DOI: http://dx.doi.org/10.22122/ijbmc.v10i4.479 Published by Vesnu Publications

International Journal of Body, Mind and Culture

Structural Equation Model of Bulimia Nervosa Based on Mindfulness and Anxiety Sensitivity in Obese Women: The Mediating Role of Body Image and Psychosomatic Symptoms

Shohreh Mortezaei Shemirani[1], Ali Talaei[2], Golnaz Ranjbar[3], Elham Taheri[4]

1 PhD, Department of Health Psychology, Karaj Branch, Islamic Azad University, Karaj, Iran
2 Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3 Assistant Professor, Department of Nutrition, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4 PhD, Department of Clinical Psychology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Corresponding Author: Ali Talaei; *Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran*
Email: talaeia@mums.ac.ir

Quantitative Study

Abstract

Background: Today, obesity is considered one of the most important and common problems in the field of world health, found to have a significant coexistence with many physical diseases and mental problems. The present study aimed to explain the model of bulimia nervosa based on the components of mindfulness and anxiety sensitivity with the mediating role of body image and psychosomatic symptoms in obese women.

Methods: The statistical population in this research included all patients diagnosed with obesity in the treatment centers of Tehran, Iran, in 2021. The research sample included 384 women diagnosed with obesity followed by removing the distorted questionnaires leading to 357 statistically analyzed samples. The questionnaires used in this research were the Five Facet Mindfulness Questionnaire (FFMQ), the psychosomatic disorders questionnaire, the self-body questionnaire, the Anxiety Sensitivity Index-Revised (ASI-R), and the Binge Eating Scale (BES), which were completed by the subjects following the principles of ethics in the research. The findings were statistically analyzed using path analysis and descriptive and inferential indicators. Data analysis was done using the SPSS software, AMOS software, and other appropriate tests.

Results: The model had a favorable fit in terms of statistics, and it was also found that psychosomatic symptoms as a mediating variable could not have provided a significant explanation for the prediction paths of bulimia nervosa based on anxiety sensitivity and component mindfulness ($P < 0.01$).

Conclusion: In the treatment of obese people with bulimia nervosa, paying attention to psychological and emotional indicators can be of great importance.

Keywords: Bulimia nervosa; Mindfulness; Anxiety; Body image; Psychosomatic; Obesity

Citation: Mortezaei Shemirani S, Talaei A, Ranjbar G, Taher E. **Structural Equation Model of Bulimia Nervosa Based on Mindfulness and Anxiety Sensitivity in Obese Women: The Mediating Role of Body Image and Psychosomatic Symptoms.** Int J Body Mind Culture 2023; 10(4): 510-20.

Received: 28 Jan. 2023
Accepted: 19 Aug. 2023

Introduction

Eating disorders are one of the worrisome factors in public health, whose rates have been increasing rapidly since the 1970s (Hoek & van Hoeken, 2003). The most common eating disorders seen in women are anorexia nervosa and bulimia nervosa (Wood, 2004). It is estimated that disrupted overeating using self-reporting occurs in approximately 30% of treatment-seeking obese individuals, although when diagnosed by examining specialists it seems that the prevalence rate will decrease to 10%-15% (Stancard, 2002). Obese people may be afflicted by any type of mental disorder and various chaoses in life can be attributed to their obesity (Mousavian, Moradi, Mirzaei, Shidfar, Mahmoudi Kahrizi, & Taheri, 2010). It is believed that women who are obese and overweight suffer from depression and severe anxiety because of their obesity and body deformity (Eagleton, 2011).

One of the important components related to stress and anxiety in obese people is anxiety sensitivity (Fergus et al., 2018). Anxiety sensitivity is a construct of individual differences in which a person fears physical symptoms associated with anxiety arousal (increased heart rate, shortness of breath, dizziness) coming from the belief that these symptoms potentially lead to social, cognitive, and physical consequences (Hearon, Quatromoni, Mascoop, & Otto, 2014). It is believed that even the fear that others will observe the symptoms of anxiety causes social anxiety to intensify (Carleton, Collimore, & Asmundson, 2010). Currently, many clinical psychologists use mindfulness as a very effective non-pharmacological tool to reduce stress and anxiety. Accordingly, it has been determined that mindfulness can be used in the therapy of many physical, psychological, and mental problems, chronic pains, and stress with a tremendous effect. Numerous kinds of research have shown the effectiveness of mindfulness-based interventions on binge eating (Miller et al., 2021; Kristeller & Wolever, 2014; Katterman, Kleinman, Hood, Nackers, & Corsica, 2014). Researchers believe that at high levels of mindfulness and acceptance, people notice their psychological arousals (feelings and thoughts) without making any attempt to avoid or control them, which consequently reduces the impact of these thoughts and feelings on their behavioral performance (Noorian et al., 2014).

