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Effectiveness of Mindfulness on Locus of Control and Nomophobia in Adolescents with Internet Addiction

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A B S T R A C T

Objective: The expansion of the use of new technologies and cyberspace, including smartphones and tablets, has caused significant changes in people's behaviors and habits. The present study was conducted to investigate the impact of mindfulness therapy on locus of control and nomophobia in adolescents with internet addiction.

Methods and Materials: In a quasi-experimental design with pre-test, post-test, and follow-up with a control group, 30 adolescents with internet addiction in Tehran were selected through convenience sampling and then randomly assigned into two groups: experimental and control (each group consisting of 15 individuals). Subsequently, members of both groups completed the Internet Addiction Questionnaire (Young, 1999), the Nomophobia Questionnaire (Yildirim & Correia, 2015), and the Locus of Control Questionnaire (Rotter, 1966) before starting therapeutic interventions. The experimental group underwent mindfulness therapy in 90-minute sessions once a week for 8 sessions, while the control group did not receive any intervention during this period. The data were analyzed using repeated measures ANOVA with SPSS version 22.

Findings: The results showed that mindfulness therapy had a significant effect on locus of control (F=10.89, P=0.003) and nomophobia (F=8.16, P=0.008) in adolescents with internet addiction.

Conclusion: It can be concluded that mindfulness therapy can improve the locus of control and reduce nomophobia in adolescents with internet addiction, making it an effective therapeutic method in reducing psychological problems in these adolescents.

Keywords: *Mindfulness therapy, locus of control, nomophobia, internet addiction.*

1. Introduction

The expansion of the use of new technologies and cyberspace, including smartphones and tablets, has led to significant changes in individuals' behaviors and habits (Jahrami et al., 2023). The information and communication technology revolution has not only altered communication methods and access to information but has also led to the emergence of new phobias and psychological issues (Daraj et al., 2023). Despite technological advancements in

communication technologies making life and daily activities easier, there is a general belief that harmful and excessive use of these technologies can have negative psychological effects on individuals (Awed & Hammad, 2022).

One of these negative effects is the prevalence of a phenomenon known as nomophobia. Nomophobia, or no-mobile-phone phobia, is a specific disorder stemming from the use of smartphones, describing the fear associated with not being able to use one's mobile phone or being inaccessible through it (Copaja-Corzo et al., 2022), referring to the discomfort or anxiety experienced by individuals when they are unable to use their mobile phone or its functionalities (Tung et al., 2022). Nomophobia is considered problematic mobile phone use; thus, it is categorized as a situational fear among phobias in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (Alwafi et al., 2022), leading to the development of various clinical symptoms including depression, feelings of loneliness, social anxiety disorder, obsessive-compulsive disorder, and other psychological disorders (Wen et al., 2023).

It seems that another variable related to nomophobia is the locus of control (Jacob, 2020; Jadaan, 2021). The locus of control, introduced in the context of Rotter's (1966) social learning theory, refers to the degree of control individuals believe they have over life events. In other words, the locus of control is a system of beliefs based on which an individual evaluates their successes and failures (Tseng et al., 2022). Individuals with an internal locus of control are physically and mentally healthier, experience less anxiety and depression, manage stress better, have greater popularity and social skills, and higher self-esteem (Gaus, 2014). Thomas and Mee (2005) believe that the belief that events are beyond personal control is associated with greater anxiety (Thomas & Mee, 2005). On the other hand, online activities are completely under the users' control. Personalization of apps and privacy features also make the user feel that they can constantly engage in activities that lead to internet addiction (Sharma et al., 2022). However, children who grow up in families that foster autonomy and self-efficacy find that there is a direct relationship between behavior and its outcomes and have an internal locus of control in internet use (Jacob, 2020). In this regard, Yıldız Durak (2018) study showed that the locus of control could predict symptoms of nomophobia (Yıldız Durak, 2018). Jadaan's (2021) study also indicated that there is an inverse relationship between nomophobia and internal locus of control, and a direct relationship between nomophobia and external locus of control (Jadaan, 2021).

