



Comparison of the Levels of Self-control and Emotion Regulation Strategies among College Students with High and Normal Body Mass Index

Katayoon Shast Fouladi¹, Simin Bashardoust^{2*}

¹ MSc in Clinical Psychology, Department of Psychology, Faculty of Psychology and Social Sciences, Roudehen Branch, Islamic Azad University, Roudehen, Iran

² Assistant Professor in Psychology, Department of Psychology, Faculty of Psychology and Social Sciences, Roudehen Branch, University of Roudehen, Roudehen, Iran

***Corresponding author:**

Simin Bashardoust, Department of Psychology, Faculty of Psychology and Social Sciences, Roudehen Branch, University of Roudehen, Roudehen, Iran
Tel: 09126595460
Email: s.bashardoust@riau.ac.ir

Received: 01 Dec. 2019
Accepted: 31 May. 2020
ePublished: 01 Nov. 2020



Abstract

Background and Objective: The purpose of this study was to compare the levels of self-control and emotion regulation strategies among college students with high and normal body mass index (BMI).

Materials and Methods: The present cross-sectional causal-descriptive study was conducted on female students with a high BMI at the Azad University of Roudehen, Iran, during the academic year of 2018-2019. The sample size was selected by the convenience sampling method (50 girls with high BMI and 50 girls with normal body weight). The data were collected using the self-control scale and the Emotion Regulation Questionnaire. Data analysis was performed in SPSS software (version 23) by ANOVA and t-test.

Results: According to the results, students with high BMI had lower levels of self-control and positive emotional regulation, compared to those with normal BMI. Moreover, the individuals with high BMI had a higher level of negative emotional regulation, compared to those with normal BMI.

Conclusion: Strategies for emotion regulation are very important for self-control, eating styles, and BMI. It is, therefore, suggested to apply this intervention for the treatment of obesity.

Keywords: Body mass index, Emotion regulation strategies, Self-control

Background

Obesity is a common public health problem around the world that is associated with the risk of various diseases. In order to improve the treatment and appropriate intervention to counter the growing wave of obesity, it is important to identify the important risk factors for this condition. This disorder is due to the changes in the lifestyle of communities, such as sedentary lifestyle and increased consumption of fatty foods. According to the World Health Organization (WHO) definition, obesity is referred to fat accumulation in the body [1].

Body mass index (BMI) is a broad measure of obesity. However, it is not able to differentiate between lean mass and fat mass and is, therefore, limited by differences in body fat in people of different age, gender, and ethnicity. For example, the current definition of BMI-based obesity (BMI 30 kg/m²) may actually underestimate obesity among non-Caucasian populations, especially

Asians [2]. Based on the classification of the WHO, the BMIs of < 18.5, 18.5-24.9, 25-29.9, 30-34.9, 35-39.9, and > 40 are indicative of limited weight, normal weight, overweight, first-type obesity, second-type obesity, and third-type obesity, respectively [3].

Although developed countries have the highest prevalence of obesity, this condition is on an increasing trend in developing countries as well [4]. The WHO has defined overweight and obesity as abnormal or excessive fat accumulation that may impair health. According to the latest WHO report, in 2018, more than 1.9 billion (39%) of the adult population were overweight and more than 600 million cases (13%) were obese [5]. The prevalence of overweight and its negative consequences has been one of the most important public health problems in most countries; accordingly, overweight and obesity are recognized as the fifth leading cause of death in the world [6].

Unwanted weight gain, which leads to overweight and obesity, has been a major contributor to the global increase in non-communicable diseases and is now considered a non-communicable disease [7]. Because of the psychological and social stresses associated with overweight and obesity, people with these conditions are vulnerable to discriminatory personal and work life, low self-esteem, and depression. The medical and psychological complications of obesity not only incur health care expenditure but also create additional economic costs through resulting in the loss of productivity, increased disability, and early death in the affected individuals [8].

