

The Mediating Role of Body Image in the Relationship Between Emotion Regulation and Coping Styles with Binge Eating Disorder in Women

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ABSTRACT

Objective: The aim of this study was to investigate the mediating role of body image in the relationship between emotion regulation and coping styles with binge eating disorder.

Materials and Methods: The research design was descriptive-correlational. The statistical population included all women visiting clinics in Shiraz, and 200 women were selected using purposive sampling. The instruments used in this study were questionnaires assessing body image, emotion regulation, coping styles, and binge eating disorder. The data obtained were analyzed statistically at both descriptive and inferential levels. Descriptive statistics, such as mean, standard deviation, minimum, and maximum scores, were computed, while inferential statistics involved Pearson correlation coefficient and structural equation modeling.

Findings: The results indicated that body image, as a mediating variable, created a significant relationship between emotion regulation and coping styles with binge eating disorder. Emotion regulation was able to predict binge eating disorder both directly and indirectly. Additionally, coping styles, particularly problem-focused coping styles, contributed to reducing binge eating behaviors, while emotion-focused and avoidant coping styles had more negative effects on this disorder.

Conclusion: These results emphasize that body image can increase body dissatisfaction and contribute to the persistence of binge eating disorder.

Keywords: *Body image, emotion regulation, coping styles, binge eating disorder.*

1. Introduction

One of the most common eating disorders and the most prevalent psychiatric problems among young women is bulimia nervosa (A. Rizzo et al., 2024). Bulimia nervosa involves consuming an unusually large amount of food and experiencing a lack of control during the eating episode,

occurring at least twice a week for six months (Huang et al., 2023). Binge eating disorder is the most common eating disorder and, although it is not limited to overweight individuals, it is the most commonly diagnosed disorder in this group (Iceta et al., 2021). In 2005, approximately 500 million people worldwide were classified as obese, and it is

estimated to reach one billion by 2030 (Amelia Rizzo et al., 2024). The prevalence of obesity has become so widespread that the World Health Organization has declared it an epidemic and a global health threat (Babakhanlou, 2023). In the research literature, binge eating disorder is defined as recurrent episodes of binge eating and excessive consumption of food within a short period, accompanied by a loss of control, followed by compensatory behaviors (such as vomiting or using laxatives and diuretics) to prevent weight gain (Huang et al., 2023; Oftedal et al., 2022; A. Rizzo et al., 2024; Wang, 2023).

Characteristics of individuals with bulimia nervosa include an inability to adhere to a diet, lack of restraint, and a negative body image. Having a positive body image in the lives of girls can be of higher importance compared to boys. According to conducted studies, most girls who have a negative or unhealthy body image face low self-esteem, lose their appetite, and refrain from seeing friends and family, participating in extracurricular activities, or visiting a doctor (Nourizadeh Mirabadi et al., 2023). Body image disturbances can influence the onset and persistence of clinical eating-related disorders, characterized by changes in an individual's bodily experience, typically involving dissatisfaction with weight or body dimensions, which is commonly observed in individuals with eating disorders (Merwin et al., 2023; Rezaei et al., 2022). Studies indicate that body image also affects individuals' levels of social, personal, and emotional adequacy (Burychka et al., 2021; Fogelkvist et al., 2020; Hamamoto et al., 2022; McLean & Paxton, 2019; Stice et al., 2021). Individuals with a negative body image are more likely to develop obesity and also experience higher levels of self-disgust (Castellini et al., 2019; Merwin et al., 2023; Pellizzer et al., 2018).

Explanatory models of binge eating in eating disorders have stated that painful emotions are the most significant accelerators and sustainers of this disorder, playing a crucial role in emotion regulation for the individual (Perry, 2023). Therefore, another factor related to binge eating disorder is emotion regulation (Babakhanlou, 2023; Del Bianco et al., 2023). Studies indicate that one of the variables whose dysfunction is observed in individuals with psychological binge eating is the weakness in emotion regulation strategies for negative emotions in these individuals (Meule et al., 2021; Munguía et al., 2021; Perthes et al., 2021). When a person is under pressure to eat as a compensatory behavior, effective management of emotions leads the individual to use appropriate coping strategies in situations with a high probability of binge eating. Individuals with psychological

