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Original Article

Modification of the dual pathway model of binge eating among women: evaluation of fear of negative evaluation and self-esteem as two new extensions

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ABSTRACT

Introduction: Binge eating disorder is an eating disorder that a large number of people suffer from. The term is utilized to explain a situation, in which the person goes through recurrent excessive eating episodes, or binging, while not regularly engaging in the compensatory behaviors to avoid weight gain. It is believed that binge eating is a way to alleviate or escape undesired and sad emotions. It is estimated that half of the people with binge eating diagnosis suffer from obesity. Concerns about obesity come from the fact that being overweight may enhance the risk of health issues namely diabetes, heart diseases, and specific types of cancers. The Dual pathway model seems to have a promising tendency to play a notable role in understanding the causal mechanisms that underlie eating disorders, emphasizing the impacts of socio-cultural influences, dietary restraint, and negative influence altogether. This model suggests that body dissatisfaction might result in binge eating. The purpose of the present investigation was to determine the dual pathway model of binge eating according to the dual pathway model framework with two suggested additions: self-esteem, and fear of negative evaluation. Method: The two variables, fear of negative evaluation and self-esteem, were added to the dual pathway model. The modified version of the model was utilized for the samples including 252 female university students with BMIs more than 25. BMI, Cooper's body shape questionnaire, Rosenberg's self-esteem scale, Dutch eating behavior questionnaire-restrained eating subscale, a brief version of fear of negative evaluation scale, Stice and Bearman's' noticed sociocultural pressure scale, Stice and Agrass' ideal-body stereotype scale, and Gormally's binge eating scale were applied. Results: According to the results, neither binge eating nor self-esteem could be predicted by restrained eating. Fear of negative evaluation could predict binge eating through body dissatisfaction. Besides, binge eating could be inversely predicted by self-esteem. Conclusion: Fear of negative evaluation is a vulnerability factor that enhances body image concerns, decreases self-esteem, and leads to binge eating. Following flexible and moderate diets has a good effect on self-esteem and is pertinent to lower levels of binge eating.

Keywords: Dual pathway model, Binge eating disorder, Self-esteem, Fear of negative evaluation

Introduction

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Binge eating is an eating disorder/disturbance, characterized as a persistent condition of eating uncontrollably. During these incidents, one would quickly take large quantities of food (often very quickly, to the point of discomfort, and feeling incapable to stop) [1]. The health risks of binge eating disorder, clinical obesity, weight cycling (yo-yo dieting), and weight stigma are generally identical [2]. Not all people who are diagnosed clinically obese suffer from binge eating disorder. Although, it has been reported as a prevalent issue among samples of obese subjects [3]. Obesity is a chronic illness with multiple comorbidities including type 2

diabetes mellitus, cardiovascular disease, cancer, back pain, joint trauma, hypertension, dyslipidemia, and mortality [4].

Eating pathology is associated with the onset of a range of negative psychological outcomes [5, 6], and knowing underlying causal processes of this disorder is crucial for designing more effective treatment plans and prevention strategies. Different models that are proposed for eating disorders are useful in better knowing these disorders. One of these models is Stice's (1994-2001) the dual pathway model. This model seems to have a promising tendency to play a notable role in understanding the causal mechanisms that underlie eating disorders, emphasizing the effects of dietary restraint, sociocultural influences, and negative affect altogether. Based on the model, two distinct pathways lead to eating psychopathology: the restraint pathway, and the negative effect pathway [7]. This model shows that the thin-ideal internalization for women leads to their body dissatisfaction, due to its unattainability in real life.

Binge eating is regarded as a response to negative affective states that are caused by body dissatisfaction [8] because it is commonly assumed that eating stimulates the feeling of comfort, and distracts one from negative emotions [9].

A large number of studies endorsed the dual pathway model [7, 10-13], yet there are some that yield controversial findings for restrained eating pathway [14] and negative affect pathway [15]. Generally, results from studies investigating the dual pathway model are diverse. There is a possibility that this diversity might stem from having various sample groups. In the current investigation, the dual pathway model of binge eating with the two suggested additions of fear of negative evaluation, and self-esteem was investigated and analyzed within the same sample of university women.

One of the additions made to the dual pathway model is the addition of self-esteem, as a global assessment of the self [16]. Sehm and Warschburger (2017) recommended that adding self-esteem (that is a more trait-like variable), instead of negative affect, could have beneficial influences on the dual pathway model. Negative affect and self-esteem are considered to be different aspects of a single underlying construct [17]. Fairburn et al. (2003) proposed that low self-esteem is a motivation for seeking achievement in the valued domain of weight and shape control (to increase their feeling of self-worth), thereby maintaining over-evaluation of shape and weight. This, in turn, steers one towards unhealthy weight-control ways and methods, which may after a while lead to eating-related psychopathological problems, such as binge eating [18].

