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Investigating the Impact of Motivational Interviewing on Internet Addiction Among Students at Qazvin University of Medical Sciences

Roya Kahaki¹, Mohammad Reza Sheikhi^{*2}, Isa Mohammadi Zeidi³, Mehdi Ranjbaran⁴

1. MA Student, Department of Psychiatric Nursing, Qazvin University of Medical Sciences, Qazvin, Iran.

2. Associate Professor, Department of Psychiatric Nursing, Qazvin University of Medical Sciences, Qazvin, Iran (Corresponding author).

3. Assistant Professor, Department of Public Health, School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran.

4. Assistant Professor, Department of Epidemiology and Biostatistics, School of Public Health, Qazvin University of Medical Sciences, Qazvin, Iran.

* Corresponding author email address: mmsheikhi1@yahoo.com

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ABSTRACT

Objective: The objective of this study was to investigate the effectiveness of motivational interviewing (MI) in reducing internet addiction among students at Qazvin University of Medical Sciences.

Methods and Materials: This study employed an experimental study. A total of 108 students were randomly assigned to intervention and control group. The intervention group received six 90-minute sessions of motivational interviewing, while the control group did not receive any intervention. Data collection tools included demographical items and Internet Addiction Test (IAT) that was responded by participations at baseline, immediately after the intervention, and at a three-month follow-up. Data were entered to SPSS 25.0 and analysed by χ^2 , independent T-Test, and repeated measurements of ANOVA.

Findings: The mean age of participants was 21.63 ± 2.37 and 55.6% of them were female. Also, 93.5% of students were single and 78.70% of them were undergraduate. The results showed a significant reduction in internet addiction scores in the intervention group compared to the control group both immediately following the intervention and at the three-month follow-up ($P < 0.01$).

Conclusion: Motivational interviewing appears to be a promising intervention for reducing internet addiction among university students.

Keywords: *Internet Addiction, Motivational Interviewing, Behavioural Intervention, Well-Being, Medical University.*

1. Introduction

The rapid increase of the internet use over the past few decades has fundamentally transformed various aspects of human life, offering unprecedented access to information, entertainment, and communication. However, this digital revolution has also led to the emergence of internet addiction, a behavioral condition characterized by excessive or poorly controlled preoccupations, urges, or behaviors regarding computer use and internet access that lead to impairment or distress (Cash et al., 2012). Internet addiction has been increasingly recognized as a significant public health issue, particularly among university students, a demographic that is particularly vulnerable due to their developmental stage, lifestyle, and academic demands (Ahmed, 2021).

University students are at a critical juncture in their lives, transitioning to greater independence and facing academic, social, and personal challenges. This period is marked by increased internet use for academic purposes, social networking, and leisure activities, which can sometimes lead to problematic internet use or internet addiction (Ahmed, 2021; Shojeyan et al., 2024; Soleymani et al., 2023). Studies have shown that internet addiction among university students can adversely affect their psychological well-being, academic performance, and social relationships (Ferdowshi & Shithee, 2018; Haramain, 2022).

Internet addiction is associated with various negative psychosocial outcomes, including increased levels of stress, anxiety, and depression. For instance, Haramain (2022) found that personal traits significantly affect learning motivation, which can be exacerbated by excessive internet use (Haramain, 2022). Similarly, Ferdowshi and Shithee (2018) demonstrated that internet addiction negatively impacts academic achievement among school-aged children, a trend likely to extend to university students (Ferdowshi & Shithee, 2018). Additionally, Wongpakaran et al. (2021) highlighted a complex relationship between loneliness, internet addiction, and interpersonal problems, further complicating the psychosocial landscape for affected individuals (Wongpakaran et al., 2021). Given the detrimental effects of internet addiction, effective interventions are essential. One promising approach is motivational interviewing (MI), a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence (Jafarzadeh et al., 2023; Rezaei et al., 2023). MI has been widely used in treating various addictive behaviors and psychological

problems, offering a non-confrontational approach that respects the autonomy of the individual (Baker, 2009).

