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Structural equation modeling of cyberspace addiction prediction among the employees of Azad University based on mindfulness with the mediation of cognitive emotion regulation strategies

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A B S T R A C T

The present study aimed to predict cyberspace addiction among the employees of Azad University based on mindfulness through the mediation of cognitive emotion regulation strategies. This study was applied in terms of its purpose and descriptive in terms of its method, and was correlational in type. The statistical population of this study consisted of all employees of Tehran Azad Universities in 2024, from which 310 people were selected using the convenience sampling method. The research tools included the Freiburg Mindfulness Inventory-Short Form by Walach et al. (2006); the Cognitive Emotion Regulation Questionnaire by Garnefski et al. (2001), and the Mobile-Based Social Network Addiction Questionnaire by Khajeh Ahmadi et al. (2016). The results showed that cyberspace addiction in employees is predicted based on mindfulness ($P<0.01$). Cyberspace addiction in employees is predicted based on cognitive emotion regulation strategies ($P<0.01$). Cyberspace addiction in employees is predicted based on mindfulness through the mediation of adaptive and maladaptive cognitive emotion regulation strategies ($P<0.05$).

Introduction

The Internet is a relatively recent technological advancement that has significantly impacted the world, offering numerous benefits to its users. However, alongside these advantages, it has also given rise to several adverse effects. Some individuals become excessively preoccupied with the Internet, losing control over their usage, which can jeopardize their employment and personal relationships. In today's digitally interconnected environment, the Internet has become an indispensable tool within the workplace. It facilitates a wide array of functions, including communication, research, project management, and customer engagement, thereby supporting nearly all facets of contemporary professional life. Nonetheless, this heightened reliance on digital technologies has also prompted concerns regarding Internet addiction in the workplace. This behavioral addiction is characterized by excessive and uncontrollable engagement with the Internet, social media, online gaming, or other digital activities during working hours, often to the detriment of professional responsibilities (Casale & Fioravanti, 2023). Prolonged and excessive use of social media may lead to the development of social media addiction. Recently, social media addiction has garnered worldwide attention due to its potential consequences, including deteriorating mental health, psychiatric disorders, and pathological dissociation (Ozturk et al., 2025). Workplace Internet use varies from aimless browsing to personal, non-work-related activities. Research indicates that 30% to 50% of

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Internet use during working hours is unrelated to job tasks, resulting in annual economic losses of up to one billion dollars. Employees reportedly spend at least one hour per workday engaged in non-work-related Internet activities (Shrivastava et al., 2018).

Deficits in emotion regulation strategies may constitute a risk factor for pathological social media addiction. Research has demonstrated that difficulties in emotion regulation are both directly and indirectly associated with problematic Internet use in individuals (Fokker et al., 2021). Emotion regulation is also recognized as a crucial component for maintaining successful interpersonal relationships. According to the schema model, challenges in emotion regulation stem from adverse early life experiences during which a child's fundamental emotional needs were unmet. Emotion regulation is typically defined as the capacity to access a repertoire of emotion regulation strategies and the flexibility to deploy these strategies as required. It facilitates adaptive functioning by promoting goal-directed behavior and enabling individuals to manage relationships effectively and cope adaptively with interpersonal difficulties (Nicol et al., 2022). Encompassing a broad spectrum of cognitive, behavioral, affective, and physiological responses, emotion regulation is essential for understanding the emotional and behavioral correlates of stress and negative emotional states (Hasani et al., 2024).

Cognitive emotion regulation refers to the patterns of thinking that individuals employ to modify and manage their emotions in response to specific events and is considered a component of cognitive coping (Mitchell et al., 2023). These strategies involve cognitive responses to emotional experiences that consciously or unconsciously aim to regulate the intensity or type of emotional response, or the interpretation of the event itself. The ability to regulate emotions through cognitive processes is fundamental to human functioning and assists individuals in coping with emotions following stressful incidents (Hasani et al., 2024). When confronted with stress, individuals utilize a range of emotion regulation strategies, which include maladaptive strategies such as rumination, self-blame, blaming others, and catastrophizing, as well as adaptive strategies such as positive refocusing, positive reappraisal, acceptance, refocusing on planning, and perspective-taking (Garnefsky et al., 2009).