One of the aspects of body image is dissatisfaction with the negative evaluation of body size, shape, and weight which refers to the individual's mentalities regarding the difference between the real body and the ideal body (Eagleton, 2011; Quoted from Sabiston, Pila, Vani, & Thogersen-Ntoumani, 2019). Considering that stress factors can lead to a decrease in the level of mental health of people and the occurrence of disorders (Pitron, Alsmith, de Vignemont, 2018), it can be assumed that psychosomatic disorder is also one of the consequences of not controlling these conditions. In fact, in addition to what is expected in psychosomatic disorders in which the problems arise from neurological and biochemical disturbances, the role of psychological distress affecting the physiological function of the body should be also taken seriously into consideration (Gatchel, Baum, & Lang, 2021). However, any type of physical illness resulting from this disorder has a psychological and emotional background and also these disorders include interactions between the mind and the body in which the brain affects a person's consciousness indicating the existence of a serious problem in the body (Desai, Kale, Shah, & Rana, 2018). Moreover, some mental or brain mechanisms lead to minor or undetectable changes in the nervous system resulting in these diseases (Mahmoudi & Malekshahi Far, 2012).

According to the above, it seems that there is some kind of chain of connection between emotional stressors and the cognitive system of people in obese individuals.

As obesity has been noticed as a disorder in the modern world with high prevalence, it is necessary to investigate the antecedents of this disorder in detail. Therefore, the purpose of this research is to explain obesity based on anxiety sensitivity and mindfulness components with an emphasis on the mediating role of body image and psychosomatic symptoms in obese women.

Methods

The method of the current research was descriptive and correlational. The statistical population in this research included all patients diagnosed with obesity in the treatment centers of Tehran, Iran, in 2021. Among the patients who met the study criteria and could participate in the study, 384 women diagnosed with obesity and in the age group of 15 to 30 years were selected based on the targeted sampling. The inclusion criteria consisted of receiving a diagnosis of bulimia nervosa by a nutritionist, a diagnosis of obesity based on body mass index (BMI) (≥ 30) according to expert opinion, having a minimum age of 18 years and a maximum age of 30 years, no drug addiction, lack of pregnancy, and lack of physical diseases such as malignant tumors or cancer that interfere with the research process. The exclusion criteria also included the following: diagnosis of acute personality disorders and mood and anxiety disorders such as depression and obsession, which are assessed using clinical interviews and the Symptom Checklist-90 (SCL-90) questionnaire in the screening process, unwillingness to complete questionnaires, and getting pregnant. Sample members completed bulimia nervosa questionnaires, component scale mindfulness, anxiety sensitivity questionnaire, body image scale, and psychosomatic symptoms questionnaire. Of course, for those who could not complete the questionnaire for any reason, the questionnaire was completed by the researcher himself.

Five Facet Mindfulness Questionnaire (FFMQ): FFMQ has been made by Baer et al. (2006) to examine multiple dimensions of mindfulness. This scale has 39 questions and is on a Likert scale from 1 (never) to 5 (always). This questionnaire has 5 subscales, which include being non-reactive, describing, observing, acting on alertness, and being non-judgmental. The validity and reliability of this scale have been investigated in studies (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). In addition, this scale has been investigated in Iran by Sajjadian, Neshat Doost, Molvi, & Maroufi (2007). The results of their study showed that the reliability of the crumb scales of this questionnaire was reported between 0.55 and 0.83 using Cronbach's alpha and 0.80 for its total score. In addition to that, in this questionnaire, there is a relationship between personality traits, psychological well-being, emotional intelligence, depression, life satisfaction, etc., which indicates the validity of the questionnaire (Sajadian, et al, 2007).

