Effects of Cognitive-Behavioral Group Therapy on Reducing Levels of Internet Addiction, Depression, Anxiety, and Stress Among Nursing Students in Morocco

Jamal Ksiksou[1, 2, *], Lhoussaine Maskour [ID][3] and Smail Alaoui[1]

[1]Sidi Mohamed Ben Abdellah University, Faculty of Letters and Human Sciences Dhar El Mehraz, Sociology and Psychology Laboratory, Fez, Morocco
[2]Higher Institute of Nursing Professions and Health Techniques (ISPITS), Tetouan, Morocco
[3]Ibn Zohr University, Laboratory of Science and Technology Research (LRST), ESEF, Agadir, Morocco

[*] *Corresponding author*: Sidi Mohamed Ben Abdellah University, Faculty of Letters and Human Sciences Dhar El Mehraz, Sociology and Psychology Laboratory, Fez, Morocco. Email: jamal.ksiksou@usmba.ac.ma

Abstract

Background: Internet addiction (IA) has emerged as a serious threat to the mental health of young individuals.

Objectives: The present study aimed to test the effects of cognitive-behavioral group therapy (CBGT) on controlling Internet addictive behaviors and improving levels of depression, anxiety, and stress among nursing students in Morocco.

Methods: A total of 60 nursing students participated in the study based on convenience sampling and were then randomly assigned to the intervention group (n = 30) and control group (n = 30). The intervention group received 8 sessions of CBGT, unlike the control group. The Internet Addiction Test and the Depression, Anxiety, and Stress Scale were used as the pretest, posttest, and 3-month follow-up tests to determine participants' levels of IA, depression, anxiety, and stress. Analysis of covariance (ANCOVA) was applied to assess the effects of this therapeutic intervention.

Results: The results showed that following the CBGT program, the intervention group showed a reduction in IA (P < 0.05), depression (P < 0.05), anxiety (P < 0.05), and stress (P < 0.05) scores.

Conclusions: Cognitive-behavioral group therapy was observed to be more effective in improving the cognitive, psychological, and behavioral skills of Internet-dependent nursing students, thereby reducing levels of depression, anxiety, and stress. This outcome opens up important perspectives in the field of health sciences education by considering this approach as a preferred way to promote students' mental health in this context.

Keywords: Cognitive-Behavioral Therapy, Internet Addiction, Mental Health, Nursing Students

1. Background

Nowadays, the Internet has become an indispensable source of technology, offering a multitude of opportunities in different disciplines. However, abuse can have a negative impact on users' health, generating psychological and physical disorders and contributing to the development of the phenomenon of Internet addiction (IA), described as a behavioral dependency, typically resulting in loss of control, tolerance, withdrawal, indifference to negative consequences, social isolation, and mood disorders (1, 2). In this sense, in line with Anderson et al.'s study, the criteria characterizing IA are identical to those of other behavioral addictions, particularly deterioration in daily life

functions, behavioral disorders, and mood lability (3). In this regard, some recent studies have highlighted a significant correlation between IA with depression, anxiety, and stress (4, 5).

As such, depressive disorders are typically manifested by a lack of pleasure and interest in daily activities, weight gain or loss, sleep disturbances, and thoughts of hopelessness and anhedonia. On the other hand, anxiety disorders correspond to diffuse emotions of worry, fatigue, irritability, difficulty concentrating, physical changes, and anxious thoughts (6). As for stress, it corresponds to an intense feeling of psychological or physiological distress, efforts to avoid external relationships accompanied most often by hypervigilance, feelings of anger, excitement, and irritability (7).

In the university context, IA then appears as a real phenomenon. A meta-analysis study showed that 11.3% of university students are victims of this addiction (8). In health sciences education, the results of several studies have shown that nursing students are an at-risk category for the development of IA and symptoms of depression, anxiety, and stress (9, 10). This is partly due to the stressful, anxiety-provoking context of clinical training and work overload, which leads students to resort to abusive Internet use in the absence of opportunities for extracurricular recreational activities to relieve their stress. Abusive use of the Internet, social networks, and video games and the establishment or maintenance of online relationships are favored means of overcoming psychological tensions and experiencing pleasurable emotions (11). However, such behaviors are likely to lead to mental and psychological disorders and can therefore be an obstacle to effective learning and the ability to deliver health services effectively.