The results of many studies have shown a positive and significant relationship between overweight and psychiatric symptoms, as well as between obesity and mental disorders [9, 10]. One of the protective factors against overweight in the transitional period of childhood to adolescence is self-control [11]. Self-control refers to a person's capacity to overcome and inhibit unacceptable and undesirable impulses and arrangement of behaviors, thoughts, and emotions [12]. In a study investigating self-control using the Rutter score, obese individuals showed lower self-care levels than normal-weight individuals. This lack of self-control resulted in poor eating and exercise behaviors, as well as increased BMI and obesity risk [13]. Self-control deficiencies make it more difficult to resist those temptations and contribute to the persistence of obesity [14]. In particular, these defects have been implicated in eating disorder behavior [15]. Significant longitudinal research even suggests that self-control deficiencies can also predict weight gain in children and adolescents [16].

In contrast, there are findings showing that long-term high-fat nutrition leads to negative emotional states, increased stress sensitivity, and altered basal corticosterone levels [17]. In this regard, research reported that negative emotions, such as anxiety, stress, and depression, can be strong predictors of emotional eating and overweight. Emotional disorders, such as depression, obsession, anxiety, and social fear, are more common in people with obesity, and even in some studies, the prevalence of these disorders has been reported to be up to 37% [18].

Many studies also confirm the undeniable role of emotions in various mental processes, such as decision making and information processing [19-21]. At the same time, it is noteworthy that despite the positive and constructive role of emotions in human life, they also have destructive aspects in human life. In this regard, excitement becomes problematic or even affects a person's

life for a long time when it is misinterpreted or occurs in an inappropriate context in an overwhelming manner. This dual function of emotions refers to the process of emotional regulation in which individuals adjust and modulate their emotions according to different situations [19]. Emotion regulation is regarded as the internal and external processes responsible for monitoring, evaluating, and modifying emotional responses to achieve goals. With these interpretations, it can be understood that emotional maladjustment can occur when a person's intense emotional arousal is disturbed by effective self-regulation [20]. Regarding this, it cannot be simply said that one's emotional regulation is disrupted, rather it should be viewed as an important symptom of poor emotional regulation, severe negative emotional arousal, or a continuation of interference with one's goals [21]. This interaction can be in the form of maladaptive behaviors one adopts to regulate (decrease the intensity and duration) one's negative emotions or in the form of emotional distress that detracts from normal self-regulation. Emotions play an important role in food choices and eating behaviors, which themselves have a strong influence on emotion [22].

In a study, Kachooei et al. [23] reported a significant relationship between eating inhibition and emotional regulation. In this regard, emotional regulation predicted coping with eating inhibition. They also observed that emotional eating was significantly related with emotional regulation and impulsivity. The inability to manage negative emotional factors is one of the significant differences between overweight and obese individuals. Overweight people endure chronic physiological and psychological abnormalities; therefore, they are more likely to have emotional problems.

Objectives

The present study was conducted to compare the levels of self-control and emotion regulation strategies among college students with high and normal BMI.

Materials and Methods

This cross-sectional causal-descriptive study was conducted on all female students with high BMI at Roudehen Azad University in the academic year of 2018-2019. The sample size was determined as 100 (50 cases in the normal BMI group and 50 cases in the high BMI group) people according to previous research using a purposeful sampling method [24]. For causal-comparative research, a sample of 30 or more is used [24]. To select samples, from the list

of all faculties in Roudehen Azad University, three faculties (Basic Sciences, Economic and Psychology) were selected (ethical No is: IR.AUS.REC.1398.8180760).

The selection of the students was purposeful, implying that students with high and normal BMI scores were selected as samples by distributing the research questionnaire. The inclusion criteria were: 1) high and normal BMI scores, 2) female gender, and 3) willingness to participate in the study. On the other hand, the exclusion criterion was a major psychological disorder. Informed consent was obtained from students, they were also assured about the confidentiality of their personal information. Descriptive (mean±SD) and inferential (ANOVA and t-test) statistics were used to analyze the data. It should be noted that all data analyses were performed in SPSS software, version 23. The research tools that were used in this study included the Self-Control Scale (CSC) and the Emotion Regulation Questionnaire (CERQ).

Self-Control Scale

The SCS, developed by Tangney et al. [25], is a 36-item tool rated on a Likert-type scale (from "Not at all" to "Very much"). The Cronbach's alpha coefficient of this scale (n=89) has been reported as 0.89 [25]. This value has been also reported as 0.89 in another study investigating Iranian university students [26]. In the present study, the Cronbach's alpha coefficient of the instrument was estimated at 0.72.