Questionnaire of psychosomatic disorders: To measure psychosomatic symptoms, the questionnaire of psychosomatic symptoms was used in a non-clinical setting. This is a self-report questionnaire which measures the intensity of psychosomatic symptoms experienced by the individual; it has 20 items that are answered on a 5-point Likert scale. The internal reliability of this questionnaire in different studies and with different samples has been mentioned between 0.70 and 0.93 (, 2000). In Iran, the reliability using Cronbach's alpha method was 0.89 and its factorial validity has been reported as suitable (Babamiri, Zoheri, Nisi, Arshadi, & Shahroie, 2015).

Self-Body Questionnaire: This questionnaire is a 46-item scale used by Cash et al. (1987) to evaluate the imagination of the body. The final form of this test was prepared in 1997. This scale has 6 evaluation subscales including attention to

appearance, assessment of fitness, the tendency to fit, preoccupation with excess weight, and satisfaction with body areas. This test is graded according to a 5-point Likert scale. Cash (2016) examined the internal consistency and validity of this scale revealing that based on Cronbach's alpha coefficient, the range from 0.83 to 0.92 indicates the favorable validity of this scale. In the same manner, in Iran, the internal consistency coefficients using the retest method indicate the desired reliability of this scale (Parizadeh, Hasan Abadi, Mashhadi, & Taghizadeh Kermani, 2011).

Anxiety Sensitivity Index-Revised (ASI-R): This scale has been designed by Taylor and Cox in 1998 to assess the degree of fear of anxiety symptoms and consequences. This tool is a 36-item self-report scale. The answer options for each question are very little, little, medium, much, and very much which, based on the Likert scale, are numbered from 0 to 4, respectively. The ASI-R is a four-factor order structure. These factors are: 1) fear of respiratory symptoms, 2) fear of anxiety reactions visible in public, 3) fear of cardiovascular symptoms, and 4) fear of cognitive disinhibition. In the study of internal homogeneity of this scale, Taylor and Cox have reported alpha coefficients between 0.83 and 0.94. In general, studies show that the ASI-R has good validity and reliability (Moradi Menesh, 2016). The validity of this index was calculated based on the three methods of internal similarity, resampling, and classification, which for the whole scale were 0.93, 0.95, and 0.95, respectively. Moreover, the validity coefficients of the subscales based on the methods of internal consistency, retesting, and classification were calculated ranging between 0.82 and 0.91, 0.92 and 0.96, and 0.76 and 0.90, respectively. Validity of the revised index was carried out through simultaneous implementation with the "revised list of 90-syndrome anxiety sensitivity questionnaire" which resulted in a correlation coefficient of 0.56. Correlation coefficients between subscales of the ASI-R with the total score were satisfactory and varied between 0.74 and 0.88. The correlation between the subscales varied also between 0.40 to 0.68 (Moradi Menesh, 2016).

Binge Eating Scale (BES): The scale was designed by Gormally et al. (1982) to measure the severity of overeating in obese people. This scale consists of 16 items and its articles consist of three or four sentences. Subjects are asked to choose a sentence that describes them best. Items are graded from zero to three, and the total score varies from zero to 46. A score of 16 indicates the presence of binge eating disorder (BED) and a score higher than that indicates the severity of binge eating. English, Portuguese, and Italian versions of this scale have satisfactory validity, sensitivity coefficient, and psychometric properties. A study of psychometric properties (Mottabi, Molodi, Dejkam, and Omidvar) investigated the Iranian version of the BES. They reported the validity of this scale as 0.72 using the retest method. They also obtained Cronbach's alpha coefficient of 0.85.

Ethical considerations including coordinating and obtaining permission to enter the environment, explaining the purpose of the research and the method of completing the questionnaires, participants' right to participate in the study or refuse, assuring participants of confidentiality of personal information, and obtaining informed consent to participate in the research were all well done. Data analysis was done using the SPSS software (version 22, IBM Corporation, Armonk, NY, USA), AMOS software, and other appropriate tests.