The investigations reveal that self-esteem might have an impact on the relationship between body dissatisfaction, restrained eating and eating pathology [8, 19].

Since there was a considerable amount of evidence regarding the role of self-esteem in predicting disordered eating, the present investigation included it in the dual pathway model, as an indication of binge eating disorder. Another addition made to the dual pathway model was fear of negative evaluation. Defined as anxiety about others' assessment of oneself, fear of negative evaluation leads to an individual to be distressed regarding others' negative evaluations, avoid situations in which there is a possibility of evaluation taking place, and expect to be negatively evaluated [20].

It is believed that fear of negative evaluation has a role in eating disorders as a pathological condition. Frequently attempting to anticipate others' negative evaluations of oneself, may eventually extend to one's weight and shape [20]. Therefore, FNE was assessed as a precursor to body image dissatisfaction, thin-ideal internalization, and restraint eating.

Method

Participants and procedure

This research was a cross-sectional and descriptive-correlative one. The statistical population consisted of all students of the Mohaghegh Ardabili University of Iran, studying in the 2016-2017 academic year. The sample of this study comprised of female undergraduate students of Mohaghegh Ardabili University (N=5500). About 575 female students participated in this study and among them, 252 students whose BMI was more than 25 (BMI≥25) and had binge eating disorder included in this study.

The age of participants varied from 19 to 61 years (M=21.59; SD=2.87). Students who were unwilling to cooperate, and those who had systemic illnesses or physical disabilities, were excluded. The main goal of the investigation and the roles of participants in the research were explained to all the participants utilizing a consent form. Despite the questionnaires being anonymous, all the participants filled up the consent form and were assured that the gathered data would only be utilized for scientific purposes. All the participants completed the demographic questionnaire and the consent form.

Measures

The Brief Fear of negative evaluation (BFNE) scale [21] is a 12-item variant of the original Fear of Negative Evaluation scale. The BFNE has been affirmed to be highly related to the FNE ($r=0.96$, $p<0.0001$) [22]. The Persian BFNE had good test-retest reliability and high internal consistency (Cronbach $\alpha=0.83$) [23].

Body mass: To indicate adiposity, fatness, or obesity, the body mass index (BMI) was utilized. In BMI calculation, bodyweight is divided by height squared ($BMI=kg/m^2$) to manage the modifications in weight that are resulted by height. Thus, it can be concluded that BMI is a measure of "relative weight." The investigation has demonstrated that BMI is a reliable and accurate index of adiposity [8].

Perceived sociocultural Pressure scale [24]**:** Participants were assumed to specify the amount of pressure they felt to be thin inflicted by dating partners, family, friends, and the media, according to the 8-item Perceived Sociocultural Pressure Scale [25]. The reliability of the Persian version of the questionnaire was assessed by Kakavand (2015). It was revealed to be 0.69, which was an agreeable number [26].

Ideal-Body stereotype scale revised [24]**:** The internalization of the thin ideal was investigated utilizing this scale. The Persian version of this scale had an agreeable reliability (r= 0.76) [27].

Body shape questionnaire (BSQ) [28]**:** BSQ is an 8-item self-report questionnaire to assess body dissatisfaction and in clinical contexts. It is widely used to assess eating pathology. It is derived from the original BSQ-34. The Persian BSQ had good test-retest reliability and high internal consistency (Cronbach α=0.87) [27].

Dutch eating behavior questionnaire-restrained eating subscale (DEBQ-RES) [29]**:** The Dutch Restrained Eating Scale was utilized to assess dieting and restrictive eating. In terms of reliability, the Persian version of this subscale has been revealed to have high internal consistency (Cronbach α=0.91) [30].

Self-esteem Scale (RSER) [31]**:** Self-esteem scale is a ten-item self-report measure that calculates global self-worth by examining both positive and negative feelings about the self. The Persian RSES has been revealed to have agreeable divergent validity and high reliability (Cronbach α=0.84) [32].

Binge Eating Scale (BES) [33]**:** The BES was developed to determine Binge eaters among the obese population. The Persian BES has good test-retest reliability and high internal consistency (Cronbach α=0.85) [34].

