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Interaction of general anxiety with anxiety about getting fat may increase the number of Binge-Eating Disorder symptoms

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Abstract

According to preliminary sources, general anxiety and anxiety about getting fat (AGF) can predict the occurrence of binge eating disorder (BED). Still, there is little research in this area. The aim of the present study was to investigate depression, anxiety, and AGF in BED. The research focused on BED from two separate perspectives: the number of BED symptoms and the recurrence rate of BED episodes. Women diagnosed with BED (n = 103) were surveyed using a self-developed questionnaire evaluating the presence of BED symptoms based on DSM-5 criteria and two other measures: the Hospital Anxiety and Depression Scale (HADS) and the Body Mass Anxiety Scale (BMAS-20). Binge-eating women experienced high levels of anxiety and AGF. Significant differences were observed in the level of anxiety and AGF between groups with a lower and higher number of BED symptoms. Also, groups with mild, moderate, and severe BED were found to differ significantly in the level of depression symptoms. We demonstrated that the interaction of anxiety and AGF could predict the number of BED symptoms. AGF may be a specific type of anxiety in BED and may be increased by anxiety disorders.

1. Introduction

Binge eating disorder (BED) is characterized by frequently recurring episodes of overeating accompanied by a subjective sense of loss of control over eating. The experience of having lost control is the main feature of a binge eating episode. Unlike bulimia, binge eating episodes do not involve compensatory behaviors aimed at preventing weight gain (e.g., regular vomiting, taking laxatives, or regularly engaging in intense physical exercise). Consumption of large amounts of food is not connected with the feeling of hunger, and it generates high psychological costs, giving rise to guilt, shame, self-devaluation, and general suffering associated with overeating. The episodes are also associated with at least three of the following symptoms: (a) eating much more rapidly than usual, (b) eating until feeling uncomfortably full, (c) eating large amounts of food despite not feeling physically hungry, (d) eating alone because of feeling embarrassed, and (e) feeling disgusted with oneself, depressed and/or guilty during and/or after the episode [1]. BED often leads to weight gain and obesity over time, but it is important to note that people with BED can also have a normal weight. In this study, anxiety is understood as an emotional state characterized by feelings of tension related to worried thoughts, fear, or stress [1]. Depressive disorder is described in ICD-11 as recurrent episodes of depressed mood, decreased interest, and loss of pleasure, accompanied by other cognitive, behavioral, or neurovegetative symptoms that negatively affect the individual's ability to function normally [2].

Mood and anxiety disorders are among the most commonly observed comorbidities in binge eating disorder. Co-occurring symptoms of depression and anxiety disorders in eating disorders are associated with greater symptom severity and poorer treatment outcomes, especially in young women [3]. Another source indicates that the interaction of obesity, anxiety, and depression is a potential predictor of BED, with the strongest positive relationship found between BED and depression [4]. Depression is regarded as a risk factor for BED and a potential cause of this disease [5]. Numerous studies confirm the co-

occurrence of anxiety with emotional eating and binge eating [6–8] and with bulimia [9]. Anxiety disorders may contribute to engaging in disordered eating behaviors [10].

Researchers distinguish several types of anxiety disorders commonly co-occurring with eating disorders [10]. One such type of anxiety is weight concern, experienced by individuals trying to meet expectations of an ideal body shape. Fear of weight gain is considered a core feature of eating disorders and an indicator of its severity [11–12]. It is associated with psychopathological behaviors in both bulimia and anorexia nervosa [13–14]. Binge eating disorder is the least well-described eating disorder in this respect, having been recognized as a distinct clinical syndrome relatively recently. However, there is preliminary evidence to suggest that fear of weight gain may be a predictor of bulimia and BED [15–16]. This is consistent with our previous work, in which we were able to show that binge-eating women experience high levels of anxiety about getting fat (AGF) [17]. There is also evidence that anxiety and depression are strongly associated with AGF and that an increased body mass index (BMI) reinforces this relationship [18].