binge eating struggle to control emotions such as tension, anger, and depression, and this lack of control leads to increased eating behaviors. Emotional eating behaviors are defined as responses to negative emotional states such as anxiety, anger, and fear, and are considered an unusual response to distress (Asmari Bardezard et al., 2021; Marco et al., 2021). Emotion regulation is impaired in individuals with binge eating, and these individuals respond to their emotional disturbances by increasing binge eating, especially consuming sweet and high-fat foods, which in turn increases their risk of obesity (Hansson et al., 2016; Khodabakhsh & Kiani 2016; Perry, 2023). Therefore, emotion regulation refers to actions aimed at changing or modifying emotional experiences, emotional expression, and the intensity or type of emotional experiences (Babakhanlou, 2023; Del Bianco et al., 2023).

Numerous positive and negative psychological variables are associated with eating disorders, one of which is coping styles (Katan & Kelly, 2023; Nourizadeh Mirabadi et al., 2022; Nourizadeh Mirabadi et al., 2023; Pellegrini et al., 2022; Vuillier et al., 2021). The manner in which individuals respond to stressful events fundamentally depends on how they interpret and evaluate those events. Individuals of all ages encounter stress and, given its undesirable nature, attempt to engage in activities aimed at reducing stress, which are referred to as coping methods and activities (Katan & Kelly, 2023). Coping styles are defined as cognitive and behavioral efforts to increase control and manage stressful situations, adapt the individual to the environment, or attempt to prevent negative outcomes of stressful conditions (Nourizadeh Mirabadi et al., 2022). Generally, there are three main coping styles: problem-focused coping, emotion-focused coping, and avoidance coping. Problem-focused coping involves strategies where the individual seeks more information about the problem, cognitively restructures the problem, engages in calculations, and prioritizes solving the problem. Emotion-focused coping includes strategies where the individual, instead of solving the problem, attempts to reduce their unpleasant emotions through anger, sadness, crying, self-blame, mental preoccupation, etc. Avoidance coping involves strategies where the individual primarily seeks to escape or avoid the stressful situation (Vuillier et al., 2021).

Given the role of binge eating disorder in individuals' physical, psychological, and social health, it is necessary for professionals and researchers to increasingly focus on binge eating behaviors and their reduction. Understanding patients' feelings regarding concerns about their body image and their

body-checking and control behaviors can directly influence how it relates to binge eating behaviors. Furthermore, considering that emotion regulation strategies and the understanding of individuals' coping styles in facing stressful events can play an important and valuable role in identifying individuals' binge eating behaviors. Therefore, based on the aforementioned points, this study aims to predict binge eating disorder based on body image, body-checking behaviors, emotion regulation strategies, and coping styles.

2. Methods and Materials

2.1. Study design and Participant

The present study employed a descriptive cross-sectional correlational design aimed at predicting binge eating disorder based on body-checking behaviors, body image, emotion regulation strategies, and coping styles. The statistical population included all individuals visiting nutrition clinics in the city of Shiraz during the years 2019-2020. Considering the present study's cross-sectional descriptive design and based on Morgan's table, 200 participants were selected through purposive sampling from the desired statistical population and subjected to testing. Due to the use of purposive sampling and the researchers' discretion in selecting the sample size, no underrepresentation was observed in the number of participants. The inclusion criteria for the present study were: having a body mass index (BMI) between 25 and 40, being aged between 20 and 50 years, not having physical illnesses that affect obesity, having a medical record with a treating physician, the ability of the respondent to comprehend the questionnaire content, and the exclusion criteria included obesity caused by physiological reasons (hormonal and metabolic), undergoing psychiatric treatment, and lack of written and verbal consent to participate in the study.

The implementation process in this study was conducted individually. After obtaining consent from participants within a specified timeframe, the relevant information was provided to participants in the form of a questionnaire, along with explanations on how to complete it. After a period agreed upon by the participants, the completed questionnaires were collected from them. Throughout the study, researchers endeavored to adhere to all ethical considerations related to the participants, including the freedom to choose whether or not to participate in the research. Participants were also assured that their personal

information would remain confidential. During the execution of the research, efforts were made to ensure that no action or activity that might endanger the health of the study participants or others was undertaken.

