

## *Effectiveness of the Cognitive-Behavioral Therapy on Weight Loss and Eating Behavior in Overweight Adolescents*

Mina Farrokhi<sup>1</sup>, Mohammadreza Seyrafi<sup>2\*</sup>, Amin Rafieipour<sup>3</sup>, Hasan Ahadi<sup>4</sup>,  
Adis Kraskian Mujembari<sup>5</sup>

<sup>1</sup>PhD Student, Department of Psychology, United Arab Emirates Branch, Islamic Azad University, Dubai, UAE

<sup>2</sup>Assistant Professor, Department of Psychology, Karaj Branch, Islamic Azad University, Karaj, Iran

<sup>3</sup>Assistant Professor, Department of Psychology, Payame Noor University, Tehran, Iran

<sup>4</sup>Professor, Department of Psychology, Karaj Branch, Islamic Azad University, Karaj, Iran

<sup>5</sup>Assistant Professor, Department of Psychology, Karaj Branch, Islamic Azad University, Karaj, Iran

**\*Corresponding Author Address:** Karaj, the end of Rajai Shahr, the intersection of Moazen and Esteghlal Boulevards,  
Amir Al-Momenin University Complex

**Tel:** 0098-9125072551

**Email:** msf\_3@yahoo.com

**Received:** 17 Nov 2021

**Accepted:** 16 April 2022

### **Abstract**

**Background:** Nutrition education is a key component of health promotion programs and leads to the improvement of nutritional behaviors of adolescents. Understanding the stages of cognitive-behavioral therapy in eating behavior and weight loss in adolescents is important in terms of preventive care.

**Objectives:** The purpose of this study was to determine the effectiveness of cognitive-behavioral therapy on eating behavior and weight loss in adolescents.

**Methods:** The research method was semi-experimental with a pre-test and post-test design with a two-month follow-up with the control group. The statistical population consisted of all adolescents referred to counseling centers in Mashhad in autumn 2019; 30 of them were selected by convenience sampling method and were randomly divided into experimental, and control groups. The research questionnaires were demographic questionnaire, and eating behavior questionnaire. Data were analyzed using repeated variance analysis and SPSS.22 software.

**Results:** The mean (SD) of age was 17.66 (4.49) years in the experimental group 59.7% and 17.01 (4.10) years in the control group. 65.9% in the experimental group and in the control group, 59.7% were girls and the mean (SD) of body mass index was 27.73 (1.34) in the experimental group and 27.32 (0.95) in the control group. The results showed that cognitive-behavioral therapy was effective in decreasing uncontrollable eating ( $P<0.01$ ), emotional eating ( $P<0.01$ ), weight loss ( $P<0.01$ ), and increasing cognitive restraint ( $P<0.01$ ) in adolescents.

**Conclusion:** It is concluded that cognitive-behavioral therapy can be used as an effective treatment of weight loss and eating behavior in adolescents.

**Keywords:** *adolescent, weight loss, feeding behavior, cognitive behavioral therapy*

### **Introduction**

Obesity and eating disorders as nutritional diseases, is increasing in developed and developing countries [1]. The prevalence of obesity in the world is increasing sharply

according to the World Health Organization findings worldwide, more than doubled from 1980 to 2014; in 2014 more than 1.9 billion adults (aged 18 and over) were overweight, and of those 600 million were obese [2]. The findings from

