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Investigating the Association between Eating Self-Efficacy and Emotional Eating: The Parallel Mediating Roles of Shame and Guilt in Women with Overweight and Obesity

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Abstract

Objective: The study investigated the direct and indirect pathways between eating self-efficacy and emotional eating behavior in women with overweight and obesity, evaluating the parallel mediating roles of shame and guilt related to body and weight.

Materials and Methods: A total of 228 women between the ages of 18 and 70, with overweight and obesity (Body Mass Index≥ 25), were recruited through purposive sampling. Participants completed online questionnaires: Demographic Information Questionnaire (DIQ), Dutch Eating Behavior Questionnaire (DEBQ), Weight- and Body-Related Shame and Guilt Scale (WEB-SG), Weight Efficacy Lifestyle-Short Form (WEL-SF). Descriptive statistics and parallel mediation analysis (PROCESS model 4) with bootstrapping were used to test the hypothesized model. SPSS version 23 was used to analyze the data.

Results: Higher levels of eating self-efficacy were directly associated with the lower levels of emotional eating behavior ($P< 0.001$), and indirectly related to reduced emotional eating by decreased weight- and body-related shame and guilt ($P< 0.05$). Shame and guilt served as partial, parallel mediators. The model explained 39% of the variance in emotional eating behavior ($R^2= 0.39$).

Conclusion: This study underscores the importance of addressing cognitive and emotional factors in interventions to improve eating behaviors and manage obesity in women, providing actionable insights for healthcare professionals and researchers.

Keywords: Disordered eating behavior, Emotions, Self-Efficacy

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Introduction

Obesity is a health concern influenced by biological, sociocultural, and psychological factors (1). In Iran, 35.26% and 21.38% of adults are overweight and obese, respectively, with a higher prevalence in women (2). In addition, some cultural beliefs prioritize thinness and the idealized body image in Iranian society (3). Thus, understanding the psychological determinants of obesity is essential for adopting a holistic approach in this domain.

Eating behaviors are among the key contributors to obesity and are primary targets for weight management interventions (4). Despite awareness of their impact, disordered eating behaviors remain a significant challenge (5). Theories and research suggest that cognitive and emotional disturbances can lead to disordered eating behaviors (6,7). Such behaviors involve overeating or unhealthy weight-control strategies and are linked to both obesity and eating disorders (8,9).

Emotional eating behavior, in particular, reflects difficulties in regulating emotional experiences and is associated with adverse psychological and physical outcomes (10,11). A current meta-analysis suggests that the prevalence of emotional eating behavior among populations with overweight and obesity is about 44.9% (12). Consequently, disordered eating behaviors complicate weight management for individuals with overweight and obesity.

Among the psychological factors influencing eating behaviors, eating self-efficacy has a crucial role (13). Eating self-efficacy refers to individuals' beliefs about their ability to regulate eating behavior in challenging situations such as stress, social gatherings, or exposure to palatable foods (14). Rooted in the social cognitive theory (15), self-efficacy is essential in initiating and maintaining health-related behavior changes. Research has suggested that higher eating self-efficacy is linked to healthier eating patterns and better weight management outcomes (16). Relatedly, studies have shown that lower self-efficacy is associated with increased BMI and unhealthy eating behaviors (17,18). Therefore, eating self-efficacy has a significant impact on managing an individual's eating behaviors.

Despite these associations, the mechanisms through which eating self-efficacy influences disordered eating behaviors, especially emotional eating, remain significant. Along with social cognitive theory, emotional aspects of individuals may have a crucial role in this process (15). In this regard, evidence suggests that negative emotions and stress contribute to unhealthy eating behaviors and interfere with dietary success (19-22), and may mediate these relationships. One of these negative emotions is weight- and body-related shame that involves negative self-evaluation and social withdrawal about individuals' weight and body. Another is weight- and body-related guilt that focuses on specific behaviors about weight and body that possibly motivate corrective actions (e.g., compensatory exercise) (23,24). However, research findings suggest that these emotions often exacerbate disordered eating behaviors rather than improve them (25-28). Additionally, studies indicate that body-related shame and guilt have negative associations with eating self-efficacy (29-31). Accordingly, Individuals with low eating self-efficacy may feel less capable of controlling their eating habits, leading to feelings of failure, guilt, and shame that relate to emotional eating as a coping mechanism.