In this regard, according to the results of a study by Lozano-Blasco et al., the frequency of IA increases significantly in young students due to not only their social isolation and increased individualism but also the current enculturation process (12). The data from a longitudinal study of a wide range of university students show that IA has a significant predictive influence on depressive and anxiety symptoms, and the latter, in turn, leads to the development of the IA phenomenon, indicating the presence of reciprocal relationships (13). Students with anxiety and depressive disorders often tend to prefer the Internet and virtual relationships over real and face-to-face contact, leading to an alteration in their physical, mental, and social well-being (14). This underscores the disturbing nature of IA and the psychological and mental risks inherent in its use. However, in recent years, a growing body of research has focused on therapeutic ways to ameliorate the phenomenon of IA and its psychopathological consequences.

Cognitive-behavioral therapy (CBT) is a scientifically validated and widely practiced psychotherapeutic approach for promoting and improving student mental health (14). This therapy focuses on developing individualized strategies to overcome negative emotions and thoughts. It is used to treat a wide variety of mental disorders, including behavioral addiction and related issues of depression, anxiety, and stress (15, 16). Many CBT methods are used to improve the psychological state of individuals, including cognitive restructuring, graded exposure, mindfulness meditation, interpersonal skills training, lifestyle reorganization, and activity planning (17).

Several studies have confirmed that CBT is an effective way to change thinking patterns, correct behavioral habits, and maintain health after rehab. This allows students to uncover the root causes of their addiction and seek to resolve difficulties and problems encountered in their activity while improving their symptoms of depression, anxiety, and stress (18, 19). According to a meta-analysis study, CBT reduced levels of stress, depression, and anxiety both before and after the test (20). Kunikata et al. showed that this improvement persisted 2 months after the intervention (19).

2. Objectives

Although previous studies conducted in different countries and cultures indicate significant relationships between IA with depression, anxiety, and stress and the beneficial effects of CBT on addressing these different issues with nursing students, to date, no study has examined this issue in the Moroccan context. Therefore, the present study aimed to evaluate the effect of CBT on the management of Internet-addictive behaviors and on the improvement of depression, anxiety, and stress levels among nursing students in Morocco. With this issue in mind, the present study was guided by the following question:

Are there significant differences in levels of IA, depression, anxiety, and stress in nursing students between the control and treatment groups?

3. Methods

A pretest and posttest design with follow-up was used in this study to evaluate the impact of a cognitive-behavioral group therapy (CBGT) program on reducing levels of IA and depression, anxiety, and stress in undergraduate nursing students between September 1, 2022, and February 15, 2023. The data were collected from 60 students from a convenience sample through a recruitment advertisement distributed at the Higher Institute of Nursing Professions and Health Techniques of Tetouan, located in northern Morocco. Initially, 65 individuals enrolled in the CBGT program. Of these students, 5 were excluded because they were undergoing antidepressant treatment. Excel's RAND function was used to randomly assign these participants to the intervention and control groups which resulted in a random order based on a 1:1 allocation. In effect, 30 participants were in a control group and 30 participants in an intervention group.

To be included in this study, the participants had to be students enrolled in the undergraduate nursing

program, have a diagnosis of IA, and have symptoms of depression, anxiety, and stress as determined by the Internet Addiction Test (IAT) and the Depression, Anxiety, and Stress Scale-21 items (DASS-21), be able to communicate in a group setting, agree to participate voluntarily in all training sessions. Excluded from the study were all subjects with severe psychiatric and/or physical disorders, including psychotic disorders, borderline or antisocial personality disorders, and substance use disorders, in addition to those undergoing psychopharmacological or psychotherapeutic treatment.

Students in the control group did not participate in this training; however, they did attend a 1-hour awareness session in which the researchers explained the purpose of the study while promising that they would receive the same CBT training at the end of the study if this intervention produced positive results with the experimental group.

The sample size was calculated with the multivariate analysis of the covariance (MANCOVA) method ([21]). Considering a significance level of α = 0.05, an expected large effect size is η^2 = 0.12, with a statistical power of 0.92. This sample size was quite sufficient to perform a meaningful statistical analysis.