Emotion Regulation Questionnaire

The CERQ was developed by Garnefsky et al. [27] to address the cognitive component of emotion regulation. This self-report questionnaire consists of 36 items rated on a five-point Likert scale. Research has confirmed the Cronbach's alpha coefficients of the dimensions of this scale, including acceptance ($\alpha=0.68$), positive refocusing ($\alpha=0.83$), positive reappraisal ($\alpha=0.87$), self-blame ($\alpha=0.78$), blaming others ($\alpha=0.74$), rumination ($\alpha=0.68$), and catastrophizing ($\alpha=0.80$). Previous research showed that all subscales have good internal consistencies ranging from 0.68 to 0.86 [27]. In Iranian culture, the Cronbach's alpha coefficients of the subscales of this instrument range from 0.64 to 0.82 [28]. The Kolmogorov-Smirnov and Leven's tests were used to check the normality of data distribution. In addition, Student's t-test and ANOVA were used to compare the variables.

Results

Table 1 presents the descriptive characteristics of the educational level, marital status, age, and weight

Table 1. Demographic variables of the research participants

Variable	Group	Frequency	Percentage
Level of education	Undergraduate	73.0	73
	Graduate	22.0	22
	PhD	5.0	5
Marital status	Single	56	56.0
	Married	44	44.0
Age	≤18	11	11.0
	19-23	60	60.0
	24-28	10	10.0
	29-33	16	16.0
	34-38	2	2.0
	39+	1	1.0
	56-60	2	2.0
	61-65	18	18.0
	66-70	12	12.0
	71-75	11	11.0
Weight	76-80	9	9.0
	81-85	13	13.0
	86-90	12	12.0
	91-95	7	7.0
	96-100	10	10.0
	101+	6	6.0

of the participants.

According to the results, the mean positive emotional regulation was higher in the normal BMI group (55.50 ± 12.83), compared to that in the high BMI group (38.64 ± 13.18). In the same vein, the students with high BMI had a higher mean level of negative emotion (71.20 ± 16.12) in comparison to those with normal BMI (49.50 ± 16.96). In addition, self-control was found to be at a higher level in the group with normal BMI (107.20 ± 31.03) than in those with a high BMI (71.64 ± 28.44 ; Table 2).

As indicated in Table 3, all factors are normally distributed ($P<0.05$).

Due to the significance of Wilk's Lambda test results, individuals with high and normal BMI differed in at least one variable of self-control levels, positive emotion regulation, and negative emotion regulation (Table 4).

The results of independent t-test, presented in Table 5, show the levels of self-control ($t=5.973$,

Table 2. Descriptive statistics of research variables

variable	Group	Mean±SD
Positive emotion regulation	Normal	55.50±12.83
	High BMI	38.64±13.18
Negative emotion regulation	Normal	49.50±16.96
	High BMI	71.20±16.12
Self-control	Normal	107.20 ± 31.03
	High BMI	71.64± 28.44

BMI: body mass index

Table 3. Kolmogorov-Smirnov test for normality

variable	Test statistics	Significance level
Positive emotion regulation	0.126	0.080 ^c
Negative emotion regulation	0.122	0.151 ^c
Self-control	0.127	0.210 ^c

Table 4. Results of multivariate analysis of variance

variable	Value	F	df	error	sig	Eta squarer
Pillai's effect	0.978	1062.266 ^b	4.000	95.000	0.000	0.978
Wilk's Lambda	0.022	1062.266 ^b	4.000	95.000	0.000	0.978
Hotelling's effect	44.727	1062.266 ^b	4.000	95.000	0.000	0.978
Roy's greatest root	44.727	1062.266 ^b	4.000	95.000	0.000	0.978

Table 5. Results of independent sample t-test showing differences in self-control levels, positive emotion regulation, and negative emotion regulation between students with high and normal body mass index

Variable		Leven's test	Sig (P)	t-test	df	Sig (P)	Mean deviation	Standard error deviation
Self-control	Equality of variances	0.627	0.43	5.973	98	0.000	35.56	5.95355
	Non-equality of variances							
Positive emotion regulation	Equality of variances	0.224	0.637	6.478	98	0.000	16.86	2.60251
	Non-equality of variances							
negative emotional	Equality of variances	0.308	0.58	-6.555	98	0.000	-21.7	3.31025
	Non-equality of variances							

P 0.001), positive emotion regulation ($t=-6.555$, P 0.001), and negative emotion regulation ($t=-6.555$, P 0.001), respectively. Therefore, an independent t-test was used to assess the mean scores of self-control, positive emotion regulation, and negative emotion regulation in the two groups with high and normal BMI at the 0.05 level.