Research indicates that mindfulness training can effectively enhance emotion regulation strategies and reduce cyberspace addiction (Hedayatizafarghandi et al., 2021; You & Liu, 2022). Since the 1970s, clinical psychology and psychiatry have incorporated various mindfulness-based interventions to support individuals experiencing diverse mental health conditions (Bowins, 2021). Mindfulness is defined as a state of focused attention and awareness of the present moment without judgment, originating from Buddhist meditation practices (Hawes & Sweeny, 2023). It serves as a means to improve quality of life, alleviate suffering, and enrich meaning and fulfillment (Chu & Mak, 2020). Through mindfulness, individuals can approach present issues with openness and non-judgment, enabling them to reconcile past experiences, live fully in the present, and maintain hope for the future. Additionally, mindfulness training promotes temporal balance and fosters greater self-awareness (Rahimpour et al., 2021). Empirical findings support the impact of mindfulness on emotion regulation and cyberspace addiction. For instance, Murat (2019) found that loneliness positively predicts Internet addiction, while mindfulness negatively predicts it. Similarly, Meynadier et al. (2024) demonstrated that lower mindfulness levels are associated with more problematic social media use.

Cyberspace addiction in the workplace represents a contemporary challenge that mirrors the broader societal transition toward digital dependency. Effectively addressing this issue necessitates a balanced approach that integrates clear organizational policies, a supportive workplace culture, and heightened individual awareness. By cultivating an environment that encourages healthy digital practices and open communication, employers and employees alike can mitigate the adverse effects of cyberspace addiction, thereby improving overall productivity and well-being. As organizations strive to reduce excessive Internet use, identifying the factors influencing cyberspace addiction among employees has become a widely studied and current issue. However, there remains a research gap regarding the impact of mindfulness on cyberspace addiction, as well as the mediating mechanisms involved, particularly among employees in the country. Therefore, the primary objective of the present study is to investigate the following research question: To what extent can cyberspace addiction in employees be predicted by mindfulness, with cognitive emotion regulation strategies serving as mediating factors?

Method

Sample and Sampling Method

The statistical population of this study consisted of all employees of Tehran Azad Universities in 2024, from which 310 people were selected using the convenience sampling method. Given that SEM requires a minimum of 5 samples and a maximum of 50 samples per parameter, with a general recommendation of at least 300 to 400 participants, this study allocated 28 samples per parameter for 11 parameters to ensure an adequate sample size. To account for potential attrition, a total of 310 participants were selected using convenience sampling (Kline, 2016).

The inclusion criteria were: age between 16 and 18 years, willingness to participate, absence of major psychiatric disorders (self-reported), and no history of substance use or psychiatric medication (self-reported). Exclusion criteria included lack of informed consent, incomplete questionnaire responses, presence of major psychiatric disorders or substance dependence, and use of psychiatric medication or concurrent psychotherapy.

Tools Used

Freiburg Mindfulness Questionnaire

The Freiburg Mindfulness Questionnaire, developed by Walach et al. (2006), comprises 14 items rated on a 4-point Likert scale ranging from "rarely = 1" to "almost always = 4." Notably, item 13 is reverse-scored. In a study conducted by Ghasemi Jobaneh et al. (2015), confirmatory factor analysis demonstrated that the questionnaire's factor structure exhibited an acceptable fit with the data. The instrument demonstrated high internal consistency, with a Cronbach's alpha coefficient of 0.92. Furthermore, itsl convergent validity was supported by a reported correlation of 0.68 with the emotional regulation subscale of the Schutte Emotional Intelligence Scale.

Cognitive Emotion Regulation Questionnaire

The Cognitive Emotion Regulation Questionnaire (CERQ), developed by Garnefski et al. (2001), consists of 36 items divided into two main categories: adaptive and maladaptive strategies. The adaptive strategies include positive refocusing (items 4, 13, 22, 31), refocusing on planning (items 5, 14, 23, 32), positive reappraisal (items 6, 15, 24, 33), perspective-taking (items 7, 16, 25, 34), and acceptance (items 2, 11, 20, 29). The maladaptive strategies comprise self-blame (items 1, 10, 19, 28), blaming others (items 9, 18, 27, 36), rumination (items 3, 12, 21, 30), and catastrophizing (items 8, 17, 26, 35). Responses are rated on a 5-point Likert scale ranging from "never = 1" to "always = 5." Hasani (2011) reported Cronbach's alpha coefficients ranging from 0.76 to 0.92, indicating good internal consistency. Furthermore, principal component analysis in Hasani's study supported the original nine-factor structure of the CERQ, explaining 74% of the variance.

