1989). Perceived cohesion is a student's sense of belonging to a group and the positive feelings they get from being part of that group (Bollen & Hoyle, 1990). Feeling socially connected is crucial for mental health and school engagement during adolescence (Anderman & Freeman, 2004; O'Brien & Bowles, 2013; Ulmanen et al., 2016). This is supported by previous research as perceived group cohesion acts as a shield against stress (Bosselut et al., 2020). However, because teenage social interactions are now highly digital, this connection can sometimes be counterintuitive. Research shows that being deeply tied to online social groups can lead to information overload, higher stress, and a fear of missing out (Wu-Ouyang, 2023). This mechanism aligns with the interaction-person-affect-cognition-execution (I-PACE) model (Brand et al., 2016), which posits that addictive technology behaviors develop through interactions between personal predisposing factors, cognitive-affective responses to stressors, and specific internet-use habits. If a teenager's peer group connects mostly through screens, a high sense of group cohesion might actually worsen the negative impacts of smartphone addiction instead of protecting against them.

The Vietnamese School Context

Despite these separate findings, limited studies have examined the connection between smartphone use and school burnout in low-resource settings. In Southeast Asia, and particularly in Vietnam, the rapid integration of digital technology has triggered an increase in adolescent smartphone dependency, which often functions as a maladaptive coping mechanism against intense educational demands (Ho et al., 2023). Within this collectivist society heavily influenced by Confucian values, adolescents navigate unique sociocultural pressures characterized by profound parental expectations, competitive examination systems, and class rankings that tie academic performance directly to personal and familial worth (Ho et al., 2022). Consequently, Vietnamese youth experience heightened vulnerability to educational stress and subsequent psychological exhaustion (Truc et al., 2015). While Western literature has firmly established the link between technology dependence and academic burnout, empirical research within the Vietnamese context remains limited. Furthermore, studies often investigate the association between smartphone use and psychological outcomes without accounting for how internal psychological assets such as mastery and external social systems such as perceived cohesion can influence the relationship. In an environment where adolescent life satisfaction is uniquely sensitive to emotional interdependence and a collective sense of school belonging (Rudolf, 2024), understanding how interpersonal cohesion interacts with individual agency to mitigate or exacerbate technology-driven burnout is vital, yet largely neglected in Southeast Asian scholarship.

Research Hypotheses

Building on the gaps mentioned, this study tests a moderated mediation model using a sample of Vietnamese secondary and high school students. Specifically, this study aims to test the indirect effect of smartphone addiction on school burnout through mastery, examine whether perceived cohesion changes the impact of smartphone addiction on burnout, and discuss practical ways schools can use these findings to design better student support and mental health intervention programs. Hence, three hypotheses were proposed:

H1: Smartphone addiction proneness will be positively and significantly associated with school burnout.

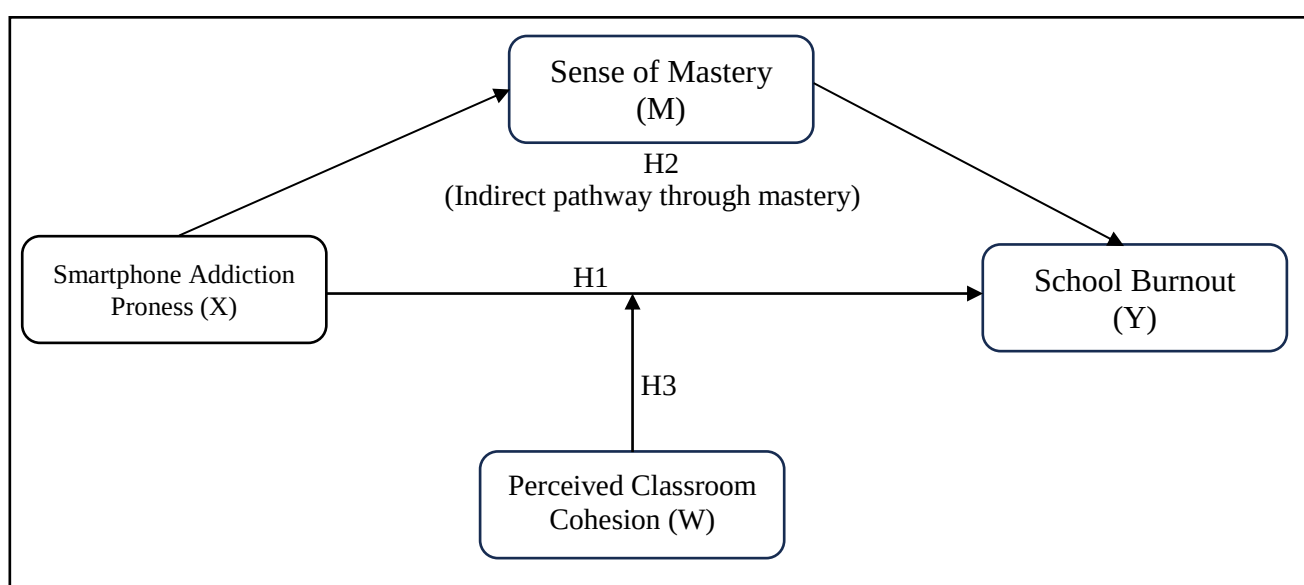
H2: Mastery will significantly mediate the association between smartphone addiction and school burnout, such that smartphone addiction proneness will be negatively associated with mastery, which will, in turn, be negatively associated with school burnout.

