

# Overweight and obesity: The significance of a depressed mood

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## Abstract

**Objective:** Comorbid depression has been found to increase morbidity in a variety of disorders. This study aimed to investigate whether the presence of depressive symptoms in overweight and obese people is related to increased specific eating psychopathology and decreased self-esteem.

**Methods:** Overweight/obese people seeking dietary treatment were grouped according to their scores on the Beck Depression Inventory (BDI), resulting in a mildly to moderately depressed group ( $BDI \geq 10$ ;  $n = 66$ ; the symptomatic group) and a non-depressed group ( $BDI < 10$ ;  $n = 83$ ). Eating psychopathology was measured by the Eating Disorder Examination-Questionnaire (EDE-Q); self-esteem was measured by the Rosenberg Self-Esteem Scale.

**Results:** Symptomatic people had more shape, weight and eating concerns ( $P$ -values  $< 0.001$ ); scored higher on restraint ( $P < 0.01$ ); had lower self-esteem ( $P < 0.001$ ); and had a higher BMI ( $P < 0.05$ ) than non-depressed people. Furthermore, the percentage of bingers was higher in the symptomatic group ( $P < 0.01$ ).

**Conclusion:** Symptomatic participants suffered more than non-depressed participants, and not only from their depression.

**Practice implications:** For dietitians treating overweight and obese people, the BDI is a useful instrument for identifying the subgroup with depressive symptoms—the group that is at risk for (eating) psychopathology.

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**Keywords:** Obesity; Depression; Eating psychopathology; Self-esteem; Dietician

## 1. Introduction

Depression has been found to coexist with a diversity of disorders, both medical – for example, cancer, cardiovascular diseases, rheumatoid arthritis or diabetes – and psychiatric – for example, anxiety disorders [1]. Morbidity in patients suffering from these disorders generally increases when comorbid depression is present [1]. Treatment outcome is also influenced by depression. In the treatment of obsessive compulsive disorder (OCD), for example, non-depressed patients benefited more from treatment than depressed patients [2,3]. Patients with comorbid depression might, therefore, be treated more effectively with an integrated approach in which depression status is taken into account, as was suggested for the treatment of panic disorder [4] and substance use disorder [5].

The role of comorbid depression in weight reduction treatment is less clear. There is some evidence that overweight and obese people suffer from depressive symptoms, as several studies found participants to be mildly to moderately depressed [6–12]. Moreover, a positive association between obesity and depression has been reported frequently [13–18]. However, other studies have found minimal or no depressive symptoms in overweight/obese people [9,19,20]; no association between obesity and depression [21]; or even found lower levels of depression in obese middle-aged men [22,23]. High levels of depression were found to be associated with treatment attrition [24]. Furthermore, research by Sherwood et al. [25] suggests that depression mediates the relationship between binge eating and weight loss. The positive relationship between changes in binge eating and weight change was no longer significant when depression scores were added to the regression analyses.

In sum, depression occurs with a variety of disorders; generally aggravates symptoms in patients with comorbid

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depression; and can adversely affect treatment outcomes. Adapting treatment to the depression status of a patient might improve its outcome. In overweight and obesity, the presence of depressive symptomatology is no exception. Overweight and obese people in the Netherlands seeking help for their weight problems usually register for diet management provided by dietitians. In the clinical practice of these dietitians, the treatment is generally focused on dietary patterns, without concern for psychological symptoms such as depression. Because comorbid depressive symptoms may affect treatment outcome, it is highly relevant for dietitians to know whether comorbid depressive symptomatology in their patients is related to increased specific eating psychopathology and decreased self-esteem. As a consequence, this subgroup may be more difficult to treat.

The present study investigated whether the presence of depressive symptoms in overweight and obese people registering for dietary treatment in a regular clinical setting is related to increased specific eating psychopathology (i.e., concerns about shape, weight and eating, restraint, and binge eating), and low self-esteem. We hypothesised that overweight and obese people with depressive symptoms are more concerned about shape, weight and eating, have a more restrained eating style, lower self-esteem, and a higher BMI than non-depressed overweight and obese people. We further hypothesised that in the symptomatic group, more participants report binge eating than in the non-depressed group.

## 2. Method

### 2.1. Participants

Participants were comprised of overweight and obese people seeking dietary treatment for their weight problems (BMI > 25). All participants enlisted for individual or group treatment in a Dutch community centre offering dietary treatments for overweight and obesity. When registering for the dietary treatment, participants were invited to participate in the study. Initially, 224 people registered for the study. However, 58 people were excluded because their BMI was lower than 25 ( $n = 4$ ) or unknown ( $n = 54$ ). The study sample thus consisted of 166 overweight and obese people.

### 2.2. Procedure

Questionnaires were mailed to the participants and collected by the dietitian at the first appointment.