Although there is evidence for the importance of fear of fat in the broader context of eating disorders, there is little research to establish the association of anxiety about weight gain with general anxiety disorders in BED. The aim of this present study was to look for relationships among symptoms of depression, anxiety, and AGF in BED. Based on our previous study [17], we adopted two separate perspectives on BED: the severity of BED measured as the frequency of binge eating episodes and the diversity of BED symptoms measured by the number of symptoms present. We hypothesized that a greater severity and a greater diversity of BED symptoms would be associated with higher levels of anxiety and depression. We also expected that the interaction of depression and anxiety with AGF would predict the severity as well as the diversity of BED symptoms.

2. Materials and Methods

2.1. Procedure

Data were collected through an online survey via social media from online support groups for binge eaters and from institutions providing healthcare to patients with overweight, obesity, and eating disorders. The survey was administered in person using test sheets and over the Internet via a link to the test battery. Only women who were patients of bariatric wards and obesity treatment clinics took part in the in-person test. The battery consisted of a BED symptoms scale, the Hospital Anxiety and Depression Scale (HADS), the Body Mass Anxiety Scale (BMAS), and a personal data sheet. All participants were provided with information regarding the purpose of the study and the survey procedures. Informed consent was obtained from all participants involved in the study. The study was approved by the Research Ethics Committee of the Institute of Psychology at the Cardinal Stefan Wyszyński University in Warsaw (registration number: 19/2022).

2.2. Participants

The sample comprised 103 women aged 18 to 66 (M = 33.76; SD = 9.59). The participants were patients of obesity treatment clinics, bariatric wards, and psychological clinics; some of them belonged to the Association of Overeaters Anonymous [Stowarzyszenie Anonimowych Jedzenioholików] or online support groups for binge eaters. Inclusion in the sample was conditional on meeting the criteria for BED [1]. The presence of BED symptoms was determined using a DSM-5-based scale developed by the present authors. According to DSM-5 criteria, individuals with at least three symptoms of BED were included in the sample. Participants diagnosed with schizophrenia and bipolar disorder were excluded from the sample. Based on these factors, seven women who reported bipolar disorder were excluded.

2.3. Instruments

BED Symptoms Scale. The scale developed by the present authors is based on the diagnostic criteria of the American Psychiatric Association's DSM-5 classification of mental disorders. It is a self-report instrument with eight items regarding BED symptoms and one control item regarding compensatory behaviors (item 9). The participants noted the symptoms that they suffered during the last month. The survey provides information on the number of BED symptoms and their severity (frequency of occurrence): mild: 1–3 times a week; moderate: 4–7 times a week; severe: 8 or more times a week. The aim of constructing the scale was to verify the presence and number of BED symptoms in each of the study participants, as well as to assess the degree of severity (frequency of occurrence) of symptoms (mild: 1–3 times a week; moderate: 4–7 times a week; severe: 8 or more times a week).

Hospital Anxiety and Depression Scale (HADS) [19]. HADS is a 14-item self-report measure divided into two subscales: HADS-Anxiety (HADS-A) and HADS-Depression (HADS-D), which are used to assess the levels of anxiety and depression, respectively. Each item is rated on a 4-point Likert scale (from 0 to 3 points). The score range is 0–21, and the higher the score, the higher the severity of anxiety and depressive symptoms. The Polish translation of the test is characterized by high reliability, both for the anxiety subscale (Cronbach's alpha of 0.8 or higher) and the depression subscale (Cronbach's alpha of 0.9 or higher).

Body Mass Anxiety Scale (BMAS-20) [20]. BMAS-20 is a self-report questionnaire that measures the level of body mass-related anxiety. Each item is rated on a 7-point scale from 1 (Does not concern me at all) to 7 (Fully concerns me). The original Polish version of BMAS-20 and its English translation have good psychometric properties (Cronbach's alpha of 0.916 and 0.91, respectively).