H3: Perceived classroom cohesion will significantly moderate the association between smartphone addiction proneness and school burnout, such that the association will be weaker among students with higher perceived cohesion.

Figure 1 presents the conceptual framework of this study, illustrating the hypothesized relationships among smartphone addiction proneness (independent variable), sense of mastery (mediator) and school burnout (dependent variable), as well as the moderating role of perceived classroom cohesion on the direct association between smartphone addiction proneness and school burnout.

Figure 1

Proposed Conceptual Framework



Method

Research Design

This study employed a convenience sampling approach within a cross-sectional survey design. Convenience sampling was selected because it allowed feasible and timely access to eligible students through participating schools; however, this approach may introduce selection bias and limit the representativeness and generalizability of the sample. The cross-sectional design enabled the examination of associations among the study variables at a single point in time, but it does not allow conclusions about temporal sequence or causality (Wang & Cheng, 2020). Eligible participants were required to (1) be Vietnamese secondary and high school students enrolled in Grades 8 to 11; and (2) reside in either Hanoi or Ho Chi Minh City (HCMC) at the time of data collection. Anyone who did not meet all eligibility criteria was excluded from the study. Data were collected from four secondary and high schools in Hanoi and HCMC. All eligible students in those schools were invited to participate and 375 agreed to take part. Participants were recruited through school-based announcements and were invited to participate on a voluntary basis. Detailed information regarding the study objectives, procedures, confidentiality measures, and participants' rights was provided before participation. Written informed consent was obtained from both participants and their legal guardians prior to survey administration.

Procedure

Data were collected in May 2025 using either paper-based or online questionnaires, depending on school arrangements and participant preferences. Survey completion typically required approximately 20–25 minutes. Research assistants were present during in-person data collection sessions to answer questions and ensure adherence to ethical procedures. Responses from paper questionnaires were collected immediately upon completion, whereas online responses were securely stored in a password-protected database. All submitted questionnaires were screened for completeness and data quality. Cases containing substantial missing data or evidence of careless responding were excluded. Only members of the research team had access to the raw data, and all personally identifiable information was removed during data processing.

Measures

All measures were translated into Vietnamese following the standard procedure (Beaton et al., 2000) including independent forward translation by two authors, backward translation by a different author and consensus review by all authors.

Smartphone addiction proneness was assessed with the smartphone addiction scale-short version (SAPS; Kim et al., 2014), which is a 10-item measure rated on a 4-point scale (1 = *never* to 4 = *always*). Higher scores indicate greater smartphone addiction. Internal consistency in the present sample was excellent ($\alpha = .83$, $\omega = .83$).

School burnout was measured with the school burnout inventory (SBI; Salmela-Aro et al., 2009). This is a 9-item scale rated on a 6-point scale (1 = *strongly disagree* to 6 = *strongly agree*) with higher scores reflecting greater burnout. In this study, the scale showed good internal consistency ($\alpha = .85$, $\omega = .85$).

Sense of mastery was measured with the 5-item Pearlin mastery scale (PMS; Pearlin & Schooler, 1978), rated on a 5-point scale (1 = *completely true* to 5 = *not true at all*). All items describe states of helplessness or low personal control (e.g., feeling unable to solve one's problems), so a higher raw score indicates greater mastery; no item reversal was required. The scale demonstrated good reliability in our sample ($\alpha = .78$, $\omega = .79$).