Before the training program began, a pretest was conducted in both groups. Then, eight CBT training sessions were provided for the experimental group by an experienced psychiatrist-psychotherapist with a doctorate in psychiatry and another doctorate in applied psychology for one 2-hour session per week, supplemented by 30 minutes of daily home exercises. This training program was designed to help nursing students limit their IA by reducing levels of depression, anxiety, and stress. The design of the training was derived from the data collected from the literature and the synthesis of some previous studies based on the cognitive-behavioral model ([22], [23]). The content of this program included cognitive restructuring, virtual exposure, mindfulness meditation, relationship skill development, activity planning, and relaxation techniques. The following exercises are offered:

Cognitive restructuring: The psychotherapist asks students to recall situations during their training where they have abused the Internet and experienced feelings of depression accompanied by feelings of disempowerment and stress while sharing this situation with them. Sharing these experiences allows students to (1) identify erroneous and inappropriate thinking patterns and develop new principles of therapeutic thinking in problematic situations and moderation and controlled use of the Internet; and (2) as a group discussion to feel a sense of belonging and socialization and to learn from the experiences of others.

Virtual exposure: The therapist asked the students to meet in groups of 4 - 5 individuals. The therapist showed them different videos and situations of individuals who use the Internet for long periods of time and show symptoms of anxiety, isolation, sleep disturbances, mood lability, body neglect, and episodes of agitation. Moreover, other videos showed students engaged in sports activities and group travel with complete satisfaction and happiness. He then asked students to analyze and comment on these situations. This strategy involves repeatedly exposing students to the problem and making them aware of the risks of this behavioral addiction and the benefits of self-awareness and valuing interpersonal relationships in reality. Through systematic exposure to similar situations, awareness levels become higher, leading students to adopt a healthy lifestyle and reduce feelings of depression, anxiety, and stress.

Mindfulness meditation: The therapist invites the students to sit comfortably in an extremely quiet space without distractions and asks them to breathe deeply through their noses while closing their eyes. While breathing, he asks them to focus on their breathing and control it for 5 minutes. Through this technique, students focus on the present moment, which increases their ability to manage distressing emotions and overcome cognitive and emotional difficulties.

Relationship skills training: The therapist began by providing a thorough diagnosis of the students' interpersonal difficulties, including the fact that Internet users prefer isolation and virtual relationships and have difficulty making physical contact and social connections. He then addressed social skills training through role-playing. These exercises allowed the therapist to give immediate feedback to the students so that they could correct any mistakes they made.

Planning activities: The therapist invited the students to identify the negative behaviors and thoughts caused by their ongoing exposure to the Internet and the ineffective coping strategies they used to deal with them. Next, the therapist encouraged the students to implement a daily program aimed at reintegrating meaningful activities into their daily lives, including hiking or volunteering in humanitarian organizations. He also suggested that the students keep a detailed weekly journal of these activities and record their feelings of happiness related to these activities so that the therapist could then identify the missing elements in their daily program.

Relaxation preparation: The therapist asks the students to place themselves in a comfortable relaxation position and immerse themselves in progressive relaxation with relaxing oriental music. The psychotherapist uses spoken words to guide them

to focus on all parts of the body, from head to toe, in a rotating manner.

During the final training session, students in the intervention and control groups were asked to complete post-test questionnaires. In addition, as part of the control and follow-up, the students in the intervention group were reassessed 3 months after the end of the CBGT training to see if the results obtained were maintained over time.

The Director of the Higher Institute of Nursing Professions and Health Techniques approved this study. Informed consent was obtained from all the students who voluntarily agreed to participate. No personal information was collected from participants, and all the data collected remained confidential. In addition, the researchers assured participants that participation was voluntary and that they could withdraw from the study at any time without any negative consequences.

The following instruments were used in this study:

3.1. Internet Addiction Test

This is the most widely used measurement instrument in the world (24, 25). In this study, the Arabic version of the IAT (26) was used to assess the degree of IA of nursing students on a 6-point Likert scale, with a total score ranging from 0 to 100. According to the manual, scores between 0 and 30 reflect a normal level of Internet use; scores between 31 and 49 indicate the presence of a mild level of IA; scores between 50 and 79 reflect the presence of a moderate level, and scores between 80 and 100 indicate severe IA (2). The psychometric properties of the 20-item scale in the Arabic context, designed as a unidimensional instrument, were deemed appropriate (26). In the present study, Cronbach's alpha of the online application of the one-item IAT was 0.912.