Contrary to the emphasis of much of the literature on the anxious nature of nomophobia and conclusions drawn to categorize this disorder among anxiety disorders, there is little consensus that nomophobia should be considered a behavioral addiction or a type of smartphone addiction (Wen et al., 2023). However, when introducing common symptoms of nomophobia, the challenge has always been that the terms phobia and addiction have been presented interchangeably (Tung et al., 2022), but it should be noted that fears, anxieties, and addictions are not homomorphic (Lozano-Blasco et al., 2022). Nevertheless, pathological addiction to mobile phones or the internet can be considered one of the symptoms associated with nomophobia. Internet addiction refers to excessive attention to social media, accompanied by an uncontrollable motive to use social media and allocating excessive time to it, disrupting other important aspects of life (Acikgoz et al., 2022). Internet addiction is considered addictive behavior and is characterized by compulsive and uncontrollable internet use, associated with negative emotional, psychological, and social consequences (Xie et al., 2023). The emergence of internet addiction damages students' psychological, communicative, social, and emotional processes (Mukhlif & Younis, 2022). Previous results have shown that students excessively dependent on the internet feel lonely, lack necessary social skills, and suffer from high vulnerability and low mental health (B. Zhang et al., 2022; W. Zhang et al., 2022). Other studies have also shown that internet addiction in learners causes a cooling of interpersonal, familial, friendly, and social relationships, as well as changes in their personal and social identity (Nopiana et al., 2022). Researchers also showed that addiction to cyberspace is related to nomophobia (Yıldız Durak, 2018; Yin et al., 2019). Others demonstrated in their study that the higher the level of internet addiction among students, the more nomophobic behaviors they exhibit. In another study, the level of nomophobia was higher among students who checked their smartphones more frequently throughout the day (Gezgin, 2017; Gezgin et al., 2018). In the research by Buctot et al. (2020), nomophobia and smartphone addiction were positively correlated (Buctot et al., 2020).

Among various psychological treatments, mindfulness-based cognitive therapy, with a focus on individual and interpersonal cognitions and feelings in the present moment, creates mental peace for the individual and increases their adaptability and tolerance to physical and psychological

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stresses (B. Zhang et al., 2022; W. Zhang et al., 2022). Mindfulness can be described as a method of paying attention to what is present now without judgment; in fact, mindfulness means thinking in the current situation and conditions without predicting what will happen in the future (Maneesang et al., 2022). In relation to the above-mentioned points and based on recent findings that mindfulness interventions have been very effective in similar cases, it can be asserted that mindfulness enables the individual to fully focus on the present and detach from their past and future (Tao et al., 2022). Researchers in their studies on mindfulness have stated that mindfulness heals depression and anxiety (Yıldırım & Çiriş Yıldız, 2022). The present study was conducted to investigate the impact of mindfulness therapy on locus of control and nomophobia in adolescents with internet addiction.

2. Methods and Materials

2.1. Study Design and Participants

The research method of the present study was quasi-experimental, utilizing a pre-test, post-test, and follow-up design with a control group. The statistical population included all adolescents with internet addiction in Tehran in the year 2023. Out of this group, 30 individuals were selected through non-random convenience sampling and then randomly assigned to either the experimental group (mindfulness treatment) or the control group (15 individuals in each group). Subsequently, the experimental group underwent mindfulness treatment in eight 90-minute sessions (once a week), while the wait-list group received no intervention until the end of the study. Inclusion criteria included internet addiction, being an adolescent, not having used psychiatric drugs in the past three months, and not suffering from serious psychiatric illnesses like psychosis. Participants also had to complete an informed consent form regarding their participation in the research project and not be undergoing any other psychological interventions during the study. Exclusion criteria included missing two treatment sessions and having used psychiatric drugs or substances in the last quarter.