Consequently, although previous studies have investigated the associations between weight- and body-related shame and guilt with eating behaviors and eating self-efficacy, the parallel mediating role of these variables in these relationships has not been specifically explored in non-Western contexts like Iranian populations. By examining these mediating roles, this study addresses this gap and provides a novel contribution to the literature. Moreover, as noted before, in Iran, societal expectations of thinness can intensify these emotions,

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particularly among women with overweight and obesity. In addition, investigating the underlying processes connecting eating self-efficacy to emotional eating may provide deeper insights into this relationship among individuals living with overweight and obesity. Accordingly, the current research aims to investigate both direct and indirect associations between eating self-efficacy and emotional eating, by assessing the concurrent mediating roles of body-related shame and guilt in a sample of 228 overweight and obese women.

Material and Methods

Participants and procedure

The present study employed a cross-sectional, correlational design. Based on prior recommendations for parallel mediation models involving two mediators and assuming a medium effect size, a minimum sample size of 150-200 participants was advised (32). Ultimately, 228 Iranian women aged between 18 and 70 years, all classified as having overweight or obesity (body mass index (BMI)≥ 25), were included in the study. Participants were selected through purposive sampling, focusing on women with internet access who were active users of social media platforms such as Twitter and WhatsApp. Therefore, the sample represented a specific subgroup of the Iranian female population: those with excess weight who were reachable online and willing to engage in a web-based survey.

Data collection occurred between November 2020 and July 2021. Eligibility criteria included: (1) having a BMI≥ 25, (2) being between 18 and 70 years, (3) having internet connectivity and active social media accounts, and (4) possessing basic literacy skills in reading and writing. Informed consent was obtained electronically via a binary response item (“I consent”/ “I do not consent”). The average survey completion time was approximately 15 minutes.

Statistical analysis

We initiated the descriptive statistical analysis by computing the mean, standard deviation, and frequency of the participants’ demographic variables. Then, we investigated minimum, maximum, mean, standard deviation, skewness, and kurtosis values for study variables. In addition, the Pearson correlation coefficients assessed relationships between study variables.

Inferential statistics included examining direct and indirect paths between eating self-efficacy and emotional eating behavior and evaluating the parallel mediation roles of weight- and body-related shame and guilt. We conducted mediation analysis using the bootstrap analysis method with 10,000 resamples and a 95% confidence interval (PROCESS macro model 4) (33). If the confidence interval does not include zero, the mediation effect is significant. Data analysis was performed using SPSS version 23.

Measures

Demographic Information Questionnaire (DIQ): This questionnaire included measurements of height (in meters) and weight (in kilograms) to calculate BMI, as well as information on participants’ age, education level, employment status, and marital status.

Dutch Eating Behavior Questionnaire (DEBQ): In this study, the emotional eating subscale of the Dutch Eating Behavior Questionnaire was used to assess emotional eating behavior. This subscale measures eating in response to emotional distress and consists of 13 items. Items are rated on a 5-point Likert scale ranging from 0 (never) to 5 (very often). The Cronbach’s alpha for the emotional eating subscale was reported as 0.94 (34). In an Iranian study, the Cronbach’s alpha of this subscale was reported as 0.89 (35). In this study, the internal consistency of the emotional eating subscale was found to be 0.91.

Weight- and Body-Related Shame and Guilt Scale (WEB-SG): This scale was developed to assess the level of shame and guilt related to weight and body in individuals with obesity and

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consists of 12 items. It is a self-report measure with two distinct but correlated subscales: shame and guilt. Items are rated on a 5-point Likert scale ranging from 0 (never) to 4 (always). In the original version, the internal consistency was reported as 0.92 for the shame subscale and 0.87 for the guilt subscale (36). To our knowledge, no Iranian study has published psychometric properties for this scale. In this study, Cronbach's alpha was found to be 0.87 for the shame subscale and 0.83 for the guilt subscale.

Weight Efficacy Lifestyle-Short Form (WEL-SF): This questionnaire consists of 8 items and is rated on a 10-point Likert scale, ranging from 0 (not at all confident) to 10 (completely confident). The internal consistency of the original version was reported as 0.92 (37). The Cronbach's alpha of the Persian version of this scale was reported as 0.83 (38). The Cronbach's alpha was found to be 0.84 in the present study.

Ethical considerations

The study adhered to ethical principles by obtaining informed consent from all participants, clearly communicating the research objectives, and ensuring the anonymity of the survey responses. Confidentiality of participants' personal information was maintained, and their right to withdraw from the study at any point was respected. Additionally, appreciation was expressed for their time, accuracy, and willingness to participate.