Iran also indicate an upward trend in overweight and obesity among adolescents [2]. Iran is one of the 7 countries with the highest prevalence of obesity [3]. The increasing spread of obesity, overweight and various physical, psychological, and economic consequences have caused eating disorders to be one of the most important psychosomatic disorders that cause many problems in physical, emotional, and behavioral domains [4]. Overeating disorder is in the most common category of eating disorders [5]. Being obese or overweight increases the risk of metabolic syndrome, type 2 diabetes, cardiovascular disease, some cancers, respiratory diseases, fatty liver disease, reproductive disease, depression, and other mental conditions [6,7]. Diets of weight loss and weight loss occur in many adolescents and sometimes indulge in this way so that in addition to reducing large levels of weight, the person still thinks he is obese and follows his diet. On the other hand, others report overeating periods for several reasons, so eating too much food and feeling mentally un optimized, along with disproportionate compensatory behaviors (intestinal cleansing or excessive exercise) is determined [8]. In this way, it is clear that nutritional status is undesirable in adolescence. Accordingly, the prevalence of these nutritional problems can be reduced by increasing consumption of low-fat food products, fruits, and vegetables, reducing consumption of sugary drinks, and increasing participation in regular physical activities in adolescent students [9]. Cognitive-behavioral therapy is one of the approved treatments for dissatisfaction with overweight [10,11]. These interventions focus on improving four main areas of overweight, including perceptions, cognitions, attitudes, emotions, and behaviors [12], and aim to improve mental health, quality of life in patients. Therefore, this view can improve various aspects of body dysfunction and eating behavior [13]. It seems that cognitive-behavioral therapy is effective in the treatment of various disorders, but on the one hand, its preventive effects are doubtful. On the other hand, in this approach, acceptance of problems and problems is not considered and remains a problem [14]. Also, one of the research-based approaches is cognitive-behavioral therapy, so people should learn new ways of thinking [15]. Accordingly, this treatment

covers a range of diet therapy, exercise, and psychological interventions (such as behavioral therapy, cognitive therapy, metacognitive therapy, etc.) [16]. Although overweight and obese people typically only undergo nutritional treatments, research shows that diet therapy alone is not effective, and in the long run, people take their previous weight [17,18]. Psychological interventions for weight loss are of great importance. In addition, in the discussion of eating control, people prefer immediate antidote to delayed reward and resistance to eat temptation is difficult for these people, so adherence to diet is associated with several problems, so the role and effectiveness of behavioral and cognitive interventions is one of the research necessities in this area. The effectiveness of psychological interventions has been proven in many types of research and nowadays some elements of behavioral interventions are used in the treatment of overweight. However, the application of these interventions for overweight people is one of the important research questions. Due to the epidemic of this phenomenon in different countries, both developed and developing, researchers have addressed these issues and have sought to determine the effectiveness of physical-therapeutic and psychotherapy methods on these two variables. On the other hand, this study can partially fill the research gap in Iran regarding effective methods on eating behavior and weight loss among different age groups of society, including adolescents. The purpose of this study was to determine the effectiveness of cognitive-behavioral therapy on eating behavior and weight loss in adolescents.

### Methods

The research method was a semi-experimental study with pretest, posttest, and follow-up design. The statistical population consisted of all adolescents referred to counseling centers (Arameshe Ravan and the Sahel) in Mashhad in autumn 2019. participants were selected by convenience sampling method and were divided into two groups randomly. The required sample size was calculated 30 people based on effect size=0.40,  $\alpha=0.95$ ,  $1-\beta$  (err prob) = 0.80 test power and 10% loss for each group. Inclusion criteria includes, body mass index at the required level (with a BMI above 25), the age

range of 14 to 18 years based on a similar study [19], not using of drugs affecting weight loss, not receiving any other interventions, consuming medication, and focusing on weight loss and eating behavior, and lack of experience in weight loss programs and treatment of obesity Exclusion criteria included the absence of more than two sessions of cognitive-behavioral therapy sessions and unwillingness to cooperate and continue treatment.

Cognitive-behavioral therapy sessions were held weekly in eight two-hour sessions. The pre-test was performed among the subjects, and then the experimental group was exposed to cognitive behavioral therapy, while the control group did not receive any intervention. Then, in the post-test stage, the questionnaire was performed between the experimental group and the control group. Informed consent of all subjects was received. They were told that the information was confidential.