Results

Descriptives

The final sample comprised of 252 female students. The BMI and average age of the community sample were 26.91 (SD=1.88) and 21.59 (SD=2.87), respectively. Descriptive statistics are represented in Table 1.

Structural model

The comparative fit index (CFI), the root mean squared error of estimation (RMSEA), and the standardized root mean squared residual (SRMR) were utilized to estimate the model fit. Based on the findings, the original and the modified dual-pathway model were non-nested. Utilizing the backward selection process, variables that were not significant, dropped, and constraints were imposed. Correspondingly, two paths had significant modification parameters, one from body shape dissatisfaction to binge eating symptoms and another from perceived sociocultural pressure to be thin to binge eating. The results indicated that the modified model provided a very good fit to the data, X^2=19.647, p=0.292, RMSEA=0.025, CFI=0.988, SRMR=0.041. Intercorrelations for observed variables are given in Table 2. The ultimate modified version of the dual-pathway model of binge eating is displayed in Fig 1.

Mediational hypotheses

Out of 14 indirect influences, four were non-significant. As represented in Table 3 by values, in contrary to our hypothesis, BMI could not predict binge eating disorder via body dissatisfaction, perceived sociocultural pressure to be thin, elevated fear of negative evaluation, and a reduction in self-esteem.

Discussion

The purpose of the present study was to conduct a replication and investigation of the modified version of the dual pathway model of binge eating disorder (Stice, 1994-2001) among female undergraduate students. It was utilized to investigate the pathways proposed by the model, as well as the roles of two other vulnerability factors. Results supported the model in the samples of the study. The findings support the model's hypothesis, that body dissatisfaction is a predictor of restrained eating. However, neither self-esteem nor binge eating could be predicted by restrained eating. These findings are inconsistent with the results of previous investigations supporting the main hypotheses of the model [7, 9, 13].

Based on recent hypotheses, there might be both healthy and risky aspects of restrained eating [8]. Shaumberg and colleagues suggested that self-regulation has a role in determining whether restrained eating is a healthy eating behavior resulting in successful weight management, or an unhealthy one resulting in elevated eating disorder risk [35]. Based on these hypotheses, healthy restrained eating is the one with realistic objectives and hence induces a positive self-evaluation. The positive self-evaluation will, then, lead to higher levels of self-esteem and efficient weight management [8].

Other investigations revealed that obese individuals with binge eating disorder that remained in long-term low-calorie diets experienced a reduction in their binge eating habits [35,36]. An explanation for that could be the difference in the sample characteristics, particularly age. The relationships between dietary restraint and binge eating might be obvious in adolescence, but not in adulthood [22].

Body image dissatisfaction is correlated with, and is often considered as a predicting and maintaining factor of disordered eating [23,25] and lower levels of self-esteem. It was also suggested that female body image satisfaction is highly associated with self-esteem [37]. In line with the findings of previous investigations, mediation analysis suggests that restrained eating might lessen the negative influences of body dissatisfaction on self-esteem. Besides, it might reduce the risk of binge eating through the improvement of self-esteem.

Another significant term to be introduced in this stage is self-objectification. Subjects embrace an observer's viewpoint on their bodies in the procedure of self-objectification, and learn to treat and view themselves as objects to be looked at and assessed based on physical appearance. This may serve as a tool that allows individuals to assess their standing, according to the gendered beauty ideals. According to reported evidence, women and men may come to realize a contrariety between their current and ideal physique, through self-objectification, and as a result, feel anxiety and shame about their body and appearance [22]. Self-objectification is speculated to cause body shame and appearance anxiety. This will then trigger either dietary restraint, as an indirect approach to lose body fat, or binge eating, as a means of coping with aversive feelings, so that it appears more compatible with the female thin-ideal [22].

It is said that individuals with eating disturbances have in their mind a hierarchical system for rating others, with the physically fit (attractive) people at the top and the fat (ugly) people at the bottom [38]. They are also said to be suffering from lower self-esteem [39]. There are also studies that demonstrate a significant connection between fear of negative evaluation and a range of eating disorder symptoms such as body dissatisfaction, drive for thinness [7], and disordered eating [20].

Fear of negative assessment and dissatisfaction with body image, accompanied by lower levels of self-esteem, create a burden of negative emotions. Emotional eating is the practice of taking food in great quantity as an approach to deal with negative emotions [40]. Emotional overeating has proved to be correlated with the frequency of binge episodes and disinhibition, but it has no relationship with the restraint. The fact that binge eating helps decrease negative influence, at least in the short-run, enhances the future risk for binge eating [41]. Women are more likely to resort to overeating as a response to a range of negative emotions, especially anger, frustration, anxiety, and depression [42]. In one of the models that have been recommended, eating psychopathology has beneficial impacts on individuals with heightened negative evaluation fears [43]. In an investigation done by Gilbert & Meyer (2005), negative evaluation fears did not appear as an indication of modification in restriction [37].