Motivational interviewing focuses on the collaborative relationship between the therapist and the client, emphasizing empathy, reflective listening, and the elicitation of the client's own motivations for change. This technique is particularly effective in addressing ambivalence, a common barrier to behavior change in individuals struggling with addiction (Setiawan, 2022). Studies have shown that MI can significantly reduce problematic behaviors, including substance abuse and, more recently, smartphone addiction, which shares similarities with internet addiction (Kaur & Dhillon, 2021; Setiawan, 2022). The application of MI in treating internet addiction is a relatively new area of research, yet preliminary findings are promising. For example, Setiawan (2022) demonstrated the effectiveness of MI in reducing smartphone addiction among students, suggesting potential applicability to broader internet addiction (Setiawan, 2022). MI's emphasis on enhancing self-efficacy and fostering a commitment to change aligns well with the needs of individuals struggling with internet addiction, who often experience ambivalence about reducing their internet use (Kaur & Dhillon, 2021). The theoretical underpinnings of MI suggest that it can effectively address the cognitive and emotional aspects of internet addiction. By helping individuals explore the discrepancies between their current behavior and broader life goals, MI can facilitate a more profound commitment to change. This process involves identifying and amplifying the client's reasons for change while mitigating the perceived benefits of continued internet use (Baker, 2009).

Several studies have highlighted the prevalence and impact of internet addiction among university students. Ahmed (2021) explored the relationship between internet addiction and psychosocial functioning, revealing significant correlations between high levels of internet use and increased psychosocial problems (Ahmed, 2021). Similarly, Jasrotia (2023) evaluated an internet de-addiction program, demonstrating its effectiveness in reducing perceived stress and improving autonomic functions in young adults (Jasrotia, 2023). Motivational interviewing has shown efficacy in various contexts, including substance abuse and behavioral addictions (Miri Rami et al., 2022). Baker (2009) provided a comprehensive review of MI's application in treating psychological problems, emphasizing its strengths in enhancing motivation and facilitating behavior change (Baker, 2009). Setiawan (2022) specifically examined MI's role in reducing smartphone addiction,

highlighting its potential applicability to internet addiction (Setiawan, 2022). Cognitive-behavioral approaches have also been employed to treat internet addiction, with studies demonstrating significant improvements in clients' behaviors and psychological well-being. Khazaal et al. (2012) discussed the effectiveness of cognitive-behavioral treatments, noting their success in reducing internet addiction symptoms (Khazaal et al., 2012). Rooij et al. (2010) conducted a thematic analysis of therapists' experiences with cognitive-behavioral therapy (CBT) for internet addiction, underscoring the importance of addressing both cognitive and behavioral components (Rooij et al., 2010). Despite these advancements, there remains a gap in the literature regarding the specific application of MI to internet addiction among university students. This study seeks to fill this gap by providing empirical evidence on the effectiveness of MI in reducing internet addiction and improving related psychosocial outcomes. The current study aims to investigate the impact of motivational interviewing on internet addiction among university students at Qazvin University of Medical Sciences. Given the increasing prevalence of internet addiction and its associated negative outcomes, there is a critical need for effective interventions

tailored to the unique needs of university students. This study will employ a randomized controlled trial design to provide robust evidence regarding the efficacy of MI in this context.

