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Investigating the Mediating Role of Experiential Avoidance in the Relationship between Stress, Mindfulness, and Binge eating in Obese People

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Abstract

Objective: This study aimed to investigate the relationship between stress, mindfulness, and binge eating in obese people with mediating role of experiential avoidance.

Method: The current research was of quantitative type with correlational method. The statistical population included all overweight and obese people in the city of Karaj in 2019, and 414 people were selected as research samples through convenience sampling method. Data were collected by calculating participants' body mass index, Acceptance and Action Questionnaire (Bond et al., 2011), Harry's stress questionnaire (2005), five-factor mindfulness questionnaire (Baer et al., 2004), and binge eating scale (Gormally et al.,1982). Collected data were analyzed using structural equation modeling in Amos software.

Results: Stress and mindfulness are known variables in clinical interventions for people with binge eating problems but choosing the strategic and practical variable of experimental avoidance as a mediator between these categories and overeating confirmed these variables' theoretical and practical value.

Conclusion: This research highlighted the role of experiential avoidance as a powerful and effective variable in the outcome of individual and social measures in the management and planning to correct overeating behavior in obese people.

Keywords: Binge eating, Obesity, Stress, Mindfulness, Experiential avoidance.

Introduction

Overweight and obesity are increasing at an alarming rate in many developed and developing countries, including Iran (Keikha et al., 2021). According to the World Health Organization estimation, approximately 1.9 billion adults worldwide are overweight, among whom 600 million are obese (Sultan, Singh & Howarth, 2021). Obesity is a serious public health concern because it leads to an increased risk of premature mortality and chronic diseases such as type 2 diabetes, cardiovascular disease, high blood pressure, stroke, some cancers, and increased healthcare costs (Gardiner et al., 2021). Binge eating has been broadly studied in the previous decades as a risk factor for obesity and an obstacle to weight loss. Inappropriate eating behaviors, such as binge eating, negatively affect all populations in different societies. Improper eating is associated with numerous physiological and psychological disorders that cause a significant economic burden on the healthcare system. The worth mentioning issue is that wrong eating can provide a ground for developing severe diseases. Chronic

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lifelong disorders are associated with multiple adverse health outcomes. These consequences are metabolic disorders, such as obesity, diabetes, drug abuse, bad temper, and anxiety disorders. Despite the severity of these adverse consequences, there is limited knowledge of the factors contributing to the development of binge eating symptoms (La Barrie, Hardy, Clendinen, et al., 2021). One of the factors shown to be associated with binge eating is experiential avoidance (Fanaei & Sajjadian, 2015).In conceptualizing overweight and obesity, experiential avoidance is considered a factor in problematic behaviors. Overweight and obese people experience more negative emotions by using avoidance strategies such as more abstinence from the diet (Stanley & Larsen, 2021). Therefore, they learn to overeat as a coping mechanism for short-term avoidance of painful feelings. As experiential avoidance mediates emotion regulation strategies and psychological outcomes, negative emotions are associated with increased experiential avoidance, which increases binge-related behaviors and self-avoidance. Dimitratos (2022) believes that experiential avoidance can cause negative emotions in obese and binge-eating people.