3.2. Depression, Anxiety, and Stress Scale-21 Items

The psychological symptoms of depression, anxiety, and stress were measured with the Arabic version of the DASS-21 (27). This scale contains 21 items divided into three domains, including depression (3, 5, 10, 13, 16, 17, 21), anxiety (2, 4, 7, 9, 15, 19, 20), and stress (1, 6, 8, 11, 12, 14, 18). Respondents rate the level of symptoms experienced in the past week on a 3-point Likert scale, ranging from 0 (does not apply to me at all) to 3 (applies to me often or most of the time). Total scores for each item ranged from 0 to 42, with a higher score indicating a greater degree of psychological suffering.

Depression levels were defined as normal (0 - 9), mild (10 - 13), moderate (14 - 20), severe (21 - 27), and extremely severe (> 27). Anxiety levels were defined as normal (0 - 7), mild (8 - 9), moderate (10 - 14), severe (15 - 19), and extremely

severe (> 19). Stress levels were defined as normal (0 - 14), mild (15 - 18), moderate (19 - 25), severe (26 - 33), and extremely severe (> 33). The DASS-21 had excellent reliability in all three domains of depression ($\alpha = 0.95$), anxiety ($\alpha = 0.96$), and stress ($\alpha = 0.94$). In the present study, Cronbach's alpha of the scale was 0.97.

3.3. Demographic Questionnaire

Personal data were collected from the demographic questionnaire completed by the nursing students, including age, gender, specialty, and level of education. Statistical tests used in this study included descriptive statistics, such as number (No), percentage (%), mean, and standard deviation (SD), to analyze group characteristics and study variables. Pearson's correlation was used to determine correlations between the IAT and DASS-21 domains. An analysis of covariance (ANCOVA) was applied to test the effects of the intervention, using the baseline scores of the two groups as input covariates. First, the ANCOVA assumptions were tested for the scores of each item. If the interaction coefficient was $P > 0.05$ for the baseline scores of the intervention group, ANCOVA was applied, and if the interaction coefficient was $P < 0.05$, ANCOVA was considered inappropriate. To investigate the follow-up effects of the intervention program, one-factor analysis of variance with repeated measures was performed at three points of time (i.e., preintervention, postintervention, and 1 month later, respectively) in the two groups. A Bonferroni multiple test was performed for the comparisons of items with significant effects. A significance level of $P < 0.05$ was used in all analyses. The data were analyzed using SPSS software version 23.0 (Armonk, NY: IBM Corp.).

4. Results

First, the demographic characteristics of the participants were presented. In the intervention and control groups, the mean age of participants was 20.12 ± 1.06 years. The majority of participants (63.33%, n = 38) were female. Moreover, 40% (n = 24) of the participants were multi-purpose nursing students, and 36.6% (n = 22) were in their second year of study (Table 1).

Descriptive statistics for the main variables of the research question are presented in Table 2 at the pretest, posttest, and 3-month follow-up stages. Consistent with the results in Table 2, mean IA, depression, anxiety, and stress scores were reduced after the CBGT program among students in the intervention group. However, these changes were not observed in the control group. Table 2 shows the results of the three-step intervention.

Table 1. Demographic Characteristics of Students Participating in the Study [a]

	Control Group (n = 30)	Intervention Group (n = 30)
Age (y)		
20.12 ± 1.06		
Gender		
Female	18 (60)	20 (66.6)
Male	12 (40)	10 (33.4)
Specialty		
MHN	12 (40)	11 (36.6)
MPN	11 (36.6)	13 (43.4)
FCHN	7 (23.4)	6 (20)
Educational level		
1st year	9 (30)	11 (36.6)
2nd year	11 (36.6)	11 (36.7)
3rd year	10 (33.4)	8 (26.7)

Abbreviations: SD, standard deviation; MHN, mental health nursing student; MPN, multi-purpose nursing student; FCHN, family and community health nursing student.

[a] Values are expressed as mean ± SD or No. (%).

The Pearson test was used to determine the correlation between the IAT and the DASS-21. A statistically positive correlation was observed between IAT scores and DASS-21 domains and between the overall scores of the two scales ($r = 0.265$, $P < 0.022$). The overall IAT score increased in parallel with that of the DASS-21 (Table 3).