2.4 Statistical analysis

The statistical analyses were conducted using JASP 0.17. Correlation analysis was performed using Spearman's rank correlation coefficient. The values of the variables were compared across the three BED severity groups (mild, moderate, and severe) using the Kruskal-Wallis one-way ANOVA followed by Tukey's post hoc tests. A cluster analysis was performed to divide the participants into groups with a greater and a lower diversity of BED symptoms. Then, the values of the test variables were compared between these groups using the Student's t-test or the non-parametric Mann-Whitney U test when the assumptions of the parametric test were not met. The results were considered significant at $p < .05$. As

the last step, a linear regression model was performed to determine the direction of the relationships between the variables.

3. Results

3.1. Descriptive statistics and correlation analysis

First, a descriptive analysis of the results was performed. Table 1 shows the means and the standard deviations for the investigated variables.

Table 1
Descriptive statistics and normality test

Variables	*M*	*SD*	*Sk.*	*Kurt.*	*S-W*	*p*	*Min*	*Max*
Age	33.77	9.65	1.06	1.20	0.93	0.001**	18	66
BMI	27.80	8.27	1.25	1.40	0.89	0.001***	17.63	56.97
Severity of BED symptoms	1.44	0.64	1.17	0.27	0.67	0.001***	1	3
Number of BED symptoms (0–8)	6.04	1.86	−0.78	−0.23	0.88	0.001***	1	8
Anxiety About Getting Fat (AGF)	51.47	14.80	−0.76	−0.15	0.93	0.001***	11	70
Anxiety	16.85	3.54	0.53	−0.65	0.94	0.00***	11	25
Depression	17.73	3.39	−0.07	−0.66	0.97	0.04*	9	24

Note. Analyses were performed for N = 105 observations; S-W – Shapiro-Wilk test; * $p < .05$, ** $p < .01$, *** $p < .001$

As a next step, a correlation analysis was carried out. A positive, moderately strong relationship was found between AGF and the number of BED symptoms (*rho* = 0.45; $p < .001$). A similar relationship was observed between AGF and general anxiety ($r = 0.48$; $p < .001$), and a slightly weaker, positive relationship between anxiety and the number of BED symptoms (*rho* = 0.35; $p < .001$). The severity of BED symptoms correlated only with depression, but the relationship was weak and negative (*rho* = − 0.20; $p < .05$). The results of the analyses discussed above are presented in Table 2.

Table 2

Pearson's correlations between variables for the entire sample

Variables	Age	BMI	Severity of BED symptoms	Number of BED symptoms (0–8)	Anxiety About Getting Fat (AGF)	Anxiety	Depression
Age	-						
BMI	0.39***	-					
Severity of BED symptoms	−0.05	0.20*	-				
Number of BED symptoms (0–8)	−0.13	−0.03	0.22*	-			
Anxiety About Getting Fat (AGF)	−0.16	−0.10	0.12	0.46***	-		
Anxiety	−0.02	−0.12	0.18	0.35***	0.48***	-	
Depression	0.03	-0.03	−0.20*	−0.14	−0.12	−0.23*	-

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

3.2. Relationships of severity of BED symptoms with depression, anxiety and anxiety about getting fat

A Kruskal-Wallis ANOVA compared three groups with mild, moderate, and severe BED symptoms. The results showed that these groups differed significantly in the severity of depression ($F(2) = 5.55$; $p = .05$). The effect size was moderately strong [21]. Post hoc tests were performed to determine the sources of these differences. The results showed that the group with mild BED symptoms (1 to 3 episodes a week) differed in depression severity from the group with moderate BED symptoms (4 to 7 episodes a week). Individuals with mild BED symptoms had more severe depression ($M = 18.35$; $SD = 3.09$), $p = .005$, than those with moderate BED symptoms ($M = 16.03$; $SD = 3.69$). The remaining results did not point to any significant differences among the groups. The means, standard deviations, F values, and Dunnett's T3 multiple comparisons post-hoc tests for each group are shown in Table 3.