### 2.3. Measures

Weight and height were recorded by the dietitian. Participants were weighed in street clothes, without shoes. Body Mass Index (BMI: weight (kg)/height (m)<sup>2</sup>) was calculated.

Specific eating psychopathology was measured using the Eating Disorder Examination-Questionnaire (EDE-Q) [26], a 36-item questionnaire that measures concerns about shape, weight and eating, restraint and self-reported binge eating. Subscale scores for shape, weight and eating concerns and restraint ranged between 0 and 6. A higher score indicates more severe eating psychopathology.

Depression was measured with the 21-item Beck Depression Inventory (BDI) [27]. The BDI measures the severity of depressive symptomatology. Items are scored on a 4-point scale. One item about weight loss was excluded from the analysis and the sum of the remaining 20 items was calculated. A higher score indicates more severe depression. Scores below 10 are considered normal; a score of 10 or more indicates mild to moderate depression [28].

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSE) [29]. The RSE is a 10-item questionnaire that measures global self-esteem. Items are scored on a 4-point scale. A higher score indicates more positive self-esteem. Scores below 21 indicate low self-esteem [30].

### 2.4. Statistical analyses

A missing value analysis was conducted to replace missing data. The number of missing values for each questionnaire (EDE-Q, BDI, RSE) was calculated for each participant. Those with fewer than 10% missing values on each of the questionnaires were included in the analyses ( $n = 149$ ). For those participants, missing item scores were replaced by the mean score of the other participants for those particular items.

Participants were grouped according to the cut-off scores for the BDI (cut-off = 10) [28]. Accordingly, two groups were created. The symptomatic group consisted of participants with mild to moderate depression (BDI  $\geq$  10,  $n = 66$ ); the non-depressed group consisted of participants without any or with a minimal number of depressive symptoms (BDI < 10,  $n = 83$ ).

To test our hypotheses, *t*-tests on the four subscales of the EDE-Q, the RSE and BMI were performed with depressive symptomatology (symptomatic versus non-depressed) as a between subjects factor. If Levene's test for equality of variances showed significance, results of the *t*-test with equality of variances not assumed were reported. A Chi-square analysis was conducted to investigate whether the percentage of participants reporting objective eating binges differed between the symptomatic and the non-depressed group.

## 3. Results

### 3.1. Participant characteristics

Characteristics of participants (age, sex) are presented in Table 1. Symptomatic and non-depressed participants did

Table 1  
Age, sex, BDI, EDE-Q, RSE and BMI of participants

	Symptomatic group (n = 66)			Non-depressed group (n = 83)		
	%	Mean	S.D.	%	Mean	S.D.
Age		43.7	14.0		43.6	13.5
Sex (%)						
Female	88			80		
Male	12			20		
BDI <sup>a</sup>		17.0	6.1		4.8	2.6
EDE-Q						
Shape concerns <sup>a</sup>		4.2	1.4		2.9	1.6
Weight concerns <sup>a</sup>		3.6	1.2		2.4	1.2
Eating concerns <sup>a</sup>		1.8	1.3		0.8	0.8
Restraint <sup>a</sup>		1.9	1.2		1.4	1.1
RSE <sup>a</sup>		27.1	4.6		32.3	4.0
BMI <sup>a</sup>		34.0	5.3		32.3	4.3
Bingers <sup>a</sup> (%)	32			12		

<sup>a</sup> Means differ significantly between symptomatic and non-depressed participants ( $P < 0.05$ ).

not differ with respect to age,  $t(137) < 1$ , or sex,  $\chi^2(1, N = 149) = 1.8, P = \text{ns}, r = 0.11$ . As expected, symptomatic and non-depressed participants' BDI scores differed significantly,  $t(84.2) = 15.2, P < 0.001$ .

### 3.2. Differences between symptomatic and non-depressed participants

We hypothesised that overweight and obese participants with depressive symptoms would be more concerned about their shape, weight and eating, have a more restrained eating style, lower self-esteem, and a higher BMI than non-depressed overweight and obese participants. We further hypothesised that in the symptomatic group, more participants would report binge eating than in the non-depressed group.

As predicted,  $t$ -tests revealed significant differences in EDE-Q shape concerns,  $t(145.3) = 5.7, P < 0.001$ ; EDE-Q weight concerns,  $t(147) = 6.0, P < 0.001$ ; EDE-Q eating concerns,  $t(107.6) = 5.2, P < 0.001$ ; EDE-Q restraint,  $t(147) = 2.8, P < 0.01$ ; RSE,  $t(147) = 7.4, P < 0.001$ ; and BMI,  $t(147) = 2.0, P < 0.05$ . Inspection of the means shows that, as expected, symptomatic participants were more concerned about shape, weight and eating; scored higher on restraint; had lower self-esteem; and had a higher BMI than non-depressed participants (see Table 1 for means on all outcome measures).

