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Role of Cognitive Mechanisms on Relationship Between Mindfulness and Internet Addiction Among Emerging Adults: A Mediated Moderation Model

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Article

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Abstract

Background: Internet addiction has become a growing psychological and public health concern among emerging adults due to increased engagement with digital technologies and online environments. Previous research suggests that mindfulness may serve as a protective factor against addictive behaviors; however, the cognitive mechanisms through which mindfulness influences internet addiction remain insufficiently understood. Additionally, limited evidence exists regarding the conditions under which these relationships operate, particularly among emerging adults in developing countries.

Objective: The present study examined the role of cognitive mechanisms in the relationship between mindfulness and internet addiction among emerging adults. Specifically, the study investigated whether attentional control and cognitive fusion mediated the relationship between mindfulness and internet addiction and whether emotion regulation moderated these indirect pathways.

Method: A cross-sectional correlational research design was employed. The sample consisted of 800 emerging adults aged 16 to 30 years. Participants completed standardized measures assessing mindfulness, internet addiction, attentional control, cognitive fusion, and emotion regulation. Data were analyzed using descriptive statistics, reliability analyses, Pearson correlations, mediation analyses, and moderated mediation analyses using Hayes' PROCESS macro with bootstrapping procedures.

Results: Results indicated that mindfulness was negatively associated with internet addiction ($r = -.42$, $p < .001$) and cognitive fusion ($r = -.51$, $p < .001$), while it was positively associated with attentional control ($r = .47$, $p < .001$) and emotion regulation ($r = .39$, $p < .001$). Mediation analyses revealed significant indirect effects of mindfulness on internet addiction through attentional control ($\beta = -.12$, 95% CI [-.18, -.07]) and cognitive fusion ($\beta = -.19$, 95% CI [-.25, -.13]). The serial mediation pathway through attentional control and cognitive fusion was not significant ($\beta = -.02$, 95% CI [-.05, .01]). Moderated mediation analyses showed that emotion regulation did not significantly moderate the indirect effects (interaction terms $ps > .05$), indicating that the mediation pathways were consistent across different levels of emotion regulation.

Conclusion: The findings suggest that attentional control and cognitive fusion are important cognitive mechanisms linking mindfulness and internet addiction among emerging adults. The study contributes to contemporary theories of mindfulness and behavioral addiction by demonstrating that mindfulness may reduce problematic internet use through improvements in cognitive functioning. These findings have important implications for the development of mindfulness-based interventions targeting internet addiction among young adults.

Introduction

Internet addiction has emerged as a significant public health concern in the digital era, particularly among emerging adults who are navigating a developmental period characterized by identity exploration, increased autonomy, emotional fluctuations, and extensive engagement with technology. Emerging

adulthood, typically ranging from 18 to 29 years of age, is considered a critical developmental stage during which individuals are especially vulnerable to maladaptive behavioral patterns due to ongoing psychosocial and cognitive maturation (Chen et al., 2022). The widespread availability of smartphones, social networking platforms, online gaming, and digital entertainment has substantially increased opportunities for excessive internet use, resulting in a growing prevalence of problematic and addictive online behaviors among young adults. Research consistently demonstrates that internet addiction is associated with adverse psychological, academic, social, and occupational outcomes, including depression, anxiety, impaired self-regulation, sleep disturbances, reduced academic performance, and diminished psychological well-being (Arslan & Coşkun, 2021; Chang et al., 2023; Yang et al., 2024).

Globally, internet use has increased dramatically over the past decade, transforming how individuals communicate, learn, work, and maintain social relationships. While digital technologies offer numerous benefits, excessive and uncontrolled internet use has become a growing concern among researchers and mental health professionals. Studies indicate that problematic internet use and related behavioral addictions have increased substantially among university students and young adults due to heightened dependence on digital devices for academic, social, and recreational purposes (Chang et al., 2023; Jeong & Bae, 2024). Contemporary theoretical perspectives suggest that internet addiction develops through an interaction of cognitive, emotional, and behavioral processes that reinforce compulsive online engagement and reduce individuals' ability to regulate internet use effectively (Rosenthal et al., 2021; Wang et al., 2022). Consequently, identifying psychological factors that may protect individuals from developing addictive online behaviors has become an important research priority.

The issue is particularly relevant in Pakistan, where rapid technological development and increased internet accessibility have transformed patterns of digital engagement among young people. The expansion of broadband connectivity, widespread smartphone ownership, and increasing social media penetration have substantially increased online participation among Pakistani youth. University students and emerging adults represent one of the most active internet-using populations in the country, spending considerable amounts of time on social networking sites, entertainment platforms, online gaming, and educational resources. Although internet use offers numerous educational and social benefits, concerns regarding excessive use, reduced self-control, academic difficulties, and psychological distress have become increasingly prominent. Despite the growing prevalence of internet use in Pakistan, empirical investigations examining the psychological mechanisms underlying internet addiction remain limited, particularly studies focusing on mindfulness and cognitive processes among emerging adults. Therefore, there is a pressing need to identify protective psychological factors and underlying mechanisms that may reduce vulnerability to internet addiction within the Pakistani context (Chen et al., 2022; Yang et al., 2024; Arslan & Coşkun, 2021).

Among the psychological factors that have attracted considerable attention in recent years, mindfulness has emerged as a promising protective factor against a wide range of maladaptive behaviors, including addictive tendencies. Mindfulness is commonly defined as a receptive and nonjudgmental awareness of present-moment experiences, encompassing thoughts, emotions, bodily sensations, and environmental

stimuli. Rather than reacting automatically to internal experiences, mindful individuals demonstrate greater acceptance, attentional control, and awareness of ongoing experiences. Contemporary research suggests that mindfulness enhances psychological flexibility, strengthens self-regulatory capacities, and reduces impulsive responding, thereby decreasing susceptibility to problematic and addictive behaviors (Rosenthal et al., 2021; Garland et al., 2022; Zainal & Newman, 2023). Because addictive behaviors are often characterized by automaticity, craving-driven actions, and diminished self-control, mindfulness may serve as an important psychological resource that protects emerging adults from excessive internet use.

A growing body of empirical evidence supports the protective role of mindfulness in reducing various forms of behavioral addiction. For example, Chang et al. (2023) reported that mindfulness was negatively associated with social media addiction among Chinese college students and exerted its effects through multiple psychological pathways. Similarly, Liu et al. (2024) found that mindfulness-based interventions significantly reduced mobile phone addiction among university students by enhancing psychological resources and meaning in life. Tang et al. (2025) further demonstrated that mindfulness-based cognitive programs may effectively reduce smartphone addiction while simultaneously improving resilience among adolescents. Additional evidence suggests that mindfulness attenuates the effects of stress, anxiety, adverse experiences, and other psychological risk factors associated with problematic internet use and digital addiction (Li et al., 2023; Yuan et al., 2025; Kong et al., 2025). Collectively, these findings indicate that mindfulness may play a critical role in preventing addictive online behaviors among young populations.

Although the association between mindfulness and addiction has been well documented, less is known about the cognitive mechanisms that explain how mindfulness exerts its protective effects. Contemporary theories of addiction emphasize that maladaptive cognitive processes often contribute to the initiation and maintenance of addictive behaviors. Individuals who experience difficulties regulating attention, managing intrusive thoughts, disengaging from cravings, or coping with distressing internal experiences may be more likely to develop compulsive behavioral patterns. Consequently, examining the cognitive mechanisms linking mindfulness and addiction may provide a more comprehensive understanding of the psychological processes underlying problematic internet use (Rosenthal et al., 2021; Fallah et al., 2025; Wang et al., 2025).

One cognitive mechanism that has received increasing attention in recent years is cognitive fusion. Cognitive fusion refers to the tendency to become excessively entangled with one’s thoughts and to treat subjective mental experiences as objective realities. Individuals with high levels of cognitive fusion often become dominated by negative thoughts, impulses, and cravings, making it difficult to regulate behavior effectively. From the perspective of Acceptance and Commitment Theory, cognitive fusion reduces psychological flexibility and increases vulnerability to maladaptive coping behaviors. Emerging evidence suggests that cognitive fusion is associated with impulsive decision-making, emotional dysregulation, and addictive tendencies. Mindfulness, in contrast, promotes cognitive defusion by encouraging individuals to observe thoughts without becoming attached to them, thereby reducing the influence of

maladaptive cognitions on behavior (Rosenthal et al., 2021; Fallah et al., 2025; Li et al., 2025). Consequently, cognitive fusion may represent an important mechanism through which mindfulness influences internet addiction.