Generally, most empirically confirmed theories of binge eating suggest that binge eating occurs in response to distressing emotional moods. Although binge eating may facilitate the avoidance of painful negative emotions (such as anxiety) that trigger episodes of binge eating during the intake process, it increases the risk of other types of negative emotions, such as depression. Further studies are required to find out how negative emotions and cognitive avoidance influence the process of binge eating (Lim et al., 2021). Research results generally indicate the relationship between stress and binge eating (Cummings, Ackerman, Wolfson, & Gearhardt., 2021). Stress is a multifaceted and dynamic construct that has a critical role in the behaviors related to binge eating and obesity. Stress is often defined as a negative emotional experience that is accompanied by biochemical, physiological, cognitive, and behavioral changes that cause the organism to change the stressor or adapt to its effects. Stress is conceptualized as a key factor in binge eating and other eating disorders through changes in cognitive function, physiology, and biochemistry in the body, which affects a person's self-awareness through cognitive dysfunction (Smith, Mason, Schaefer, Anderson, et al., 2021). Recently, mindfulness and mindful eating have emerged as novel scientific approaches to eating behavior change(Giannopoulou, Kotopoulea-Nikolaidi, Daskou, Martyn & Patel., 2020). According to Jon Kabat-Zinn, mindfulness is a psychological process of purposely bringing one's attention to experiences occurring in the present moment without judgment (Kabat-Zinn, 2013). Mindfulness refers to a non-judgmental state of purposeful awareness in which the attention is focused on the present moment and allows recognition and consideration of internal and external experiences without pressure to change or take immediate action (Daudén Roquet, Sas & Potts, 2021). Applying the concept of mindfulness to eating has become an approach to improving eating behaviors, which is called 'conscious eating' (Nakamura, Akamatsu, & Yoshiike, 2021). Experiencing and accepting negative emotions is one of the consequences of mindfulness, which is one of the emotion regulation skills. Thus, we can say that mindfulness controls binge eating behaviors by managing and regulating the emotions that cause binge eating and forms a more adaptive pattern in eating behavior. Mindfulness and conscious eating have emerged as new scientific approaches to changing eating behavior

(Giannopoulou, Kotopoulea-Nikolaidi, Daskou, Martyn, et al., 2020). Mindfulness activities have consistently shown improvements in levels of stress and anxiety and increased stress has been associated with weight gain (Geiker NRW, Astrup A, Hjorth MF, Sjödin A, Pijls L, et al., 2018). Mindfulness provided additional benefits in the treatment of obesity when applied in a weight management program with or without other psychological interventions (La Barrie, Hardy, Clendinen, Jain & et al., 2021). Due to the growing number of people suffering from binge eating and obesity, and also because these people are susceptible to other dangerous diseases that can endanger their health and consequently impose a lot of costs on the community, it is essential to conduct fundamental studies on this area. So regarding the limited number of related studies and to identify the factors associated with binge eating behavior in general and the limitations of psychological models for binge eating in particular, this study was conducted to examine the mediating role of experiential avoidance in the relationship between stress, mindfulness, and binge eating in obese people.

Method

The research method was descriptive correlational using structural equation modeling. The statistical population included all overweight and obese people in the city of Karaj in 2019, and the sample size was 414 people who were selected using the convenience sampling method. After identifying and agreeing with the obesity clinics of Karaj, the research participants were selected, and the questionnaires were given to them. After obtaining consent from the authorities of the centers, data was collected. To prevent possible bias in the responses to the questionnaire items and to strengthen the validity of the collected results, the counterbalance method was used, and by changing the order of presentation of the questionnaires, the maintaining balance in the validity of the answers was created. After collecting the data, according to the strict monitoring of the completion of the questionnaires, distorted cases, and statistical outliers were excluded from the data after the initial evaluation, and the questionnaires that were complete in terms of accuracy were included in the analysis. Data were collected by calculating participants' body mass index, the acceptance and action questionnaire, Harry's stress index, the five-factor mindfulness questionnaire, and the binge eating scale. The collected data were analyzed using structural equation modeling in Amos software. Inclusion criteria included a body mass index above 30, a high school diploma or higher, age 18 to 50, willingness to participate in research, and living in Karaj city. The lack of any inclusion criteria, inaccurate and incomplete answers to the questionnaires, and withdrawal from participation in the research at any stage were among the exclusion criteria of the research.

Ethical statement

To observe the ethical principles of the study, the objectives of the research were explained to all participants, then they were assured that their names and data would be kept confidential in all research stages, and they would have the right to withdraw their participation at any time they wanted.