Discussion

The aim of the present study was to compare emotion and self-control between college students with high and normal BMI. The results showed that individuals with high BMI had a lower level of self-control in comparison to those with normal BMI. These results are in line with those reported by some studies [11-14]. The study performed by Lombard et al. [29] showed that exclusively healthy weight control behaviors were more common in adult girls who had overweight, compared to those in overweight and obese girls. The results of a study carried out by Marks [30] revealed that the increase of overweight and obesity is a complex issue that depends on the conditions controlled by human efforts (i.e., economic status) [30]. Fan and Yanhong showed that the lack of self-control was associated with poor eating and exercise behaviors, as well as increased BMI and obesity risk [13].

In another study, Junger and Van Kampen [31] found that people with high self-control were more likely to engage in exercise than those with lower self-control. To explain this finding, it should be stated that self-control is especially related to the motivational conflicts in which one must resist the temptation of pleasure to achieve a long-term goal. In this sense, self-control is important for maintaining both healthy diet (resisting the temptation to eat fatty foods) and regular exercise (resisting the temptation to pursue easier and sedentary life). To the extent that weight loss

depends on diet and exercise, self-control should be an important predictor of success in achieving the goal of weight loss [32]. Dieters with low inhibitory control had the lowest rate of self-control failure (e.g., they induced a tendency to feed even if they did not try), especially when they were faced with unhealthy food desires [12]. The ability to control motives and delay pleasure enables an individual to maintain a healthy weight even in today's obesogenic environment [11].

Given the evidence on insufficient ability to control motivation and engage in targeted behavior, it is not surprising that patients with eating or purging disorder reported a lack of access to effective strategies to regulate their emotions at times of emotional distress. Previous studies have reported that patients with binge eating behaviors do not use adaptive emotion regulation strategies, such as cognitive assessment [33].

People's attitudes toward foods may vary depending on their mood. Feelings have a profound effect on dietary preference and the formation of eating habits [34]. Numerous studies have supported the relationship between eating behaviors/emotions and increased energy consumption. Feelings are a mental state resulting from the interaction of biochemical and environmental factors and requiring understanding by the senses [35]. Emotional hunger means entering the cycle of hunger through the influence of emotions, even if physiological satisfaction is achieved by the perceived sense of hunger [36]. The concept of emotional hunger is related to the state of food consumption observed by emotions [37].

Difficulty in regulating emotions and eating habits can play an important role in obesity [38]. In a study, students with higher BMI showed body dissatisfaction. The results also indicated a negative association between higher BMI and concerns about body image, social anxiety, self-esteem, and eating

disorder [39]. It has been suggested that chronic negative emotional states lead to maladaptive coping strategies, such as over-eating appetizing and unhealthy foods, to suppress negative emotions [40]. In a study, the results also showed that overweight during the experience and regulation of negative emotions was related to the abnormal pattern of activation and neural connectivity, whereas insula played a key role in these changes. Researchers believe that dysfunction in emotion regulation results in gaining and maintaining extra weight [41].

Our results are in line with the previous findings indicating that higher levels of emotion regulation are common among those with unhealthy eating patterns, various eating disorders, and obesity [42-44]. In particular, the stronger relationship of emotion regulation difficulties with emotion eating seems to be quite plausible, as one begins to eat emotionally to reduce their problems in emotion regulation. This relationship can be understood in the form of emotion regulation theories that suggest that emotional eating through blocking or dissociation reduces disturbance awareness [45].