Table 3

Comparisons of anxiety about getting fat (AGF), anxiety, and depression across BED severity groups

Variables	Mild BED symptoms (1) *N* = 66		Moderate BED symptoms (2) *N* = 29		Severe BED symptoms (3) *N* = 8		*H*	*p*	η^2	post hoc
	Mdn	*IQR*	*Mdn*	*IQR*	*Mdn*	*IQR*				
Anxiety About Getting Fat (AGF)	49.73	16.36	54.28	11.16	55.63	11.22	1.30	0.28	0.03	
Anxiety	16.38	3.43	17.83	3.58	17.25	3.99	1.77	0.18	0.03	
Depression	18.35	3.09	16.03	3.69	18.75	2.76	**5.55**	**0.005**	**0.10**	1 > 2

Note. Post hoc analysis was carried out using Dunnett's T3 test; coefficients in bold represent statistically significant relationships.

3.3 Relationships of diversity of BED symptoms with depression, anxiety, and anxiety about getting fat

A cluster analysis of the number of BED symptoms in the sample was carried out. We used a two-step cluster analysis approach with hierarchical cluster analysis followed by k-means analysis. Hierarchical cluster analysis was used to determine the optimal solution for the number of clusters. The hierarchical clustering results suggested that the two clusters showed significant differences and adequately represented the data. Accordingly, k-means clustering was performed with the number of clusters set to two. The results of the analysis of differences between the two clusters are presented in Table 4.

Table 4

Differences in depression, anxiety, and anxiety about getting fat between a group with a larger number of BED symptoms and a group with a smaller number of BED symptoms

Variables	Group 1 (Me = 5)			Group 2 (Me = 7)			*Statistics*	*p*	*Effect size*
	N	*M*	*SD*	*N*	*M*	*SD*			
BMI	42	27.94	7.05	61	27.70	9.07	1424.50	0.34	0.11
Anxiety About Getting Fat (AGF)	42	39.14	13.27	61	59.95	8.51	242.00	**0.001**	**−0.81**
Anxiety	42	14.05	1.90	61	18.79	3.09	232.00	**0.001**	**−0.82**
Depression	42	18.36	3.36	61	17.30	3.36	1545.00	0.08	0.21

Note. The effect size statistics for Student's t-test and the Mann-Whitney U test were Cohen's d and the rank biserial correlation, respectively; coefficients in bold indicate statistically significant relationships; group 1 – lower diversity of BED symptoms, group 2 – higher diversity of BED symptoms

Cluster analysis yielded two groups: group 1 with a median number of 5 BED symptoms (lower diversity of BED symptoms) and group 2 with a median number of 7 symptoms (higher diversity of BED symptoms). The Mann-Whitney U test showed that the two groups differed statistically significantly in the mean anxiety score, $U = 232$, $p < .001$. Women with more diverse BED symptoms had a higher mean anxiety score ($M = 18.79$; $SD = 3.09$) than women with less diverse symptoms ($M = 14.05$; $SD = 1.90$). The effect size showed that the effect was very strong [22]. The same difference was observed for the mean AGF, $U = 242$, $p < .001$. Women with a larger number of BED symptoms had a higher mean AGF ($M = 59.95$; $SD = 8.51$) than women with fewer symptoms ($M = 39.14$; $SD = 13.27$), and the effect size was also strong. The detailed results of the analyses are shown in Table 4.