Results

The purpose of this research was to explain obesity based on anxiety sensitivity and mindfulness components, emphasizing the mediating role of body image and

psychosomatic symptoms in obese women. In this section, descriptive and inferential findings are presented separately.

82 (23%) subjects had mild obesity, 151 (42%) had severe obesity, 76 (21%) had difficult obesity, and 48 (14%) ones had super obesity. As it is shown, four levels of obesity were investigated. It is well indicated that a higher percentage of the sample members were afflicted with severe obesity while a smaller percentage suffered from hyper-obesity. In terms of employment status, 106 (30%) were freelancers, 157 (44%) were governmental employees, and 94 (26%) were housewives. The results indicated that a large part of the research sample had a governmental job and a smaller percentage were housewives.

The highlighted boxes in table 1 indicate the non-significance of the correlation of that subscale with the corresponding component. Fitness of the proposed model is based on the chi-square (χ^2) index, comparative fit index (CFI), goodness of fit index (GFI), adjusted GFI (AGFI), and root mean square error of approximation (RMSEA). The results of structural equations were as follows: $\chi^2 = 78.047$, χ^2/degree of freedom (df) = 1.773, RMSEA = 0.047, GFI = 0.924, AGFI = 0.918, CFI = 0.908 (P = 0.001). The χ^2/df is less than 2.5 and the RMSEA value is close to zero. Besides, the values of GFI, AGFI, and CFI are close to 1.

Table 2 shows the amount of direct, indirect, and total effects of each structure compared to the variables defined in the path. In this regard, the direct and indirect effects have been investigated, and according to the highlighted items indicating the paths that could not be considered statistically significant, it was found that psychosomatic symptoms in total did not have many paths to explain predictor variables as statistically significant paths and body image also as the title of a mediating variable did not show a significant path for only two subscales.

Table 1. Correlation of variables and subscales included in the research model (Part I)

Variables	1	2	3	4	5
Body image	1				
Being non-reactive	0.25**	1			
Description	0.28**	0.21**	1		
Observation	0.45**	0.22**	0.27**	1	
Act with awareness	0.11*	0.32**	0.23**	0.27**	1
Non-judgmental	0.29**	0.22**	0.32**	0.32**	0.22**
Mindfulness total score	0.41**	0.72**	0.86**	0.85**	0.80**
Psychosomatic disorders	-0.43**	-0.26**	-0.33**	-0.28**	-0.34**
Fear of respiratory symptoms	-0.35**	0.17*	-0.42**	-0.34**	-0.41**
Fear of public reactions	-0.26**	-0.29**	-0.26**	-0.48**	-0.19*
Cardiovascular symptoms	-0.43**	-0.35**	-0.53**	-0.25**	-0.27**
Fear of cognitive disinhibition	-0.14*	-0.24**	-0.15*	-0.33**	-0.11*

Table 1. Correlation of variables and subscales included in the research model (Part II)

Variables	6	7	8	9	10	11	12
Body image							
Being non-reactive							
Description							
Observation							
Act with awareness							
Non-judgmental	1						
Mindfulness total score	0.81**	1					
Psychosomatic disorders	-0.24**	-0.33**	1				
Fear of respiratory symptoms	-0.36**	-0.44**	0.34**	1			
Fear of public reactions	-0.35**	-0.34**	0.46**	0.37**	1		
Cardiovascular symptoms	-0.29**	-0.45**	0.26**	0.81**	0.85**	1	
Fear of cognitive disinhibition	-0.35**	-0.18*	0.33**	0.82**	0.85**	0.86**	1