Another important cognitive mechanism is attentional control, which refers to the capacity to direct, sustain, and shift attention in accordance with current goals. Effective attentional control enables individuals to resist distractions, regulate impulses, and maintain focus on adaptive activities. Deficits in attentional control have been consistently linked to problematic internet use, excessive smartphone engagement, and various addictive behaviors. Individuals with poor attentional control may be particularly susceptible to the rewarding and attention-capturing features of digital technologies, increasing their risk of compulsive internet use. Conversely, mindfulness training has been shown to improve attentional regulation, executive functioning, and cognitive flexibility, thereby strengthening individuals' capacity to regulate online behavior (Zainal & Newman, 2023; Gkintoni et al., 2025; Talebisiavashani & Mohammadi-Sartang, 2024). Therefore, attentional control may serve as another key pathway linking mindfulness and internet addiction.

The relationship between mindfulness and cognitive functioning has received substantial empirical support in recent years. A comprehensive meta-analysis of 111 randomized controlled trials conducted by Zainal and Newman (2023) demonstrated that mindfulness interventions produce significant improvements in attention, executive functioning, working memory, and cognitive flexibility. Similarly, Gkintoni et al. (2025) reported that mindfulness-based cognitive therapy contributes to favorable neurocognitive outcomes across diverse populations. Research further indicates that mindfulness enhances executive functioning, reduces cognitive rigidity, and improves self-regulatory capacities that are essential for adaptive behavior (Li et al., 2025; Talebisiavashani & Mohammadi-Sartang, 2024). These findings suggest that mindfulness may reduce internet addiction by strengthening cognitive processes that facilitate effective self-regulation and behavioral control.

In addition to cognitive mechanisms, emotional factors may influence the effectiveness of mindfulness in reducing addictive behaviors. Emotion regulation refers to the processes through which individuals monitor, evaluate, and modify emotional experiences to achieve adaptive outcomes. Individuals who possess strong emotion regulation abilities are generally better equipped to manage stress, negative emotions, and psychological challenges without resorting to maladaptive coping behaviors. In contrast, poor emotion regulation has been consistently associated with addictive tendencies and problematic internet use. Previous studies indicate that mindfulness promotes adaptive emotion regulation strategies, including cognitive reappraisal, emotional awareness, and acceptance, which subsequently contribute to improved mental health outcomes (Li et al., 2025; Fallah et al., 2025; Jeong & Bae, 2024). Therefore, emotion regulation may function as an important moderator influencing the strength of the relationship between mindfulness, cognitive mechanisms, and internet addiction.

Several recent studies have highlighted the importance of moderated mediation models in understanding addiction-related behaviors. For instance, Jeong and Bae (2024) demonstrated that

mindfulness moderated the relationship between perceived stress, rumination, and smartphone addiction. Similarly, Kong et al. (2025) reported that mindfulness moderated the effects of academic anxiety and self-regulatory fatigue on smartphone addiction among college students. Chang et al. (2023) identified multiple mediating pathways through which mindfulness influenced social media addiction, while Zheng et al. (2025) found that cognitive reappraisal mediated the relationship between mindfulness and work addiction. These findings collectively suggest that mindfulness operates through complex cognitive and emotional pathways rather than exerting only direct effects on addictive behaviors.

Despite the growing literature on mindfulness and addiction, several important gaps remain. First, much of the existing research has focused on direct associations between mindfulness and addictive behaviors, providing limited understanding of the cognitive processes through which mindfulness exerts its effects. Second, relatively few studies have simultaneously examined multiple cognitive mechanisms within a comprehensive explanatory framework. Third, evidence regarding the role of emotion regulation as a moderating factor remains limited, particularly among emerging adults. Finally, research examining these relationships in developing countries such as Pakistan remains scarce despite increasing concerns regarding internet addiction among young people. Addressing these gaps may advance theoretical understanding of addiction while informing culturally relevant prevention and intervention strategies.

The present study was designed to address these limitations by examining the role of cognitive mechanisms in the relationship between mindfulness and internet addiction among emerging adults. Specifically, the study investigates whether cognitive fusion and attentional control mediate the relationship between mindfulness and internet addiction and whether emotion regulation moderates these indirect pathways. By integrating mindfulness, cognitive functioning, and emotion regulation within a single mediation–moderation framework, the study seeks to provide a more comprehensive understanding of the psychological processes underlying addictive internet use. The findings are expected to contribute to the growing literature on mindfulness and addiction while offering practical implications for psychological interventions aimed at reducing problematic internet use among emerging adults in Pakistan and beyond.

Theoretical Framework and Hypotheses Development

Theoretical Framework

The present study is primarily grounded in Self-Regulation Theory, the Interaction of Person–Affect–Cognition–Execution (I-PACE) Model, and contemporary mindfulness-based frameworks of addiction. Together, these theoretical perspectives provide a comprehensive explanation for how mindfulness may influence internet addiction through underlying cognitive mechanisms and emotional processes.

Self-Regulation Theory

Self-Regulation Theory proposes that individuals continuously monitor, evaluate, and modify their thoughts, emotions, and behaviors in pursuit of desired goals. Effective self-regulation enables individuals to inhibit impulsive responses, manage emotional experiences, and maintain behavior consistent with long-term objectives. Conversely, failures in self-regulation increase vulnerability to maladaptive behaviors, including addictive patterns of internet use. Internet addiction has frequently been conceptualized as a consequence of impaired self-regulatory functioning, whereby individuals experience difficulty controlling online behavior despite awareness of its negative consequences (Choi et al., 2021; Wang et al., 2022).

Mindfulness is considered a central mechanism for strengthening self-regulation because it promotes awareness of present-moment experiences while reducing automatic and reactive behavioral tendencies. Through mindful awareness, individuals become better able to recognize cravings, urges, and emotional triggers without acting upon them impulsively. Consequently, mindfulness may reduce excessive internet use by enhancing self-regulatory capacities and facilitating adaptive behavioral choices (Rosenthal et al., 2021; Garland et al., 2022). From this perspective, cognitive mechanisms such as attentional control and cognitive fusion represent critical components of self-regulation that may explain the relationship between mindfulness and internet addiction.

I-PACE Model of Internet Addiction

The Interaction of Person–Affect–Cognition–Execution (I-PACE) Model provides one of the most influential theoretical frameworks for understanding the development and maintenance of behavioral addictions. According to this model, addictive behaviors emerge through dynamic interactions among personal characteristics, emotional responses, cognitive processes, and executive functioning. Cognitive variables such as attentional biases, maladaptive beliefs, cognitive distortions, and executive control deficits are considered central determinants of problematic internet use and related addictive behaviors.

The I-PACE model further proposes that individuals with impaired cognitive control are more likely to engage in excessive internet use when confronted with emotional distress or rewarding online stimuli. In contrast, protective factors that strengthen cognitive control and emotional regulation reduce vulnerability to addiction. Mindfulness may function as one such protective factor because it improves attentional regulation, executive functioning, and awareness of internal experiences. Consequently, the relationship between mindfulness and internet addiction may operate through cognitive mechanisms that influence individuals' capacity to regulate online behavior effectively (Chang et al., 2023; Li et al., 2023; Yang et al., 2024).

Mindfulness-to-Meaning Theory

Mindfulness-to-Meaning Theory further suggests that mindfulness facilitates adaptive cognitive and emotional processing by increasing awareness, reducing automatic reactivity, and promoting psychological flexibility. Through repeated mindful engagement, individuals become less controlled by maladaptive thought patterns and emotional reactions that often contribute to addictive behavior.

Instead, they develop greater capacity for cognitive reappraisal, attentional regulation, and value-based decision-making. These adaptive processes enhance resilience and reduce dependence on external sources of gratification such as excessive internet use (Garland et al., 2022; Liu et al., 2024).