Measurements

The Acceptance and Action Questionnaire (AAQ-2): This questionnaire was developed by Bond et al. (2011) to assess the avoidance of experience. High scores indicate greater psychological flexibility and lower scores indicate experiential avoidance. The reliability of this scale has been reported between 0.78 and 0.88 by Cronbach's alpha method and 0.81 and 0.79 by the test-

retest method at intervals of 3 and 12 months in some studies (Bond et al., 2011). This scale has been examined in Iran by Abbasi et al. (2011) in healthy people and patients with depression and anxiety. In their study, the reliability of this scale was 0.89 and 0.83 using Cronbach's alpha and split-half methods, respectively. The results showed that the questionnaire had a significant relationship with psychological disorders, i.e., depression and anxiety (-0.44 to -0.81) and difficulty in emotion regulation (-0.59 to -0.92), which indicates the convergent validity of the scale (Abbasi et al.,2022)

Hari`s Stress Inventory (HIS): Hari's Stress Scale is a self-report questionnaire with 66 questions developed by Chandran Hari to measure stress. This questionnaire was analyzed in Iran by Adina in 2015 after translating and checking its face and content validity by factor analysis. The result of exploratory factor analysis showed that 39 items of this scale were not suitable for the Iranian population, and eight factors in three sections of sources of stress, consequences of stress, and stress-reducing activities under the headings of sources of stress in the family, sources of stress at work, sources of stress in dealing with social power factors, psychological and behavioral consequences, emotional consequences,physical-physiological consequences, and emotional consequences are interpersonal stress-reducing activities and intra-personal stress-reducing activities. The correlation coefficient between Hari's stress inventory and the mental health questionnaire was 0.74, which statistically was significant at 99% confidence and 1% error, showing the validity of this questionnaire. Also, the highest correlation between Hari's stress questionnaire and insomnia and mental health subscales was 0.66. (Adine, 1394) Also, Cronbach's alpha coefficient of the scale in the present study was 0.79, which was an acceptable coefficient.

Five-Factor Mindfulness Questionnaire (FFMQ): This Questionnaire was developed by Baer et al. (2008) to assess multiple dimensions of mindfulness. This scale has 39 items and its scoring is based on a five-point Likert scale from 1 (never) to 5 (always). This questionnaire has five subscales: non-reaction, description, observation, acting with alertness, and non-judgmental. The validity and reliability of this scale were 0.80 and 0.91, respectively (Baer et al., 2006). In addition, this scale has been examined in Iran by Sajjadian (2014) and Ahmadvand et al. (2014). The results showed that the reliability of its subscales by using Cronbach's alpha was between 0.55 and 0.83, and the total score was 0.80. In addition, this questionnaire had a correlation with personality traits, psychological well-being, emotional intelligence, depression, life satisfaction, and meta-personality characteristics, which indicates the validity of the questionnaire (Sajadian, 2014; Ahmadvand et al., 2013). Cronbach's alpha coefficient of the scale in the present study was 0.77, which was acceptable.

Binge Eating Scale (BES): Gormali et al. (1982) developed this scale to measure the severity of binge eating in obese people. This scale consists of 16 items, each consisting of three or four sentences. The overall score ranges from 0 to 46, where a score of 16 indicates binge eating disorder and the higher scores indicate severe binge eating. This scale's English, Portuguese, and Italian versions have satisfactory validity, sensitivity coefficient, and psychometric properties. In a study, Mottabi, Molodi, Dejkam, and Omidvar (2010) investigated the psychometric properties of the Iranian version of this scale. They reported the validity of this scale at 0.67 by split half and 0.72 by test-retest methods. They also obtained Cronbach's alpha coefficient of 0.85. (Gormally, Black, Daston & Rardin, 1982). In this study, Cronbach's alpha coefficient of the scale was 0.84

Results

In this research, 414 people (235 women and 179 men) with a mean and standard deviation age of 30.62 and 7.98 participated as the research samples. Among them, 260 were single (62.8%), and 154 were married. The level of education of 54 (13%) was below a diploma, 106 (25.6%) had a diploma degree, 46 (11.1%) had a postgraduate diploma, 147 (35.5%) had a bachelor's degree, and 61 (14.7%) had a master's degree or higher. The body mass index (BMI) of 147 of the participants (35.5%) was less than 32, 140 (33.8%) were between 32 and 34, and 127 (30.7%) were above 34. The mean and standard deviation of the BMI of the participants were 33.20 and 3.01, respectively. Table 1 shows the mean, standard deviation, and correlation coefficients between the components of stress (work stress, stress caused by psychological distress, social stress, physical stress, and family stress), mindfulness (observation, description, action with alertness, non-judgmental, and no-reaction), experiential avoidance (avoidance of emotional experiences and control over life), and binge eating.