Ethical considerations in this study included voluntary participation. Participants were familiarized with the project details and regulations before the start. The attitudes and beliefs of individuals were respected. Members of both the experimental and control groups were allowed to withdraw from the research at any stage. Additionally, if interested, members of the control group could receive the intervention performed for the experimental group in similar therapeutic sessions after the project's conclusion. All documents, questionnaires, and confidential records were exclusively available to the investigators. Informed written consent was obtained from all volunteers.

2.2. Measures

2.2.1. Internet Addiction

Created by Young in 1999, this questionnaire consists of 20 questions rated on a five-point Likert scale, ranging from rarely (score 1) to always (score 5), with scores ranging from 20 to 100. Higher scores indicate greater dependency and addiction to the internet. The questionnaire scores are categorized into three groups: 1) scores 20 to 49 (no internet addiction), 2) scores 50 to 79 (at risk of internet addiction), and 3) scores 80 to 100 (internet addiction). The questionnaire has an overall score. In the study by Young and Rogers (1998), the questionnaire's internal reliability was reported to be higher than 0.92, and its test-retest reliability was also significant. Alavi et al. (2010) obtained a test-retest reliability of 0.82 and a split-half reliability of 0.72, confirming its content validity and psychometric properties (Alimoradi et al., 2019).

2.2.2. Nomophobia

Developed by Yildirim & Correia (2015) to assess the severity of nomophobia and identify its dimensions, this questionnaire consists of 20 items answered on a seven-point Likert scale (from 1 for strongly disagree to 7 for strongly agree), with scores ranging from 20 to 140. Higher scores indicate greater severity of nomophobia. It measures four sub-scales: losing contact (items 1 to 4), inability to communicate (items 5 to 9), lack of access to information (items 10 to 15), and loss of convenience (items 16 to 20). The questionnaire also has an overall score. Cronbach's alpha coefficient for the total items ranged between 0.92 and 0.95, indicating good internal consistency and reliability (Davoudi et al., 2020).

2.2.3. Locus of Control

Comprising 29 items, this questionnaire was devised by Rotter in 1966. Rotter developed 23 of these items specifically to clarify individuals' expectations regarding locus of control, while items 24, 19, 14, 8, 1, and 28 are fillers. Scoring is based on the sum of scores for specified questions, with 'a' responses scored as one and 'b' responses

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as zero, as the total score indicates the type and degree of individuals' locus of control. Thus, individuals scoring 9 or more are considered to have an external locus of control, and those scoring less have an internal locus of control. The questionnaire does not have an overall score. In Rotter's study (1972), the initial reliability coefficient of the locus of control scale was 0.65 using the split-half method, 0.73 with the Kuder-Richardson formula, and 0.72 using the test-retest method with a one-month interval. In Iran, the test-retest reliability was 0.75, and Cronbach's alpha was 0.70. The discriminative validity coefficient of the locus of control scale based on the correlation with students' academic averages was -0.22, Cronbach's alpha was 0.84, and the concurrent validity of this scale with the Coopersmith Self-Esteem Inventory and the Piers-Harris Children's Self-Concept Scale was 0.61 and 0.72, respectively (Yousefi, 2012).

2.3. Intervention

2.3.1. Mindfulness Training

The session guidelines were based on the Cognitive Therapy Based on Mindfulness manual by Segal et al. (2018). The treatment consisted of eight group training sessions held weekly for two hours. In this training, participants learned how to differently relate to their negative thoughts and emotions and focus on changing the content of their beliefs and thoughts. They also learned how to change, become aware of, and see their general satisfaction, negative emotions, relationships with teachers, opportunities, advancement, adventures, and social cohesion from a broader perspective (Segal et al., 2018).

2.4. Data analysis

Descriptive data analysis calculated statistical indicators for each research variable. In the inferential statistics section, repeated measures ANOVA and SPSS-22 software were used.