Perceived classroom cohesion was assessed with the perceived classroom cohesion scale (PCS; Chin et al., 1999), comprising six items rated on a 7-point scale (1 = *completely false* to 7 = *completely true*). Higher scores reflect a stronger sense of classroom community. Reliability was excellent in the current study ($\alpha = .88$, $\omega = .89$).

Statistical Analysis

All analyses in this study were carried out using the software- R, version 4.5.2 (R Core Team, 2025) with R codes included in the Supplementary Materials.

Item-level missing data were minimal. Four smartphone addiction (SAPS) items and one school burnout (SBI) item each had a single missing value (0.27%). Using the *mice* package (van Buuren & Groothuis-Oudshoorn, 2011), missing data were addressed through multiple imputation using predictive mean matching with 5 imputed datasets. Imputation was conducted at the item level and incorporated age, gender, grade, academic performance as auxiliary predictors. Due to low missingness, analyses were conducted on the first imputed dataset since according to Rubin's relative efficiency formula, for data with missingness <1%, pooling results from 1 imputed dataset would retain 99% efficiency compared to pooling the results from infinite imputed datasets (White et al., 2011). No missing values remained in the composites following imputation.

Prior to hypotheses testing, variable scores were computed and statistical assumptions were screened to minimize bias during inference. Item-rest correlations were examined for each scale to identify inverse items. The results were positive (range .39 to .81) for all measures, confirming the absence of inverse items.

Composite scores of all variables were computed by summing raw item responses for each scale from the imputed dataset. Univariate normality, multivariate normality, multivariate outliers, and multicollinearity were tested.

The primary hypotheses were tested with a moderated mediation path model estimated in the *lavaan* package using maximum likelihood (ML) estimation. All composite scores were standardized prior to analysis to facilitate interpretation of path coefficients as standardized regression weights. An interaction term was formed by multiplying the standardized scores of smartphone addiction and classroom cohesion to minimize multicollinearity in product terms (Aiken & West, 1991). The model included two structural equations, specifically (a) an equation predicting mastery from smartphone addiction representing the mediation path; and (b) an equation predicting school burnout from smartphone addiction, mastery, perceived classroom cohesion, and their interaction term to model both the direct and the moderation effects. The moderating effect was assessed based on whether the interaction term significantly predicted school burnout on school ($p < .05$), whereas indirect effects were estimated via the delta method with standard error estimation. Additionally, a Johnson-Neyman analysis was conducted to identify the specific values of the moderator where the conditional effect of smartphone addiction on school burnout transitioned between statistical significance and non-significance. Following that, a bootstrapping procedure with 5000 resamples and 95% percentile confidence intervals was performed to assess the stability of the results (MacKinnon et al., 2007). A stable effect was confirmed when its 95% bootstrap confidence interval (CI) excluded zero.

Results

Sociodemographic Characteristics

The sample included 187 female students (49.9%), 177 male students (47.2%), and 10 students who identified as another gender (2.7%); one participant did not report gender. Students were enrolled in Grades 8 to 11, including 201 secondary school students ($n = 201$, 53.6%) and 174 high school students ($n = 174$, 46.4%). Age ranged from 14 to 17 years ($M = 15.44$, $SD = 1.16$). Most students reported excellent (74.7%) or good (19.5%) academic performance, whereas smaller proportions reported average (4.5%) or below-average (1.3%) performance.

Descriptive Analyses

Mean, standard deviation, and bivariate Pearson correlations among the study variables are presented in Table 1. Smartphone addiction was positively correlated with school burnout ($r = .39$, $p < .001$) and negatively correlated with mastery ($r = -.20$, $p < .001$) and perceived classroom cohesion ($r = -.12$, $p = .02$). Mastery was negatively associated with school burnout ($r = -.29$, $p < .001$), and perceived classroom cohesion was also negatively associated with school burnout ($r = -.25$, $p < .001$).

Table 1

Descriptive Statistics, Internal Consistency Reliabilities, and Pearson Intercorrelations

Variable	<i>M</i>	<i>SD</i>	1	2	3	α	ω
1. Smartphone Addiction Proneness	22.45	6.33	—			.83	.83
2. Sense of Mastery	15.23	4.24	-.20***	—		.78	.79
3. Perceived Classroom Cohesion	29.14	8.49	-.12*	.19***	—	.88	.89
4. School Burnout	29.41	9.83	.39***	-.29***	-.25***	.85	.85

Note. α = Cronbach's alpha; ω = McDonald's omega. * $p < .05$, ** $p < .01$, *** $p < .001$.