Table 1: shows the correlation coefficients of the research variables. As it demonstrates, the components of mindfulness were negatively, and the components of stress and experiential avoidance were positively correlated with binge eating at a significance level of 0.01.

Research variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1.work stress	27.67	6.58	-											
2. distress-Stress	31.05	6.42	0.68**	-										
3. social- stress	14.67	3.88	0.56**	0.57**	-									
4. physical- stress	10.33	2.34	0.55**	0.65**	0.49**	-								
5. Family -stress	8.45	2.27	0.71**	0.57**	0.64**	0.57**	-							
6. Mindfulness - observation	23.39	5.04	-021**	0.14**	-0.20**	-0.25**	-0.27**	-						
7. Mindfulness - description	22.81	5.33	-0.07	-0.08	-0.15**	-0.17**	-0.15**	0.55**	-					
8. Mindfulness - act	26.88	7.14	-0.12*	-0.10*	-0.17**	-0.13**	-0.19**	0.50**	041**	-				
9. Mindfulness – non-judgment	27.46	6.83	-0.10*	-0.05	-0.16**	-0.08	-0.11*	0.39**	0.33**	0.53**	-			
9. Mindfulness – no action	17.86	4.41	-0.11*	-0.06	-0.16**	-0.11**	-0.14**	0.55**	0.48**	0.44**	0.62**	-		
11. Avoiding emotional experiences	32.68	7.28	0.11*	0.20**	0.18**	0.15**	0.15**	-0.19**	-0.06	0.04	-0.11**	-0.05	-	
12. Avoiding control over life	13.32	3.23	0.31**	0.34**	0.29**	0.35*	0.32**	-0.37**	-0.28**	-0.15**	-026**	-0.27**	0.35**	-
13. binge eating	29.94	6.74	0.36**	0.33**	0.37**	0.36**	0.24**	-0.51**	-0.21**	-0.32**	-0.17**	-0.31**	0.28**	0.56**

Model Analysis

Measurement model: In the present study, stress, mindfulness, and experiential avoidance were underlying variables that formed the measurement model of the study. The researchers assumed that the underlying variable of stress was represented by the indicators of work stress, stress from psychological distress, social stress, physical stress, and family stress; the underlying variable of mindfulness was represented by the indicators of observation, description, action with alertness, non-judgment, and no-action; and the underlying variable of experiential avoidance was measured by indicators of avoiding emotional experiences and control over life. The fitness of the model with the collected data was evaluated by using the

confirmatory factor analysis method using AMOS software version 24 and the maximum likelihood (ML) estimation method. Table 2 shows the fit indices of measurement and structural models.

Table 2 shows that the fit indices obtained from the confirmatory factor analysis confirm the acceptable fit of the initial measurement model with the collected data. However, the evaluation of the modified indices showed that it is possible to modify the measurement model and obtain better fit indices by creating covariance between two indicators of stress caused by distress and family stress on the one hand and lack of judgment and no-reaction on the other hand (χ2/df=3.04, CFI=0.952, GFI= 0.946, AGFI =0.914, and RMSEA = 0.070). In the measurement model, the largest factor load belonged to the indicator of family stress (β=0.874) and the smallest factor load belonged to the indicator of avoiding emotional experiences (β=0.374). Thus, considering that the factor loadings of all indicators were higher than 0.32, it can be said that all of them have the required power to measure the current research variables.

Structural model: In the structural model, it was assumed that stress and mindfulness in obese people would have an effect on binge eating through the mediation of experiential avoidance. As Table 2 shows, all the fit indices obtained from the analysis of structural equation modeling support the fit of the structural model with the collected data (χ^2/df =2.95, CFI=0.952, GFI=0.943, AGFI=0.910, and RMSEA=0.069).