Mobile-Based Social Network Addiction Questionnaire

The Mobile-Based Social Network Addiction Questionnaire, developed by Khajeh Ahmadi et al. (2016), comprises 23 items designed to assess four components: personal performance, time management, self-control, and social relationships. Items are rated on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." Using exploratory factor analysis, Khajeh Ahmadi et al. (2016) demonstrated that these four components collectively explained 50% of the variance in the questionnaire. The instrument exhibited strong psychometric properties, with a content validity index (CVI) of 0.95, a content validity ratio (CVR) of 0.86, and a Cronbach's alpha coefficient of 0.92, indicating excellent reliability.

Procedure

To collect data, after obtaining approval from Islamic Azad University and preparing the questionnaires online, an invitation to participate in the study along with the survey link was posted on various virtual networks. Interested individuals accessed the link to complete the questionnaires. Once the target sample size was reached, the data were extracted and prepared for analysis. Both descriptive and inferential statistical methods were employed. The descriptive analysis included demographic information and summary statistics such as means and standard deviations. For inferential statistics, Pearson correlation coefficients were calculated, and the assumptions required for structural equation modeling (SEM) were

assessed. These assumptions included data normality, tested via skewness, kurtosis, and Mahalanobis distance statistics; linearity, evaluated through scatterplots of standardized residuals; and absence of multicollinearity, examined using tolerance coefficients and variance inflation factors (VIF). The structural model was then tested using fit indices, maximum likelihood estimation, and standardized regression coefficients (beta weights), utilizing SPSS and AMOS software for analysis.

Results

In the present study, 151 (48.71%) of the research participants were male and 159 (51.29%) were female.

Table 1- Correlation matrix of research variables.

Variables	1	2	3	4
1. Adaptive strategies	-			
2. Inconsistent strategies	-0.351**	-		
3. Mindfulness	0.321	-0.340**	-	
4. Cyberspace addiction	-0.345**	0.339**	-0.219**	-

**P<0.01

Table 1 shows that there is a negative and significant relationship between adaptive strategies and mindfulness and cyberspace addiction, and a positive and significant relationship between maladaptive strategies and cyberspace addiction.

Table 2- Fitness indices of the research structural model.

Viability indicators	Chi-square	Softened chi-square	Root mean square error of approximation	Adaptive fitness index	Goodness of fit index	Adaptive goodness of fit index
Model	157.74	2.82	0.072	0.943	0.916	0.894
Acceptable values	P>0.05	3>	0.080>	0.090<	0.090<	0.080<

Table 2 shows that the obtained fit indices support the acceptable fit of the research structural model with the collected data. Thus, it was concluded that the structural model of predicting cyberspace addiction in employees based on mindfulness with the mediation of cognitive emotion regulation strategies fits the collected data.

Table 3 – Direct, indirect and total path coefficients.

Path	Variables	Unstandardized regression coefficient	Standard error	Standard regression coefficient	Sig
Direct	Mindfulness- Cyberspace Addiction	-0.118	0.041	-0.198	0.006
	Adaptive Strategies- Cyberspace Addiction	-0.092	0.026	-0.342	0.001
	Maladaptive Strategies- Cyberspace Addiction	0.057	0.019	0.336	0.001
	Mindfulness- Adaptive Strategies	0.405	0.098	0.304	0.001
	Mindfulness- Maladaptive strategies	-1.258	0.073	-0.423	0.001
Indirect	Mindfulness- Cyberspace Addiction	-0.053	0.025	-0.203	0.027
Total	Mindfulness- Cyberspace Addiction	-0.125	0.034	-0.401	0.001

Table 3 shows that cyberspace addiction in employees is predicted based on mindfulness. Cyberspace addiction in employees is predicted based on cognitive emotion regulation strategies.

Next, the Sobel test (Baron and Kenny, 1986) was used to calculate the separate role of each of the mediating variables of adaptive strategies and maladaptive strategies in the relationship between mindfulness and cyberspace addiction. The Sobel test is used to test the significance of the mediating effect of one variable on the relationship between two other variables.

Table 4- Sobel test to estimate the mediating role of adaptive and maladaptive strategy variables.

Path	Z-statistic	Sig
Mindfulness - Adaptive Strategies - Cyberspace Addiction	–2.45	0.014
Mindfulness - Maladaptive Strategies - Cyberspace Addiction	-5.25	0.001

Table 4 shows that cyberspace addiction in employees is predicted based on mindfulness through the mediation of adaptive and maladaptive cognitive emotion regulation strategies.