Assumptions Testing

Univariate normality was evaluated using the Shapiro–Wilk test. The results indicated that all four variables significantly departed from normality ($W_s = .96-.99$, all $p_s \leq .02$). The Henze–Zirkler test further confirmed multivariate non-normality ($HZ = 1.43$, $p < .001$). However, skewness and kurtosis values for all variables were within acceptable ranges ($|\text{skewness}| \leq 0.52$, $|\text{kurtosis}| \leq 0.45$; West et al., 1995), suggesting that the violations were not severe. Two multivariate outliers were identified ($D^2 > 18.47$), representing 0.50% of the sample. These cases were retained because their responses were within plausible item ranges and their removal did not meaningfully alter the results. All variance inflation factors were below 1.10, indicating no multicollinearity concerns.

Structural Modelling Analysis

The structural model demonstrated an acceptable fit to the data, $\chi^2(2) = 12.39$, $p < .010$, CFI = .920, SRMR = .048, RMSEA = 0.112. Specifically, in our model, we did not regress mastery on either perceived cohesion or the interaction term between perceived cohesion and smartphone addiction proneness, resulting in a model with two degree of freedom. Fit was evaluated against conventional cutoffs (CFI $\geq .90$, RMSEA $\leq .08$, SRMR $\leq .08$; Hu & Bentler, 1999). Despite RMSEA exceeding the conventional threshold, Kenny et al. (2015) demonstrated that RMSEA often falsely indicates poor fit in models with very small degrees of freedom. Thus, we proceed with the results of the structural model as both CFI and SRMR satisfied cutoffs. The model explained 3.80% of the variance in mastery and 23.00% of the variance in school burnout. Path coefficients and bootstrap confidence intervals are presented in Table 2.

Table 2

Path Coefficients and Bootstrapping Statistics from the Moderated Mediation Model

Path	<i>B</i>	<i>SE</i>	β	<i>z</i>	<i>p</i>	Bootstrapping 95% CI
SAPS → Mastery	-.20	.05	-.20	-3.86	< .001	[-.30, -.09]
Mastery → School Burnout	-.19	.06	-.19	-4.11	< .001	[-.30, -.08]
SAPS → School Burnout	.33	.05	.33	7.04	< .001	[.22, .43]
PCS → School Burnout	-.17	.05	-.17	-3.81	< .001	[-.27, -.07]
SAPS × PCS → School Burnout	.10	.05	.10	2.27	.04	[.00, .18]
Indirect effect: SAPS → Mastery → SBI	.04	.02	.04	2.81	.03	[.01, .08]
Total effect	.36	.05	.37	7.81	< .001	[.26, .46]

Note. SAPS = Smartphone Addiction Proneness Scale; PCS = Perceived Classroom Cohesion Scale; SBI = School Burnout Inventory. *B* = unstandardized coefficient; *SE* = bootstrapped standard error; β = standardized coefficient; CI = confidence interval. Bootstrap confidence intervals were based on 5,000 resamples.