One of the most important limitations of the study was the use of convenience sampling method. In addition, data collection using self-report tools and low sample size due to sample specificity were among other limitations of the study. This research was conducted on a female community; therefore, the results cannot be generalized to a male community. Furthermore, the non-use of clinical samples restricts the direct application of results for people with pathological eating disorders. Therefore, it is required to perform further studies to address the role of research structures in the patterns of unhealthy eating in both male and clinical populations. The nature of the cross-sectional study design is to avoid the causal interpretations of relationships. Longitudinal studies help understand the causal relationship of emotion regulation and self-control with unhealthy eating patterns.

Conclusions

The college students with normal BMI levels had higher self-control and positive emotion regulation scores, compared with those with high BMI levels. In addition, the subjects with higher BMI values had a higher level of negative emotion in comparison to those with normal BMI. These findings emphasize the importance of these variables in gaining weight in the healthcare system.

Compliance with ethical guidelines

Following ethical guidance, written consent was obtained from the participants.

Authors' contributions

All authors contributed to preparing this article.

Funding/Support

None declared.

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. World Health Organization. Report of the commission on ending childhood obesity. Geneva: World Health Organization; 2016.
2. Lam BC, Koh GC, Chen C, Wong MT, Fallows SJ. Comparison of body mass index (BMI), body adiposity index (BAI), waist circumference (WC), waist-to-hip ratio (WHR) and waist-to-height ratio (WHtR) as predictors of cardiovascular disease risk factors in an adult population in Singapore. *PLoS One*. 2015; 10(4):e0122985. [DOI:10.1371/journal.pone.0122985] [PMID] [PMCID]
3. Nuttall FQ. Body mass index: obesity, BMI, and health: a critical review. *Nutrition Today*. 2015; 50(3):117-28. [DOI:10.1097/NT.000000000000092] [PMID] [PMCID]
4. Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS. Childhood obesity: causes and consequences. *Journal of Family Medicine and Primary Care*. 2015; 4(2):187-92. [DOI:10.4103/2249-4863.154628] [PMID] [PMCID]
5. World Health Organization. Report of the commission on ending childhood obesity. Geneva: World Health Organization; 2018.
6. Rizzuto D, Fratiglioni L. Lifestyle factors related to mortality and survival: a mini-review. *Gerontology*. 2014; 60(4):327-35. [DOI:10.1159/000356771] [PMID]
7. Kyrou I, Adesanya O, Hedley N, Wayte S, Grammatopoulos D, Thomas CL, et al. Improved thyroid hypoechogenicity following bariatric-induced weight loss in euthyroid adults with severe obesity-a pilot study. *Frontiers in Endocrinology*. 2018; 9:488. [DOI:10.3389/fendo.2018.00488] [PMID] [PMCID]
8. Kyrou I, Randeve HS, Tsigos C, Kaltsas G, Weickert MO. Clinical problems caused by obesity. In: De Groot LJ, Chrousos G, Dungan K, Feingold KR, Grossman A, Hershman JM, et al, editors. *Endotext*. South Dartmouth, MA: MDText.com, Inc; 2018.
9. Zhao Z, Ding N, Song S, Liu Y, Wen D. Association between depression and overweight in Chinese adolescents: a cross-sectional study. *BMJ Open*. 2019; 9(2):e024177. [DOI:10.1136/bmjopen-2018-024177] [PMID] [PMCID]
10. Mousavi S, Rajabi S, Ebadi Z, Mashalpoorefar M. Comparing trait-state anxiety as well as positive and negative affect among obese and normal women (Ahvaz city, Iran, 2017). *Journal of Occupational Health and Epidemiology*. 2018; 7(4):194-200. [DOI:10.29252/johe.7.4.194]
11. Tsukayama E, Toomey SL, Faith MS, Duckworth AL. Self-control as a protective factor against overweight status in the transition from childhood to adolescence. *Archives of Pediatrics & Adolescent Medicine*. 2010; 164(7):631-5. [DOI:10.1001/archpediatrics.2010.97] [PMID] [PMCID]
12. Hofmann W, Adriaanse M, Vohs KD, Baumeister RF. Dieting and the self-control of eating in everyday environments: An experience sampling study. *British Journal of Health Psychology*. 2014; 19(3):523-39. [DOI:10.1111/bjhp.12053] [PMID] [PMCID]
13. Fan M, Jin Y. Obesity and self-control: Food consumption, physical activity, and weight-loss intention. *Applied Economic Perspectives and Policy*. 2014; 36(1):125-45. [DOI:10.1093/aep/ppt034]
14. Naets T, Vervoort L, Verbeke S, Braet C. Enhancing childhood multidisciplinary obesity treatments: the power of