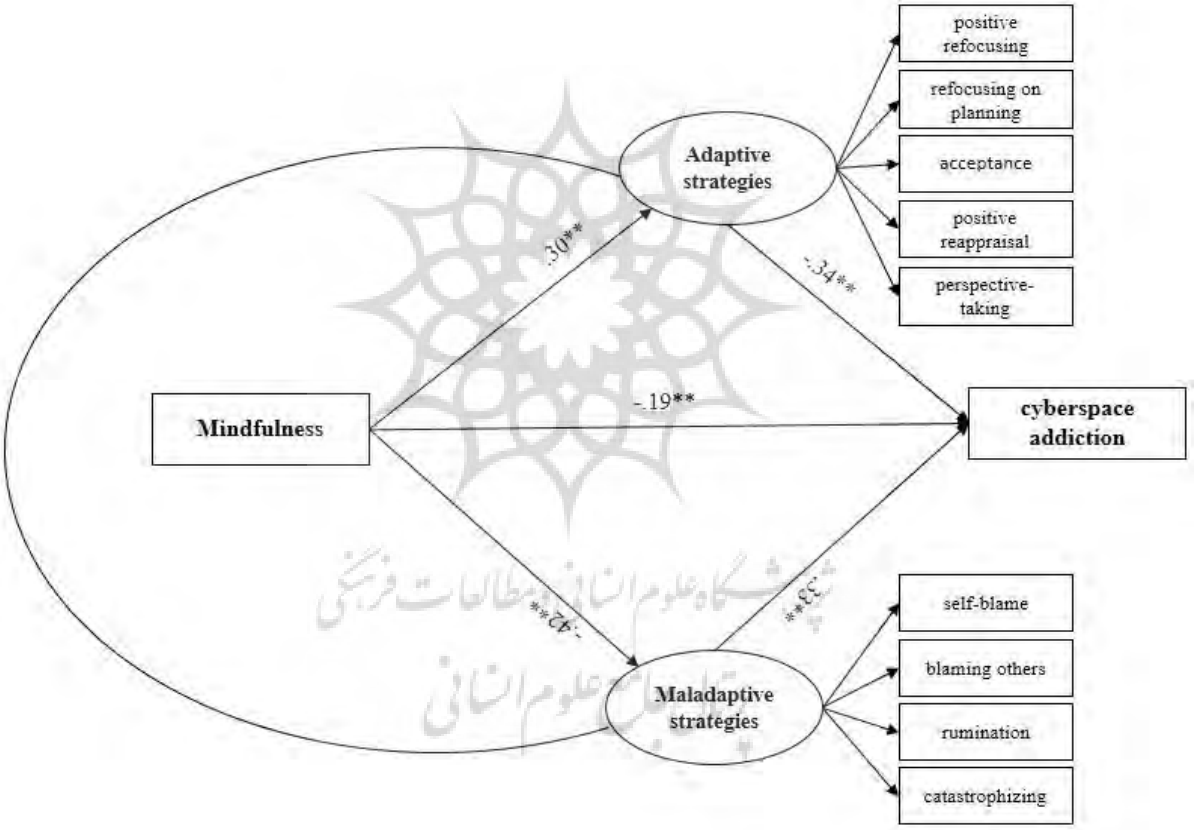

Figure 1. Structural model of the research

Discussion and Conclusion

The aim of the present study was to predict cyberspace addiction among employees based on mindfulness, with cognitive emotion regulation strategies serving as mediators. Specifically, cyberspace addiction in employees was predicted by mindfulness mediated through both adaptive and maladaptive cognitive emotion regulation strategies. These findings align with prior research by Meynadier et al. (2024); You and Liu (2022), and Murat (2019).

In explaining how mindfulness predicts cyberspace addiction through cognitive emotion regulation strategies, it can be posited that mindfulness facilitates more adaptive coping and management of adverse

stimuli. Individuals with higher levels of mindfulness report enhanced emotional and behavioral self-regulation and exhibit greater self-compassion (Wilson et al., 2020). Mindfulness enhances bodily self-awareness and physical self-monitoring, which may contribute to improved physiological regulation and self-care. Similar to traditional relaxation techniques, mindfulness meditation has been associated with increased parasympathetic nervous system activation, promoting deep muscle relaxation and reducing tension and arousal. Through the cultivation of attentional control, mindfulness enables individuals to be fully aware of their thoughts and emotions without judgment, maintaining a state of calm and focus. This ability fosters a greater sense of control over life circumstances, allowing individuals to respond to challenging situations with greater composure, awareness, and regulation rather than reacting with negative automatic responses (Burhanudin, 2024). Consistent with this, Shapiro et al. (2006) assert that mindfulness practices enhance the use of problem-focused coping strategies while reducing reliance on avoidance and emotion-focused strategies by improving self-regulation, cognitive, emotional, and behavioral flexibility. Mindfulness exercises increase an individual's capacity to re-perceive situations, allowing them to observe events objectively without triggering associated negative emotional responses. This expanded perspective enables more deliberate and self-regulated responses instead of habitual automatic reactions. Consequently, as problem-solving capabilities improve, the individual relies less on emotion-focused coping strategies (Shapiro et al., 2006).