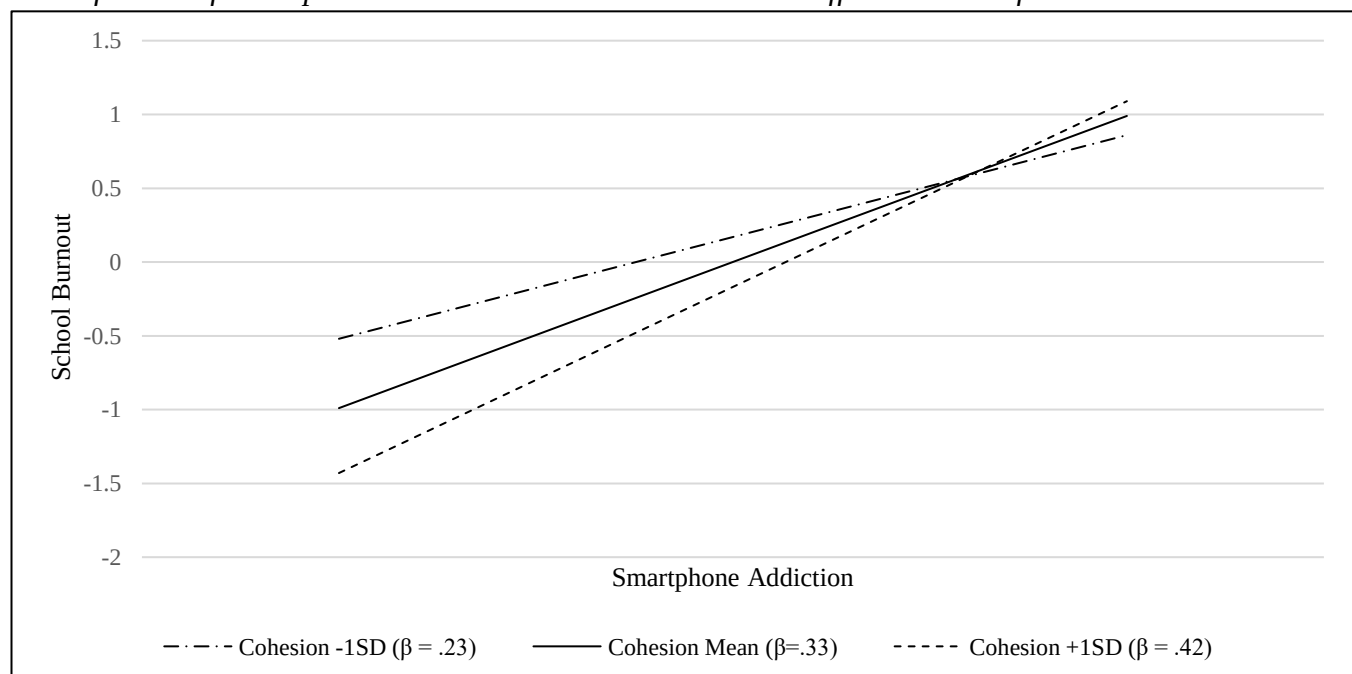
Specifically, smartphone addiction significantly and negatively predicted mastery ($\beta = -.20$, $p < .001$), indicating that higher levels of smartphone addiction were associated with lower personal mastery. Mastery also significantly and negatively predicted school burnout ($\beta = -.19$, $p < .001$). The indirect effect of smartphone addiction on school burnout through mastery was positive and statistically significant ($\beta = .04$, $p = .03$). This indirect effect accounted for approximately 11% of the total effect of smartphone addiction proneness on school burnout, indicating that reduced mastery is a statistically significant partial mediator, suggesting that smartphone addiction was associated with greater burnout partly through reduced mastery.

The direct effect of smartphone addiction proneness on school burnout remained positive and statistically significant after accounting for mastery and perceived classroom cohesion ($\beta = .33$, $p < .001$). The total effect of smartphone addiction on school burnout was $\beta = .37$.

Perceived classroom cohesion had a significant negative main effect on school burnout ($\beta = -.17$, $p < .001$). However, the interaction between smartphone addiction and perceived classroom cohesion was positive and statistically significant ($\beta = .10$, $p = .04$), indicating that the association between smartphone addiction and school burnout was stronger at higher levels of classroom cohesion. Simple-slope analysis showed that smartphone addiction was positively associated with school burnout at low (-1 SD: $\beta = .23$), mean ($\beta = .33$), and high ($+1$ SD: $\beta = .42$) levels of perceived classroom cohesion, with the strongest association observed when cohesion was high. Johnson–Neyman analysis further indicated that the positive association between smartphone addiction and school burnout became statistically significant when perceived classroom cohesion exceeded approximately 1.66 standard deviations below the mean, and the effect strengthened as classroom cohesion increased.

Figure 2

The Influence of Smartphone Addiction on School Burnout at different levels of Perceived Cohesion



Note. Slopes represent predicted standardized School Burnout as a function of standardized Smartphone Addiction (SD units), based on the path model coefficients for the main effect of Perceived Cohesion and its interaction with Smartphone Addiction, at low (-1 SD), mean, and high ($+1$ SD) levels of Perceived Cohesion. The dash-dot line indicates Perceived Cohesion at -1 SD ($\beta = .23$). The solid line indicates Perceived Cohesion at the mean ($\beta = .33$). The dashed line indicates Perceived Cohesion at $+1$ SD ($\beta = .42$).

Discussion and Conclusion

This study examined a structural model linking smartphone addiction to school burnout among Vietnamese secondary and high school students, with mastery as a mediator and perceived classroom cohesion as a moderator of the direct path. Overall, the results supported the hypotheses H1 and H2, whereas H3 was not supported; although the interaction was statistically significant, its direction was opposite to the hypothesized buffering effect.