- self-control abilities as intervention facilitator. *Frontiers in Psychology*. 2018; 9:1956. [DOI:10.3389/fpsyg.2018.01956] [PMID] [PMCID]
15. Allom V, Mullan B. Individual differences in executive function predict distinct eating behaviours. *Appetite*. 2014; 80:123-30. [DOI:10.1016/j.appet.2014.05.007] [PMID]
 16. Groppe K, Elsner B. Executive function and weight status in children: a one-year longitudinal perspective. *Child Neuropsychology*. 2017; 23(2):129-47. [DOI:10.1080/09297049.2015.1089981] [PMID]
 17. Singh M. Mood, food, and obesity. *Frontiers in Psychology*. 2014; 5:925. [DOI:10.3389/fpsyg.2014.00925] [PMID] [PMCID]
 18. Javadi M, Jourabchi Z, Shafikhani AA, Tajik E. Prevalence of depression and anxiety and their association with body mass index among high school students in Qazvin, Iran, 2013-2014. *Electronic Physician*. 2017; 9(6):4655-60. [DOI:10.19082/4655] [PMID] [PMCID]
 19. Andrei F, Nuccitelli C, Mancini G, Reggiani GM, Trombini E. Emotional intelligence, emotion regulation and affectivity in adults seeking treatment for obesity. *Psychiatry Research*. 2018; 269:191-8. [DOI:10.1016/j.psychres.2018.08.015] [PMID]
 20. Frayn M, Livshits S, Knäuper B. Emotional eating and weight regulation: a qualitative study of compensatory behaviors and concerns. *Journal of Eating Disorders*. 2018; 6:23. [DOI:10.1186/s40337-018-0210-6] [PMID] [PMCID]
 21. Kobylńska D, Kusev P. Flexible emotion regulation: how situational demands and individual differences influence the effectiveness of regulatory strategies. *Frontiers in Psychology*. 2019; 10:72. [DOI:10.3389/fpsyg.2019.00072] [PMID] [PMCID]
 22. Levitan RD, Davis C. Emotions and eating behaviour: Implications for the current obesity epidemic. *University of Toronto Quarterly*. 2010; 79(2):783-99. [DOI:10.3138/utq.79.2.783]
 23. Kachooei M, Moradi A, Kazemi A S, Ghanbari Z. The discriminative role of emotion regulation and impulsivity in different unhealthy eating patterns. *Feyz*. 2016; 20(4):383-90.
 24. Gall MD, Borg WR, Gall JP. *Educational research: an introduction*. Boston: Longman Publishing; 2007.
 25. Tangney JP, Baumeister RF, Boone AL. High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*. 2004; 72(2):271-324. [DOI:10.1111/j.0022-3506.2004.00263.x] [PMID]
 26. Khormaei F, Farmani A, Yazdani F. Predicting self-control on the basis of patience and its components among high school students. *Practice in Clinical Psychology*. 2017; 5(1):11-6. [DOI:10.18869/acadpub.jpcp.5.1.11]
 27. Garnefski N, Kraaij V, Spinhoven P. Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences*. 2001; 30(8):1311-27. [DOI:10.1016/S0191-8869(00)00113-6]
 28. Abdi S, Taban S, Ghaemian A. Cognitive emotion regulation questionnaire: validity and reliability of Persian translation of CERQ-36 item. *Procedia-Social and Behavioral Sciences*. 2012; 32:2-7. [DOI:10.1016/j.sbspro.2012.01.001]
 29. Lampard AM, Maclehoose RF, Eisenberg ME, Larson NI, Davison KK, Neumark-Sztainer D. Adolescents who engage exclusively in healthy weight control behaviors: Who are they? *International Journal of Behavioral Nutrition and Physical Activity*. 2016; 13(1):5. [DOI:10.1186/s12966-016-0328-3] [PMID] [PMCID]
 30. Marks DF. Homeostatic theory of obesity. *Health Psychology Open*. 2015; 2(1):2055102915590692. [DOI:10.1177/2055102915590692] [PMID] [PMCID]