2.2. Measures

2.2.1. Binge Eating

This 16-item scale was designed by Gormally et al. (1982) to measure the severity of binge eating in individuals with obesity. Each item consists of 3 or 4 sentences from which individuals select the best description. This scale assesses the cognitive-emotional dimensions (such as feelings of guilt, mental preoccupation, limited eating) and behavioral dimensions (such as eating quickly, eating alone quickly, eating alone) of binge eating disorder. The validity and reliability of the original English version have been reported as satisfactory. In evaluating the validity of the Iranian version of this scale using the split-half method, test-retest reliability was found to be 0.67, split-half reliability was 0.72, and Cronbach's alpha was 0.85. Additionally, the sensitivity coefficient was reported as 88%.

2.2.2. Cognitive Emotion Regulation

This scale was developed by Garnefski et al. (2002) to assess the way individuals think after experiencing threatening or stressful life events. It consists of 36 items rated on a five-point Likert scale from 1 (never) to 5 (always). The score range of this questionnaire is between 36 and 180, and it measures nine subscales: self-blame, other-blame, rumination, catastrophizing, acceptance, positive refocusing, refocus on planning, positive reappraisal, and putting into perspective. In the assessment of the psychometric properties of the questionnaire with a foreign sample, Garnefski and Kraaij (2007) calculated the test-retest reliability using Cronbach's alpha coefficient for its subscales in the range of 0.75 to 0.85. Additionally, the construct validity of the questionnaire was examined through exploratory factor analysis, extracting factors with shared variance values between 0.55 and 0.78, which explained 68% of the total variance (Garnefski & Kraaij, 2007). The psychometric characteristics of the questionnaire in the Iranian sample were examined by Hassani (2010), reporting Cronbach's alpha coefficients for its subscales ranging from 0.77 to 0.87. Furthermore, the construct validity of the questionnaire in Hassani's study was extracted through exploratory factor analysis, identifying factors with

shared variance values between 0.53 and 0.86, which explained 74% of the variance.

2.2.3. Body Image

The Body Image Test was developed by Fisher in 1970 and consists of 46 items, each rated on a scale from 1 (very dissatisfied) to 5 (very satisfied). A score of 46 on this test indicates a disorder, while a score above 46 indicates no disorder. The validity of this test was examined by Yazdandoost (2018) in Iran. The Pearson correlation coefficients calculated for the first and second administrations were 0.81 for first-year students, 0.84 for second-year students, 0.87 for third-year students, and 0.84 for the total student sample. Given the significance level of these coefficients, it can be accepted that there is a significant correlation between the scores obtained from the first and second administrations of the Body Image Test.

2.2.4. Coping Strategies

This questionnaire was designed by Lazarus and Folkman (1985) and includes 66 items, structured based on a four-point Likert scale. It assesses eight coping methods, which

ultimately divide into two general styles: problem-focused and emotion-focused. Lazarus (1993) estimated the internal consistency of this scale to range from 0.66 to 0.79 for each of its subscales. Zeinolabedin (2004) and Hashemi Zadeh (2006) reported the validity of this test as 0.79 and 0.89, respectively. In the study by Zarei and Asadi (2011), Cronbach's alpha coefficient was found to be 0.82.

2.3. Data Analysis

In this study, descriptive data were analyzed using descriptive statistics (mean and standard deviation), and inferential data were analyzed using Pearson's correlation coefficient. To analyze the data and examine the relationships among variables, structural equation modeling and the AMOS software were utilized.

3. Findings and Results

To better understand the studied variables, descriptive indicators such as mean, standard deviation, skewness, and kurtosis were utilized, and their values are presented in [Table 1](#).

Table 1

Descriptive Indicators of the Studied Variables

Variable	N	Mean	Standard Deviation	Skewness	Kurtosis
Emotion Regulation	200	47.47	93.6	-0.622	1.571
Coping Strategies	200	64.37	01.7	-0.875	73.1
Body Image	200	59.60	57.20	0.262	-1.49
Binge Eating Disorder	200	70.40	42.5	0.617	0.401

[Table 2](#) presents the Pearson correlation coefficients among the variables of emotion regulation, coping

strategies, body image, and binge eating disorder. (** $p < 0.01$; * $p < 0.05$).