After two months of post-test, a follow-up period was performed. The present study's ethical considerations were as follows: All individuals received written information about the research and participated in the research if they wished. The assurance was given to individuals that all information is confidential and used for research. To respect privacy, the participants' names and surnames were not registered.

The research questionnaires were demographic questionnaire and eating behavior questionnaire.

The demographic questionnaire contained age, gender, weight, height, Body mass index (BMI)( $\text{kg}/\text{cm}^2$ ). Weight was measured using a digital scale (Seca 769 made in Germany) with a sensitivity of 100 g, and height was measured using an indispensable tape meter with an accuracy of 0.5 cm.

The eating behavior questionnaire is a 17-question self-report tool developed to assess eating behaviors by Cappelleri et al. [20]. The questionnaire is made up of 3 subscales of uncontrollable eating (9-1) such as "I'm always hungry, so it's hard for me to stop eating before I finish eating on a plate," cognitive restraint (10-14) like "I consciously stay behind in meals to avoid losing weight," emotional eating (15-17) like "often when I feel depressed when I'm

overrated." Scoring the questionnaire on a four-point Likert scale (definitely "true=1"), (true =2), (false = 3), (definitely" false = 4). The raw score is obtained through the Likert score of each subscaled. As the score increases, eating behavior becomes more negative [20]. The validity of the three-factor eating behavior questionnaire in correlation with other similar scales such as the self-restraint scale and Dutch food behaviors questionnaire was 0.74 and 0.98, respectively, which indicates the desired validity of the questionnaire [21]. The internal consistency of each subscale ranges from 0.76 to 0.85 based on Cronbach's alpha [20]. The validity and reliability of the questionnaire in Iran were assessed by Bidadian et al. Its reliability was calculated by the internal consistency method, which was 0.42, 0.91, and 0.78 for each component of cognitive self-control, emotional eating, and untested eating, respectively [21]. Face validity in this study was obtained by five psychology and reliability professors using Cronbach's alpha method for subscales between 0.71 and 0.80.

In descriptive statistics, mean and standard deviation were used. In the inferential statistics section, repeated measure ANOVA was used. It is worth noting that to investigate the assumptions of the inferential test, Levene's test (to investigate the homogeneity of variances), Kolmogorov-Smirnov test (for normality of data distribution), Mbox test, and Mauchly's sphericity test were used. The above statistical analysis was performed using SPSS.22 software. The significance level of the tests was 0.05.

## Results

The mean (SD) of age was 17.66 (4.49) in the experimental group and 17.01 (4.10) years in the control group. Also, the mean (SD) of body mass index was 27.73 (1.34) in the experimental group and 27.32 (0.95) in the control group. In the experimental group, 65.9% and in the control group, 59.7% were girls. There was no significant difference between the two groups in terms of gender. Accordingly, the mean (SD) of the scores of the subjects are presented by groups before and after the interventions and follow-up stage in Table 1.

**Table 1: Descriptive Findings Obtained from Eating Behavior and Weight Loss Variable (Standard Deviation of  $\pm$  Mean)**

Variable	Experimental	Pre-test	Post-test	Follow-up
<b>Uncontrollable eating</b>	Control	2.41 $\pm$ 30.53	1.66 $\pm$ 31.27	1.43 $\pm$ 30.27
	CBT	2.41 $\pm$ 30.47	2.16 $\pm$ 24.40	3.22 $\pm$ 25.67
<b>Cognitive restraint</b>	Control	1.64 $\pm$ 10.00	1.35 $\pm$ 9.13	1.71 $\pm$ 10.67
	CBT	2.29 $\pm$ 10.87	1.12 $\pm$ 13.40	1.47 $\pm$ 12.80
<b>Emotional eating</b>	Control	0.81 $\pm$ 10.67	1.22 $\pm$ 9.73	0.94 $\pm$ 10.20
	CBT	1.22 $\pm$ 10.27	1.19 $\pm$ 6.00	1.35 $\pm$ 6.60
<b>Weight Loss</b>	Control	3.88 $\pm$ 68.73	4.22 $\pm$ 68.60	3.91 $\pm$ 68.73
	CBT	1.85 $\pm$ 69.20	2.01 $\pm$ 64.93	1.98 $\pm$ 62.07