Table 2. Direct, indirect, and total effects for explaining the model

Variable	Direct effect	Indirect effect	P-value
Being unresponsive to body image	0.238	0.128	0.123
Description of body image	0.547	0.395	< 0.001
Observing body image	0.381	0.235	0.021
Practicing body image awareness	0.324	0.262	0.014
Being non-judgmental about body image	0.387	0.239	0.011
Fear of respiratory signs of body image	0.310	0.238	0.035
Fear of public reactions to body image	0.417	0.284	0.020
Fear of cardiovascular symptoms of body image	0.439	0.373	0.017
Fear of cognitive disinhibition of body image	0.299	0.185	0.138
Being unresponsive to psychosomatic symptoms	0.288	0.204	0.112
Description of psychosomatic symptoms	0.160	0.091	0.176
Observing psychosomatic symptoms	0.247	0.181	0.067
Practicing awareness of psychosomatic symptoms	0.132	0.054	0.037
Being non-judgmental about psychosomatic symptoms	0.241	0.185	0.048
Fear of respiratory symptoms of psychosomatic symptoms	o.128	0.123	0.095
Fear of public reactions to psychosomatic symptoms	0.161	0.106	0.108
Fear of cardiovascular symptoms of psychosomatic symptoms	0.236	0.197	0.043
Fear of cognitive disinhibition of psychosomatic symptoms	0.181	0.099	0.124
Being unresponsive to bulimia nervosa	0.256		0.041
Description of bulimia nervosa	0.260		0.038
Observing bulimia nervosa	0.248		0.032
Practicing alertness to bulimia nervosa	0.264		0.041
Being non-judgmental about bulimia	0.244		0.049
Fear of respiratory symptoms of bulimia	0.296		0.010
Fear of public reactions to bulimia	0.288		0.025
Fear of cardiovascular symptoms of bulimia	0.262		0.027
Fear of cognitive disinhibition of bulimia nervosa	0.273		0.011
Body image to bulimia nervosa	0.327		< 0.001
Psychosomatic symptoms of bulimia nervosa	0.231		0.024

Discussion

The purpose of this research was to explain obesity based on anxiety sensitivity and mindfulness components, emphasizing the mediating role of body image and psychosomatic symptoms in obese women. The results obtained from the data analysis showed that, in general, the researcher's model had a good statistical fit and it was also found that body image and psychosomatic symptoms were significant explanations to predict overeating in obese women, but in detail and based on anxiety sensitivity components and mindfulness subscales, psychosomatic symptoms could not be a significant mediator for predicting pathways of bulimia nervosa.

In explaining this finding, it can be said that what is significant in the mechanism of the effect of stress is that as a result of experiencing stress and the disruption of the cognitive balance, we witness the occurrence of some psychological and physiological reactions in people, which can be seen as both cognitive/emotional as well as behavioral/physiological problems. In other words, when experiencing stress, the human body is ready for quick action by releasing hormones that increase the state of care and concentration (Parsaei, 2013); meanwhile, if the source of stress is not eliminated, the remaining stress hormones in the body will make the person at risk of a wide range of physical diseases such as obesity, gastrointestinal disorders, cardiovascular disorders, skin problems, and psychological disorders such as anxiety attacks and depression (Koolhaas et al., 2011). It is well known that in times of stress, some people unconsciously and automatically look for ways to get rid of it, in which

the first behavior is usually eating. Based on the stimulus-oriented model, psychological pressure is considered an external factor by which and based on the mental capacities and the level of sensitivity towards the sources of anxiety, people can cope and stand against a certain amount of mental pressure (Hernigou, Koulischer, & Maes, 2017). Hence, the person's coping with stress, regarding the individual's situation and abilities, includes confrontations based on the projection of emotions and the reduction of negative emotions through activities such as overeating (Parsaei, 2013). In other words, in people suffering from eating disorders and any problems related to obesity and overweight, the way of coping with psychological pressure in an incompatible way and as opposed to solving conflicts can lead to the aggravation of disorder symptoms, especially in the field of eating disorders (Romero-Martinez & Moya-Albiol, 2017). Mason et al. (2018), Paszynska et al. (2020), and Moreno-Encinas et al. (2020) also reported similar results. Persons who show high anxiety sensitivity experience more psychological disturbance due to the existence of anxiety backgrounds, which can cause interpersonal conflicts and ultimately problems in social relations (Gerhart, Baker, Hoerger, & Ronan, 2014; McEvoy, Burgess, Page, Nathan, & Fursland, 2013). Moreover, knowing all these, people with BED have serious weaknesses in expressing and regulating their emotions, which affects the formation and continuation of their disorder (Whiteside, Chen, Neighbors, Hunter, Lo, & Larimer, 2007). These people often take refuge in overeating for short-term relief from their painful emotions (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Conclusion

One of the limitations of this research is the presence of disturbing variables such as the marital status and employment of the sample. Besides, the limitation of this research to the city of Tehran requires caution in generalizing the results to other cities. Researchers interested in the field of BED are suggested to investigate the role of metacognitive variables and antecedent factors such as defense mechanisms and personality traits. The results of this research can be beneficial in developing intervention protocols for the treatment of obesity.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgements

Thanks are given to all the people and nutrition counseling centers who cooperated in the implementation of this research.