3.4 Prediction of BED symptom diversity based on depression, anxiety, and anxiety about getting fat

Linear regression analysis was performed to test the predictability of BED symptom diversity among the participants. Three predictors were entered into the model: depression, anxiety, and AGF. The explained variable in the model was the number of BED symptoms. The model fitted the data well, $F(3;102) = 12.19$; $p < .001$; $R^2_{adj.} = 0.25$ and explained 25% of the variance in the explained variable. In the model, anxiety $\beta = 0.13$, t (1.30); $p = 0.20$ and AGF $\beta = 0.44$, t (4.52); $p < .001$ were significant predictors, while depression turned out to be non-significant. The estimated value of the regression coefficient indicates that an increase in the intensity of the interaction of anxiety with AGF may lead to a rise in the number of BED symptoms. The detailed results of the analyses are shown in Table 5.

Table 5

Prediction of BED symptom diversity based on depression, anxiety, and anxiety about getting fat – linear regression analysis

	B	*SE*	β	*t*	*p*
$F(3;102) = 12.19$; $p < 0.001$ **$R^2_{adj.} = 0.25$**					
(Constant)	2.48	1.33		1.87	**0.06**
Anxiety	0.07	0.05	0.13	1.30	**0.20**
Depression	-0.02	0.05	-0.04	-0.49	0.63
Anxiety About Getting Fat (AGF)	0.06	0.01	0.44	4.52	**< .001**

Note. Dependent variable: number of BED symptoms; predictors: (Constant), Anxiety, Depression, Anxiety About Getting Fat

4. Discussion

The primary object of the present study was to examine depression and anxiety in women suffering from BED. As hypothesized, BED was associated with both depression and anxiety, but not in a straightforward manner. The diversity of BED symptoms (as measured by the number of those symptoms) was positively associated with anxiety but not with depression. In contrast, BED severity (as measured by the frequency of binge eating episodes) was negatively associated with depression but not with anxiety. In this present study, we observed a significant difference in anxiety between groups with less and more diverse BED symptoms. Women who reported more BED symptoms displayed higher levels of anxiety than women with fewer symptoms. The positive relationship between anxiety and BED was previously reported by other researchers who found that people with higher levels of anxiety experienced more severe binge eating symptoms [23–25]. According to some researchers, certain forms of overeating, including BED, may help individuals regulate negative emotions, such as anxiety, and cope with them effectively [26–27].

We also found a positive relationship between anxiety and AGF. AGF is associated with body image dissatisfaction and contributes to the development of eating disorders [13], similar to general anxiety, whose association with eating disorders has been widely described in the literature [6,8–9]. It is, therefore, possible that AGF results from a general tendency to react with anxiety. Moreover, AGF may results from prejudice and stigmatization of overweight and obesity from the environment. Experiences of stigmatization may contribute to the development of anxiety disorders [20]. In the present study, no relationship was observed between AGF and depression. In contrast to Styk et al.'s study [20], in which depression, like anxiety, was associated with AGF, our data did not show the existence of this relationship. Perhaps the difference in findings was due to the type of sample. While in the present study,

we investigated a sample that consisted exclusively of women suffering from BED, Styk et al. [20] examined a non-clinical and gender-diverse study group.

Preliminary evidence suggests that AGF may predict BED [16]. This assumption is supported by the results obtained. We determined that the interaction of anxiety with AGF could predict the diversity of BED symptoms, with AGF being the stronger predictor. High levels of both anxiety and AGF may increase the likelihood of experiencing more BED symptoms. This result is corroborated by one of the latest studies, which found that anxiety was the strongest predictor of the occurrence of BED among patients after bariatric surgery [28]. AGF may be increased by general anxiety disorders, which are common in eating disorders. At the same time, AGF represents a specific type of anxiety for BED. Some individuals who are intensely preoccupied with the appearance of their own body and are anxious about gaining weight may experience psychological discomfort, which they relieve by eating. On the other hand, overeating can reinforce fears of weight gain, which will lead to a vicious cycle of increasing anxiety and coping with it through binge eating. Unlike the diversity of symptoms, the severity of BED was not predicted by anxiety or AGF. It can, therefore, be assumed that anxiety and AGF are associated with the number of BED symptoms but not with the frequency of recurrence of binge eating episodes. More BED symptoms may affect more areas of daily functioning, worsening overall quality of life.