The theory is particularly relevant for emerging adults because this developmental stage is characterized by heightened emotional sensitivity, reward-seeking behavior, and ongoing development of executive functioning. Consequently, mindfulness may protect emerging adults from addictive internet use by strengthening cognitive mechanisms that facilitate adaptive self-regulation.

Mindfulness and Internet Addiction

Mindfulness has consistently emerged as a protective factor against a variety of addictive behaviors. Individuals with higher levels of mindfulness tend to exhibit greater awareness of their thoughts and emotions, reduced impulsivity, and enhanced self-control. These characteristics decrease susceptibility to compulsive behaviors that are often maintained through automatic reactions and emotional avoidance. Recent empirical evidence indicates that mindfulness is negatively associated with internet addiction, smartphone addiction, social media addiction, and work addiction across diverse populations (Chang et al., 2023; Li et al., 2023; Tang et al., 2025; Zheng et al., 2025).

Several mechanisms have been proposed to explain this relationship. First, mindfulness enhances awareness of problematic behavioral patterns, enabling individuals to recognize excessive internet use before it becomes habitual. Second, mindfulness reduces emotional reactivity and stress, which are common triggers for excessive online engagement. Third, mindfulness improves executive functioning and inhibitory control, thereby facilitating healthier behavioral choices. Consequently, individuals with higher levels of mindfulness are expected to demonstrate lower levels of internet addiction.

Hypothesis 1

H1: Mindfulness will be negatively associated with internet addiction among emerging adults.

Mediating Role of Cognitive Fusion

Cognitive fusion refers to the tendency to become entangled with thoughts and to perceive subjective mental experiences as objective truths. Individuals experiencing high levels of cognitive fusion often respond automatically to internal experiences such as cravings, worries, and negative emotions. This rigid relationship with thoughts may contribute to maladaptive coping behaviors, including excessive internet use.

Mindfulness directly opposes cognitive fusion by encouraging individuals to observe thoughts as temporary mental events rather than objective realities. Through mindful awareness, individuals learn to disengage from automatic cognitive processes and develop greater psychological flexibility. Empirical research indicates that mindfulness reduces cognitive fusion and enhances adaptive functioning across various psychological domains (Rosenthal et al., 2021; Fallah et al., 2025).

Furthermore, cognitive fusion has been linked to addictive behaviors because individuals who become overly attached to craving-related thoughts may experience greater difficulty resisting maladaptive impulses. High levels of cognitive fusion may therefore strengthen the influence of addictive cognitions and increase vulnerability to compulsive internet use (Li et al., 2025; Fallah et al., 2025).

Accordingly, cognitive fusion is expected to function as an explanatory mechanism through which mindfulness influences internet addiction.

Hypothesis 2

H2: Mindfulness will be negatively associated with cognitive fusion among emerging adults.

Hypothesis 3

H3: Cognitive fusion will be positively associated with internet addiction among emerging adults.

Hypothesis 4

H4: Cognitive fusion will mediate the relationship between mindfulness and internet addiction.

Mediating Role of Attentional Control

Attentional control refers to an individual's ability to focus, sustain, and shift attention according to situational demands. Effective attentional control enables individuals to resist distractions and regulate behavioral responses in the presence of competing stimuli. Given the highly stimulating nature of digital environments, attentional control is particularly relevant for understanding problematic internet use.

Mindfulness has been shown to improve attentional functioning by enhancing awareness and reducing susceptibility to distracting thoughts and external stimuli. Meta-analytic evidence indicates that mindfulness interventions produce significant improvements in attention regulation, executive functioning, and cognitive flexibility (Zainal & Newman, 2023). Similarly, neurocognitive research demonstrates that mindfulness strengthens brain systems involved in attentional control and cognitive regulation (Gkintoni et al., 2025).

Deficits in attentional control have been consistently linked to problematic internet use and behavioral addictions. Individuals who experience difficulties regulating attention may be more likely to become absorbed in online activities and less capable of disengaging from rewarding digital content. Therefore, attentional control may represent a key cognitive pathway linking mindfulness to reduced internet addiction.

Hypothesis 5

H5: Mindfulness will be positively associated with attentional control among emerging adults.

Hypothesis 6

H6: Attentional control will be negatively associated with internet addiction among emerging adults.

Hypothesis 7

H7: Attentional control will mediate the relationship between mindfulness and internet addiction.

Moderating Role of Emotion Regulation

Although mindfulness may reduce internet addiction through improvements in cognitive functioning, the strength of these relationships may vary depending on individuals' emotion regulation capacities. Emotion regulation refers to the processes through which individuals monitor, evaluate, and modify emotional experiences in order to achieve adaptive outcomes. Individuals with effective emotion regulation skills are generally better equipped to manage stress, negative emotions, and psychological challenges without engaging in maladaptive coping strategies.

Recent studies indicate that mindfulness and emotion regulation are closely interconnected. Mindfulness promotes adaptive emotion regulation strategies such as acceptance and cognitive reappraisal while reducing maladaptive strategies such as suppression and rumination (Li et al., 2025; Fallah et al., 2025). Moreover, emotion regulation has been identified as an important factor influencing addiction-related behaviors and psychological adjustment (Jeong & Bae, 2024).

Individuals with strong emotion regulation abilities may derive greater benefits from mindfulness because they can more effectively translate mindful awareness into adaptive behavioral responses. Conversely, individuals with poor emotion regulation may continue to rely on excessive internet use as a means of coping with emotional distress despite possessing some degree of mindfulness. Therefore, emotion regulation may strengthen or weaken the indirect effects of mindfulness on internet addiction through cognitive mechanisms.

Hypothesis 8

H8: Emotion regulation will moderate the relationship between mindfulness and cognitive fusion, such that the negative association between mindfulness and cognitive fusion will be stronger among individuals with higher levels of emotion regulation.

Hypothesis 9

H9: Emotion regulation will moderate the relationship between mindfulness and attentional control, such that the positive association between mindfulness and attentional control will be stronger among individuals with higher levels of emotion regulation.

Hypothesis 10

H10: The indirect effects of mindfulness on internet addiction through cognitive fusion and attentional control will vary across different levels of emotion regulation, indicating a moderated mediation effect.

Conceptual Model of the Study

The present study proposes a moderated mediation model in which mindfulness serves as the independent variable and internet addiction serves as the dependent variable. Cognitive fusion and attentional control are conceptualized as parallel mediators explaining the relationship between mindfulness and internet addiction. Emotion regulation is proposed as a moderator influencing the strength of the pathways between mindfulness and the cognitive mediators. This framework integrates contemporary theories of mindfulness, self-regulation, and behavioral addiction and provides a comprehensive explanation of how and under what conditions mindfulness may reduce internet addiction among emerging adults (see figure 1).

Methods

Study Design and Study Setting

The present study used a cross-sectional correlational research design to examine the role of cognitive mechanisms in the relationship between mindfulness and internet addiction among emerging adults. The current study was conducted among university students in Islamabad, Pakistan, focusing on the developmental stage of emerging adulthood.

Population and Sample

The final sample consisted of 800 emerging adults. Participants were categorized into two age groups: 16–23 years and 24–30 years. Among the participants, 414 were male and 386 were female. Most participants were single and belonged to rural residential backgrounds. Participants reported varying levels of daily internet use, ranging from less than 2 hours to 8 or more hours per day.

Measures

Internet Addiction

Internet addiction was assessed using the Internet Addiction Scale, consisting of 26 items. Responses were recorded on a 4-point response format ranging from 1 = not true to 4 = mostly true. Higher scores indicated greater levels of internet addiction. In the present study, the scale demonstrated excellent internal consistency, α = .91 (Young, 1998).

Mindfulness

Mindfulness was measured using the Five Facet Mindfulness Questionnaire short form. The scale consisted of 15 items rated on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Higher scores reflected greater mindfulness. In the present sample, the scale showed acceptable internal consistency, α = .77 (Baer et al., 2025).

Cognitive Fusion

Cognitive fusion was assessed using the Cognitive Fusion Questionnaire, which included 5 items rated on a 5-point Likert scale. Higher scores indicated greater cognitive fusion. The scale showed acceptable internal consistency in the present study, α = .69 (Gillanders et al., 2014).