Specifically, consistent with H1 (smartphone addiction proneness positively associated with school burnout), smartphone addiction proneness was directly and positively associated with school burnout. Consistent with H2 (mastery mediating this association), smartphone addiction proneness positively

predicted school burnout both directly and indirectly through reduced mastery, confirming mastery as a significant mediator. Although perceived classroom cohesion was negatively associated with burnout, contrary to our expectation, it strengthened the association between smartphone addiction and school burnout. Beyond these specific pathways, the findings contribute to behavioral science by empirically testing, in a non-Western adolescent sample, whether conservation of resources (COR) theory, a classic resource-based behavioral framework, generalizes to digitally mediated stressors and digitally mediated social resources.

Smartphone Addiction, Mastery, and School Burnout

The robust positive association between smartphone addiction and school burnout was observed in this study. This finding is consistent with a growing body of literature documenting the academic risk of problematic technological use. Prior research in China and Western countries has linked excessive smartphone use to reduced academic adaptability (Chen et al., 2023; Wang et al., 2025), heightened academic procrastination (Zhao et al., 2025), technology-related conflict that drains self-regulatory capacity (Yang et al., 2024), and in-class distraction that impairs both learning and homework completion (Amez & Baert, 2020). The present findings extend this evidence to a younger, non-Western sample, and demonstrate that the smartphone addiction–burnout pathway is significant among Vietnamese adolescents. Furthermore, the results align with conservation of resources theory (Hobfoll, 1989). The COR theory posits that psychological stress and burnout arise when individuals perceive a threat to, actual loss of, or failure to gain valued personal and social resources. Smartphone addiction represents a chronic resource threat as the compulsive, attention-fragmenting nature of excessive device use steadily depletes cognitive and emotional capacity that students rely on to meet school demands. When these capacities fall below the threshold necessary for sustained academic engagement, burnout becomes a highly probable outcome (Salmela-Aro et al., 2009). From this perspective, this study adds to the evidence that problematic device uses functions as a resource-draining stressor in academic settings. This corroborates and extends prior cross-sectional evidence from East Asian student populations (Hu et al., 2024; Li & Zhou, 2025), and contributes one of the first examinations of this relationship in a Vietnamese sample.

Another finding is that mastery showed a potential mediating mechanism in the association between smartphone addiction proneness and school burnout. Particularly, smartphone addiction significantly and negatively predicted mastery, and mastery, in turn, negatively predicted. This pathway underscores a resource-depletion mechanism wherein problematic smartphone use may undermine students' capacity for self-control and perceived agency, which consequently fosters higher levels of school burnout. This pattern aligns with evidence in previous studies. For instance, Hu et al. (2024) surveyed 628 Chinese postgraduate medical students and discovered that smartphone addiction indirectly drives academic burnout through the depletion of positive psychological capital which includes self-efficacy, hope, optimism, and resilience. In their model, psychological capital served as an internal buffer that, when intact, significantly mitigated the negative impacts of technology overuse. The negative influence of smartphone overuse on psychological capital found by Hu et al. (2024) was confirmed in another study (Li & Zhou, 2025), further strengthening the protective aspects of psychological capital against the effects of smartphone addiction. Since Hu et al. (2024) focused on a cohort of adults in a specialized field, the current study extends the findings to a younger sample in a more academic setting.

Perceived Classroom Cohesion as a Risk-Enhancing Moderator

Regarding the moderating effect of perceived cohesion, this finding is contrary to expectation. Specifically, we found that although perceived cohesion negatively predicted school burnout, higher perceived cohesion would strengthen the positive association between smartphone addiction and school burnout. This pattern is opposite to the buffering effect typically expected of social resources within the COR framework (Hobfoll, 1989), and documented in prior research where social connectedness was found to attenuate the relationship between problematic smartphone use and psychological symptoms, including depression, anxiety, and stress (Guo et al., 2020). This finding is interpreted with caution, however, because the bootstrap confidence interval for the interaction effect was close to zero, indicating a comparatively

fragile effect relative to the H1 and H2 findings. Beyond the COR theory, the interaction of person-affect-cognition-execution (I-PACE) model (Brand et al., 2016) offers a complementary lens. It proposes that situational and social cues can either constrain or reinforce compulsive technology use depending on how they interact with an individual's affective and cognitive responses, which may help explain why peer cohesion enacted through constant digital contact reinforces, rather than buffers, problematic smartphone use.

