Research Paper

Investigating the Effectiveness of Group Metacognitive Therapy on Internet Addiction and Cognitive Emotion Regulation Among Adolescents

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ABSTRACT

Objective: This study aims to investigate the effectiveness of group metacognitive therapy on internet addiction and cognitive-emotional regulation among adolescents.

Methods: We used a quasi-experimental design that included pre-test s, post-tests, and follow-ups. In the 2020-2021 academic year, all the male adolescents in Qazvin City, Iran were included in this study. A total of 30 adolescents were randomly selected and assigned to intervention or control groups based on the convenience sampling method (n=15). We provided ten 90-min group metacognitive therapy sessions to the intervention group, while the control group received no intervention. The internet addiction questionnaire along with the cognitive emotion regulation questionnaire was used to collect the data. We conducted the multivariate analysis of covariance, repeated measures, and Fisher least significant difference post hoc test via the SPSS software, version 26.

Results: The results of this study demonstrated that group metacognitive therapy significantly affected adolescents' internet addiction and cognitive emotion regulation ($P<0.05$). In addition, the analysis revealed that internet addiction and cognitive emotion regulation among adolescents were significantly different between intervention and control groups. The treatment remained unchanged at the follow-up stage ($P<0.05$).

Conclusion: It is recommended that school and family counselors be trained and given executive duties in group metacognitive therapy, which influences Iranian adolescents. These methods may assist overactive adolescents and their families in achieving their learning goals through empowerment, analysis, and interpretation workshops and meetings.

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Highlights

- Metacognitive therapy (MCT) is effective in treating Internet addiction and improving emotion regulation in adolescents.
- 30 adolescents were assigned into a metacognitive therapy and a control groups.
- The MCT significantly improved Internet addiction and cognitive emotion regulation.
- The study highlights early intervention in addressing Internet addiction and promising avenues for future research.

Plain Language Summary

The prevalence of Internet addiction has been rapidly increasing among adolescents in recent years. It is a multifaceted issue that affects various aspects of their lives, including their cognitive-emotional regulation. One promising approach to addressing this issue is group metacognitive therapy, which is a form of cognitive-behavioral therapy that focuses on enhancing metacognitive skills, such as awareness of thoughts and beliefs, and their impact on behavior. The therapy aims to improve individuals' ability to regulate their emotions and behaviors by providing them with cognitive and behavioral strategies to monitor and control their thoughts and feelings. It is delivered in a group setting, which allows participants to learn from each other's experiences and offer support to one another. The effectiveness of group metacognitive therapy in addressing Internet addiction and improving cognitive-emotional regulation among adolescents has been supported by research. The findings highlight the importance of providing adolescents with effective interventions to help them manage their Internet use and regulate their emotions and behaviors.

1. Introduction

In recent years, the development of information technology has brought convenience and problems to societies, particularly adolescents. Given their immature physical and psychological characteristics, adolescents are prone to poor self-control (Nooripour et al., 2022).

Nowadays, the internet plays a significant role in the development of adolescents. Furthermore, the internet has become a primary channel for adolescents to understand the world and form values besides their studies, daily activities, entertainment, and social interactions (Lawrence, 2021). However, with the proliferation of the internet and other social tools, such as smartphones, tablets, and computers, adolescents' focus has shifted toward the internet. There are also several controversial problems associated with the internet, such as internet addiction (Li & Katsumata, 2020).

Adolescents may be prone to internet addiction, which can affect their physical (Alaca, 2020) and mental health (Hosseinian & Nooripour, 2019) along with their academic performance (Ding et al., 2022). They can even generate suicidal ideation (Hamilton et al., 2022). According to the diagnostic and statistical manual of mental disorders, 5th edition (DSM-5-TR), internet addiction is characterized by psychological dependence, tolerance, and withdrawal symptoms (First et al., 2022) Adolescents with internet addiction have more problematic internet usage, which is associated with negative emotions and poor emotional regulation (Drach et al., 2021). Because the internet has a primarily social function, internet addiction can also be considered a social tool (Cerniglia et al., 2017; Gong et al., 2020). The internet has become increasingly popular among adolescents, and internet addiction is becoming more prevalent; therefore, understanding what characteristics adolescents exhibit when using the internet and how social media impacts this group's development has become an important research area (Yeh et al., 2008).