As is evident from Table 1, in the pre-test, all groups have the same mean scores of variables. Then, the inferential findings of this study were investigated. Shapiro-Wilks's test was used to test normality. The significance level of the Shapiro-Wilks test for indices is greater than 0.05. As a result, they have a normal distribution. Considering the normality of the indicators, multivariate analysis of covariance (MANCOVA) was used to investigate the research hypotheses, and before doing so, the assumption of variance homogeneity was used using Levene's test. Levene's F-test statistics were not significant for homogeneity of variances of variable error in untested eating (0.718), cognitive restraint (0.339), emotional eating (1.384), weight loss (1.730). These findings show that the variance of

errors of these variables is homogeneous in the groups. The significant level for interactive effects of intervention and components of eating behavior in all cases is greater than 0.05. Therefore, the assumption of homogeneity of regression slopes has been observed.

The results of Table 2 indicate that the analysis of variance is significant for the within-subject factor (time) and between-subject factor (Group) for uncontrollable eating, cognitive restraint, emotional eating and weight Loss. Findings showed that cognitive-behavioral therapy was effective in decreasing uncontrollable eating ( $P < 0.01$ ), emotional eating ( $P < 0.01$ ), weight loss ( $P < 0.01$ ), and increasing cognitive restraint ( $P < 0.01$ ) in adolescents.

**Table 2: Analysis of Variance with Repeated Measures to Compare Variables in Experimental and Control Groups**

Variables	Source of effect	SS	Df	MS	F	P-value	Eta square
<b>Uncontrollable eating</b>	Time	119.52	1.29	92.11	250.16	0.0001	0.89
	Time*group	92.14	1.29	71.01	192.86	0.0001	0.86
	Group	117.04	1	117.04	25.29	0.0001	0.45
<b>Cognitive restraint</b>	Time	112.14	2	56.07	379.08	0.0001	0.92
	Time*group	64.31	2	32.15	217.39	0.0001	0.87
	Group	128.34	1	128.34	5.49	0.026	0.15
<b>Emotional eating</b>	Time	140.27	1.41	99.08	344.69	0.0001	0.92
	Time*group	109.52	1.41	77.36	269.13	0.0001	0.90
	Group	145.04	1	145.04	39.46	0.0001	0.56
<b>Weight Loss</b>	Time	Time	661.52	1.69	390.46	86.20	0.001
	Time*group	Time*Group	269.49	3.38	79.53	17.55	0.001
	Group	Group	547.97	2	273.98	14.81	0.001

## Discussion

This study aimed to determine the effectiveness of cognitive-behavioral therapy on eating behavior and weight loss in adolescents. Also, it was found that the cognitive-behavioral therapy effects are

persistent on the eating behavior of adolescents. The results were with the findings of Dibaei et al. [22] is consistent because cognitive behavioral therapy affects eating behavior and weight loss.

It is stated that adolescence is one of the most important periods of one's life. In this period, the person is very important to the construction of his body image and identity [23]. As Painot et al. [24] have stated, adolescents in this period are looking for an identity, being accepted and trying hard to gain independence, and are interested in attending mass activities. So, body image is very important and remarkable for them. Therefore, it is important to understand how to consume proper nutrition, and to know the type of profitable nutrition. In preventive care, it is important to put the weight loss framework and organize eating behavior according to the factors of uncontrollable eating, cognitive restraint, and emotional eating [25]. In the study of Dalle et al. [26], the role of false beliefs and cognitions is to achieve adaptive thoughts and behaviors so that the combination of subjects' mental and practical behavior against eating and how to lose and control weight has changed, and accordingly, their post-test scores have significantly different from their pre-test scores. In addition, cognitive-behavioral therapy has considered improving the quality of life, reducing depression symptoms and reducing physical symptoms related to suffering and improving performance in adolescents, and has had more influence than the change stages model in affecting weight loss and uncontrollable eating [26].