 31. Junger M, van Kampen M. Cognitive ability and self-control in relation to dietary habits, physical activity, and bodyweight in adolescents. *International Journal of Behavioral Nutrition and Physical Activity*. 2010; 7:22. [DOI:10.1186/1479-5868-7-22] [PMID] [PMCID]
 32. Hagger MS, Panetta G, Leung CM, Wong GC, Wang JC, Chan DK, et al. Chronic inhibition, self-control and eating behavior: test of a 'resource depletion' model. *PLoS One*. 2013; 8(10):e76888. [DOI:10.1371/journal.pone.0076888] [PMID] [PMCID]
 33. Weinbach N, Sher H, Bohon C. Differences in emotion regulation difficulties across types of eating disorders during adolescence. *Journal of Abnormal Child Psychology*. 2018; 46(6):1351-8. [DOI:10.1007/s10802-017-0365-7] [PMID] [PMCID]
 34. Arslan M, Aydemir i. Relationship between emotional appetite, eating attitudes, sleep quality, and body mass index in healthcare workers: a multi-centre study. *Psychiatry and Clinical Psychopharmacology*. 2019; 29(3):346-53. [DOI:10.1080/24750573.2019.1627694]
 35. Bello NT, Walters AL, Verpeut JL, Caverly J. Dietary-induced binge eating increases prefrontal cortex neural activation to restraint stress and increases binge food consumption following chronic guanfacine. *Pharmacology, Biochemistry, and Behavior*. 2014; 125:21-8. [DOI:10.1016/j.pbb.2014.08.003] [PMID]
 36. Akay GG. Distinguishing physical hunger from emotional hunger in eating disorders. *Clinical Psychology in Turkey*. 2016; 1(2):17-22.
 37. Davis C, Curtis C, Levitan RD, Carter JC, Kaplan AS, Kennedy JL. Evidence that 'food addiction' is a valid phenotype of obesity. *Appetite*. 2011; 57(3):711-7. [DOI:10.1016/j.appet.2011.08.017] [PMID]
 38. Shahsavari M, Fathi Ashtiani A, Rasoolzadeh Tabatabaee K. Body mass index: comparison of emotion regulation and eating behavior. *Yafteh*. 2016; 18(3):104-13.
 39. Jankauskiene R, Baceviciene M. Body image concerns and body weight overestimation do not promote healthy behaviour: evidence from adolescents in Lithuania. *International Journal of Environmental Research and Public Health*. 2019; 16(5):864. [DOI:10.3390/ijerph16050864]
 40. Hemmingsson E. A new model of the role of psychological and emotional distress in promoting obesity: conceptual review with implications for treatment and prevention. *Obesity Reviews*. 2014; 15(9):769-79. [DOI:10.1111/obr.12197] [PMID]
 41. Steward T, Picó-Pérez M, Mata F, Martínez-Zalacaín I, Cano M, Contreras-Rodríguez O, et al. Emotion regulation and excess weight: impaired affective processing characterized by dysfunctional insula activation and connectivity. *PLoS One*. 2016; 11(3):e0152150. [DOI:10.1371/journal.pone.0152150] [PMID] [PMCID]
 42. Bekiroğlu K. Investigating eating attitude behaviors and emotional appetite in individuals taking part in weight control. [Master Thesis]. Istanbul, Turkey: Medipol University; 2018.
 43. Bourdier L, Lalanne C, Morvan Y, Kern L, Romo L, Berthoz S. Validation and factor structure of the French-language version of the emotional appetite questionnaire (EMAQ). *Frontiers in Psychology*. 2017; 8:442. [DOI:10.3389/fpsyg.2017.00442] [PMID] [PMCID]
 44. Quick V, Shoff S, Lohse B, White A, Horacek T, Greene G. Relationships of eating competence, sleep behaviors and quality, and overweight status among college students. *Eating Behaviors*. 2015; 19:15-9. [DOI:10.1016/j.eatbeh.2015.06.012] [PMID] [PMCID]
 45. Prefit AB, Căndea DM, Szentagotai-Tătar A. Emotion regulation across eating pathology: a meta-analysis. *Appetite*. 2019; 143:104438. [DOI:10.1016/j.appet.2019.104438] [PMID]