Attentional Control

Attentional control was assessed using the Attentional Control Scale. The scale consisted of 10 items rated on a 5-point Likert scale. Higher scores indicated greater attentional control. The reliability of the scale was good, α = .82 (Judah et al., 2014) .

Emotion Regulation

Emotion regulation was measured using the Emotion Regulation Questionnaire, consisting of 10 items rated on a 5-point Likert scale. Higher scores represented greater emotion regulation. The scale showed acceptable reliability in the current sample, α = .77 (Gross & John, 2012).

Procedure

Data were collected from emerging adults after obtaining informed consent. Participants were informed about the purpose of the study, voluntary participation, confidentiality of responses, and their right to withdraw at any stage. After consent, participants completed demographic information and standardized self-report measures assessing mindfulness, internet addiction, cognitive fusion, attentional control, and emotion regulation.

Ethical Considerations

The study followed ethical principles for psychological research. The institutional review board of the Department of Applied Psychology, National University of Modern Languages, Islamabad, approved the ethical considerations for the current study (Approval# DERB-PSY-2025-019). Participation was voluntary, and no personally identifying information was required. Participants were assured that their responses would remain confidential and would be used only for academic and research purposes. Informed consent was obtained before data collection.

Data Analysis Plan

Data were analyzed using IBM SPSS Statistics. First, data were screened for missing values, out-of-range values, and coding errors. Invalid item responses outside the original scale response ranges were treated as missing. Descriptive statistics were computed for demographic variables and study variables. Cronbach's alpha reliability coefficients were calculated to assess the internal consistency of each scale. Pearson correlation analysis was planned to examine bivariate associations among mindfulness, internet addiction, cognitive fusion, attentional control, and emotion regulation. Mediation and moderated mediation analyses were planned using Hayes' PROCESS macro with bootstrapping procedures. Mindfulness was entered as the independent variable, internet addiction as the dependent

variable, cognitive fusion and attentional control as mediators, and emotion regulation as the moderator. A 95% bootstrap confidence interval was used to determine the significance of indirect and conditional indirect effects.

Table 1. *Demographic Characteristics of Participants (N = 800)*

Variable	Category	*f*	%
Age	16–23 years	480	60.0
	24–30 years	320	40.0
Gender	Male	414	51.8
	Female	386	48.3
Marital Status	Single	576	72.0
	Married	191	23.9
	Other	29	3.6
Residence	Rural	650	81.3
	Urban	150	18.8
Internet Use	Less than 2 hours	371	46.4
	2–4 hours	234	29.3
	5–7 hours	112	14.0
	8+ hours	81	10.1

Table 2. *Psychometric Properties of Study Variables*

Scale	*k*	*α*	*M*	*SD*	Range
Internet Addiction Scale	26	.91	55.58	15.10	27–104
Five Facet Mindfulness Questionnaire	15	.77	43.03	8.52	17–73
Cognitive Fusion Questionnaire	5	.69	13.88	4.04	5–25
Attentional Control Scale	10	.82	30.83	6.91	10–50
Emotion Regulation Questionnaire	10	.77	30.25	6.49	10–50

Note. k = number of items; α = Cronbach's alpha.

Table 3. *Planned Statistical Analysis for the Article*

Research Purpose	Variables	Statistical Test
Describe sample characteristics	Age, gender, marital status, residence, internet use	Frequencies and percentages
Assess reliability	IA, FFMQ, CFQ, ACS, ERQ	Cronbach's alpha
Examine associations	Mindfulness, internet addiction, cognitive fusion, attentional control, emotion regulation	Pearson correlation
Test mediation	FFMQ → CFQ/ACS → IA	Mediation analysis
Test moderation	ERQ as moderator	Moderation analysis
Test full model	FFMQ, CFQ, ACS, ERQ, IA	Moderated mediation using PROCESS

Results

Preliminary Analyses

Descriptive statistics, reliability coefficients, and bivariate correlations among the study variables are presented in Tables 2 and 3. All scales demonstrated acceptable to excellent internal consistency, with Cronbach's alpha coefficients ranging from .69 to .91. Mindfulness was significantly associated with cognitive fusion, attentional control, emotion regulation, and internet addiction. Therefore, the assumptions for mediation and moderation analyses were considered satisfactory.

Table 3

Correlations, Means, Standard Deviations, and Reliabilities of Study Variables (N = 800)

Variable	***M***	***SD***	***α***	**1**	**2**	**3**	**4**	**5**
1. Mindfulness	43.13	8.64	.77	-				
2. Cognitive Fusion	13.88	4.04	.69	− .51***	-			
3. Attentional Control	30.92	7.17	.82	.47***	− .21**	-		
4. Emotion Regulation	30.32	6.83	.77	.39**	− .27***	.41***	-	
5. Internet Addiction	55.90	15.29	.91	− .42***	.48***	− .34***	− .22**	-

*Note. α = Cronbach's alpha. **p < .01, **p < .001*

Mediation Analysis

A parallel mediation analysis was conducted using Hayes' PROCESS Macro to examine whether cognitive fusion and attentional control mediated the relationship between mindfulness and internet

addiction. Results indicated that mindfulness significantly predicted both cognitive fusion and attentional control. Furthermore, both mediators significantly predicted internet addiction. The direct effect of mindfulness on internet addiction remained significant after controlling for the mediators, indicating partial mediation (see Fig. 2 also).

Table 4 *Parallel Mediation Analysis Examining the Effect of Mindfulness on Internet Addiction Through Cognitive Fusion and Attentional Control*

Mediator Models

Outcome Variable	Predictor	B	SE	t	p	95% CI
Cognitive Fusion	Mindfulness	-0.15	0.02	-8.72	< .001	[-0.18, -0.11]
Attentional Control	Mindfulness	0.29	0.03	10.36	< .001	[0.23, 0.34]

Dependent Variable Model

Outcome Variable	Predictor	B	SE	t	p	95% CI
Internet Addiction	Mindfulness	-0.73	0.06	-11.99	< .001	[-0.85, -0.61]
	Cognitive Fusion	0.41	0.12	3.31	.001	[0.17, 0.65]
	Attentional Control	-0.20	0.07	-2.84	.005	[-0.34, -0.06]

Bootstrapped Indirect Effects

Indirect Effect	Effect	Boot SE	LLCI	ULCI
Mindfulness → Cognitive Fusion → Internet Addiction	-0.06	0.02	-0.10	-0.02
Mindfulness → Attentional Control → Internet Addiction	-0.06	0.02	-0.10	-0.02
Total Indirect Effect	-0.12	0.03	-0.18	-0.07

Note. Bootstrap sample = 5,000. LLCI = Lower-Level Confidence Interval; ULCI = Upper-Level Confidence Interval.

Moderation Analysis

A moderation analysis was performed to investigate whether emotion regulation moderated the relationship between mindfulness and attentional control. Results indicated that mindfulness and emotion regulation significantly predicted attentional control. However, the interaction effect between

mindfulness and emotion regulation was not statistically significant, indicating that emotion regulation did not moderate this relationship (see also Fig. 3).

Table 5
Moderation Analysis Predicting Attentional Control From Mindfulness and Emotion Regulation

Predictor		B	SE	t	p	LLCI	ULCI
Intercept		1.47	0.44	3.32	.001	0.59	2.35
Mindfulness		0.18	0.03	6.31	< .001	0.13	0.24
Emotion Regulation		0.32	0.04	8.68	< .001	0.25	0.39
Mindfulness × Emotion Regulation		-0.003	0.003	-0.88	.377	-0.01	0.004
ΔR^2	.001						
F	108.42						

Note. Interaction term was non–significant, indicating the absence of moderation

Moderated Mediation Analysis

Conditional indirect effects were examined at low (− 1 SD), mean, and high (+ 1 SD) levels of emotion regulation. Although indirect effects remained significant across all levels, the index of moderated mediation was not significant because the confidence interval included zero.