The Chi-square analysis revealed that the percentage of participants reporting eating binges differed significantly between symptomatic and non-depressed participants,  $\chi^2(1, N = 148) = 8.5, P < 0.01, r = 0.24$ . As hypothesised, in the symptomatic group, more participants reported binge eating than in the non-depressed group (Table 1).

Table 2  
BDI, EDE-Q, RSE and BMI of obese participants

	Symptomatic group (n = 49)			Non-depressed group (n = 53)		
	%	Mean	S.D.	%	Mean	S.D.
BDI <sup>a</sup>		17.5	6.5		4.7	2.5
EDE-Q						
Shape concerns <sup>a</sup>		4.3	1.5		2.8	1.7
Weight concerns <sup>a</sup>		3.8	1.3		2.4	1.3
Eating concerns <sup>a</sup>		1.9	1.3		0.8	0.9
Restraint <sup>a</sup>		2.0	1.1		1.4	1.2
RSE <sup>a</sup>		26.5	4.5		32.7	4.2
BMI		35.8	4.8		34.6	3.7
Bingers <sup>a</sup> (%)	33			12		

<sup>a</sup> Means differ significantly between symptomatic and non-depressed participants ( $P < 0.05$ ).

### 3.3. Overweight versus obese participants

Within the study sample, 47 participants were overweight (BMI 25–30) and 102 were obese (BMI  $\geq 30$ ); BMI correlated significantly with BDI scores ( $r = 0.23, P < 0.01$ ). To determine whether the pattern of results would be maintained for each weight group, we conducted analyses for the overweight and obese groups separately. Using the same cut-off scores as in the total group, we found 17 symptomatic and 30 non-depressed participants in the overweight group, and 49 symptomatic and 53 non-depressed participants in the obese group. Analysing data for the two weight groups separately did not change the results substantially. In the obese group (Table 2), symptomatic participants were more concerned about their weight, shape and eating, scored higher on restraint, and had lower self-esteem (all  $P$ -values  $< 0.02$ ) than the non-depressed participants. Furthermore, the percentage of participants reporting eating binges was higher in the symptomatic group ( $P < 0.02$ ). BMI differences were in the same direction as in the group as a whole, but not significant. In the overweight group (Table 3), the pattern of results was similar to that of the group as a whole, but because of an apparent power problem, some of the findings were no longer significant. Symptomatic participants were more concerned about their shape, had lower self-esteem ( $P$ -values  $< 0.03$ ), and tended to be more concerned about their weight and eating ( $P$ -values  $< 0.11$ ) than non-depressed participants. For restraint, BMI and the percentage of binge eaters, the results were similar to those of the total group, but differences were not significant.

### 3.4. Bingers versus non-bingers

In the symptomatic group, more participants reported binge eating than in the non-depressed group. To test whether the psychopathology in the symptomatic group could be attributed entirely to the binge eaters in this group,

Table 3  
BDI, EDE-Q, RSE and BMI of overweight participants

	Symptomatic group ( <i>n</i> = 17)			Non-depressed group ( <i>n</i> = 30)		
	%	Mean	S.D.	%	Mean	S.D.
BDI <sup>a</sup>		15.5	4.8		4.9	2.9
EDE-Q						
Shape concerns <sup>a</sup>		4.0	1.2		3.0	1.3
Weight concerns <sup>b</sup>		3.0	1.0		2.5	1.0
Eating concerns <sup>b</sup>		1.3	0.9		0.9	0.7
Restraint		1.8	1.3		1.4	0.8
RSE <sup>a</sup>		28.8	4.6		31.6	3.4
BMI		28.5	1.2		28.3	1.3
Bingers (%)	29			13		

<sup>a</sup> Means differ significantly between symptomatic and non-depressed participants ( $P < 0.05$ ).

<sup>b</sup> Means differ marginally significantly between symptomatic and non-depressed participants ( $P < 0.11$ ).

Table 4  
BDI, EDE-Q, RSE and BMI of non-bingers

	Symptomatic group ( <i>n</i> = 45)		Non-depressed group ( <i>n</i> = 72)	
	Mean	S.D.	Mean	S.D.
BDI <sup>a</sup>	16.3	5.8	4.5	2.6
EDE-Q				
Shape concerns <sup>a</sup>	4.1	1.5	2.7	1.6
Weight concerns <sup>a</sup>	3.5	1.4	2.3	1.2
Eating concerns <sup>a</sup>	1.4	1.2	0.7	0.8
Restraint <sup>a</sup>	1.8	1.1	1.4	1.1
RSE <sup>a</sup>	27.7	4.3	32.5	4.0
BMI <sup>a</sup>	34.3	5.2	32.4	4.4

<sup>a</sup> Means differ significantly between symptomatic and non-depressed participants ( $P < 0.05$ ).

all bingers were removed from the analyses. Analyses of the non-bingers alone did not change the results substantially. Symptomatic participants again were more concerned about their weight, shape and eating; scored higher on restraint; had lower self-esteem; and had a higher BMI than non-depressed participants (all  $P$ -values  $< 0.05$ ) (Table 4).