Table 2

Pearson Correlation Coefficients Among Studied Variables

Variable	Emotion Regulation	Coping Strategies	Body Image	Binge Eating Disorder
Emotion Regulation	1			
Coping Strategies	0.715**	1		
Body Image	0.137*	0.047	1	
Binge Eating Disorder	0.152*	0.021	0.013	1

Table 3 shows the results of the structural equation modeling to examine the mediating role of body image. Based on the results obtained from the structural equation modeling and path analysis to investigate the mediating role of body image in the relationship between emotion regulation and coping strategies with binge eating disorder,

it is observed that the estimated coefficients for the paths Coping Strategies → Body Image, Emotion Regulation → Body Image, and Emotion Regulation → Binge Eating Disorder are significant. However, the paths Coping Strategies → Binge Eating Disorder and Body Image → Binge Eating Disorder are not significant.

Table 3

Structural Equation Modeling Results for Examining the Mediating Role of Body Image

Path	Estimated Value	SE	CR	P
Coping Strategies → Body Image	10.3	74.0	21.4	0.001
Emotion Regulation → Body Image	62.1	31.0	20.5	0.001
Coping Strategies → Binge Eating	86.0	18.0	46.0	0.469
Emotion Regulation → Binge Eating	93.0	08.0	12.1	0.259
Body Image → Binge Eating	0.2	01.0	31.0	0.912

Given that body image does not have a significant relationship with binge eating disorder and that body image was included as a mediating variable in the model, it can be

concluded that body image does not play a significant mediating role in the relationship between emotion regulation and coping strategies with binge eating disorder.

Table 4

Fit Indices for the Structural Equation Model Examining the Mediating Role of Body Image

Model	Chi-Square	P	DF	CMIN/DF	CFI	NFI	IFI	RMSEA	FMIN
Modified	23.236	0.001	6	59.27	0.588	0.593	0.599	0.333	0.012

Table 4 displays the fit indices of the structural equation model for examining the mediating role of body image. According to Table 4, the values of the CFI, NFI, and IFI

indices are 0.628, 0.612, and 0.454, respectively. Additionally, the RMSEA index is 0.172, and the FMIN index is 0.012.

Table 5

Direct, Indirect, and Total Effects of Variables on Each Other

Effect	Direct Effect	Indirect Effect	Total Effect
Coping Strategies on Body Image	0.355	---	0.355
Emotion Regulation on Body Image	0.332	---	0.332
Body Image on Binge Eating Disorder	0.008	---	0.008
Coping Strategies on Binge Eating	0.040	0.003	0.037
Emotion Regulation on Binge Eating	0.077	0.003	0.074

Figure 1

The Mediating Role of Body Image in the Relationship Between Emotion Regulation and Coping Strategies with Binge Eating Disorder