Before proceeding with the analyses of variance, the Kolmogorov-Smirnov test was used to normalize the data. The results obtained by this test were greater than 0.05, which indicated that the distribution of the scores of the dependent variables was normal ($P \geq 0.05$). In addition, to check the presumption of the test, Box's covariance matrix equality test was used, which equalizes the covariance matrices. Furthermore, Mauchly's sphericity test was used, which checks the conditionality of the results.

Table 4 shows the results of Box's covariance matrix equality test. The significance level of the F statistic for all four variables was above 0.05, indicating that all dependent variables were equally distributed between the two groups. In Table 5, the results of Mauchly's sphericity test designed to verify the sphericity condition reveal that the hypothesis is valid ($P \geq 0.05$).

In order to confirm that the changes in the mean values were statistically significant, a MANCOVA was conducted. As a prerequisite to this analysis, Levene's test was applied to examine the validity of the assumptions regarding the stability of variance. This test yielded no statistically significant results for any of the variables (IAT: $F = 2.44$, P

> 0.05; depression: $F = 2.32$, $P > 0.05$; anxiety: $F = 2.49$, $P > 0.05$; stress: $F = 2.51$, $P > 0.05$). Therefore, a MANCOVA can be performed.

The results of MANCOVA showed that the mean posttest scores were statistically significant between the two groups after excluding the pretest score (IAT: $F = 11.12$, $P < 0.05$; depression: $F = 8.12$, $P < 0.05$; anxiety: $F = 7.43$, $P < 0.05$; stress: $F = 9.54$, $P < 0.05$). Therefore, the descriptive results allowed the researchers to state that CBGT was effective in improving levels of Internet addiction, resulting in reduced levels of depression, anxiety, and stress (Table 6).

Furthermore, a 3-month follow-up evaluation was also conducted with MANCOVA to test for the maintenance and persistence of differences in the level of the variables involved between the two groups. To this end, Levene's test was used prior to the MANCOVA analyses to determine the extent to which the assumptions of homogeneity of variance were met. The results for each variable were not statistically significant (IAT: $F = 1.22$, $P > 0.05$; depression: $F = 1.14$, $P > 0.05$; anxiety: $F = 1.27$, $P > 0.05$; stress: $F = 1.30$, $P > 0.05$). Therefore, it was still possible to conduct MANCOVA (Table 7).

The results of the 3-month follow-up assessment showed a statistically significant difference between the pretest and post-test results in the areas of IA, depression, anxiety, and stress. As a result, the intervention group showed remarkable improvements after eight weekly CBGT sessions, and these improvements continued after 3 months of follow-up. Therefore, this program was effective in treating IA problems, contributing to a reduction in psychological disorders while improving the participants' quality of life.

5. Discussion

The present study is the first in Morocco to evaluate an eight-session CBGT program and a three-month follow-up with nursing students addicted to the Internet with symptoms of depression, anxiety, and stress. The results obtained allow the researchers to confirm that the students were able to develop the necessary skills to control problematic behaviors related to IA according to the results of the posttest and the 3-month follow-up, thanks to the CBGT program, including a knowledge base on IA and practical exercises. At the same time, there was a decrease in symptoms of depression, anxiety, and stress. This result corroborates the findings of Hofmann and Smits (28) and Olthuis et al. (29), who found a significant reduction between pretest and posttest scores for all variables and in particular for IA, depression, anxiety, and stress, and this improvement was maintained throughout

Table 2. Comparison of Mean ± Standard Deviation Scores for the Internet Addiction Test and the Depression, Anxiety, and Stress Scale-21 Items at Pretest, Posttest, and 3-Month Follow-up [a]

Variables and Evaluation	Control Group (n = 30)	Intervention Group (n = 30)	P-Value
Total IAT			0.001
Pretest	51.32 ± 12.31	52.92 ± 14.79	
Posttest	51.89 ± 12.29	47.24 ± 12.35	
3-month follow-up	50.89 ± 12.75	45.38 ± 11.60	
Depression			0.002
Pretest	12.39 ± 3.77	12.30 ± 3.28	
Posttest	12.52 ± 3.78	10.27 ± 2.22	
3-month follow-up	12.30 ± 3.46	8.48 ± 2.13	
Anxiety			0.003
Pretest	17.33 ± 4.74	16.24 ± 4.31	
Posttest	17.77 ± 4.83	14.12 ± 3.46	
3-month follow-up	17.43 ± 4.62	11.38 ± 2.28	
Stress			0.001
Pretest	19.28 ± 4.34	19.16 ± 4.63	
Posttest	19.69 ± 4.56	14.64 ± 3.38	
3-month follow-up	18.11 ± 3.96	11.40 ± 2.76	

Abbreviations: SD, standard deviation; IAT, Internet Addiction Test.
[a] Values are expressed as mean ± SD.