The association between depression and the severity of BED was weak and negative. Further analysis showed that women with mild BED symptoms (1–3 binge eating episodes per week) showed significantly higher levels of depression compared to women with moderate BED symptoms (4–7 binge eating episodes per week). This relationship suggests that more severe depression reduces the desire to eat. Research, however, indicates that depression can lead to both increased and decreased appetite, reflecting different patterns of neural activity [29]. Our data suggest that in the study group, BED and depression co-occurred but were not mutually related.

Based on the obtained results, it can be assumed that anxiety and AGF are vital to the diversity of BED symptoms but not for the frequency of binge eating episodes. Analogously, depression is more vital to the frequency of recurrence of BED episodes than to the number of symptoms. It should be emphasized that all the associations with the diversity of BED symptoms were stronger than the associations with the severity of BED. Thus, it can be assumed that the diversity of BED symptoms plays a greater role in the psychopathology of BED than the recurrence rate of binge eating episodes, which is corroborated by our previous research [17]. Few studies describe BED from two perspectives: the number of symptoms and the recurrence rate of episodes.

5. Strengths and limitations

The key strength of the study is the adoption of two separate perspectives on BED, including the number of symptoms and the recurrence rate of episodes. Most previous studies have focused on the frequency of BED episodes, while the present study included data on more broadly defined binge eating disorder. Also, there is little research about the fear of weight gain among women who suffer from BED.

Despite our efforts, we could not avoid certain limitations. The final number of individuals included in the study group was relatively small due to the need to gather a homogeneous sample of participants. Hence, the groups were not proportionally divided by severity. An additional limitation was the fact that the items of the questionnaire for assessing the presence and severity of BED symptoms had not been standardized or normalized. Nonetheless, the items' fidelity to the DSM-5 diagnostic criteria ensures the reliability of the data we collected.

6. Conclusions

Women with BED experienced high levels of anxiety and AGF, and a larger number of BED symptoms was associated with greater severity of both of these variables. Moreover, the interaction of anxiety and AGF predicted the diversity of BED symptoms. AGF is a specific type of anxiety in BED and may be increased by anxiety disorders. Women who engaged in binge eating the least often had significantly more severe depression symptoms than women who binge ate with moderate frequency. As the level of depressive symptoms increased, the frequency of BED episodes decreased. The diversity of BED symptoms, measured by their number, plays a more critical role in the psychopathology of BED than the frequency of recurrence of binge eating episodes. This observation is corroborated by our previous research [17]. Little research into BED focuses on the two separate perspectives of the number of symptoms and the recurrence rate of episodes. The obtained results may provide information necessary for developing effective interventions for preventing and treating BED.

Abbreviations

AGF Anxiety about getting fat

BED Binge eating disorder

BMAS Body Mass Anxiety Scale

BMI Body mass index

HADS Hospital Anxiety and Depression Scale

Declarations

Competing interests:

The authors declare that they have no competing interests.

Ethics approval and consent to participate:

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics and Bioethics Committee of the Cardinal Stefan Wyszyński University in Warsaw (19/2022; date

of approval: 15 September 2022). Informed consent was obtained from all participants involved in the study.

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Author Contribution

Conceptualization, K.L., W.K.; methodology, K.L., W.K., W.S.; data collection, K.L.; analyses, W.S.; interpretation of data, K.L., W.S., W.K., J.I.; writing—original draft preparation, K.L.; writing—review and editing, K.L., W.S., W.K., J.I.; supervision, W.K. All authors read and approved the final manuscript. All authors read and approved the final manuscript.

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Data Availability

The data that support this study's findings are not openly available due to reasons of sensitivity, but are available from the corresponding author upon reasonable request. The data are located in controlled-access data storage at the corresponding author.

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