References

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clin.Psychol.Rev.*, *30*(2), 217-237. doi:S0272-7358(09)00159-7 [pii];10.1016/j.cpr.2009.11.004 [doi]. Retrieved from PM:20015584

Babamiri, M., Zoheri, A., Nisi, A., Arshadi, N., & Shahroie, S. H. (2015). Job stressors as predictors of psychosomatic symptoms. *J Ilam Univ Med Sci*, *23*(1), 45-55.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27-45. doi:13/1/27 [pii];10.1177/1073191105283504 [doi]. Retrieved from PM:16443717

Blostein, F., Assari, S., & Caldwell, C. H. (2017). Gender and ethnic differences in the association between body image dissatisfaction and binge eating disorder among blacks. *J Racial.Ethn.Health Disparities.*, *4*(4), 529-538. doi:10.1007/s40615-016-0255-7 [pii];10.1007/s40615-016-0255-7 [doi]. Retrieved from PM:27352115

Caloudas 3rd, S. G. (2011). *Personality, coping, and quality of life in early stage breast cancer survivors*. Houston, TX: University of Houston.

Carleton, R. N., Collimore, K. C., & Asmundson, G. J. (2010). "It's not just the judgements--It's that I don't know": intolerance of uncertainty as a predictor of social anxiety. *J Anxiety.Disord*, *24*(2), 189-195. doi:S0887-6185(09)00210-2 [pii];10.1016/j.janxdis.2009.10.007 [doi]. Retrieved from PM:19931391

Cash, T. F. (2016). Multidimensional Body' Relations Questionnaire (MBSRQ). In T. Wade (Ed.), *Encyclopedia of Feeding and Eating Disorders* (pp. 1-4). Singapore: Springer Singapore.

De Lorenzo, A., Gratteri, S., Gualtieri, P., Cammarano, A., Bertucci, P., & Di Renzo, L. (2019). Why primary obesity is a disease? *J Transl.Med*, *17*(1), 169. doi:10.1186/s12967-019-1919-y [pii];1919 [pii];10.1186/s12967-019-1919-y [doi]. Retrieved from PM:31118060

Desai, K. M., Kale, A. D., Shah, P. U., & Rana, S. (2018). Psychosomatic disorders: A clinical perspective and proposed classification system. *Arch Iran Med*, *21*(1), 44-45. doi:S1029-2977-21(01)044-0 [pii]. Retrieved from PM:29664670

Gatchel, R. J., Baum, A., & Lang, P. J. (2021). Psychosomatic disorders: Basic issues and future research directions. In *Handbook of Psychology and Health, Volume I* (pp. 371-397). New York, NY: Routledge.

Gerhart, J. I., Baker, C., Hoerger, M., & Ronan, G. F. (2014). Experiential avoidance and interpersonal problems: A moderated mediation model. *J Contextual Behav Sci.*, *3*(4), 291-298. doi:10.1016/j.jcbs.2014.08.003 [doi].

Gormally, J., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating severity among obese persons. *Addict.Behav*, *7*(1), 47-55. doi:0306-4603(82)90024-7 [pii];10.1016/0306-4603(82)90024-7 [doi]. Retrieved from PM:7080884

Hearon, B. A., Quatromoni, P. A., Mascoop, J. L., & Otto, M. W. (2014). The role of anxiety sensitivity in daily physical activity and eating behavior. *Eat.Behav*, *15*(2), 255-258. doi:S1471-0153(14)00033-6 [pii];10.1016/j.eatbeh.2014.03.007 [doi]. Retrieved from PM:24854814