Table 3. Correlation Matrix Between Internet Addiction Test Scores and Depression, Anxiety, and Stress Scale Scores

Variables	IAT	Depression	Anxiety	Stress
Depression				
r	0.243 [a]	1		
P	0.021			
Anxiety				
r	0.182 [a]	0.281 [a]	1	
P	0.004	0.026		
Stress				
r	0.197 [a]	0.272 [a]	0.251 [a]	1
P	0.032	0.024	0.022	
DASS-21				
r	0.265 [a]	0.242 [a]	0.269 [a]	0.255 [a]
P	0.022	0.031	0.034	0.023

Abbreviations: r, Pearson product-moment correlation; IAT, Internet Addiction Test; DASS-21, Depression, Anxiety and Stress Scale-21 items.
[a] $P < 0.05$.

the follow-up period. Therefore, these results support the validity of CBGT programs for improving this type of disorder.

Previous studies have shown that any excessive and abusive use of the Internet contributes to the development of certain psychological disorders, including depression, anxiety, and stress, thereby significantly affecting students' interpersonal relationships, habits, and quality of life, in addition to their personal and academic performance (30). In this context, the psychological problems of Internet addicts appear when they experience an irrepressible need to connect to the Internet with a loss

Table 4. Box's M Test of Equality of Covariance Matrices [a]

Variables	Box's M	F	Df$_1$	Df$_2$	P-Value
IAT	12.26	1.24	8.00	4836.17	0.34
Depression	10.30	1.02	8.00	4836.17	0.38
Anxiety	9.25	0.69	8.00	4836.17	0.47
Stress	11.07	1.13	8.00	4836.17	0.35

Abbreviation: IAT, Internet Addiction Test.
[a] $P \geq 0.05$.

Table 5. Mauchly's Test of Sphericity [a]

Variables	Mauchly's W	Approx. Chi-Square	Df	Sig
IAT	0.96	2.84	2	0.27
Depression	0.82	4.61	2	0.18
Anxiety	0.85	4.59	2	0.13
Stress	0.93	2.64	2	0.21

Abbreviation: IAT, Internet Addiction Test
[a] $P \geq 0.05$.

Table 6. Multivariate Analysis of Covariance Results Related to Internet Addiction, Depression, Anxiety, and Stress in the Control and Experimental Groups at Posttest Stage [a]

Dependent Variables	Sum of Squares	df	Mean Square	F	P-Value
IAT	59.15	1	59.15	11.12	0.001
Depression	31.22	2	15.61	8.12	0.001
Anxiety	24.51	2	12.25	7.43	0.001
Stress	41.36	2	20.68	9.54	0.001

Abbreviation: IAT, Internet Addiction Test.
[a] $P < 0.05$.

Table 7. Multivariate Analysis of Covariance Results Related to Internet Addiction, Depression, Anxiety, and Stress in the Control and Experimental Groups at 3-Month Follow-up [a]

Dependent Variables	Sum of Squares	df	Mean Square	F	P-Value
IAT	64.30	1	64.30	9.84	0.001
Depression	44.14	2	22.07	7.24	0.001
Anxiety	35.73	2	17.86	6.30	0.001
Stress	29.98	2	14.99	5.76	0.002

Abbreviation: IAT, Internet Addiction Test.
[a] $P < 0.05$.

of quantitative and temporal control (use turns into abuse) and tolerance and, therefore, manifestations of withdrawal when their use is reduced or interrupted. Relational or social difficulties refer to the use of the Internet as a means of social comfort and interaction, replacing real-life relationships and social activities. Habit and quality of life issues refer to the inability to manage time spent online, resulting in sleep and eating disorders. Performance refers to the lack of self-control in the face of internet abuse, which leads to neglect of school obligations and poor performance or dropping out of school.