It is suggested that according to the CBT, eating abnormalities and how adolescents consume nutrition in educational sessions should be challenged to significantly affect positive eating behavior in adolescents. The main limitation in this study was the domain of society, which is limited to adolescents in Mashhad and reduces the ability to generalize the results over other study societies and therefore, it is suggested that studies be conducted in other age groups (youth, elderly, etc.) and other parts of the country.

### Conclusion

Cognitive-behavioral therapy was effective on eating behavior and weight loss of adolescents. It is suggested that cognitive-behavioral therapy should be considered in the treatment of appropriate principles of nutrition and control of adolescents' weight.

### Acknowledgments

This research has the code of ethics committee IR.SBMU.RETECH.REC.1399.384 from Research and Technology of Shahid Beheshti University of Medical Sciences.

### Conflict of interest

The authors have no conflicts of interest to declare.

### Funding:

The research has been carried out by personal funding.

### References

1. Abdolkarimi M, Ghorban Shirudi S, Khalatbari J, Zarbakhsh M. The Effectiveness of Diagnostics Educational Package Based on Acceptance and Commitment Therapy, Compassion Focused Therapy and Dialectical Behavior Therapy on the Eating Behavior and the Weight-Efficacy of lifestyle in the Overweight and Obese Woman. *Int J Middle East Stud.* 2018; 8: 3-13. [In Persian]
2. Mohammadbeigi A, Asgarian A, Ahmadli R, Fara-Shirazi SZ, Moshiri E, Ansari H, et al. Prevalence of junk food consumption, overweight/obesity and self-rated health and fitness in high school adolescent girls: a cross sectional study in a deprived area of Qom. *Sri Lanka J Child Health.* 2019; 48(3): 208-14.
3. Abdollahi F, Rouhani Otaghsara S, Yazdani-Charati J. Prevalence of obesity and overweightness among adolescents in Mazandaran Province. *J Guilan Univ Med Sci.* 2017; 25(100): 28-37. [In Persian]
4. Bodell LP, Pearson CM, Smith KE, Cao L, Crosby RD, Peterson CB, et al. Longitudinal associations between emotion regulation skills, negative affect, and eating disorder symptoms in a clinical sample of individuals with binge eating. *Eat Behav.* 2019; 32: 69-73.
5. Holmqvist Larsson K, Lowén A, Hellerstedt L, Bergcróna L, Sallerud M, Zetterqvist M. Emotion regulation group skills training: a pilot study of an add-on treatment for eating disorders in a clinical setting. *J Eat Disord.* 2020; 8(12): 1-1.
6. Gouveia MJ, Canavarro MC, Moreira H. Associations between mindfulness, self-compassion, difficulties in emotion regulation, and emotional eating among adolescents with