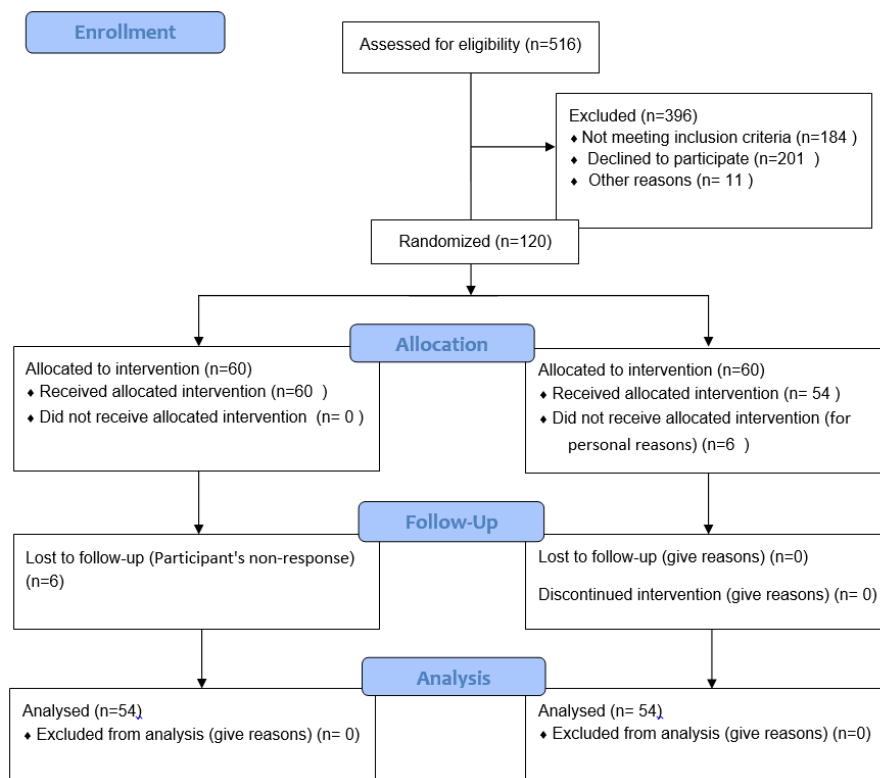
2. Methods and Materials

2.1. Study Design and Participants

This study was designed as experimental study to investigate the impact of motivational interviewing on internet addiction among students. The population included all students enrolled at Qazvin University of Medical Sciences during the 2021-2022 academic year, and finally 516 individuals were selected as primary population. From this population, 108 participants were randomly selected and assigned into two groups: the intervention group (54 participants) and the control group (54 participants) (Figure 1). The intervention group received six 90-minute sessions of MI, while the control group did not receive any intervention. Follow-up assessments were conducted three months after the intervention to evaluate the sustainability of the effects.

Figure 1

Consort Flow Diagram



2.2. Measures

2.2.1. Internet Addiction

The Internet Addiction Test (IAT), developed by Young (1998), is a widely used tool to measure internet addiction. The IAT consists of 20 items, each rated on a 5-point Likert scale ranging from 0 (not applicable) to 5 (always). The test assesses the extent of an individual's problems caused by internet use, considering various aspects such as neglect of work, anticipation, lack of control, and social consequences. The IAT has demonstrated strong reliability and validity in numerous studies, making it a standard measure for evaluating internet addiction in diverse populations (Asdolahzadeh et al., 2021; Qudsi & Asadzadeh, 2017).

2.3. Interventions

2.3.1. Motivational Interviewing

The motivational interviewing session designed based on previous guideline (Miller & Rollnick, 2002). This MI techniques comprised six 90-minute sessions designed to address internet addiction among students of Qazvin University of Medical Sciences

Session 1: Introduction

In the first session, participants are introduced to each other and the group norms are established. The facilitator explains the group process and the philosophy behind MI. Exercises include practicing freedom of choice, exploring the impact dimensions of behaviour, and using the cycle of commitment and confidence assessment.

Session 2: Identifying Emotions

This session focuses on recognizing and expressing emotions. Participants engage in exercises to identify their feelings and complete the impact dimensions exercise with an emphasis on emotional aspects. Homework is assigned to reinforce these exercises. Additional activities include practicing freedom of choice, revisiting the impact dimensions of behaviour, and assessing commitment and confidence in the change cycle.

Session 3: Exploring Positive and Negative Aspects

Participants examine the positive and negative aspects of their behaviour and the potential for change. Doubts are normalized, and exercises help participants weigh the pros and cons of internet use. Activities include brainstorming short-term and long-term benefits and costs, completing a table of positive and negative dimensions, and discussing

alternative behaviours. Emotions are further explored, and participants complete related homework.

Session 4: Clarifying Personal Goals

In this session, participants clarify their personal goals for change. The facilitator presents a list of change options through therapy, and participants negotiate and develop a behavioural contract. The session addresses potential obstacles to change, identifies tempting situations, and includes a final assessment. Previous exercises are summarized and integrated into a vision exercise to prepare for behaviour change.

Session 5: Values and Lifestyle Changes

This session emphasizes the importance of lifestyle changes and deconditioning. The facilitator helps participants identify and prioritize their core values through exercises. Participants define their values and align them with their behaviours, reinforcing self-efficacy and the solutions they generate.

Session 6: Final Assessment and Perspective

The final session focuses on identifying tempting situations and developing coping strategies. Participants learn to view setbacks as learning opportunities and are encouraged to re-enter the change cycle if needed. The session concludes with a summary and integration of previous exercises, emphasizing readiness for behaviour change and preparing for sustained efforts.