Table 6 *Conditional Indirect Effects of Mindfulness on Internet Addiction at Levels of Emotion Regulation*

Emotion Regulation	Effect	Boot SE	LLCI	ULCI
Low (− 1 SD)	-0.06	0.03	-0.11	-0.002
Mean	-0.06	0.02	-0.10	-0.02
High (+ 1 SD)	-0.06	0.03	-0.11	-0.01
Index of Moderated Mediation	Index	Boot SE	LLCI	ULCI
	-0.001	0.002	-0.005	0.003

Note. *Because the 95% confidence interval contains zero, the moderated mediation effect was not statistically significant.*

Results Summary

The findings supported the mediating roles of cognitive fusion and attentional control in the relationship between mindfulness and internet addiction. Specifically, greater mindfulness was associated with lower cognitive fusion and higher attentional control, which subsequently predicted lower levels of internet

addiction. However, emotion regulation did not significantly moderate the proposed pathways, and the moderated mediation hypothesis was not supported. This suggests that the indirect effects of mindfulness on internet addiction through cognitive mechanisms were relatively stable across varying levels of emotion regulation.

Discussion

The present study examined the role of cognitive mechanisms in the relationship between mindfulness and internet addiction among emerging adults. Specifically, the study investigated whether attentional control and cognitive fusion mediated the relationship between mindfulness and internet addiction and whether emotion regulation moderated these indirect pathways. Consistent with expectations, mindfulness demonstrated significant associations with internet addiction and the proposed cognitive mechanisms. The findings further revealed significant indirect effects through attentional control and cognitive fusion, highlighting the importance of cognitive processes in understanding how mindfulness relates to internet addiction. However, the hypothesized moderated mediation model was not supported because emotion regulation did not significantly moderate the proposed pathways.

Mindfulness and Internet Addiction

The first hypothesis proposed that mindfulness would be significantly associated with internet addiction. The findings supported this hypothesis, indicating that mindfulness was a significant predictor of internet addiction among emerging adults. This finding is consistent with previous literature suggesting that mindfulness serves as an important protective factor against addictive behaviors by enhancing awareness, self-regulation, and behavioral control (Rosenthal et al., 2021; Garland et al., 2022).

The observed relationship may be explained by the ability of mindful individuals to regulate impulses and respond more adaptively to internal experiences. Mindfulness encourages nonjudgmental awareness of thoughts, emotions, and urges, thereby reducing automatic engagement in maladaptive coping behaviors such as excessive internet use. Previous studies have similarly reported negative associations between mindfulness and various forms of behavioral addiction, including smartphone addiction, social media addiction, mobile phone addiction, and work addiction (Chang et al., 2023; Tang et al., 2025; Zheng et al., 2025).

The findings also support contemporary theoretical perspectives emphasizing the role of mindfulness in strengthening self-regulation and reducing vulnerability to addictive behaviors. According to Mindfulness-to-Meaning Theory, mindfulness enhances adaptive cognitive processing and facilitates value-based decision-making, thereby reducing reliance on external sources of gratification. The present findings provide further evidence supporting the applicability of mindfulness-based frameworks to understanding problematic internet use among emerging adults.

Mediating Role of Attentional Control

The study hypothesized that attentional control would mediate the relationship between mindfulness and internet addiction. Results supported this hypothesis by demonstrating a significant indirect effect through attentional control. Individuals reporting higher levels of mindfulness also reported greater attentional control, which in turn was associated with lower levels of internet addiction.

This finding aligns with extensive research demonstrating that mindfulness improves attentional functioning and executive control processes. Mindfulness training has repeatedly been shown to enhance the ability to sustain attention, resist distractions, and regulate cognitive resources effectively (Zainal & Newman, 2023; Gkintoni et al., 2025). Such improvements may reduce susceptibility to the highly stimulating and rewarding features of digital environments.

Emerging adults frequently encounter competing attentional demands from social media platforms, online entertainment, and digital communication technologies. Individuals with stronger attentional control may be better able to disengage from distracting online stimuli and maintain focus on goal-directed activities. Consequently, enhanced attentional control may represent one mechanism through which mindfulness reduces problematic internet use. The present findings therefore extend previous research by identifying attentional control as a significant cognitive pathway linking mindfulness and internet addiction.

Mediating Role of Cognitive Fusion

The findings also supported the mediating role of cognitive fusion in the relationship between mindfulness and internet addiction. Mindfulness was significantly associated with lower levels of cognitive fusion, which subsequently predicted lower levels of internet addiction. This finding is consistent with Acceptance and Commitment Theory, which conceptualizes cognitive fusion as a tendency to become overly attached to thoughts and internal experiences.

Individuals experiencing high levels of cognitive fusion may be more likely to interpret craving-related thoughts, emotional discomfort, and urges as compelling reasons to engage in excessive internet use. Such individuals often struggle to separate themselves from their cognitive experiences, increasing vulnerability to maladaptive behavioral responses. In contrast, mindfulness encourages cognitive defusion by promoting awareness of thoughts as transient mental events rather than objective truths (Rosenthal et al., 2021).

The current findings are consistent with recent research emphasizing the importance of cognitive processes in addiction-related behaviors. Fallah et al. (2025) reported that executive functions and emotion regulation play important roles in understanding problematic internet use, while Li et al. (2025) highlighted the significance of cognitive functioning in behavioral addiction. By demonstrating the mediating role of cognitive fusion, the present study contributes to a growing body of evidence

suggesting that mindfulness reduces addiction partly by altering individuals' relationships with their thoughts.

Absence of Serial Mediation

Contrary to expectations, the serial mediation pathway involving attentional control and cognitive fusion was not significant. Although mindfulness predicted both attentional control and cognitive fusion independently, attentional control did not significantly predict cognitive fusion. Consequently, the sequential pathway from mindfulness through attentional control and cognitive fusion to internet addiction was not supported.

One possible explanation is that attentional control and cognitive fusion may operate as relatively independent cognitive processes rather than as sequential mechanisms. While both variables contribute to self-regulation, they represent distinct aspects of cognitive functioning. Attentional control primarily involves regulation of cognitive resources, whereas cognitive fusion reflects the degree of attachment to internal experiences. Therefore, each mechanism may independently influence internet addiction without necessarily influencing one another directly.

This finding highlights the complexity of psychological processes underlying internet addiction and suggests that multiple cognitive pathways may operate simultaneously. Future research employing longitudinal or experimental designs may further clarify the temporal relationships among these cognitive variables.

Moderating Role of Emotion Regulation

The study further hypothesized that emotion regulation would moderate the indirect effects of mindfulness on internet addiction. However, the results did not support this hypothesis. Emotion regulation did not significantly moderate the relationship between mindfulness and attentional control or the relationship between cognitive fusion and internet addiction.

Although previous studies have identified emotion regulation as an important factor in addiction-related behaviors (Li et al., 2025; Jeong & Bae, 2024), the present findings suggest that its moderating influence may be weaker than anticipated within this sample. One possible explanation is that mindfulness itself may already encompass important emotion regulation processes, thereby reducing the additional contribution of emotion regulation as a separate moderator.

Another explanation may involve cultural and developmental factors. Emerging adults may rely on multiple psychological resources when managing emotional experiences, and the influence of emotion regulation may vary according to contextual factors not assessed in the present study. Consequently, future studies should examine alternative moderators such as psychological distress, resilience, self-control, social support, and perceived stress.

Theoretical Implications

The present findings contribute to several theoretical perspectives. First, the results support Self-Regulation Theory by demonstrating that mindfulness influences internet addiction through cognitive mechanisms associated with behavioral regulation. Second, the findings align with the I-PACE model, which emphasizes the role of cognitive and executive processes in the development of addictive behaviors. Third, the findings extend mindfulness-based theories by illustrating specific pathways through which mindfulness may reduce vulnerability to internet addiction.

By identifying attentional control and cognitive fusion as significant mediators, the study advances understanding of the psychological processes linking mindfulness and addiction. These findings suggest that interventions designed to reduce internet addiction should focus not only on enhancing mindfulness but also on strengthening attentional regulation and reducing maladaptive cognitive attachment.

Practical Implications

The findings have important practical implications for mental health professionals, educational institutions, and policymakers. Mindfulness-based interventions may be particularly useful for reducing problematic internet use among emerging adults. Such interventions could incorporate strategies aimed at enhancing attentional control, improving cognitive flexibility, and reducing cognitive fusion.

Universities may also benefit from implementing mindfulness-based psychoeducational programs to help students manage digital distractions and maintain healthier patterns of internet use. Additionally, counseling services may integrate mindfulness and cognitive-behavioral techniques to address problematic internet use and related psychological difficulties. Given the increasing prevalence of internet use in Pakistan, such interventions may contribute to improved psychological well-being among young adults.