- overweight/obesity. *J Child Fam Stud.* 2019; 28(1): 273-85.
7. Young KS, Sandman CF, Craske MG. Positive and negative emotion regulation in adolescence: links to anxiety and depression. *Brain sci.* 2019; 9(4): 76.
8. Rahmani M, Omid A, Asemi Z, Akbari H. The effect of dialectical behaviour therapy on binge eating, difficulties in emotion regulation and BMI in overweight patients with binge-eating disorder: A randomized controlled trial. *Men Health Prev.* 2018; 9: 13-8.
9. Barnhart WR, Braden AL, Price E. Emotion regulation difficulties interact with negative, not positive, emotional eating to strengthen relationships with disordered eating: An exploratory study. *Appetite.* 2021; 158: 105038.
10. Pisetsky EM, Haynos AF, Lavender JM, Crow SJ, Peterson CB. Associations between emotion regulation difficulties, eating disorder symptoms, non-suicidal self-injury, and suicide attempts in a heterogeneous eating disorder sample. *Comp psych.* 2017; 73: 143-50.
11. Mikhail ME, Kring AM. Emotion regulation strategy use and eating disorder symptoms in daily life. *Eat Behav.* 2019; 34: 101315.
12. Sloan E, Hall K, Moulding R, Bryce S, Mildred H, Staiger PK. Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: A systematic review. *Clin Psychol Rev.* 2017; 57: 141-63.
13. Prefit AB, Căndea DM, Szentagotai-Tătar A. Emotion regulation across eating pathology: A meta-analysis. *Appetite.* 2019; 143: 104438.
14. Vieira AI, Moreira CS, Rodrigues TF, Brandão I, Timóteo S, Nunes P, et al. Nonsuicidal self-injury, difficulties in emotion regulation, negative urgency, and childhood invalidation: A study with outpatients with eating disorders. *J Clin Psychol.* 2021; 77(3): 607-28.
15. Kafi Nia F. The effectiveness of group cognitive-behavioral therapy on emotional self-awareness and problem-solving skill of students with internet addiction. *Psychol Science.* 2020; 19(85): 111-20.
16. Wadden TA, Tronieri JS, Butryn ML. Lifestyle modification approaches for the treatment of obesity in adults. *Am Psychol.* 2020; 75(2): 235.
17. Nalbant K, Kalaycı BM, Akdemir D, Akgül S, Kanbur N. Emotion regulation, emotion recognition, and empathy in adolescents with anorexia nervosa. *Eat Weight Disord.* 2019; 24(5): 825-34.
18. Heris MA, Alipour A, Janbozorgi M, Hajhosseini R, Shaghghi F, Golchin N, et al. Lipid profile improvement after four group psychological interventions in combination to nutritional and physical activity instructing among overweight and obese individuals. *Iranian J Publ Health.* 2013; 42(1): 86-95.
19. Wilfley DE, Kolko RP, Kass AE. Cognitive-behavioral therapy for weight management and eating disorders in children and adolescents. *Child Adolesc Psychiatr Clin.* 2011; 20(2): 271-85.
20. Cappelleri JC, Bushmakin AG, Gerber RA, Leidy NK, Sexton CC, Lowe MR. Psychometric analysis of the Three-Factor Eating Questionnaire-R21: results from a large diverse sample of obese and non-obese participants. *Int J Obesit.* 2009; 33(6): 611-20.
21. Bahrami Ehsan H, Poursharifi H, Zahraie S. Designing and evaluating weight maintenance prediction model in the obese women. *J Health Psychol.* 2013; 2(8): 22-39.
22. Dibaei S, Vafaei MA, Janbozorgi M, Rasoolzade Tabatabaei K, Ashrafi A, et al. Practical Components of Cognitive-Behavioral Therapy for Weight Loss in Women: Directed Qualitative Content Analysis. *Qual Health Res.* 2020; 6(4): 461-76. [In Persian]
23. Schutz DD, Busetto L, Dicker D, Farpour-Lambert N, Pryke R, Toplak H, et al. European practical and patient-centred guidelines for adult obesity management in primary care. *Obes Facts.* 2019; 12(1): 40-66.
24. Painot D, Jotterand S, Kammer A, Fossati M, Golay A. Simultaneous nutritional cognitive-behavioural therapy in obese patients. *Patient Educ Couns.* 2001; 42(1): 47-52.
25. Shaw K, O'Rourke P, Del Mar C, Kenardy J. Psychological interventions for overweight or obesity. *Cochrane Database Syst Rev.* 2005; 2: CD003818.
26. Dalle Grave R, Sartirana M, El Ghoch M, Calugi S. Personalized multistep cognitive behavioral therapy for obesity. *Diabetes Metab Syndr Obes.* 2017; 10: 195-206.