After completing questionnaires at baseline time by participants in two groups, students

After assigning students to experimental and control groups, a virtual group was formed on Eitaa (Iranian social App). Then, the time, place and date of the MI were coordinated with the experimental group in Eitaa. The MI was conducted by a member of the research team who had acquired the necessary training and skills to manage and implement the MI sessions.

2.4. Data analysis

Data were analysed using SPSS: 27 software. Independent T test, χ^2 , and Analysis of variance with repeated measurements was employed to compare the variables and outcomes between the intervention and control groups over times. Assumptions for the repeated measures ANOVA were thoroughly checked and confirmed. The normality of the distribution was assessed using the Histogram and Q-Q plot. Homogeneity of variances was tested using Levene's test, with non-significant results

indicating equality of variances for the intervention and control group.

3. Findings and Results

The demographic characteristics of the participants were assessed, and the distribution across various categories is presented (Table 1). In terms of gender, the intervention group consisted of 31 females (57.4%) and 23 males (42.6%), while the control group included 29 females

(53.7%) and 25 males (46.3%). Regarding age, the mean age for the intervention group was 21.45 years ($SD = 2.34$), and for the control group, it was 21.78 years ($SD = 2.41$). Result showed that 42 (77.8%) students in the intervention group and 43 (79.6%) individuals in the control group were undergraduate students. Also, most of the participants 101 (93.52%) was single. The data indicate a balanced distribution of demographic characteristics between the two groups, ensuring comparability for the intervention's impact assessment.

Table 1

Comparison demographic variables between control and experimental group at baseline

Variables		Control group		Experimental group		Chi-Square or Fisher's Exact Test
		Frequency	Percent	Frequency	Percent	P-value
Age (year)	19-23	40	74.1	37	68.5	0.889
	24-28	13	24.1	15	27.8	
	29-33	1	1.9	2	3.7	
Marriage status	Single	51	94.4	50	92.6	1.000
	Married	3	5.6	4	7.4	
Gender	Female	29	53.7	31	57.4	0.699
	Male	25	46.3	23	42.6	
Education	Undergraduate	43	79.6	42	77.8	1.000
	M.Sc	4	7.4	4	7.4	
	Ph.D and GP	7	13	8	14.8	
Living status	Native	17	31.5	16	29.6	0.835
	Non-native	37	68.5	38	70.4	
University average score	12-14	0	0	3	5.6	0.368
	14-16	16	26.6	15	27.8	
	16-18	34	63.0	30	55.6	
	18-20	4	7.4	6	11.1	

The descriptive statistics indicate that the intervention group showed decrease in internet addiction scores from baseline ($M = 58.92$, $SD = 4.03$) to post-intervention ($M = 39.54$, $SD = 9.54$), while in the follow-up phase, the addiction score has returned to previous state ($M = 58.11$, $SD = 3.61$). In contrast, the control group's scores remained relatively stable across the three time points, with a slight decrease from baseline ($M = 57.37$, $SD = 4.55$) to post-intervention ($M = 58.33$, $SD = 3.28$) and three-month follow-up ($M = 54.90$, $SD = 5.78$). (Table 2, Figure 2)

The mean score of Internet addiction in students before the motivational interview in the control group and the intervention group did not show a statistically significant difference ($p=0.063$), but after the motivational interview in the control group and the intervention group ($p<0.001$).

The Repeated measured ANOVA results in Table 2 indicate significant main effects for group ($p < .001$) and time ($p < .001$), as well as a significant interaction between time and group ($p < .001$). These results suggest that the intervention had a significant effect on reducing internet addiction scores over time compared to the control group.