Limitations, Future Directions, and Conclusion

Limitations

Despite its contributions, the present study has several limitations that should be considered when interpreting the findings. First, the study employed a cross-sectional research design, which limits the ability to establish causal relationships among mindfulness, cognitive mechanisms, emotion regulation, and internet addiction. Although the proposed model was theoretically grounded and supported by previous literature, causal inferences cannot be drawn from correlational data. Longitudinal and experimental studies are needed to determine the temporal ordering of these variables and to establish causal pathways more confidently.

Second, all study variables were assessed using self-report measures. Self-report instruments are susceptible to several sources of bias, including social desirability, recall inaccuracies, and response tendencies. Participants may have underreported problematic internet use or overestimated positive psychological characteristics such as mindfulness and emotion regulation. Future studies may benefit from incorporating multiple methods of assessment, including behavioral indicators, clinical interviews, experimental tasks, and informant reports.

Third, the sample consisted exclusively of emerging adults, which may limit the generalizability of the findings to other age groups. Psychological processes underlying internet addiction may differ across developmental stages due to variations in cognitive maturity, emotional functioning, and technology use patterns. Consequently, the findings should be interpreted with caution when extending conclusions to adolescents, middle-aged adults, or older populations.

Fourth, although the study examined important cognitive mechanisms, other potentially relevant psychological variables were not included in the model. Previous research suggests that factors such as psychological distress, impulsivity, resilience, self-control, loneliness, social support, academic stress, and fear of missing out (FoMO) may also contribute to problematic internet use. Inclusion of these variables may provide a more comprehensive understanding of internet addiction.

Finally, the moderated mediation model did not receive full empirical support because emotion regulation did not significantly moderate the proposed pathways. It is possible that alternative moderators may better explain individual differences in the relationship between mindfulness and internet addiction. Future research should explore additional moderating variables to further clarify these relationships.

Future Directions

Several directions for future research emerge from the present findings. First, longitudinal studies should be conducted to examine how mindfulness, attentional control, cognitive fusion, and internet addiction influence one another over time. Such designs would provide stronger evidence regarding causal mechanisms and developmental trajectories.

Second, future research should evaluate the effectiveness of mindfulness-based interventions specifically designed to target internet addiction among emerging adults. Intervention studies could investigate whether improvements in attentional control and reductions in cognitive fusion mediate treatment outcomes. Such findings would strengthen the practical application of mindfulness-based approaches in addiction prevention and intervention programs.

Third, future studies should examine alternative moderators that may influence the effectiveness of mindfulness. Variables such as self-control, psychological resilience, perceived stress, depressive symptoms, social connectedness, and emotional intelligence may provide additional insights into the conditions under which mindfulness is most effective in reducing addictive behaviors.

Fourth, researchers should consider incorporating multiple dimensions of mindfulness rather than treating mindfulness as a unitary construct. Different facets of mindfulness, such as observing, acting with awareness, nonjudging, and nonreactivity, may demonstrate differential relationships with internet addiction and cognitive mechanisms.

Fifth, future studies should explore these relationships across diverse cultural contexts. Although internet addiction is a global phenomenon, cultural values, social norms, and patterns of technology use may influence the relationships among mindfulness, cognitive functioning, and addictive behaviors. Cross-cultural research may therefore enhance the generalizability of theoretical models and intervention strategies.

Finally, future investigations may examine additional forms of behavioral addiction, including smartphone addiction, social media addiction, gaming addiction, and online shopping addiction. Such research would help determine whether the cognitive mechanisms identified in the present study operate similarly across different forms of problematic technology use.

Practical Implications

The present findings have several practical implications for mental health professionals, educators, university administrators, and policymakers. First, the results suggest that mindfulness-based interventions may be effective tools for reducing problematic internet use among emerging adults. Such interventions may enhance awareness of online behaviors, strengthen self-regulatory capacities, and reduce vulnerability to addictive tendencies.

Second, the identification of attentional control and cognitive fusion as significant mediating mechanisms highlights important intervention targets. Programs designed to improve attentional regulation and reduce maladaptive attachment to thoughts may contribute to healthier internet use behaviors. Cognitive-behavioral and mindfulness-based approaches may be particularly useful in addressing these cognitive vulnerabilities.

Third, educational institutions may benefit from implementing preventive mental health programs that incorporate mindfulness training, stress management strategies, and digital well-being education. Such initiatives may help students develop healthier relationships with technology while enhancing psychological well-being and academic functioning.

Fourth, counseling centers and mental health practitioners may integrate mindfulness-based techniques into treatment protocols for individuals experiencing problematic internet use. Interventions focusing on present-moment awareness, cognitive defusion, and attentional regulation may reduce excessive online engagement and promote adaptive coping strategies.

Finally, policymakers and public health organizations may use these findings to develop evidence-based strategies addressing problematic internet use among young adults. As digital technology becomes

increasingly integrated into daily life, promoting psychological resources such as mindfulness may represent an important component of broader mental health promotion efforts.

Conclusion

The present study investigated the role of cognitive mechanisms in the relationship between mindfulness and internet addiction among emerging adults. The findings demonstrated that mindfulness was significantly associated with internet addiction and that this relationship was partially explained through attentional control and cognitive fusion. Specifically, higher levels of mindfulness were associated with greater attentional control and lower cognitive fusion, which in turn were linked to reduced vulnerability to internet addiction. These findings support contemporary theoretical models emphasizing the role of cognitive processes in addiction-related behaviors and provide evidence that mindfulness exerts its influence through multiple psychological pathways.

Although emotion regulation did not significantly moderate the proposed pathways, the overall findings highlight the importance of cognitive mechanisms in understanding how mindfulness relates to internet addiction. The study contributes to the growing literature on mindfulness and behavioral addiction by identifying attentional control and cognitive fusion as key explanatory processes. Moreover, the findings offer valuable theoretical and practical insights for the development of prevention and intervention programs targeting problematic internet use among emerging adults.

In conclusion, mindfulness appears to represent a valuable psychological resource that may protect emerging adults from problematic internet use through its influence on cognitive functioning. Strengthening mindfulness, enhancing attentional control, and reducing cognitive fusion may therefore constitute important targets for future research, clinical practice, and public mental health initiatives aimed at addressing internet addiction in an increasingly digital world.

Declarations

Ethics Statement

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and the ethical guidelines for research involving human participants. Participation was voluntary, and informed consent was obtained from all participants prior to data collection. Participants were informed about the purpose of the study, confidentiality of responses, anonymity of data, and their right to withdraw from the study at any time without penalty. No identifying information was collected, and all data were used solely for research purposes.

Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of Interest Statement

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

Ethical Approval

This study was approved through departmental ethical review committee (Approval No. DERB-PSY-2025-019)

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Supervision: Dr Asia Mushtaq

All authors contributed to the article and approved the submitted version.

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References

1. Arslan, G., & Coşkun, M. (2021). Social Exclusion, Self-Forgiveness, Mindfulness, and Internet Addiction in College Students: a Moderated Mediation Approach. *International Journal of Mental Health and Addiction, 20*, 2165 - 2179. https://doi.org/10.1007/s11469-021-00506-1
2. Baer, R., Gu, J., & Strauss, C. (2025). Five facet mindfulness questionnaire (FFMQ). In *Handbook of assessment in mindfulness research* (pp. 307-329). Cham: Springer Nature Switzerland.