3. Findings and Results

The mean (standard deviation) age of participants was 34.5 (9.7) for the experimental group and 36.1 (8.6) for the control group. There was no significant difference in age between the two groups.

Table 1

Descriptive Statistics for Research Variables by Test Type and Groups

Variable	Dimension	Phase	Experimental Group	Control Group
			M (SD)	M (SD)
Locus of Control	Pre-test	15.26	(4.01)	15.66
	Post-test	8.46	(3.20)	14.46
	Follow-up	7.14	(3.41)	14.33
Nomophobia	Pre-test	56.53	(13.22)	57.86
	Post-test	73.60	(18.54)	55.80
	Follow-up	72.40	(18.61)	56.60

Note. M = Mean, SD = Standard Deviation.

According to the results presented in Table 1, the mean locus of control in the post-test and follow-up phases for the experimental group showed a decrease, while the mean nomophobia variable increased. No such changes were observed in the control group.

Before proceeding with the main analyses, assumptions necessary for the multivariate repeated measures ANOVA were tested and confirmed to ensure the validity of the statistical results. Specifically, the assumption of sphericity was tested using Mauchly's test, which showed no significant violation ($p = .56$), indicating that variances of the differences between all combinations of related groups were equal. The assumption of normality was assessed through Shapiro-Wilk tests for each group and condition, with all p-values exceeding .05, confirming that the data were normally distributed. Furthermore, Levene's test for equality of variances was performed, yielding non-significant results ($p > .05$) across all variables, which validated the homogeneity of variances across groups.

The results of the multivariate repeated measures ANOVA among the study groups for locus of control and nomophobia variables indicated a significant between-subject (group) effect, meaning that at least one group differed from the others in at least one of the variables of

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locus of control and nomophobia. The within-subject (time) effect for the study variables was also significant, indicating that there was a change in at least one of the variables' means over time from pre-test to follow-up.

Table 2

Repeated Measures ANOVA for Comparing Pre-test, Post-test, and Follow-up of Locus of Control and Nomophobia in Experimental and Control Groups

Scale	Source of Effect	Sum of Squares	df	Mean Square	F	Significance	Eta Squared
Locus of Control	Time*Group	59.267	2	29.633	12.761	< .001	.313
	Group	35.267	1	35.267	10.891	< .003	.280
Nomophobia	Time*Group	156.800	2	78.400	15.116	< .001	.351
	Group	56.067	1	56.067	8.162	< .008	.226

Note. df = Degrees of Freedom.

Results from Table 2 demonstrated that the F-ratio obtained for the group factor in the dimensions of locus of control ($p < .01$) and nomophobia ($p < .01$) was significant. This finding suggests that mindfulness training improved locus of control and nomophobia in adolescents with internet addiction. A repeated measures ANOVA for the experimental group across three phases of the therapeutic intervention showed that the observed F-ratio for the improvement in dimensions of locus of control ($p < .01$) and nomophobia ($p < .01$) was significant.

Table 3

Bonferroni Post-hoc Within-Group Results for Mindfulness Training on Dimensions of Locus of Control and Nomophobia in the Experimental Group

Variable	Time	Mean Difference	Standard Error	P-value
Locus of Control	Pre-Post	7.39	2.50	< .001
	Pre-Follow-up	8.54	2.51	< .001
	Post-Follow-up	0.72	2.44	.576
Nomophobia	Pre-Post	5.54	17.51	< .001
	Pre-Follow-up	1.61	18.10	< .001
	Post-Follow-up	2.86	1.23	.089

Changes in the experimental group over time, as shown in Table 3, indicated that the dimensions of locus of control and nomophobia in the mindfulness training group were significantly different in the post-test compared to the pre-test ($p < .001$). Similarly, a significant difference was observed in the follow-up phase compared to the pre-test ($p < .001$), but there was no significant difference between the follow-up and post-test phases, indicating the treatment effect's persistence.