According to recent research, adolescents addicted to the internet have less ability to regulate their emotions because of excessive expressive suppression and insufficient cognitive reappraisal (Karaer & Akdemir, 2019). Possible negative emotional experiences and internet addiction are related due to the extreme suppression of negative emotions. This leads to a deficit in emotional regulation (Hormes, Kearns, & Timko, 2014). Negative emotions can lead to risky and compulsive behaviors along with maladaptive coping strategies in a person suffering from emotional dysregulation. Emotional regulation leads to internet addiction (Quaglieri et al., 2021). Individuals with problematic internet use find it difficult

to accept negative emotions, control impulsive behavior, and access effective emotional regulation strategies (Pettorruso et al., 2020). People who are more likely to engage in maladaptive strategies may use the internet excessively to suppress negative emotions or compensate for this state (Gioia, Rega, & Boursier, 2021).

Various short-term interventions have been used for adolescents and students. Group metacognitive therapy (MCT) is one of these treatments.

MCT identifies 3 primary psychological processes: Metacognitive beliefs, experiences, and strategies. By strengthening regulation strategies and increasing capabilities, such as evaluation, planning, attention, and removing cognitive, emotional, and behavioral traits, this treatment provides adolescents with the possibility to deal with their condition with more power and efficiency (Papageorgiou & Wells, 2015). By correcting destructive and unrealistic metacognitive beliefs, experiences, and strategies of adolescents, MCT can be effective in considerably improving their motivation (McEvoy, Erceg-Hurn, Anderson, Campbell, & Nathan, 2015). MCT (Fisher & Wells, 2005; Wells & Leahy, 1998) focuses on modifying metacognitive beliefs and rituals. Experimental component studies have derived empirical evidence supporting MCT (Fisher & Wells, 2005). There is evidence to support full MCT in both children and adolescents (Simons et al., 2006) along with adults receiving this treatment individually (Fisher & Wells, 2008; van et al., 2016) and group setting (Rees & van Koesveld, 2008).

Psychological interventions aim to reduce internet addiction severity while striving to achieve 3 primary goals as follows: Reducing hours spent on the internet, improving functioning in crucial areas of an individual's life, and reducing exposure to online content. According to the theoretical model that guides the present intervention, adolescents with self-skills acquired through MCT intervention will have better outcomes, including problem-solving, positive thinking, distraction, decision-making, and emotional and cognitive control. There has been no direct research on the efficacy of this type of therapy on internet addiction or cognitive emotion regulation among adolescents because this therapy is new, and studies on MCT have focused more on anxiety and depression disorders. The present research aims to investigate the effectiveness of group MCT on internet addiction and cognitive emotion regulation among adolescents.

2. Materials and Methods

This was a quasi-experimental study with a pre-test, post-test, and follow-up with a control group. Accordingly, we had two groups (intervention and control). In this study, 30 male adolescents were selected via the convenience sampling method from Qazvin City, Iran and randomly assigned to intervention (n=15) and control groups (n=15) in the 2020-2021 academic year. We provided ten 90-min group MCT sessions to the intervention group, while the control group received no intervention. In total, adolescents were in 3 educational levels (grades 10, 11, and 12). The average age of the participants was 17.2 years. We used the following measures.

Internet addiction questionnaire

The internet addiction questionnaire (IAQ) was developed by Young in 1998 (Young, 1998). It has 20 items and is scored based on a 5-point Likert scale. A score in the range of 0 and 30 indicates no problematic internet use. In the present study, the participants' scores were divided into two dichotomous categories as follows: 0 to 49=no problematic use, and 50 to 100=problematic internet use. The scale's internal consistency was reported at 0.82 using the Cronbach α method at (α=0.92) (Widyanto & McMurran, 2004). In Iran, the Cronbach α of the scale was equal to 0.73 for Iranian adolescents (Nemati & Matlabi, 2017). In this study, Cronbach α was reported at 0.89.