3. Chang, H., Meng, X., Li, Y., Liu, J., Yuan, W., Ni, J., & Li, C. (2023). The effect of mindfulness on social media addiction among Chinese college students: A serial mediation model. *Frontiers in Psychiatry, 14*. https://doi.org/10.3389/fpsyt.2023.1087909
4. Chen, L., Li, J. Y., & Huang, J.-H. (2022). COVID-19 Victimization Experience and College Students' Mobile Phone Addiction: A Moderated Mediation Effect of Future Anxiety and Mindfulness. *International Journal of Environmental Research and Public Health, 19*. https://doi.org/10.3390/ijerph19137578
5. Choi, T.-J., Park, J., & Kim, D. (2021). The Effect of Stress on Internet Game Addiction Trends in Adults: Mindfulness and Conscientiousness as Mediators. *Psychiatry Investigation, 18*, 779 - 788. https://doi.org/10.30773/pi.2020.0034
6. Fallah, M., Mohajerani, H., Omidi, A., & Ghaderi, A. (2025). Targeting Internet Addiction Through Body Awareness Psychotherapy: The Mediating Role of Executive Functions and Emotion Regulation. *Brain and Behavior, 15*. https://doi.org/10.1002/brb3.70846
7. Garland, E., Hanley, A. W., Hudak, J., Nakamura, Y., & Froeliger, B. (2022). Mindfulness-induced endogenous theta stimulation occasions self-transcendence and inhibits addictive behavior. *Science Advances, 8*. https://doi.org/10.1126/sciadv.abo4455
8. Giancola, M., Perazzini, M., Bontempo, D., Perilli, E., & D'Amico, S. (2024). Narcissism and Problematic Social Media Use: A Moderated Mediation Analysis of Fear of Missing out and Trait Mindfulness in Youth. *International Journal of Human–Computer Interaction, 41*, 8554 - 8564. https://doi.org/10.1080/10447318.2024.2411468
9. Gibson, J. (2024). Trauma, early life stress, and mindfulness in adulthood. *BMC Psychology, 12*. https://doi.org/10.1186/s40359-024-01563-6
10. Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., ... & Remington, B. (2014). The development and initial validation of the cognitive fusion questionnaire. *Behavior therapy*, *45*(1), 83-101.
11. Gkintoni, E., Vassilopoulos, S., & Nikolaou, G. (2025). Mindfulness-Based Cognitive Therapy in Clinical Practice: A Systematic Review of Neurocognitive Outcomes and Applications for Mental Health and Well-Being. *Journal of Clinical Medicine, 14*. https://doi.org/10.3390/jcm14051703
12. Gross, J. J., & John, O. P. (2012). Emotion regulation questionnaire. *Journal of personality and social psychology*.
13. Jeong, J. H., & Bae, S. (2024). The Relationship Between Perceived Stress and Smartphone Addiction: The Mediating Effect of Rumination and The Mediated Moderating Effect of Mindfulness. *Psychiatry Investigation, 21*, 340 - 351. https://doi.org/10.30773/pi.2022.0288
14. Judah, M. R., Grant, D. M., Mills, A. C., & Lechner, W. V. (2014). Factor structure and validation of the attentional control scale. *Cognition & emotion*, *28*(3), 433-451.
15. Kong, L., Zhao, M., Huang, W., Zhang, W., & Liu, J. (2025). The impact of academic anxiety on smartphone addiction among college students: the mediating role of self-regulatory fatigue and the moderating role of mindfulness. *BMC Psychology, 13*. https://doi.org/10.1186/s40359-025-02696-y

16. Li, D., Xu, Y., & Cao, S. (2023). How Does Trait Mindfulness Weaken the Effects of Risk Factors for Adolescent Smartphone Addiction? A Moderated Mediation Model. *Behavioral Sciences, 13*. https://doi.org/10.3390/bs13070540
17. Li, J., Lu, A., Ye, L., Chen, G., Ling, H., Chen, W., Zhong, Y., An, Y., & Ke, X. (2025). Mobile Phone Addiction, Self-Control, Mind Wandering, and Cognitive Failure in Chinese Adolescents: A Network Analysis and a Chain Mediation Model. *Psychology in the Schools, 62*. https://doi.org/10.1002/pits.23426
18. Li, J., Man, L., Chen, L., Zhang, Y., & Wang, Z. (2025). Mindfulness, emotion regulation, and mental health in Chinese college students: Cognitive reappraisal as mediator and neuroticism/openness as moderators.. *Acta psychologica, 260*, 105552 . https://doi.org/10.1016/j.actpsy.2025.105552
19. Li, J., Wang, D., Bai, S., & Yang, W. (2025). The effect of mindfulness-based Tai Chi Chuan on mobile phone addiction among male college students is associated with executive functions. *PLOS One, 20*, e0314211 - e0314211. https://doi.org/10.1371/journal.pone.0314211
20. Liu, F., Xi, Y., Li, N., & Wu, M. (2024). Brief Mindfulness Training Mitigates College Students' Mobile Phone Addiction: The Mediating Effect of the Sense of Meaning in Life. *Psychology Research and Behavior Management, 17*, 273 - 282. https://doi.org/10.2147/prbm.s439360
21. Rosenthal, A., Levin, M. E., Garland, E., & Romanczuk-Seiferth, N. (2021). Mindfulness in Treatment Approaches for Addiction — Underlying Mechanisms and Future Directions. *Current Addiction Reports, 8*, 282 - 297. https://doi.org/10.1007/s40429-021-00372-w
22. Schepers, M., Lagerweij, P., Geurts, D. E. M., Krause, F., Ouden, H. D., Cools, R., Speckens, A., & Collin, G. (2025). Promoting Resilience in Youth through Mindfulness mEditation (PRYME): Study protocol for a randomized controlled trial investigating the effects of mindfulness training as add-on to care-as-usual on internalizing problems, mental illness development, and associated brain and cognitive processes in h. *BMC Psychiatry, 25*. https://doi.org/10.1186/s12888-024-06430-7
23. Talebisiavashani, F., & Mohammadi-Sartang, M. (2024). The Effect of Mindfulness-Based Interventions on Mental Health and Cognitive Function in Older Adults: A Systematic Review and Meta-Analysis. *Journal of Aging and Health, 37*, 619 - 631. https://doi.org/10.1177/08982643241263882
24. Tang, A. C., Lee, R. L.-T., Chan, A. C.-K., Kwan, R. Y. C., & Lee, P. (2025). Mindfulness-based cognitive program as a potential intervention for managing smartphone addiction and resilience in adolescents: a pilot evaluation. *Health Psychology and Behavioral Medicine, 13*. https://doi.org/10.1080/21642850.2025.2508833
25. Wang, S., Cheng, Y., Yang, Y., & Lu, B.-C. (2025). The impact of physical activity on internet addiction among college students: the chain mediation role of rumination and mindfulness. *BMC Public Health, 25*. https://doi.org/10.1186/s12889-025-25053-5
26. Wang, Y., Tang, W., Cao, L., & Li, Y. (2022). Self-concept clarity and Internet addiction disorder among junior high school students: A moderate mediation model. *Frontiers in Psychiatry, 13*. https://doi.org/10.3389/fpsyt.2022.989128

27. Wu, J., & Li, H. (2021). Mindfulness for Sustainable Internet Use in Chinese Junior Secondary School Students: A Dual-Path Mediation Model. *Sustainability, 13*, 4626. https://doi.org/10.3390/su13094626
28. Yang, G.-H., Cao, X.-X., Fu, Y.-Y., Wang, N., & Lian, S. (2024). Mobile phone addiction and academic burnout: the mediating role of technology conflict and the protective role of mindfulness. *Frontiers in Psychiatry, 15*. https://doi.org/10.3389/fpsyt.2024.1365914
29. Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. *Cyberpsychology & behavior*, *1*(3), 237-244. https://doi.org/10.1089/cpb.1998.1.237
30. Yuan, G. F., Lu, Y., Tao, Y., & Shi, W. (2025). Roles of mindfulness and depressive symptoms on the association between adverse childhood experiences and non-suicidal self-injury. *European Journal of Psychotraumatology, 16*. https://doi.org/10.1080/20008066.2025.2521917
31. Zainal, N., & Newman, M. (2023). Mindfulness Enhances Cognitive Functioning: A Meta-Analysis of 111 Randomized Controlled Trials. *Health psychology review, 18*, 369 - 395. https://doi.org/10.1080/17437199.2023.2248222
32. Zheng, G., Sheng, J., Wang, H., & Xu, Z. (2025). Mindfulness and work addiction among young employees: the mediating roles of cognitive reappraisal and perfectionism. *Frontiers in Psychiatry, 16*. https://doi.org/10.3389/fpsyt.2025.1631792