One explanation is that peer cohesion may no longer function as a purely protective factor in the digital age. Adolescents who feel strongly connected to their classmates are often embedded in continuous online interactions through group chats, social media, and expectations of immediate responsiveness. As a result, highly cohesive peer relationships may increase social pressure to remain digitally available, leading to greater smartphone use and more compulsive engagement. This interpretation is consistent with recent evidence, Wu-Ouyang (2023) showed that multiplatform mobile connectedness among Chinese youth was linked to poorer well-being through fear of missing out (FoMO) and boredom, further reinforcing that strong social connectedness in digital environments can become a source of psychological strain. Additionally, a cultural perspective may further account for this pattern. Vietnamese adolescents are socialized within a collectivist, Confucian-influenced context that emphasizes group harmony, peer relationships, and avoidance of social exclusion (Ho et al., 2022). Consequently, students who feel highly integrated into their classroom community may experience stronger obligations to remain constantly connected through digital channels. In this context, smartphones may serve not only as communication tools but also as instruments for fulfilling social expectations. When smartphone use becomes addictive, these social obligations may make disengagement more difficult, which lead to increased risks of school burnout.

Limitations

Several limitations should be noted when interpreting the present findings. First, the cross-sectional design precludes causal inference. The observed mediation and moderation patterns are consistent with the proposed theoretical model, but longitudinal studies are needed to establish temporal precedence and to track the developmental trajectory of resource depletion across the school year. Experience sampling or diary study designs (Tuerlinckx et al., 2026) would be particularly well suited to capturing the dynamic interplay between daily smartphone use, fluctuations in mastery, social interactions, and momentary burnout experiences. Second, the sample was recruited through convenience sampling from volunteer students in schools in Hanoi and Ho Chi Minh City, which may limit generalizability to adolescents in rural areas and other regions of Vietnamese and may introduce risk self-selection bias. Future research should seek broader and more diverse samples, including sampling across urban, peri-urban, and rural school settings. Lastly, although the assumption of linearity was not formally violated, visual inspection of the locally estimated scatterplot smoothing curve suggests potential nonlinear paired associations among the included variables, such as between smartphone addiction and mastery. As a result, the linear assumption may not fully capture the complexity of variable interaction. Future research could explore potential curvilinear relationships to provide a more nuanced understanding of how the variables may influence one another.

Implications for Behavioral Science

The present findings offer key theoretical and practical implications for behavioral science and school-based mental health practice, particularly in Vietnam and other rapidly digitalizing Southeast Asian countries. First, from a theoretical standpoint, models of adolescent stress in behavioral science must adapt to the digital age by recognizing that high social cohesion can carry a 'resource tax' when maintained through compulsive digital availability. Second, the mediating role of mastery highlights the importance of strengthening students' sense of personal control through interventions grounded in cognitive-behavioral and acceptance-based approaches, such as self-monitoring, goal-setting, and attributional retraining (Ulaş & Seçer, 2022). Incorporating mastery-building activities into school wellbeing programs may help protect students who show early signs of problematic smartphone use or academic exhaustion. Third, the

moderating role of cohesion suggests that social connectedness should be addressed more carefully within prevention efforts. Rather than simply promoting peer cohesion, schools should consider how cohesion is maintained in digital environments and encourage face-to-face collaboration, shared offline activities, and norms around device-free social interaction. Finally, because most participants reported good or excellent academic performance, a pattern that may partly reflect self-selection into this voluntary study, schools should recognize that high-achieving students may still be vulnerable to burnout. Within Vietnam's highly competitive educational context, smartphone addiction and diminished mastery may contribute to psychological risk that remains hidden behind strong academic outcomes. This interpretation should be treated as tentative given the likely non-representative, higher-achieving composition of the sample.

Conclusion

This study showed that smartphone addiction proneness was associated with school burnout among Vietnamese adolescents, both directly and indirectly, through lower mastery. Contrary to expectations, higher perceived classroom cohesion strengthened this relationship. These findings extend the application of COR theory to a collectivist, rapidly digitalizing context while also suggesting that social resources may not always operate as protective factors in digitally connected environments. They further highlight the importance of strengthening students' sense of mastery and promoting healthier peer connections to reduce technology-related burnout.

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Declarations

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Declaration of Generative AI: During the preparation of this work, the author(s) used Chat GPT to revise English expression and improve language clarity. After using these tools, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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