Cognitive emotion regulation questionnaire

The cognitive emotion regulation questionnaire (CERQ) was developed by Garnefski et al. in 2002 (Garnefski et al., 2002). This scale has 36 items to identify cognitive coping strategies. The items are scored based on a 5-point Likert scale ranging from 1 to 5. The reliability of the scale in Iran was reported at 0.83 using the Cronbach α coefficient (Abdi et al., 2012). We obtained the Cronbach α of 0.71 for this scale in this study.

Study procedure

After passing the inclusion and exclusion criteria, we could access 33 male adolescents in the 2020-2021 academic years. The final group of 30 individuals was randomly assigned to the intervention or control group.

Inclusion criteria

The inclusion criteria were as follows: Conscious and voluntary consent to participate in the study, scoring above 80 on IAQ, lacking any psychiatric severe disor-

der at the discretion of the researcher, lacking any physical disability and psychiatric medication use, the lack of simultaneous participation in other educational interventions, and middle socio-economic status.

Exclusion criteria

The exclusion criteria included absence for over two sessions, failure to do homework, unwillingness to participate in sessions, and participation in any psychological training parallel to the current study.

The participants received individual weekly 90-min sessions of group MCT as follows (Wells & King, 2006; Wells & Matthews, 1996):

Weeks 1–3: These sessions included familiarizing the students with MCT, defining and introducing internet addiction and cognitive emotion regulation, explaining MCT, and providing homework, along with teaching and conducting thought suppression experiments, starting with belief in uncontrollability, teaching broken mindfulness, teaching and practicing techniques for teaching attention, and refocusing attention on situation, and then, the assignment was to practice broken mindfulness and to postpone worries.

Weeks 4–7: These sessions included reviewing the homework (mindfulness techniques), starting challenging motivators, and ignoring metaphors of broken minds. The task was to cease worry-avoiding behaviors and experiment with losing control. Meanwhile, we reviewed the homework and behavioral tests to challenge beliefs regarding danger and threat. Implementing mismatch strategies, challenging maladaptive strategies, reversing any maladaptive strategies, and other behavioral tests to challenge positive beliefs were also components of this part.

Weeks 8–10: These sessions included reviewing homework, continuing challenging with positive beliefs, and implementing the strategy of non-compliance in a treatment session, along with identifying residual factors that trigger mind-numbing symptoms and working on a new program. Strengthening alternative programs and explaining the method by giving an example and running a post-test were also components of this part.

This study used multivariate analysis of covariance, repeated measures, and the Fisher least significant difference post hoc test via the SPSS software, version 26 to analyze the data.

3. Results

The participants' demographic data are shown in this study. Accordingly, 30 male students of the secondary high school participated in the research, 15 of whom were in the intervention group, including 5 students in 10th grade, 4 students in 11th grade, and 6 students in 12th grade. The Mean±SD age was 17.34±0.84 years. In addition, 15 students were in the control group, including 6 students in 10th grade, 5 students in 11th grade, and 4 students in 12th grade, with a Mean±SD age of 16.75±0.79 years.