Hernigou, J., Koulischer, S., & Maes, R. (2017). Bilateral simultaneous femoral neck stress fracture despite clinical recovery from anorexia nervosa: A case report. *JBJS Case Connect.*, *7*(1), e12. doi:01709767-201707010-00013 [pii];10.2106/JBJS.CC.16.00047 [doi]. Retrieved from PM:29244693

Hoek, H. W., & van, H. D. (2003). Review of the prevalence and incidence of eating disorders. *Int J Eat.Disord*, *34*(4), 383-396. doi:10.1002/eat.10222 [doi]. Retrieved from PM:14566926

Katterman, S. N., Kleinman, B. M., Hood, M. M., Nackers, L. M., & Corsica, J. A. (2014). Mindfulness meditation as an intervention for binge eating, emotional eating, and weight loss: a systematic review. *Eat.Behav*, *15*(2), 197-204. doi:S1471-0153(14)00019-1 [pii];10.1016/j.eatbeh.2014.01.005 [doi]. Retrieved from PM:24854804

Kinlen, D., Cody, D., & O□ÇÖShea, D. (2018). Complications of obesity. *QJM: An International Journal of Medicine*, *111*(7), 437-443. doi:10.1093/qjmed/hcx152 [doi].

Koolhaas, J. M., Bartolomucci, A., Buwalda, B., de Boer, S. F., Flugge, G., Korte, S. M. et al. (2011). Stress revisited: A critical evaluation of the stress concept. *Neurosci Biobehav.Rev.*, *35*(5), 1291-1301. doi:S0149-7634(11)00022-4 [pii];10.1016/j.neubiorev.2011.02.003 [doi]. Retrieved from PM:21316391

Kristeller, J. L., & Wolever, R. Q. (2014). Mindfulness-based eating awareness training: treatment of overeating and obesity. In R.A. Baer (Ed.), *Mindfulness-based treatment approaches (2nd ed) Practical Resources for the Mental Health Professional* (pp. 119-139). San Diego, CA: Academic Press.

Maher, C. G. (2000). A systematic review of workplace interventions to prevent low back pain. *Aust.J Physiother.*, *46*(4), 259-269. doi:S0004-9514(14)60287-7 [pii];10.1016/s0004-9514(14)60287-7 [doi]. Retrieved from PM:11676811

Mahmoudi, N., Malekshahi Far, M. (2012 Oct 17). *Examining the prevalence and relationship between psychosomatic disorders and emotional intelligence and attachment style in Boys' secondary schools of Zanjan province, Azad University of Isfahan*. Proceedings of the 4th International Psycho-Physical Congress; Isfahan, Iran.

Mason, T. B., Lavender, J. M., Wonderlich, S. A., Crosby, R. D., Engel, S. G., Mitchell, J. E. et al. (2018). Examining a momentary mediation model of appearance-related stress, anxiety, and eating disorder behaviors in adult anorexia nervosa. *Eat.Weight.Disord, 23*(5), 637-644. doi:10.1007/s40519-017-0404-y [pii];10.1007/s40519-017-0404-y [doi]. Retrieved from PM:28589469

McEvoy, P. M., Burgess, M. M., Page, A. C., Nathan, P., & Fursland, A. (2013). Interpersonal problems across anxiety, depression, and eating disorders: a transdiagnostic examination. *Br.J Clin.Psychol., 52*(2), 129-147. doi:10.1111/bjc.12005 [doi]. Retrieved from PM:24215144

Miller, R. L., Lucas-Thompson, R. G., Sanchez, N., Smith, A. D., Annameier, S. K., Casamassima, M. et al. (2021). Effects of a mindfulness-induction on subjective and physiological stress response in adolescents at-risk for adult obesity. *Eat.Behav, 40*, 101467. doi:S1471-0153(20)30386-X [pii];10.1016/j.eatbeh.2020.101467 [doi]. Retrieved from PM:33310488

Moloodi, R. (2010). Comparison of early maladaptive schema in obese binge eaters and obese non-binge eaters. *International Journal of Behavioral Sciences, 4*(2), 109-114.

Moradi Manesh, F. (2016). *Investigating the psychometric characteristics of the revised index of anxiety sensitivity and its relationship with mental health in students Shiraz University [MSc Thesis]*. Shiraz, Iran: Shiraz University.