Figures

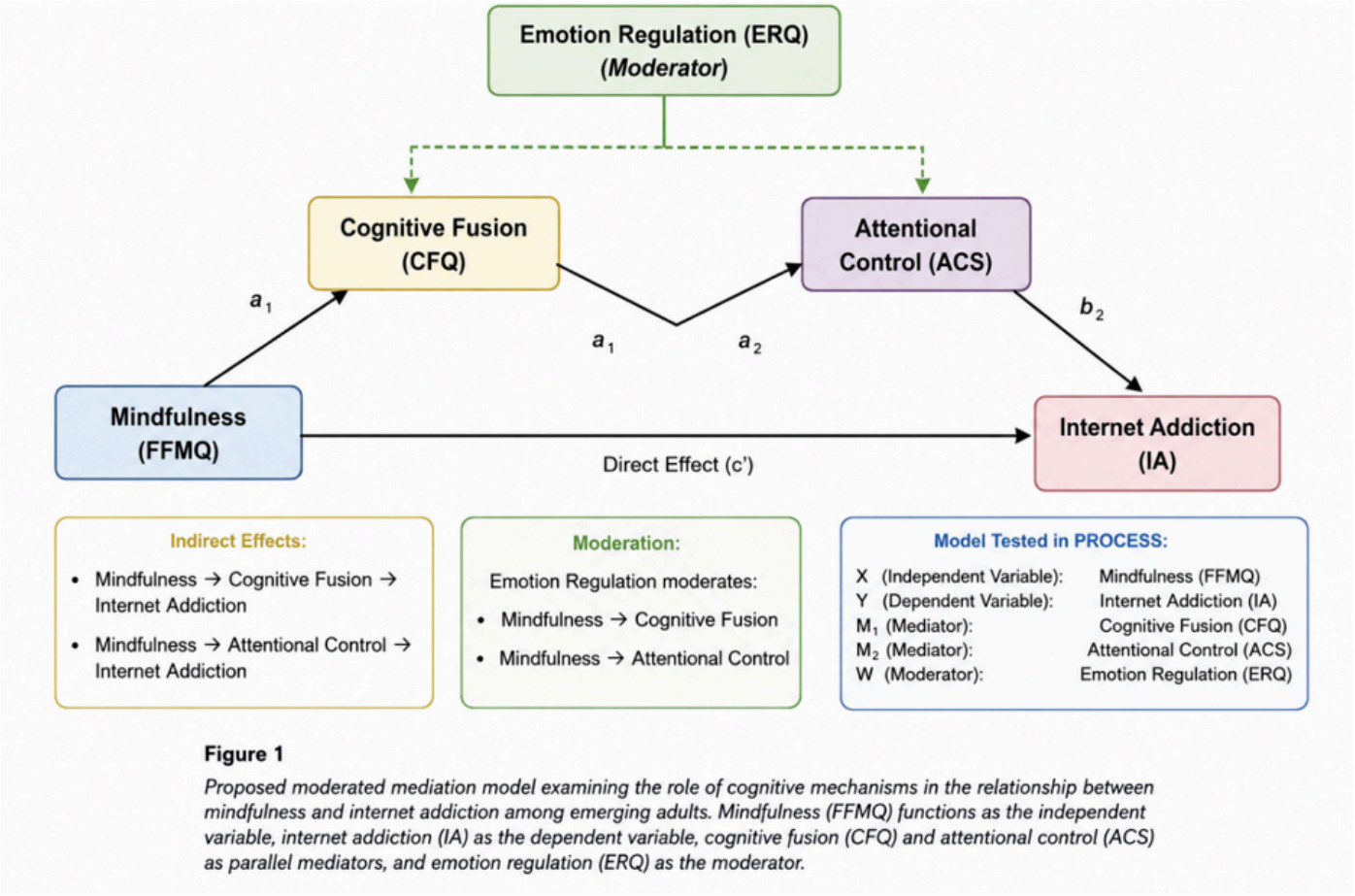


Figure 1

Proposed moderated mediation model examining the role of cognitive mechanisms in the relationship between mindfulness and internet addiction among emerging adults. Mindfulness (FFMQ) functions as the independent variable, internet addiction (IA) as the dependent variable, cognitive fusion (CFQ) and attentional control (ACS) as parallel mediators, and emotion regulation (ERQ) as the moderator.

Figure 1

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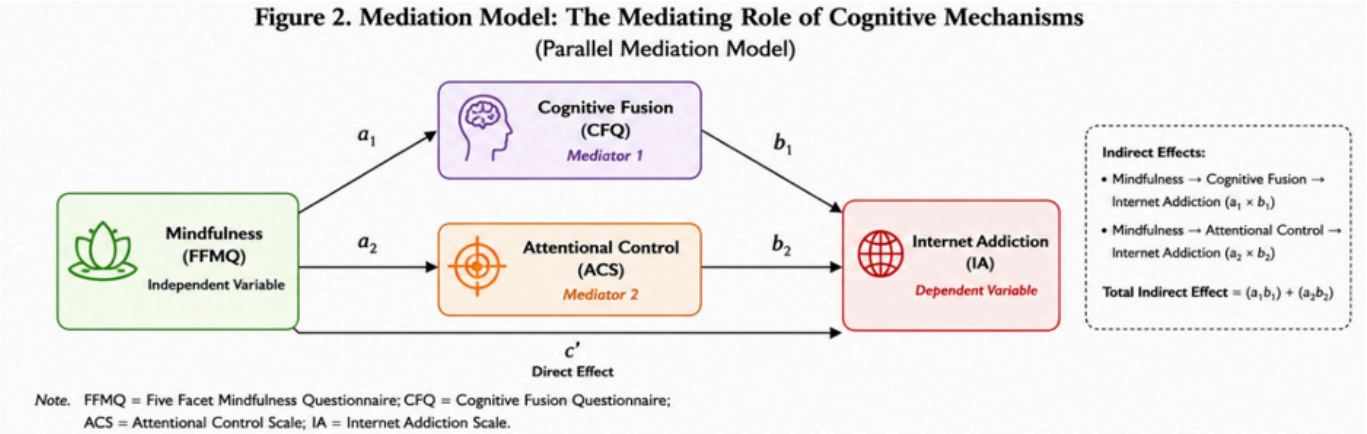


Figure 2

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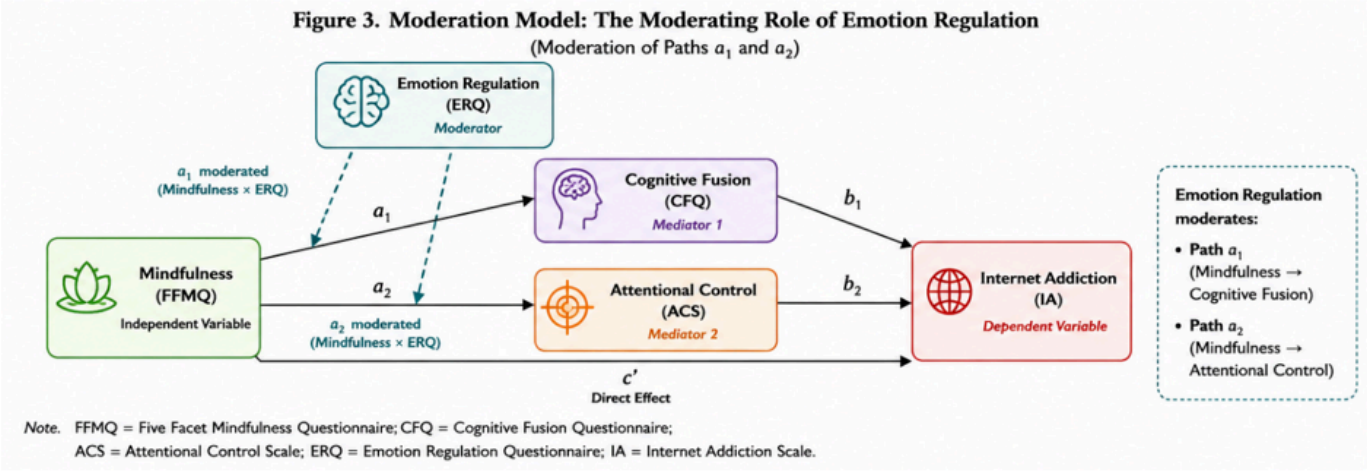


Figure 3

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