Table 3 shows the path coefficients between the variables in the structural model of the research.

Table 3 shows that the total path coefficient between mindfulness and binge eating ($p < 0.01$, $\beta = -0.460$) is negative and significance

Table 2: Fit indices of measurement and structural models

Fit indicators	Measurement model		structural model	cut points*
	Initial model	Modified model		
-Chi-Square	237.43	148.87	171.16	-
Degree of freedom of the model	51	49	58	-
- normed chi-square (χ^2/df)	4.66	3.04	2.95	> 3
Goodness Fit Index (GFI)	0.917	0.946	0.943	< 0.90
Adjusted Goodness Fit Index (AGFI)	0.873	0.914	0.910	< 0.850
Comparative Fit Index (CFI)	0.911	0.952	0.952	< 0.90
Root Mean Square Error of Approximation (RMSEA)	0.094	0.070	0.069	> 0.08

* Cut points based on Klein's perspective (2016)

Table 3: Path coefficient of variables in the model

Path coefficients	b	S. E	**β**	sig
mindfulness → experiential avoidance	-0.362	0.082	-0.375	0.001
stress → experiential avoidance	0.149	0.037	0.382	0.001
experiential avoidance →binge eating	0.967	0.272	0.492	0.001
Direct path coefficient of mindfulness → binge eating	-0.567	0.160	-0.285	0.005
Direct path coefficient of stress→Binge eating	0.095	0.069	0.124	0.209
Indirect path coefficient of mindfulness→Binge eating	-0.350	0.125	-0.175	0.001
Indirect path coefficient of stress→Binge eating	0.144	0.061	0.188	0.001
The total path coefficient of mindfulness→ binge eating	-0.917	0.117	-0.460	0.001
The total path coefficient of stress→ binge eating	0.240	0.41	0.312	0.001

at the 0.01 significant level. Also, the path coefficient between stress and binge eating ($p<0.01$, $\beta=0.312$) was positive and significant at the significant level of 0.01. The path coefficient between experiential avoidance and binge eating ($p<0.01$, $\beta=0.492$) was positive and significant at the 0.01 level. According to the results of the table, the coefficient of the indirect path between mindfulness and binge eating ($p < 0.01$, $\beta = -0.175$) is negative and significant at the 0.01 level. On the other hand, the indirect path coefficient between stress and binge eating ($p<0.01$, $\beta=0.188$) was positive and significant at the 0.01 level. Accordingly, the results implied that experiential avoidance mediates the effect of stress on binge eating in a positive way and the effect of mindfulness on binge eating in a negative and significant way. The results showed that the model has a good fit with the observed data (RMSEA=0.069 and df2=2.95). in consequence, research hypothesis was proven, and it can be concluded that stress, awareness, and experimental avoidance affect overeating. Figure 1 shows the structural model of the research in explaining the relationships between mindfulness, stress, experiential avoidance, and binge eating.

Figure 1 shows that the sum of the squared multiple correlations for the binge eating variable is 0.54. This finding indicates that mindfulness, stress, and experiential avoidance explain 54% of the variance of binge eating.