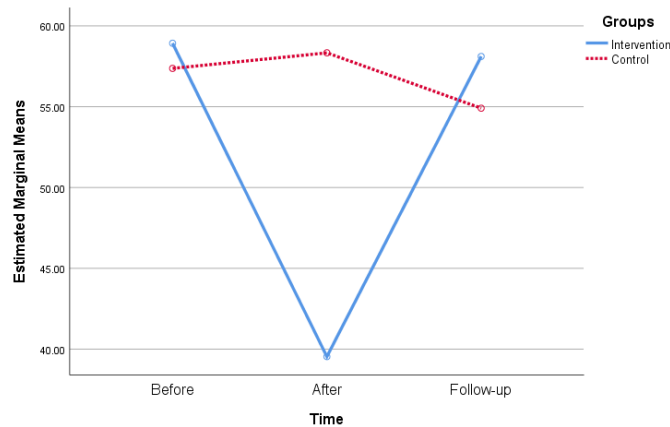
Table 2

The comparison mean of internet addiction scores between two group regarding repeated measured ANOVA

Internet addiction scores	Control group	Experimental group	Independent T-test
	Mean (SD)	Mean (SD)	P-value
Baseline	57.37 (4.55)	58.92 (4.03)	0.063
After motivational interview	58.33 (3.28)	39.54 (9.54)	<0.001
3 month follow up	54.90 (5.78)	58.11 (3.61)	<0.001
Repeated measures ANOVA	Time effect (P<0.001) Group effect (P <0.001) Interaction effect (P<0.001)		

Figure 2

The comparison mean of internet addiction scores between two groups



The results demonstrate a statistically significant increase in AMH levels post-intervention ($t = 8.47, p < 0.001$), indicating improved ovarian reserve following the Tajik lifestyle intervention. Additionally, 100% of participants achieved successful pregnancies, which further supports the effectiveness of this intervention.

The improvement in AMH levels is indicative of the intervention’s ability to create a more favorable physiological environment for fertility. This is consistent with previous research suggesting that lifestyle modifications, including dietary changes, stress management, and physical activity, positively influence reproductive health (Wang et al., 2021; Hunter et al., 2021).

These findings underscore the potential of tailored lifestyle interventions in addressing infertility challenges, especially among women with diminished ovarian reserves. Future studies could explore larger sample sizes and incorporate control groups for a more robust evaluation of efficacy.

4. Discussion and Conclusion

The present study investigated the effectiveness of motivational interviewing (MI) in reducing internet addiction among students at Qazvin University of Medical Sciences. The results indicated a significant reduction in internet addiction scores in the intervention group compared to the control group, both immediately following the intervention and at the three-month follow-up. These findings emphasize the potential of MI as a powerful tool in addressing internet addiction among university students.

The significant reduction in internet addiction observed in the MI group aligns with previous research highlighting the efficacy of MI in treating various forms of addiction. Zeidi et al(20) emphasized the ability of MI to enhance self-efficacy, self-control and motivation and resolve ambivalence, which are crucial factors in the context of internet addiction. The collaborative and empathetic approach of MI likely contributed to the participants'

increased willingness to engage in behaviour change, thereby reducing their reliance on the internet (Baker, 2009).

Furthermore, the study's findings are consistent with Setiawan's (2022) research on the effectiveness of MI in reducing smartphone addiction among students. Both studies underscore the applicability of MI in addressing behavioural addictions, characterized by excessive engagement with digital devices (Setiawan, 2022). The relative decrease in the severity of Internet addiction is probably due to the improvement of self-efficacy and the strengthening of self-control and other psychological variables influencing Internet addiction.

The reduction in impulsivity related to internet use observed in this study can be linked to the MI process, which involves exploring and addressing the underlying motivations for addictive behaviours. Haramain (2022) discussed how personal traits, such as impulsivity, significantly impact learning motivation and can be exacerbated by internet addiction. By addressing these traits through MI, the intervention group likely experienced a more profound and lasting change in their internet use behaviours (Haramain, 2022).

The results of this study are supported by a growing body of literature on the effectiveness of MI and other therapeutic interventions for internet addiction. For example, Khazaal et al. (2012) highlighted the success of cognitive-behavioural treatments in reducing internet addiction symptoms, suggesting that structured therapeutic approaches can be highly effective (Khazaal et al., 2012). Similarly, Rooij et al. (2010) noted the positive experiences of therapists using cognitive-behavioural therapy (CBT) for internet addiction, emphasizing the importance of addressing both cognitive and behavioural components of the disorder (Rooij et al., 2010).