Stress can cause individuals to become mentally preoccupied with the past and future, resulting in a psychological state characterized by a loss of mindfulness—defined as a lack of awareness of one's thoughts, behaviors, emotions, and feelings—leading to diminished presence in the moment and judgmental reactions to events (Agnoli & Venosi, 2020). In contrast, mindful individuals tend to process events more realistically rather than responding impulsively. By perceiving internal and external realities without distortion, they experience events as less distressing and demonstrate a greater capacity to manage a wide range of thoughts, emotions, and experiences.

According to mindfulness principles, attention is a fundamental component of behavioral control and regulation, as well as an essential factor in alleviating unhealthy physical conditions or illness symptoms. Difficulties in directing attention can result in common challenges such as persistent rumination on the past or future, an inability to focus on important tasks, and ineffective coping behaviors like avoidance. Mindfulness exercises, which promote continuous and objective observation of distressing events, enhance individuals' capacity to tolerate stress. Repeated exposure to distressing stimuli without reactive avoidance diminishes habitual avoidance behaviors, thereby reducing reliance on avoidance strategies (Nauphal et al., 2024). Bishop et al. (2004) identify two key elements of mindfulness: self-regulation of attention and orientation toward present-moment experience. Self-regulation of attention involves focused awareness on the present moment and the ability to observe a continuous flow of changing thoughts, feelings, and sensations. This facilitates direct experiential awareness of mental and emotional processes, reducing engagement in rumination or elaborate cognitive processing. The second element, orientation to experience, refers to adopting a curious, open, and nonjudgmental attitude toward one's present experience, demonstrating acceptance of whatever arises in the moment. Mindfulness training emphasizes repeatedly returning attention to the present experience, whether it be thoughts, emotions, or bodily sensations. The capacity to attend to emotions without reactive judgment (defusion) fosters improved emotional regulation. This process of decentering enables individuals to confront experiences with self-reflection and observation rather than judgment. As a result, mindfulness enhances the capacity and efficiency of information processing. Moreover, mindfulness reduces the use of negative cognitive emotion regulation strategies and promotes purposeful living. It encourages individuals to avoid fixating solely on the negative aspects of experiences, facilitating a lighter, more joyful approach to life free from envy toward personal shortcomings or limitations (Morgan et al., 2016).

In general, individuals with high levels of mindfulness and a strong sense of meaning in life demonstrate greater resilience to stress and pressure, as well as a unique ability to adapt and overcome challenges. Mindfulness encourages the repeated practice of focused attention on neutral stimuli and intentional awareness of the body and mind, thereby freeing individuals from preoccupation with threatening thoughts and worries about their performance. This process disengages the mind from automatic, habitual

patterns of thinking and reacting. Mindfulness enables individuals to maintain functional stability while allowing flexibility in novel situations. It involves metacognitive learning and the adoption of new behavioral strategies to sustain focused attention, inhibit rumination and anxious responses, foster the generation of new thoughts, and reduce unpleasant emotions (Shamblaw & Segal, 2022).

Due to their heightened mindfulness, these individuals are better equipped to respond to difficult situations without automatic or maladaptive reactions. They tend to be more adaptable to new perceptual frameworks and more resilient in coping with problems. Mindfulness involves shifting awareness from concerns about the past and future to a full presence in the current moment. When fully present, individuals perceive reality in its internal and external aspects and recognize that the mind often ruminates due to judgments and interpretations. It is crucial for individuals to avoid becoming entangled in their thoughts and to develop the capacity to let them go. Given that mindfulness entails a state of non-attachment to thoughts, the appropriate response is to deliberately choose the best course of action rather than reacting instinctively or immediately, while employing strategies to regulate intense emotions effectively. This study utilized a self-report instrument, which may have led participants to consciously or unconsciously present themselves in a favorable light. Additionally, a non-random sampling method was employed, limiting the generalizability of the findings. It is recommended that future research adopt qualitative approaches, such as in-depth interviews, to explore other influential factors. Furthermore, future studies should consider using random sampling methods to enhance representativeness. Given the current study's findings that mindfulness training positively impacts employees' cognitive emotion regulation strategies, it is suggested that such programs be implemented for prevention and intervention purposes aimed at improving emotion regulation among employees.

Resources

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