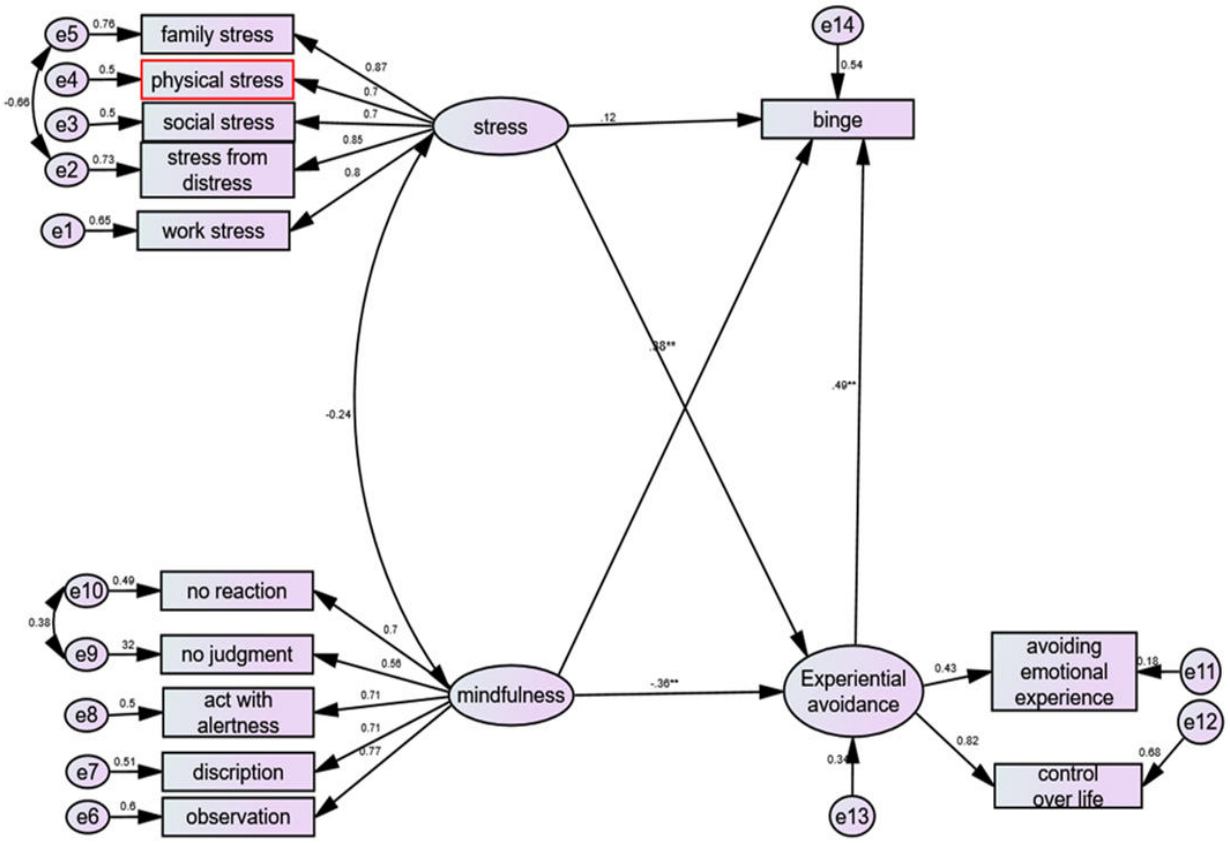

Figure 1: Structural model of research using standard data

Discussion

This research aimed to investigate the relationship between stress, mindfulness, and binge eating in obese people with the mediating role of experiential avoidance. All the fit indices obtained from structural equation modeling analysis support the fit of the structural model with the collected data. Consequently, the structural model of the research fits the collected data. Analyzing the path coefficients showed that the total path coefficient between mindfulness and binge eating ($p < 0.01$, $\beta = -0.460$) is negative and significant at the 0.01 level. Also, the indirect path coefficient between mindfulness and binge eating ($p<0.01$, $\beta=0.175$) was significantly negative at the 0.01 level. These results are in line with the results of Kechoui et al. (2017), Ponde Nejadan et al. (2019), and Gouveia et al. (2019), which showed that mindfulness has a negative and significant relationship with binge eating.

The results of the research also showed that the path coefficient between stress and binge eating ($p<0.01$, $\beta=0.312$) and experimental avoidance and binge eating ($p<0.01$, $\beta=0.492$) were positive and significant at the level of 0.01. The indirect path coefficient between stress and binge eating ($p<0.01$, $\beta=0.188$) was positive and significant at the 0.01 level. These findings are in line with Nikosresht and Oskui Shomali (2021), Barnhart et al. (2021), and Willem et al. (2020)'s findings that showed stress has a positive and significant relationship with binge eating.