In addition, the study by Jasrotia (2023) evaluating an internet de-addiction program found significant reductions in perceived stress and improvements in autonomic functions, further supporting the notion that structured interventions can lead to meaningful improvements in psychosocial functioning (Jasrotia, 2023). The findings from the present study contribute to this body of evidence, demonstrating that MI can effectively reduce internet addiction and improve related psychosocial outcomes among university students. Throughout the intervention, students were touched how to recognised and revise negative thought and destructive emotions that effect on their craving toward internet using. Moreover, along with increasing their awareness regarding different problems such as inability or

insufficiency to time management, difficulty in overcoming temptation, lack of an alternative to the Internet in daily life, and the issue of coping with stress and negative emotions, individuals get familiar with coping strategies such as self-control and self-regulation. Strengthening self-efficacy and reassuring people to boost driving capacity and ability to cope with challenges are also effective factors in reducing IA severity (Mansouri & Khodabakhshi-Koolae, 2024; Pagan, 2024). In addition to MI, other intervention methods and strategies such as cognitive behaviour therapy, mindfulness-based cognitive therapy can be utilized in treating IA. With enhancing specific skills through mindfulness-based cognitive therapy, people would be able to be more aware of their thoughts without judgment, consider positive or neutral thoughts as reflections of reality rather than negative ones, and regard them only as transient mental events (Jafarzadeh et al., 2022; Jafarzadeh et al., 2023; Parsafar, 2024).

The findings of the present study showed the positive effect of motivational interviewing on the amount of internet use and also the prevalence of internet addiction among students of the University of Medical Sciences. Therefore, it is suggested to use cognitive-behavioral techniques such as motivational interviewing in order to reduce the prevalence of Internet addiction and also to prevent its physical, psychological, social and emotional consequences in students.

Despite the promising results, this study has several limitations. First, the sample size, while adequate for detecting significant effects, may not be large enough to generalize the findings to all university students. Future studies with larger and more diverse samples are needed to confirm the results and ensure broader applicability. Second, the study relied on self-reported measures of internet addiction, which may be subject to social desirability bias and inaccuracies in self-assessment. Including objective measures of internet use, such as tracking software, could enhance the reliability of the findings.

Third, the study's follow-up period was limited to three months. While this timeframe allowed for the assessment of short-term effects, it may not capture the long-term sustainability of the intervention. Longer follow-up periods are necessary to determine whether the benefits of MI persist over time. Finally, the study was conducted in a single university, limiting the ability to generalize the findings to students in different educational settings or cultural contexts.

Future research should address the limitations identified in this study to build a more comprehensive understanding

of the effectiveness of MI for internet addiction. First, researchers should aim to conduct studies with larger and more diverse samples, including students from various universities and cultural backgrounds. This would enhance the generalizability of the findings and provide insights into how MI may need to be adapted for different populations.

Second, incorporating objective measures of internet use, such as tracking software, can complement self-reported data and provide a more accurate assessment of changes in internet use behaviour. This approach would help mitigate potential biases associated with self-reporting and offer a more robust evaluation of the intervention's impact.

Third, future studies should consider longer follow-up periods to assess the sustainability of MI's effects on internet addiction. Extended follow-up periods would allow researchers to determine whether the initial benefits of MI are maintained over time and identify any additional factors that may influence long-term outcomes.

Lastly, exploring the integration of MI with other therapeutic approaches, such as cognitive-behavioural therapy, could provide valuable insights into the potential synergistic effects of combining different interventions. Such research could help develop more comprehensive and effective treatment programs for internet addiction.

The findings of this study have important implications for practice, particularly in the context of university counselling services and mental health support. First, university counselling centres should consider incorporating MI into their existing programs to address internet addiction among students. Training counsellors and mental health professionals in MI techniques can enhance their ability to engage students in meaningful conversations about their internet use and motivate them to make positive changes.

Second, universities should implement preventive measures by offering workshops and seminars on healthy internet use habits and the potential risks of internet addiction. These educational initiatives can raise awareness among students and provide them with strategies to manage their internet use effectively.

Third, developing peer support programs can complement professional counselling services by creating a supportive community for students struggling with internet addiction. Peer mentors who have successfully managed their internet use can offer guidance and encouragement, helping others navigate their journey toward healthier internet habits.

Lastly, universities should foster a holistic approach to student well-being by promoting balanced lifestyles that

include physical activity, social engagement, and academic support. By addressing the broader context of students' lives, universities can create an environment that supports healthy behaviours and reduces the risk of internet addiction.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

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

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