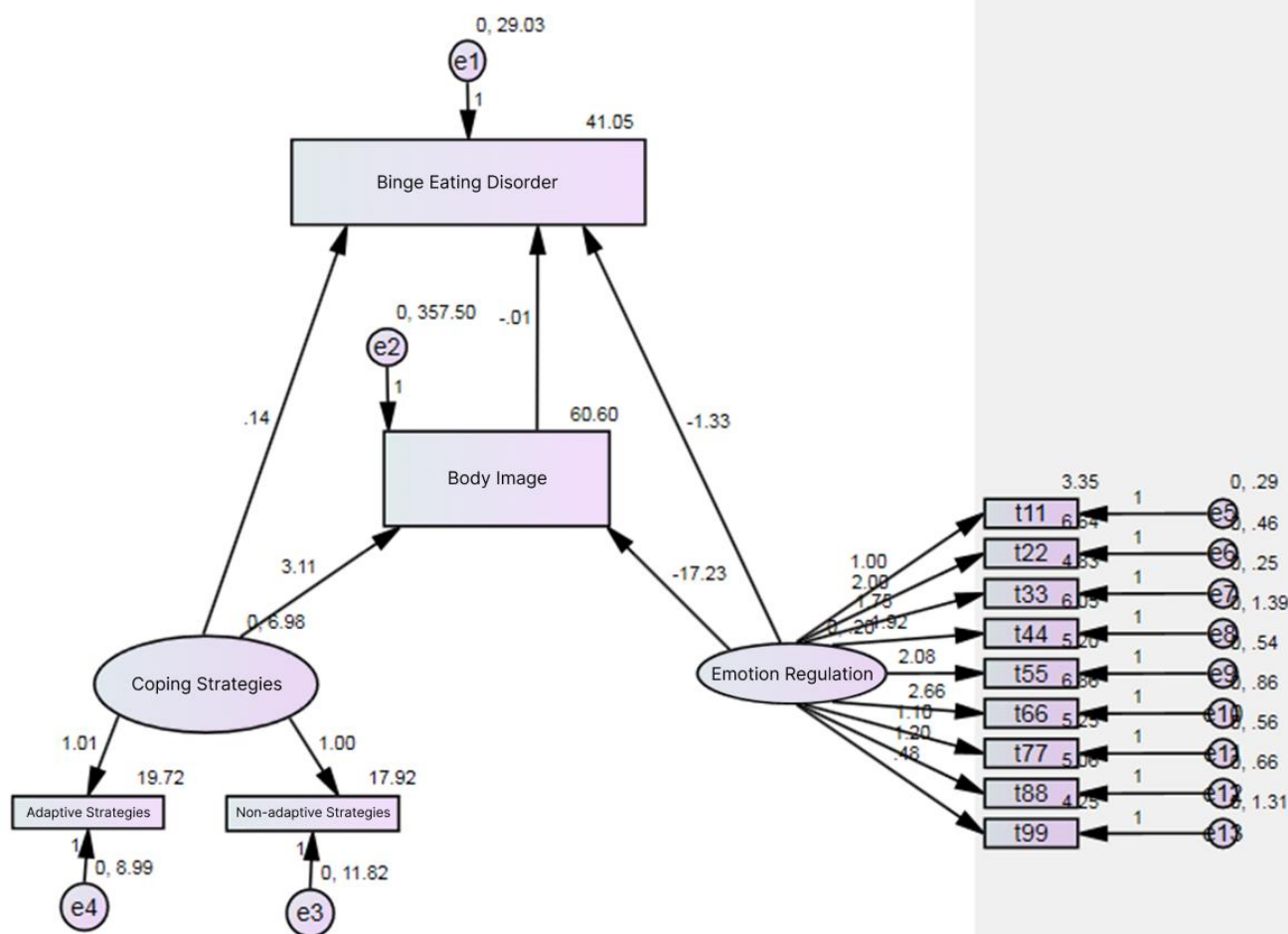


Table 5 illustrates the direct effects, indirect effects, and total effects of the variables on each other. Based on the structural equation modeling results, the following findings were obtained:

- The direct and total effect of coping strategies on body image is 0.372.
- The direct and total effect of emotion regulation on body image is 0.354.
- The direct and total effect of body image on binge eating disorder is 0.023.
- The direct, indirect, and total effects of coping strategies on binge eating disorder are 0.070, 0.009, and 0.062, respectively.
- The direct, indirect, and total effects of emotion regulation on binge eating disorder are 0.111, 0.008, and 0.103, respectively.

4. Discussion and Conclusion

The results indicated that the direct and indirect effects of coping strategies on binge eating disorder are significant. These findings are consistent and aligned with the results of prior studies (Babakhanlou, 2023; Katan & Kelly, 2023; Nourizadeh Mirabadi et al., 2022; Nourizadeh Mirabadi et al., 2023; Pellegrini et al., 2022; Vuillier et al., 2021).

To elaborate on these findings, Hamburg and Adams (1967) defined coping as "the search for and use of information." Coping refers to the efforts made to control and manage situations that appear dangerous and stressful, one of which is binge eating disorder. Coping requires a certain amount of effort and planning; the ultimate outcome of coping responses is not always assumed to be positive. Coping is considered a process that occurs over time, where individuals employ flexible responses that best fit the situation. For example, when an individual is angry, they

might engage in excessive eating, but using problem-focused coping strategies can prevent binge eating (Nourizadeh Mirabadi et al., 2022; Pellegrini et al., 2022).