4. Discussion and Conclusion

The aim of the present study was to determine the effectiveness of mindfulness therapy on locus of control and nomophobia in adolescents with internet addiction. The results showed that mindfulness therapy was effective in improving locus of control and nomophobia in adolescents with internet addiction. This finding aligns with the results of the prior studies (Gezgin, 2017; Gezgin et al., 2018; Jacob, 2020; Yin et al., 2019).

This finding can be explained by the significant impact of mindfulness theory on emotions. In other words, mindfulness helps individuals become more aware of their positive feelings, providing them with greater confidence to achieve success. This is because mindfulness enables individuals to combat negative emotions and think about them positively. Furthermore, since mindfulness focuses on the present, it can prevent the occurrence of risky behaviors (Tao et al., 2022; Yıldırım & Çiriş Yıldız, 2022). Therefore, practicing mindfulness techniques makes an individual resistant to negative emotions and, overall, reduces the occurrence of risky behaviors. Continuous repetition of mindfulness techniques increases awareness and understanding of the body, feelings, and thoughts, thus strengthening factors that lead to emotional regulation and reduce internet addiction and nomophobia.

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In explaining this finding, it can be noted that practicing mindfulness techniques involves both physical and mental aspects in combating negative emotions, allowing an individual to control their negative emotions without judgment. Mindfulness is among the therapies that emphasize individual awareness, being in the moment, and consciousness towards existing realities. Mindfulness specifically focuses on goals and the present. For individuals with internet addiction, one of the main issues is that they easily lose track of moments and postpone tasks and goals. They can be present in the moment and make the right decisions (Li et al., 2023). Therefore, procrastination, which is not merely a time management problem but a complex process involving cognitive, emotional, and behavioral components, often accompanied by significant stress from delaying tasks, is observed in their behavior. Since mindfulness greatly emphasizes attention and focus on the current moment and with regular practice makes being in the moment a habitual behavior, it can be an effective training in reducing procrastination and managing time to the extent that the individual is able to plan according to the current moment and what is considered a goal or task, experiencing positive emotions and self-control in managing their affairs through sufficient knowledge and awareness. This is particularly crucial for high school students facing entrance exams, as making informed decisions can significantly impact their future (Abad & Haroon Rashidi, 2022). Thus, as observed, mindfulness as a lifestyle, using meditative practices integrated into daily life, helps individuals become familiar with dualistic states of mind and consciously utilize them as a unified mind. Through formal meditations (like breath and body mindfulness, mindful yoga, and body scan meditation) as well as informal meditations (like mindful eating, walking, showering, etc.) and habit-breaking exercises, individuals learn to be present in their lives here and now. The inability to be present in the moment creates a gap between the individual and reality, removing the possibility of accurately understanding situations and formulating sensible and aware responses.

5. Limitations & Suggestions

The study faced several limitations that warrant consideration. First, the sample size was relatively small, limiting the generalizability of the findings to the broader population of adolescents with internet addiction. Additionally, the study's quasi-experimental design does not fully eliminate potential confounding variables or ensure the groups were equivalent at baseline. Another limitation includes the reliance on self-reported measures for assessing internet addiction and nomophobia, which might introduce bias or inaccuracies due to social desirability or recall issues. Finally, the study was conducted within a specific cultural and geographic context, which may limit the applicability of the findings to different settings or populations.

For future research, it is suggested to replicate this study with larger and more diverse samples to enhance the generalizability of the findings. Longitudinal studies could also provide deeper insights into the long-term effects of mindfulness therapy on locus of control and nomophobia. Exploring additional variables such as self-esteem, social anxiety, and other psychological factors could further elucidate the complex interplay between internet addiction, nomophobia, and mental health. Implementing and comparing different therapeutic interventions besides mindfulness could provide a broader understanding of effective treatments for internet addiction and nomophobia. The implications of this research are significant for clinical practice, suggesting that mindfulness therapy could be a valuable addition to treatment programs for adolescents struggling with internet addiction and its associated psychological challenges.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed in this article.

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