Conclusion

In explaining these findings, we can state that experiential avoidance mediates stress and mindfulness, negative emotions increase the behaviors related to binge eating and self-avoidance by increasing experiential avoidance, and mindfulness reduces the tendency to binge eating behaviors. One of the critical factors in risky behaviors is stress. Chronic stress causes emotion regulation problems, which leads to unhealthy eating behaviors. Both perceived stress and exposure to chronic stress are positively associated with hunger, eating disinhibition, and binge eating behaviors. Emotions such as anger, frustration, anxiety, sadness, and depression are common moods before binge eating. The available research literature suggests that binge eating improves a person's mood temporarily (Venden et al., 2022). During chronic stress and hyperactivation of the hypothalamic-pituitary-adrenal axis, glucocorticoids, and insulin increase the desire for high-calorie meals, a phenomenon explained by the "convenience food" theory (Lizarraga, 2021). Eating is a normal physiological sign of hunger; however, many people change their food intake under stress. High perceived stress is associated with eating high-fat and palatable but non-nutritious food. Furthermore, the consumption of palatable foods reduces the stress response by activating reward pathways through reward-based structural plasticity. Consequently, increased consumption of stress-induced palatable foods is associated with reductions in behavioral indicators of stress, such as anxiety-related behaviors, stress-induced learned helplessness, and pain and distress responses (Hildebrandt et al., 2021). Avoidant personality traits are common in eating disorders, which are one of the causes of the initiation and continuation of unhealthy eating patterns. Binge eating does not result from the mere presence of emotional events,but is affected by maladaptive regulation strategies such as suppression which is a form of experiential avoidance. Weight-related experiential avoidance (i.e., avoiding unwanted weight-related thoughts, emotions, and feelings) predicts binge eating as an emotion regulation strategy related to weight

changes. Evidence suggests that specific internal events, such as emotions or cognition, can influence eating behavior (Calugi et al., 2021). sychological factors, such as stress, can affect eating behaviors and influence weight gain. Psychological approaches to weight management could increase the motivation and self-control of the patients with obesity, limiting their impulsiveness and inappropriate use of food. mindfulness provides a promising therapeutic option by improving weight loss, food awareness, self-acceptance of body image, and limiting emotional eating (Pellegrini, M., Carletto, S., Scumaci, E., Ponzo, V et al.,2021). In the conceptualization of obesity based on Acceptance and experiential avoidance is considered a factor of problematic behaviors. Obese individuals feel more negative emotions by using avoidance strategies such as more diet and food avoidance. So, they learn to eat as a coping mechanism for short-term avoidance of painful emotions.Emotion regulation strategies are mediated by experiential avoidance,thus negative emotions are interrelated with increased experiential avoidance, which increases behaviors related to overeating and self-avoidance(Weineland, 2013)

In summary, we can conclude that binge eating occurs when coping strategies are not helpful in the face of environmental stressors. At this time, the stress is so annoying that it is beyond the person's tolerance that makes the person use avoidance defenses such as experiential avoidance, which leads the person towards avoidance strategies and eventually binge eating. In this way, binge eating is a form of experiential avoidance used to manage external experiences and is an appropriate response to facing a crisis. It also causes the break of feelings and emotions in binge eaters and disables them to deal with negative experiences and enhances their tendency to binge eat.

Research Limitations

Like any research, this research has some limitations. Among the most critical limitations, we can refer to the statistical population that was only from the city of Karaj. Also, in this study, the age range was 18-40 years old, so the findings cannot be generalized to other age groups. Also, because the correlation in the present study was of the structural equation type, distinguishing cause and effect relationships between the variables was not possible. To meet these limitations, it is suggested that these variables be evaluated in other cities with different cultural, language, and religious contexts. Also, to generalize the results to other groups of children, teenagers are suggested to be considered as research samples in future studies.

Research Proposals

The findings demonstrate that all research variables, such as stress, mindfulness, and experiential avoidance, play critical roles in binge eating. Therefore, to effectively treat and improve the quality of life in people suffering from obesity and binge eating, it is suggested that therapists, especially psychotherapists, pay special attention to stress, mindfulness, and experiential avoidance of their clients, and reduce the level of stress and experimental avoidance with training, and increase the individual's attention to the conscious mind.

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