According to Table 1, the Mean±SD of internet addiction in the intervention group for the pre-test was 82.33±3.81, respectively, and for the post-test stage these numbers were 75.86±5.64, respectively, while in the follow-up stage, the numbers were 76.80±3.27, respectively. The Mean±SD of internet addiction in the control group for the pre-test stage were 81.20 and 3.72, respectively, and for the post-test stage, these numbers were 83.20±6.06, respectively. The intervention group's Mean±SD of negative cognitive emotion regulation for the pre-test were 30.13±1.45, while they were 23.40±2.66, respectively, for the post-test stage, and 23.86±2.85, respectively, for the follow-up stage. The Mean±SD of negative cognitive emotion regulation in the control group for the pre-test stage was 31.93±1.86, respectively, while for the post-test stage were 31.60±5.03, respectively. The Mean±SD of the intervention group's positive cognitive emotion regulation for the pre-test stage were 14.66±3.28, respectively, while for the post-test stage, they were 19.80±2.33, respectively, and 20.46±4.27, respectively, for the follow-up stage. The Mean±SD of positive cognitive emotion regulation in the control group in the pre-test stage were 15.20±3.93, respectively, and in the post-test stage, they were 16.00±3.02, respectively.

Table 2 shows the homogeneity, normality, and equality of the regression slopes. The Box M test was used to compare the covariance matrices of dependent variables between the intervention and control groups. The covariance matrix of dependent variables was unequal in both groups. A significant difference was detected between the intervention and control groups in the linear combination of internet addiction and emotion regulation (Pillai Trace=0.50, F (3, 23)=7.70, P<0.05).

table 1. Descriptive findings of internet addiction and cognitive emotion regulation in intervention and control groups (n=15)

Test		Pre-test	Post-test		Follow-up
Variables	**Group**	**Mean±SD**	**Mean±SD**	**Mean**	**Mean±SD**
Internet addiction	Intervention	82.33±3.81	75.86±5.64	75.38	76.80±3.27
	Control	81.20±3.72	83.20±6.06	83.68	-
Negative emotion regulation strategy	Intervention	30.13±1.45	23.40±2.66	23.30	23.86±2.85
	Control	31.93±1.86	31.60±5.03	31.69	-
Positive emotion regulation strategy	Intervention	14.66±3.28	19.80±2.33	20.08	20.46±4.27
	Control	15.20±3.93	16.00±3.02	15.71	-

SD: Standard deviation.

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Table 2. Examination of assumptions of normality, equality of error variances, homogeneity of regression slope, and equality of covariance matrix

Variables	Test	Group	Kolmogorov-Smirnov		Levene Test	Variance Test	Box Test
			Statistics	**Significance**	**F (1, 28)**	**F (2, 23)**	**F (6.5680, 30)**
Internet addiction	Pre-test	Intervention	0.13	0.20	0.49 (P=0.49)	1.15 (P=0.33)	2.26 (P<0.05) Box's M=15.39
		Control	0.15	0.20			
	Post-test	Intervention	0.17	0.20			
		Control	0.16	0.20			
	Follow-up	Intervention	0.15	0.20			
		Control	0.14	0.20			
Negative emotion regulation strategy	Pre-test	Intervention	0.20	0.097	2.63 (P=0.11)	3.09 (P=0.056)	
		Control	0.22	0.068			
	Post-test	Intervention	0.17	0.20			
		Control	0.15	0.20			
	Follow-up	Intervention	0.18	0.17			
		Control	0.20	0.20			
Positive emotion regulation strategy	Pre-test	Intervention	0.16	0.20	0.59 (P=0.45)	0.42 (P=0.66)	
		Control	0.22	0.089			
	Post-test	Intervention	0.17	0.20			
		Control	0.17	0.20			
	Follow-up	Intervention	0.11	0.20			
		Control	0.19	0.091			

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Table 3. Univariate analysis of covariance of internet addiction and cognitive emotion regulation

Dependent Variables	Source of Changes	Total Squares	df	Mean of Squares	F	Sig.	Effect Size	Test Power
Internet addiction	Pre-test	143.00	1	143.00	5.01	0.034	0.17	0.57
	Group	378.40	1	378.40	13.27	0.001	0.35	0.94
	Error	712.72	25	28.51				
Negative emotion regulation strategy	Pre-test	0.001	1	0.001	0.001	0.99	0.99	1.00
	Group	385.68	1	385.68	21.76	0.001	0.46	0.99
	Error	443.14	25	17.72				
Positive emotion regulation strategy	Pre-test	3.92	1	3.92	0.52	0.47	0.02	0.11
	Group	104.91	1	104.91	13.98	0.001	0.36	0.95
	Error	187.51	25	7.50				