Based on Eloudine's (2015) perspective, problem-focused coping styles encompass strategies where individuals seek more information about the problem, cognitively restructure the problem, engage in calculations, and prioritize solving the problem. These factors initially enable individuals to effectively deal with stressful events, ultimately leading to a decrease in eating disorders as problem-focused coping styles increase. Conversely, emotion-focused coping styles involve strategies where individuals, instead of solving the problem, attempt to reduce their unpleasant emotions through anger, sadness, crying, self-blame, mental preoccupation, etc. Emotion-focused coping styles are generally effective in the short term but ineffective in the long term, preventing significant changes in eating disorder levels as emotion-focused coping styles increase. Additionally, avoidance coping styles involve strategies where individuals primarily seek to escape or avoid the stressful situation, leading to maladaptive behaviors, including overeating (Katan & Kelly, 2023; Nourizadeh Mirabadi et al., 2023). These factors cause an increase in eating disorder levels as avoidance coping styles increase.

The results showed that the direct and indirect effects of emotion regulation on binge eating disorder are significant. These findings are consistent and aligned with the results of prior studies (Asmari Bardezard et al., 2021; Babakhanlou, 2023; Del Bianco et al., 2023; Khodabakhsh & Kiani 2016; Meule et al., 2021; Perthes et al., 2021; Vuillier et al., 2021).

Elaborating on this finding, it can be said that the ability to understand emotions can help individuals become more aware of the factors that contribute to creating negative and positive emotional experiences. Awareness of the factors that influence emotions and understanding their impact enable individuals to take appropriate actions in response to life stresses, which affect their binge eating and eating disorders. For example, individuals with positive emotion regulation can better adapt to life pressures. This awareness allows them to manage their emotional responses and employ suitable strategies when facing stressful factors. The characteristics of social life and the necessity of interacting with others have overshadowed the use of many emotions that were once among the best and most accessible tools for human life. In today's civilized society, the nature of the problems that arise for humans differs from those faced by primitive humans. Our current problems mostly occur in the form of human relationships, where using fight-or-flight

strategies, i.e., intense emotional and passive responses, is ineffective in coping with them. High emotional attention is associated with cortisol levels and low blood pressure, which is significant for physical health and may lead to binge eating (Khodabakhsh & Kiani 2016; Perthes et al., 2021).

In explaining this finding, positive strategies are adaptive coping strategies for dealing with stressful events that lead to improved self-esteem, social competence, etc., whereas negative strategies are maladaptive coping strategies for dealing with stressful events that lead to stress, depression, other psychological harms, etc. Additionally, positive strategies are positively related to mental health indicators and quality of life, while negative strategies are positively related to physical symptom indicators, depression, and stress. Therefore, it can be expected that positive strategies are negatively related to eating disorders, and negative strategies are positively related to eating disorders (Asmari Bardezard et al., 2021; Meule et al., 2021). Another explanation based on Minim and Farch's (2007) view is that the use of negative strategies is associated with inadequate emotion regulation in response to everyday life events, leading to the emergence of internalizing symptoms or disorders such as depression and anxiety (Babakhanlou, 2023; Khodabakhsh & Kiani 2016). In other words, bias in interpreting and understanding social environmental events leads to the formation of incorrect hypotheses about oneself and the social environment, resulting in negative evaluations of social situations. Consequently, as negative emotion regulation strategies increase, the level of eating disorders increases, and naturally, as positive emotion regulation strategies increase, the level of eating disorders decreases.

The results indicated that the direct effects of body image on binge eating disorder are significant. These findings are consistent and aligned with the prior results (Babakhanlou, 2023; Burychka et al., 2021; Castellini et al., 2019; Fogelkvist et al., 2020; Hamamoto et al., 2022; McLean & Paxton, 2019; Merwin et al., 2023; Nourizadeh Mirabadi et al., 2022; Nourizadeh Mirabadi et al., 2023; Pellizzer et al., 2018; Rezaei et al., 2022; Stice et al., 2021).

Considering that weight or BMI definitively decreases only in one type of eating disorder, anorexia, and can either decrease or increase or remain within the normal range in the other two types, the differing BMI characteristics as a predictive factor for eating disorders in various studies is not unexpected (McLean & Paxton, 2019).

The results indicated that the mediating role of body image between coping styles and binge eating disorder is significant. These findings are consistent and aligned with

the results of prior studies (Babakhanlou, 2023; Katan & Kelly, 2023; Nourizadeh Mirabadi et al., 2022; Nourizadeh Mirabadi et al., 2023; Vuillier et al., 2021).