Limitations

This investigation solely depended on self-report data. Utilizing diagnostic interviews, however, might have been preferable in diagnosing participants with binge eating disorder. The second limitation of the present study was relying on self-reported height and weight for computing BMI. Given the fact that previous research manifested a strong correlation between self-reported height and weight measurements [44], factors such as social desirability or unawareness of one's measurements could have impacted this data. This investigation relied on cross-sectional data, as a result of which no interference about causality could be made. It would be beneficial if future researches examined these processes utilizing longitudinal data. Another limitation that requires to be addressed is that a community sample was utilized here rather than a clinical one. Therefore, the findings may not exactly be indicative of females with an eating disorder. The last limitation to be pointed out is that in the current investigation, the aforementioned modified and extended version of the dual pathway model was only assessed in women's cases. Therefore, a similar study can be repeated in the future, with male samples.

Conclusion

Based on the findings of our study, following flexible and moderate diets has a good impact on self-esteem and is pertinent to lower levels of binge eating. It seems that examining different aspects of healthy restrained eating in future investigations will be beneficial. Fear of negative evaluation is a vulnerability factor that enhances body image concerns, reduces self-esteem, and results in binge eating. It, therefore, can be concluded that self-esteem and fear of negative evaluation are two main factors, which should be considered in the preventive programs. The last conclusion is that techniques should be of concern in clinical contexts while working with patients diagnosed with an eating disorder, and obese patients who are being assisted by adaptive emotion regulation.

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Table 1. Descriptives for observed Variables.

Variable	*M*	*SD*
BFNE	30.2	11.2
PSPS	18.37	8.16
IBS	25.7	5.02
BSQ	18.63	8.64
DEBQ-RES	27.3	5.35
RSER	13.8	2.3
BES	30.7	1.000

BFNE= the Brief Fear of Negative Evaluation scale, PSPS= Perceived Socio cultural Pressure Scale, IBS=Ideal-Body Stereotype Scale Revised, BSQ= Body Shape Questionnaire, DEBQ-RES= Dutch Eating Behavior Questionnaire-Restrained eating subscale, RSER= Rosenberg Self-Esteem Scale, BES= Binge Eating Scale.

Table 2. Intercorrelation between observed variables.

	R	Sig.
BMI → PSP	0.271	0.001*
BMI → FNE	0.144	0.022*
BMI → IBI	0.163	0.009*
PSP → BD	0.437	0.001*
FNE → BD	0.295	0.001*
IBI → BD	0.029	0.594
PSP → DR	0.171	0.012*
FNE → DR	-0.008	0.906
BD → DR	0.204	0.004*
DR → SE	0.062	0.353
PSP → SE	0.054	0.457
FNE → SE	-0.015	0.829
BD → SE	-0.174	0.021*
DR → BED	0.085	0.163
SE → BED	-0.288	0.001*

Table 3. Estimates for the indirect effects.

Meditational chain	Indirect effect	95% CI
BMI → FNE → BD → BED*	0.013	0.001, 0.026
BMI → PSP → BD → BED*	0.035	0.009, 0.062
FNE → BD → BED*	0.089	0.037, 0.141
PSP → BD → BED*	0.131	0.065, 0.197
BD → SE → BED*	0.033	0.001, 0.066
BMI → FNE → BD → SE → BED	0.001	-0.001, 0.003
BMI → PSP → BD → SE → BED	0.004	-0.001, 0.008
BMI → PSP → BED*	0.061	0.014, 0.108
FNE → BD → SE → BED	0.010	-0.001, 0.021
PSP → BD → SE → BED*	0.014	0.001, 0.029
BMI → FNE → BED*	0.043	0.006, 0.080
BMI → PSP → BD*	0.119	0.048, 0.189
FNE → BD → SE	-0.041	-0.084, 0.002
PSP → BD → SE*	-0.060	-0.114, -0.006

BMI= Body Mass Index, FNE= Fear of Negative Evaluation, PSP= Perceived Socio cultural Pressure, IBI=Ideal-body Internalization, BD= Body dissatisfaction, DR= Dietry restraint, SE=Self-Esteem, BED= Binge Eating Disorder.
*$p<0.05$