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According to Table 3, the difference between the adjusted mean of the two groups for internet addiction (P<0.05, F=13.27), negative cognitive emotion regulation (P<0.05, F=21.76), and positive cognitive emotion regulation with (P<0.05, F=13.98) were significant. In addition, a difference was observed between the intervention and control groups in the mean score of internet addiction and emotion regulation. The adjusted mean of the intervention group in two variables of internet addiction and negative emotion regulation was less than the adjusted mean of the control group, and the adjusted mean of the intervention group in the positive emotion regulation strategy was higher than the adjusted mean of the control group. Group MCT effectively reduced internet addiction and negative cognitive regulation of emotion and increased positive cognitive regulation of adolescents' emotions.

According to Table 4, the F ratio of the analysis of variance with repeated measures in the 3 demonstrated a significant difference between 3 stages (pre-test, post-test, and follow-up) of measurement in internet addiction (P<0.05, F=14.57), negative cognitive emotion regulation (P<0.05, F=76.25) and in positive cognitive emotion regulation strategies (P<0.05, F=11.65).

Table 5. Fisher least significant difference post hoc test of group metacognitive therapy in internet addiction and cognitive emotion regulation

Dependent Variables	Group	Stage	Stage	Mean±SE	P
Internet addiction	Intervention	Pre-test	Post-test	6.46±1.26	0.001
			Follow-up	5.53±1.03	0.001
		Post-test	Follow-up	-0.93±1.54	0.55
Negative emotion regulation strategy	Intervention	Pre-test	Post-test	6.73±0.59	0.001
			Follow-up	6.26±0.77	0.001
		Post-test	Follow-up	-0.46±0.41	0.28
Positive emotion regulation strategy	Intervention	Pre-test	Post-test	-5.13±1.08	0.001
			Follow-up	-5.80±1.39	0.001
		Post-test	Follow-up	-0.66±1.44	0.65

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Table 4. Repeated measures analysis of variance for stability of treatment for internet addiction and negative and positive strategies of cognitive emotion regulation

Source of Changes	Source of Changes	Total Squares	d_f	F	P	Effect Size	Test Power
Internet addiction	Stages	366.53	2	14.57	0.003	0.51	0.99
	Error	352.13	28				
Negative emotion regulation strategy	Stages	424.13	1.39	76.25	0.001	0.84	1.00
	Error	77.86	19.42				
Positive emotion regulation strategy	Stages	302.18	2	11.65	0.001	0.45	0.99
	Error	363.15	28				

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According to Table 5, the mean difference in internet addiction between the pre-test and post-test stages was 6.46, and the mean difference between the pre-test and follow-up stages was 5.53 (P<0.05). As a result, group MCT effectively reduces adolescents' internet addiction. No significant difference was observed between the post-test and follow-up stages (mean difference=-0.93, P<0.05). The effect of the group MCT on reducing adolescents' internet addiction was stable.

The mean difference in negative cognitive emotion regulation variable between the pre-test and post-test stages was 6.73, and the mean difference for the pre-test and follow-up stages was 6.26 (P<0.05). Group MCT is effective in reducing the use of negative adolescents' cognitive emotion regulation strategy. No significant difference was observed between the post-test and follow-up stages, with a mean difference of -0.46. The mean difference in positive cognitive emotion regulation variable between the pre-test and post-test stages was -5.13, and the mean difference for the pre-test and the follow-up stages was -5.80. As a result, group MCT effectively increases the use of positive strategies among adolescents. No significant difference was observed between the post-test and follow-up stages, with a mean difference of -0.66. The effect of group metacognitive therapy on this variable was stable (P<0.05).