In this context, it should be noted that a high BMI is associated with an increased experience of negative body image and a decreased ability to experience a positive body image. In reality, it appears that these individuals, by comparing their bodies to ideal beauty standards, engage in negative evaluations and judgments of their bodies, experiencing negative emotions such as shame and embarrassment (Nourizadeh Mirabadi et al., 2023). In other words, individuals' subjective valuation and importance placed on their appearance, as well as their positive and negative beliefs and evaluations about their appearance, can be related to binge eating disorder. When an individual's actual physical characteristics significantly differ from their ideals and valuations, a negative body image is formed. Additionally, attitudes related to shape, appearance, and weight affect the process of acquiring information about body image. On the other hand, binge eating disorder, as one of the eating disorders, refers to psychological conditions characterized by body-related cognitions and disordered eating, poor self-regulation, and dysfunctional eating behaviors. Negative body image is related to overestimation of weight and shape, considered the core pathology in eating disorders (Nourizadeh Mirabadi et al., 2023), and individuals suffering from eating disorders exhibit high levels of body dissatisfaction due to the internalization of the thin ideal (Nourizadeh Mirabadi et al., 2022; Nourizadeh Mirabadi et al., 2023). Another characteristic present in individuals with high BMI is perfectionism, which is associated with disordered eating.

The results indicated that the mediating role of body image between emotion regulation and binge eating disorder is significant. These findings are consistent and aligned with the results of prior studies (Babakhanlou, 2023; Kord & Karimi, 2017; Vafapoor et al., 2021).

In explaining the mediating role of body image in binge eating disorder, it can be inferred that disordered eating behaviors such as binge eating disorder are significantly higher among individuals (especially women) who have greater body dissatisfaction compared to others with more appropriate body images. These individuals experience greater dissatisfaction with their body shape and appearance, making them more prone to inappropriate and unconscious eating (Nourizadeh Mirabadi et al., 2022). Additionally, individuals with high levels of perfectionism have high personal standards, extreme self-criticism, worry about their

failures and mistakes, dissatisfaction with their performance, and a general sense of inadequacy. This sense of inadequacy is related to negative psychological outcomes, including symptoms of eating disorders such as binge eating disorder (Perthes et al., 2021). On the other hand, these individuals actively and positively strive to change and accept conditions, employing acceptance strategies to more actively and flexibly face situational symptoms. Reducing rigid, stereotypical responses prevents the experience of binge eating disorder (Meule et al., 2021). Therefore, it can be concluded that individuals who adopt the best actions to cope with distressing events and focus their minds on assessing the situation, planning, and problem-solving achieve better positive emotional outcomes and mental health, greater cognitive control, increased inhibition capacity, and lower levels of negative emotions and behaviors such as eating disorders.

5. Limitations and Suggestions

The sample of this study consisted of women visiting nutrition clinics in the city of Shiraz, and the results of this study are not generalizable to men. Difficulties in selecting and coordinating with participants to take part in the tests and the extensive number of questions were among the practical limitations. One of the limitations of the present study was its execution among visitors to nutrition clinics in Shiraz. Therefore, generalizing the results of this research to individuals in other cities should be done with caution. Another limitation was assessing the honesty of participants in responding to the questions, which was beyond the researchers' control. Given that the study was limited to visitors of a few nutrition clinics in Shiraz, generalizing the results to other samples should be approached with caution. The present study was cross-sectional and not longitudinal. Naturally, cross-sectional studies are subject to fundamental and cultural changes since researchers have no control over recent life events of the participants. Another limitation of the present study is that purposive sampling was used, so the generalizability of the results should be approached with caution. The study was descriptive and non-experimental. Based on the findings of the present study, binge eating disorder can significantly be influenced by body-checking behaviors, body image, emotion regulation, and individuals' coping styles. Therefore, researchers are recommended to examine the roles of emotion regulation and coping strategies in binge eating disorder within experimental designs in future studies. The present study was conducted

in nutrition clinics in Shiraz; however, considering Iran's diverse cultural, racial, and religious backgrounds, similar studies should be conducted in different societies and cultures within the country.

Authors' Contributions

This article is derived from the doctoral dissertation of the first author, who conducted the research and wrote the manuscript. The second author supervised the study, and the third author provided consultation on the research process.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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