## 4. Discussion and conclusion

### 4.1. Discussion

The present study investigated whether depressive symptoms in overweight and obese people seeking dietary treatment are related to increased specific eating pathology (i.e. shape-, weight- and eating concerns, eating restraint, and binge eating) and low self-esteem. In accordance with our hypotheses, we found that symptomatic participants had more shape, weight and eating concerns, a more restrained eating style, lower self-esteem and a higher BMI than non-

depressed participants. Moreover, in the symptomatic group, more participants reported binge eating than in the non-depressed group.

It is noteworthy that almost half (44%) of a community sample that registered for dietary weight loss treatment scored 10 or higher on the BDI, and thus exhibited some symptoms of mild to moderately severe depression [28]. Of course, an accurate clinical diagnosis of depression is necessary before concluding that these participants were depressed; but the present data show that depressive symptoms may be more common in overweight and obese people than we think.

As reviewed in the introduction, comorbid depression generally exacerbates several disorders and treatment outcomes. Therefore, treating the depression might improve treatment success. This study points to an overwhelming amount of depressive symptoms in the overweight/obese population. At the same time, depressive symptoms were accompanied by appearance and eating-related worries, a restrained eating style, low self-esteem and eating binges. In sum, these results suggest that providers of weight reduction programmes should take into consideration the level of depressive symptoms in overweight and obese people who participate in these programmes.

Participants with mild to moderate depression had a higher BMI than non-depressed participants. Furthermore, the significant correlation between BMI and BDI scores suggests that the chance of depressive symptoms increases when BMI rises. Could it simply be that BMI accounts for the elevated levels of specific eating psychopathology and lowered self-esteem in the symptomatic group? This explanation is not likely for two reasons. First, the present data show that when overweight and obese people were analysed separately, symptomatic as well as non-depressed people were found within each weight group, though all participants in the overweight group had a lower BMI than those in the obese group. Thus, being overweight (rather than obese) is no guarantee that depression will not be a factor, as about one-third of the overweight group was symptomatic. Moreover, obesity is not necessarily accompanied with depression, as about half of the obese group was not depressed. Furthermore, symptomatic people still showed higher levels of psychopathology than non-depressed participants in these separate analyses, whereas importantly, BMI differences were not significant. This pattern of results appeared in both weight groups, though because of an apparent power problem, some findings were no longer significant in the overweight group. In conclusion, although BMI and depressive symptoms were related, these findings clearly suggest that BMI alone is not enough to account for the elevated psychopathology in the symptomatic group.

Second, several previous studies suggest that BMI alone does not account for psychopathology in obese people; mediating factors such as binge eating [11,20,31–34] or body dissatisfaction [35,36] play a prominent role. The causal relationship between binge eating, psychopathology

and BMI, however, has not been established yet; most data is correlational in nature. The present data show that even when the bingers were removed from the analyses, the symptomatic group still showed higher levels of psychopathology. Apart from binge eating, negative affect plays a central role. However, causality cannot be determined from our data; we still do not know which factor – depression, body dissatisfaction, binge eating, or something else – *causes* the (eating) psychopathology in obese people.

#### 4.2. Conclusion

About one in every two participants registering for dietary treatment exhibited some symptoms of depression. These symptomatic participants were more concerned about shape, weight and eating; had a more restrained eating style; lower self-esteem; and a higher BMI than non-depressed participants. Moreover, in the symptomatic group, more participants reported binge eating than in the non-depressed group. The symptomatic participants clearly suffered more than their non-depressed co-participants, and not only from their depression.

#### 4.3. Practice implications

The present study clearly shows that even mild to moderate depressive symptoms indicate the presence of specific eating pathology and low self-esteem in overweight and obese people. As discussed previously, however, it is not yet known which factor (e.g. binge eating, body dissatisfaction, depression or something else) *causes* psychopathology in obese people. In identifying this subgroup with psychological problems, it may be of practical importance to focus on the person's depression status. Binge eating is not easily determined and binge self-reports are often criticised for being unreliable [26,37]; whereas the BDI is a reliable measure of depressive symptomatology [28,38]. For practical reasons, dieticians can focus on the depression status of their overweight and obese patients to select those people who are at risk for psychological problems. Whether or not adapting treatment for obesity to a patient's depression status would improve treatment outcome remains to be investigated. However, adding cognitive therapy to the behavioural dietary treatment might be a rewarding enterprise [39]. For dieticians or other health care providers, the BDI could be used as an easy and helpful tool to select and refer overweight and obese people with depressive symptoms to an appropriately trained psychotherapist.

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