4. Discussion

We investigated the efficacy of MCT on internet addiction and cognitive emotion regulation among adolescents. The findings showed that group MCT significantly affects adolescents' internet addiction and cognitive emotion regulation, and this change remained constant during the follow-up period. The research focus on the group MCT on internet addiction along with cognitive emotion regulation among adolescents was not found in the literature review and research documents. However, in the literature review, aligned with the results, some studies confirmed that group MCT was effective on internet addiction and cognitive emotion regulation among adolescents (Fisher & Wells, 2008; McEvoy, Erceg-Hurn, Anderson, Campbell, Swan et al., 2015; Papageorgiou & Wells, 2003; Thorslund et al., 2020; Wells & King, 2006; Wells & Leahy, 1998). In explaining the results, MCT emphasizes changing attitudes and beliefs about thought processes (e.g. worrying and ruminating) rather than idiosyncratic thought content. Although people have different worry content, they can assist each other in identifying maladaptive metacognitive beliefs and coping mechanisms.

According to the literature, emotion regulation is essential in various psychological consequences and is imperative for determining health and social performance. Good feelings and optimism are not enough when facing an emotional situation. A person needs better cognitive function. For emotion regulation to be effective, cognition and emotion must interact optimally (Smith & Hudson, 2013) because humans interpret all the phenomena that they encounter and their cognitive interpretation determines their reactions. Thus, people with negative cognitive styles, such as rumination, catastrophizing, and self-blame are more likely to experience emotional difficulties. Group MCT emphasizes emotional self-awareness and believes that people can bring out numerous cognitions, thoughts, and even unconscious contents consciously; therefore, it can be a suitable intervention for cognitive emotion regulation in adolescents. MCT helps adolescents realize distorted realities through knowledge about cognition. MCT helped these adolescents to face their fears and change their thoughts by judging and evaluating themselves (Simons et al., 2006). As a result, MCT helped these adolescents screen inter-

nal and external information better and perform higher quality processing on data so that they could use the information they obtained in different situations to improve their sense of reality (Esbjørn et al., 2018). MCT improves people's performance by correcting and adjusting people's fears and thoughts (Batmaz et al., 2021).

5. Conclusion

In conclusion, MCT can influence adolescents' expression, cognition, and control of emotions by challenging metacognitive beliefs and evoking cognitive-attention syndrome, preventing internet addiction and emotional disturbance, and increasing cognitive emotion regulation.

Study Limitations

Similar to other studies, the present study had its limitations. For example, because of the COVID-19 pandemic, we held the group-counseling sessions online and via the Skyroom space. This may have limited the effectiveness of some exercises. Furthermore, there was no control over the change processes and no mediation or moderating variables in the present study. As a result, it was not possible to study the mechanism of change and process of change. Future research should examine intervening and mediating variables. A comparison of this research with a prospective study on female adolescents is also recommended. It is recommended that in future research, other interventions, such as emotion-based group therapy and cognitive behavioral therapy to compare the results with the present study.

Using qualitative and in-depth studies consistent with concerns about adolescence is another research suggestion. It is suggested to consider the possibility of measuring changes made from the perspective of family members and parents in future research.

This study included some inclusion criteria, such as age, education level, and gender; therefore, it was not possible to compare the treatment's effectiveness with other groups. The study's results could only be generalized within the desired range due to a lack of time. The efficacy of this treatment needs to be examined in more groups since this field needs more research. This method would be better evaluated on females to make generalize the results. Long-term results should be assessed through longitudinal research. Due to these limitations, we recommend interpreting results with caution. The effectiveness of MCT and mechanisms of change should be assessed in larger adolescent cohorts in the future, with blind assessments and control groups to account for potential confounds (such as passing the time, nonspecific factors, and concurrent medication), to ensure findings apply to other populations and settings and to be reliable and durable.

Ethical Considerations

Compliance with ethical guidelines

The Helsinki Declaration of 1964 and its subsequent revisions, as well as comparable ethical standards for research including humans, were considered by the researchers. Meanwhile, the participants volunteered to participate in the study.

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Authors' contributions

All authors contributed equally to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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