Moreno-Encinas, A., Sepulveda, A. R., Kurland, V., Lacruz, T., Nova, E., & Graell, M. (2020). Identifying psychosocial and familial correlates and the impact of the stressful life events in the onset of anorexia nervosa: Control-case study (ANOBAS): Psychosocial and familial correlates and stressful life events in AN. *Psychiatry Res, 284*, 112768. doi:S0165-1781(19)31958-4 [pii];10.1016/j.psychres.2020.112768 [doi]. Retrieved from PM:31931274

Mousavian, N., Moradi, A. R., Mirzaei, J., Shidfar, F., Mahmoudi Kahrizi, B., & Taheri, F. (2010). Effectiveness of mindfulness on weight loss. *Journal of Thought & Behavior In Clinical Psychology, 4*(16), 49-58.

Noorian, M. *et al. (2014).* Investigating the effectiveness of treatment based on acceptance and commitment on the mental experiences of eating and losing weight in obese women. *Knowledge and Research in Applied Psychology. 60 (1:) 15-23.*

Parizadeh, H., Hasan Abadi, H., Mashhadi, A., & Taghizadeh Kermani, A. (2012). Investigating effectiveness of existential and reality group-therapy in treatment of body-image problem in women who undergo mastectomy. *Iran J Obstet Gynecol Infertil, 15*(22), 27-35. doi: 10.22038/IJOGI.2012.5659 [doi].

Parsaei, F. *(2013) Examining the relationship between coping styles and the quality of life of blind female students [MSc Thesis]. Tehran, Iran: Islamic Azad University.*

Paszynska, E., Roszak, M., Slopien, A., Boucher, Y., Dutkiewicz, A., Tyszkiewicz-Nwafor, M. et al. (2020). Is there a link between stress and immune biomarkers and salivary opiorphin in patients with a restrictive-type of anorexia nervosa? *World.J Biol.Psychiatry, 21*(3), 220-229. doi:10.1080/15622975.2019.1593502 [doi]. Retrieved from PM:30880537

Pitron, V., Alsmith, A., & de, V. F. (2018). How do the body schema and the body image interact? *Conscious.Cogn, 65*, 352-358. doi:S1053-8100(18)30267-8 [pii];10.1016/j.concog.2018.08.007 [doi]. Retrieved from PM:30262229

Romero-Martinez, A., & Moya-Albiol, L. (2017). Reduced cardiovascular activation following chronic stress in caregivers of people with anorexia nervosa. *Stress., 20*(4), 390-397. doi:10.1080/10253890.2017.1343815 [doi]. Retrieved from PM:28618917

Sabiston, C. M., Pila, E., Vani, M., & Thogersen-Ntoumani, C. (2019). Body image, physical activity, and sport: A scoping review. *Psychology of Sport and Exercise, 42*, 48-57. doi:10.1016/j.psychsport.2018.12.010 [doi].

Safavi, M., Mahmoodi, M., & Roshandel, A. (2009). Assessment of body image and its relationship with eating disorders among female students of Islamic Azad University, Tehran center branch. *Med Sci J Islamic Azad Univ Tehran Med Branch, 19*(2), 129-134.

Sajjadian, A., Neshat Doost, H., Molvi H., & Maroufi. M. *(2007) The effect of mindfulness training on the symptoms of obsessive-compulsive disorder in women Isfahan. Educational and Psychological Studies of Ferdowsi University. 12 (3): 140-128.*

Schaefer, L. M., Burke, N. L., Anderson, L. M., Thompson, J. K., Heinberg, L. J., Bardone-Cone, A. M. et al. (2019). Comparing internalization of appearance ideals and appearance-related pressures among women from the United States, Italy, England, and Australia. *Eat.Weight.Disord, 24*(5), 947-951. doi:10.1007/s40519-018-0544-8 [pii];10.1007/s40519-018-0544-8 [doi]. Retrieved from PM:30019258

Whiteside, U., Chen, E., Neighbors, C., Hunter, D., Lo, T., & Larimer, M. (2007). Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect? *Eat.Behav, 8*(2), 162-169. doi:S1471-0153(06)00029-8 [pii];10.1016/j.eatbeh.2006.04.001 [doi]. Retrieved from PM:17336786