Ethical approval was approved by the Ethics Committee of Islamic Azad University, Karaj Branch, Iran (Ethics Code: IR.IAU.K.REC. 1398.082). This study forms part of a doctoral dissertation in Health Psychology at Islamic Azad University, Karaj Branch.

Results

Analyzing the participants' BMI revealed that 56.5% were classified as overweight, while 43.5% met the obesity range. Additional demographic characteristics of the sample are presented in Table 1, and the descriptive statistics of the study variables are summarized in Table 2.

Subsequently, the results of Pearson correlation coefficients indicated significant correlations between all variables, as reported in Table 3.

Table 1. Sociodemographic Characteristics of Participants

Characteristic	Mean	Standard deviation (SD)
Age	38.65	11.06
BMI	28.92	4.76
Variable	**Range**	**Frequency (%)**
Highest educational level	Diploma or below	10.09%
	Associate	6.58%
	Undergraduate	38.16%
	Masters	25.88%
	Ph.D.	19.30%
Marital status	Single	35.96%
	Married	55.71%
	Separated	8.33%
Employment	Employed	48.68%
	Unemployed	51.32%
BMI (kg/m^2)	25<BMI≤29.9	56.5%
	BMI≥ 30	43.5%

Table 2. Descriptive Statistics of Research Variables

Variable	Mean	Standard deviation (SD)	Skewness	Kurtosis
Eating self-efficacy	35.12	17.88	0.16	-0.52
Shame	7.50	6.04	0.63	-0.041
Guilt	11.97	5.56	-0.09	-0.51
Emotional eating	26.09	10.39	-0.18	-0.42

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According to this table, eating self-efficacy demonstrated the strongest negative correlation with emotional eating behavior ($P< 0.01$).

Parallel mediation analysis was conducted using the bootstrap analysis method in the PROCESS macro model 4 to test the study hypotheses. The assumptions of this method, including the normal distribution of variables (assessed via skewness and kurtosis), absence of multicollinearity (evaluated using variance inflation factor and tolerance index), and independence of residuals (Durbin-Watson test), were examined. The results confirmed that these statistical assumptions were met (All VIF values were below 5, and the Durbin-Watson value was 1.91).

Next, the effects (direct and indirect) of eating self-efficacy on emotional eating behavior were examined, along with the parallel and simple mediation roles of body shame and body guilt in this relationship (Table 4).

Our findings demonstrated a significant direct association between eating self-efficacy and emotional eating behavior ($P< 0.001$). Additionally, results supported an indirect effect, whereby eating self-efficacy related to emotional eating behavior through the mediating roles of body shame and body guilt. Specifically, higher eating self-efficacy was associated with lower levels of body-related shame and guilt ($P< 0.01$), which, in turn, led to reductions in emotional eating behavior ($P< 0.01$, $P< 0.05$).

Furthermore, the results of parallel and simple mediation roles of body shame and body guilt confirmed that both parallel and simple mediation effects were significant, as the confidence intervals did not include zero (Table 4).

The total effect of eating self-efficacy on emotional eating behavior was also significant ($P< 0.001$). Overall, the proposed model explained 39% of the variance in emotional eating behavior ($R^2= 0.39$).

Discussion

This study aimed to contribute to the existing literature by examining the direct and indirect pathways (via the parallel mediating roles of body shame and body guilt) between eating self-efficacy and emotional eating behavior in women with overweight and obesity.

The results showed a significant negative direct relationship between eating self-efficacy

Table 3. Correlation Coefficient Matrix (and *P*-values) of Research Variables (n=228)

Measures	Eating self-efficacy	Shame	Guilt	Emotional eating
Eating self-efficacy	1			
Shame	r: -0.21** *P*: 0.002	1		
Guilt	r : -0.23** *P:* 0.0001	r : 0.59** *P:* 0.0001	1	
Emotional eating	r:-0.63** *P:* 0.0001	r : 0.37** *P:* 0.0001	r : 0.37** *P:* 0.0001	1

**P-value< 0.01

Table 4. Parallel Mediation Model Characteristics

Paths	Unstandardized Coefficient (B)	*P*-value	Standard Error	95% CI
eating self-efficacy → emotional eating (c')	-0.32***	0.0000	0.03	-0.382, -0.266
eating self-efficacy → emotional eating (c)	-0.36***	0.0000	0.03	-0.423, -0.304
eating self-efficacy → shame (a_1)	-0.07**	0.0015	0.02	-0.114, -0.027
eating self-efficacy → guilt (a_2)	-0.07***	0.0005	0.02	-0.111, -0.032
shame → emotional eating (b_1)	0.30**	0.0048	0.10	0.092, 0.503
guilt → emotional eating (b_2)	0.26*	0.0241	0.11	0.034, 0.483
Mediation Paths	**Unstandardized Coefficient (B)**		**Standard Error**	**95% CI**
eating self-efficacy → shame and guilt → emotional eating (parallel mediation)	-0.04		0.01	-0.064, -0.017
eating self-efficacy → shame → emotional eating	-0.02		0.01	-0.046, -0.004
eating self-efficacy → guilt → emotional eating	-0.02		0.01	-0.040, -0.0001
				Partial mediators