According to a study by Du et al., a CBGT program gradually reduced IA. Results showed that only the school-based CBGT improved time management skills and behavioral, emotional, and cognitive symptoms compared to the control group (31). At the same time, some studies indicate that cognitive distortions (errors) are the primary factor in IA. Therefore, a CBGT program can correct these types of cognitive distortions (32).

Moreover, the results of the present study indicated that CBT is particularly beneficial in alleviating depressive symptoms in the intervention group compared to the control group. These results are consistent with findings from previous research. For example, Liu et al. claimed that psychotherapeutic treatment with CBT resulted in sustained and satisfactory improvement in depressive states (9). Okunna et al.'s study added that CBT exerts a significant effect on the attitudes and beliefs of Internet addicts through the enhancement of social skills, increase in self-esteem, development of logical thinking, and strengthening of the willingness to rationalize one's Internet use, thereby leading to a decrease in their depressive symptoms (33).

Regarding the interest of CBT in alleviating anxiety symptoms in Moroccan nursing students addicted to the Internet, it is important to note that this therapy is one of the most effective therapeutic methods for anxiety disorders (32). This therapy is particularly suitable to help Moroccan nursing students suffering from IA develop new cognitive mechanisms allowing them to modify their perception and behavior. This therapeutic approach is essentially based on relaxation and cognitive restructuring strategies. The latter aims to challenge anxiety-provoking ideas through the control and reshaping of information and effective behavior modification (34).

In addition, relaxation exercises, such as respiratory relaxation and mindfulness, induce the relaxation of muscle tension, heart rate, and breathing (35). In the present study, relaxation and mindfulness exercises allowed Moroccan nursing students to relax these physical responses and therefore report a decrease in anxiety levels. In addition, relaxation exercises generally improve blood flow and brain function, thereby reducing anxiety (20).

The results of the current study also showed that CBT helped reduce the stress level of Moroccan nursing students addicted to the Internet. In this regard, previous studies have revealed similar results to those obtained in the present study (36). From this perspective, this therapeutic method can promote the development of social, coping, and personal emotion management skills to enable students to build relationships with their peers and combat social isolation, which is a facet of stress and anxiety states in young students. In addition, CBT can reduce stress levels as a supportive therapy that helps students understand that everyone is on the same path. This can develop pleasant emotions necessary to reduce stress and anxiety states (9, 20).

In summary, the present study concludes that eight weekly CBT sessions and a 3-month follow-up were effective in managing Internet addictive behaviors and significantly reduced levels of depression, anxiety, and stress. However, additional studies are still needed. Due to the high risk of comorbidity associated with IA and related problems, there is a need for nursing education programs to incorporate a module on IA into their curriculum.

5.1. Strength and Limitations

To the best of our knowledge, this study is the first to evaluate the effects of CBGT on the management of IA and improvements in levels of depression, stress, and anxiety. The main strengths are the longitudinal research design based on randomization, which ensures that causal relationships between the different variables can be determined. In addition, the active participation of all the students throughout the study should be highlighted, which also guarantees the reliability of the data. However, certain limitations must be taken into account. This study was carried out with nursing students from a single institution suffering from IA, depression, anxiety, and stress. This might limit the representativeness of all nursing students and, therefore, the generalisability of the results. In addition, the psychological intervention was not compared to a sham or a placebo. Sessions used outside the technique could be useful. Similarly, future studies should be based on mixed methods, including measurement scales and individual interviews, to enable a more comprehensive evaluation of the effect of the CBGT program on IA, depression, anxiety, and stress.

5.2. Conclusions

In conclusion, this study showed that CBGT is a very effective treatment for IA and reduces levels of depression, anxiety, and stress in nursing students. Due to its highly individualized nature, CBGT is a real therapeutic tool for individuals who cannot afford expensive therapy. It can also help treat other behavioral addictions, such as smartphone addiction, and reduce the symptoms of IA. Randomized cross-sectional studies are also needed to verify the effects of this type of therapy on IA and psychopathological manifestations in Morocco.

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Footnotes

Authors' Contribution: Study design, data acquisition, and data analysis and interpretation: JK; article writing

and critical revision for important intellectual content: LM and SA; final approval of the version for submission: All authors.

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