* P-value < 0.05, ** P-value < 0.01, *** P-value < 0.001

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and emotional eating, consistent with prior studies (16,17,39-41). This suggests that women with overweight and obesity who feel more capable of managing their eating behaviors are less likely to use eating as a strategy for managing their emotions. These findings are supported by social cognitive theory (15), which posits that self-efficacy promotes self-regulation and reduces emotional reactivity. Furthermore, escape theory (42) offers another interpretation, proposing that individuals facing intense negative emotions may turn to emotional eating to avoid self-awareness. In this framework, high eating self-efficacy is a protective factor by strengthening behavioral regulation and lowering the reliance on maladaptive coping strategies like emotional eating.

Furthermore, the findings demonstrated that eating self-efficacy had a significant indirect effect on emotional eating behavior through body shame and body guilt. Findings consistent with earlier studies linking self-efficacy to decreased negative emotions and disordered eating behaviors (30,31,45-48). In line with social cognitive theory (15), individuals with higher self-efficacy better manage emotional challenges and adopt healthier behaviors. When individuals with higher body weight believe in their capacity to regulate their eating behaviors, they develop a more substantial "self" in this domain, which helps them manage negative emotions and engage in more adaptive behaviors and reduce reliance on emotional eating as a coping mechanism. These findings also align with self-determination theory (47), which emphasizes the importance of autonomy, competence, and relatedness in fostering adaptive behaviors. High eating self-efficacy reflects a sense of competence, contributing to well-being and reduced negative emotions. Additionally, drawing from the process model of emotion regulation (49), individuals with higher self-efficacy are more likely to use adaptive strategies, such as cognitive reappraisal, rather than emotional eating, to manage distress. Thus, this cognitive characteristic can be a key strategy for modulating emotional responses.

Our findings have some implications. Theoretically, the results significantly contribute to the growing literature on the relationship between eating self-efficacy and emotional eating behavior. The results not only confirm the direct association between eating self-efficacy and emotional eating but also reveal an indirect effect through self-conscious emotions such as body shame and body guilt. These findings illuminate the complex interplay between cognitive and emotional processes in shaping emotional eating behavior and underscore the crucial role of emotion regulation in this context. Practically, the findings highlight the importance of interventions that enhance eating self-efficacy and reduce self-conscious negative emotions. Previous studies have shown that such interventions can significantly improve health-related behaviors (39,50). Therefore, this study highlights the need for treatment plans that address cognitive aspects and emotion regulation strategies related to body weight and eating behaviors.

Despite providing valuable insights, certain limitations should be acknowledged. First, the cross-sectional design of our study does not justify causal inferences. Future research needs to employ longitudinal or experimental designs to examine these relationships' causal and temporal dynamics. Second, the sample consisted exclusively of women with overweight and obesity who had access to the internet and social media and were selected through purposive sampling. Therefore, the generalizability and interpretation of the results are limited. Future studies with random sampling methods and more diverse samples, including men and individuals across different weight categories, need to determine whether these pathways hold across other groups. Lastly, relying on self-report measures may introduce biases such as social desirability. Future research can use objective assessments of eating behaviors (e.g, food intake monitoring in natural settings) and physiological stress

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indicators (e.g, cortisol levels) to provide a more comprehensive understanding of these relationships.

Conclusion

In conclusion, the results of this study underscore the critical importance of eating self-efficacy in the context of emotional eating behavior in women with overweight and obesity. The pathways identified, direct association and indirect link through body shame and body guilt, provide valuable insights into the complex interplay between cognitive and emotional processes. This understanding is crucial for the development of effective interventions in the field of obesity and eating behaviors.

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Conflict of Interest

The authors declared no conflict of interest.

Authors' contributions

N.T: writing original draft and analyzing data, M.S and M.M: Supervision and conceptualization A.N: collecting the data and Conceptualization, Gh.SF: Supervision and methodological contributions.

All the authors critically revised the manuscript, agree to be fully accountable for the integrity and accuracy of the study, and read and approved the final manuscript.

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