Research report

# Jolly fat or sad fat?
# Subtyping non-eating disordered overweight and obesity along an affect dimension

Anita Jansen *, Remco Havermans, Chantal Nederkoorn, Anne Roefs

*Maastricht University, Department of Clinical Psychological Science, P.O. Box 616, 6200 MD Maastricht, The Netherlands*

## ABSTRACT

Although a substantial part of the overweight and obese show increased depression scores, overweight and obesity are not necessarily depressing. This study tested the fitting of a sample of non-eating disordered overweight and obese people ($n = 195$) into high and low negative affect profiles. Cluster analysis created a subtype high in negative affect (47%) and a subtype low in negative affect (53%). The subtypes did not differ in body weight but robust differences were found in body-related worrying. Body-related worrying explained one-third of the variance in negative affect levels, whereas body weight and binge eating did not predict negative affect levels at all. Increased levels of body related worrying may be an important clinical characteristic to distinguish the sad from the happy non-eating disordered overweight/obese. It is argued that obesity treatments should include therapeutic strategies that decrease body-related worrying and sad mood, particularly for the overweight/obese who are high in negative affect.

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## Introduction

Lay people often stereotypically associate fatness with jolliness, and some decades ago researchers also suggested a 'jolly-fat' hypothesis; the fat were hypothesized to be jollier, and obesity was believed to protect against depression (e.g., Crisp & McGuiness, 1976). However, recent epidemiological and treatment studies show the opposite: overweight and obese individuals are at increased risk of depression compared to normal weight people. But not all studies support this finding, implicating that the existence of an association between overweight/obesity and depression is more complex.

Most evidence for the existence of an association between depressive symptoms and overweight/obesity stems from studies with samples seeking treatment (e.g., Baumeister & Härter, 2007; Faith, Matz, & Jorge, 2002; Grilo, Masheb, & Wilson, 2001; Kasen, Cohen, Chen, & Must, 2007; Nauta, Hospers, Jansen, & Kok, 2000; Werrij, Mulkens, Hospers, & Jansen, 2006). Medical problems, higher body weights and Binge Eating Disorder (BED) typically are over represented in treatment-seeking samples; epidemiological studies show a point prevalence of 1–3% for BED in the general

population, whereas higher prevalence rates of up to 30% have been observed in obese patients seeking weight loss treatment (Dingemans, Bruna, & van Furth, 2002). The general and consensual finding is that in particular the obese suffering from BED show an increased chance of being depressed, compared to the non-eating disordered obese (Dingemans et al., 2002; Fitzgibbon, Stolley, & Kirschenbaum, 1993; Telch & Stice, 1998).

Within community samples, the evidence for an association is less clear, but studies do suggest an increased chance of depression in obesity (Baumeister & Härter, 2007; Herva et al., 2006). A recent meta-analysis of 13 cross-sectional general population surveys including more than 60,000 participants shows a modest but significant association between overweight/obesity and major depressive disorder according to the DSM IV diagnostic criteria (Scott et al., 2007). Note that an association with full-blown depression diagnoses was sought for, and not just increased depressive symptoms.

It has been argued that body image distress in particular might facilitate depression in overweight people (Schwartz & Brownell, 2004). In current societies, a strong explicit and implicit anti-fat bias is evident (Puhl & Brownell, 2003; Teachman & Brownell, 2001) and excess body weight may be considered a social stigma that is linked to discrimination and teasing. This stigmatization might subsequently promote body-related or self-related negative thinking and interpretation bias, leading to a sad obese (Jansen

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* Corresponding author.
  *E-mail address:* a.jansen@psychology.unimaas.nl (A. Jansen).

et al., 2007; Kasen et al., 2007). Some earlier studies indeed show more negative self-evaluations that are largely influenced by shape and weight concerns in the depressed obese compared to the non-depressed obese (Nauta, Hospers, Jansen, et al., 2000) and body image dissatisfaction was found to partially mediate the relationship between degree of obesity and depression in a clinical sample seeking treatment (Friedman, Reichmann, Costanzo, & Musante, 2002).

Therefore, it appears that overweight/obesity and depression are associated, in both clinical and non-clinical community samples. However, the association in the non-clinical samples is weaker, suggesting that overweight in itself is not necessarily depressing (Carr, Friedman, & Jaffe, 2007; Wardle, Williamson, Johnson, & Edwards, 2006). In line with this, anecdotal evidence from experiments conducted in our lab suggests that there are two subgroups of overweight/obese people (Nederkoorn, Havermans, Roefs, Smulders, & Jansen, 2006; Roefs et al., 2006). Our impression was that about half of the non-eating disordered overweight and obese samples that participated in our research, appeared to be sad or (slightly) depressed, whereas the other half appeared to be happy and enjoying life. This clinical observation, and the fact that the association between non-clinical overweight/obesity and depression in large population samples is weak, led us to the hypothesis that the non-eating disordered overweight/obese might possibly be subtyped into a happy or an unhappy group along an affect dimension.

Earlier studies showed valid subtyping in the eating disorders Bulimia Nervosa and Binge Eating Disorder along dietary restraint and negative affect dimensions (Grilo et al., 2001; Stice & Agras, 1999; Stice et al., 2001; Stice, Bohon, & Fischer, submitted for publication). It was found that increased negative affect signalled more eating disorder symptoms and general psychopathology in the high negative affect subtypes, and predicted a more persistent clinical course over 3-year follow-ups (Stice et al., submitted for publication). However, these findings in clinical populations are not generalizable to outpatient or community populations of non-eating disordered obesity (Grilo et al., 2001). In the present study, it was predicted that a non-eating disordered sample of overweight and obese women could be subtyped along an affect dimension that was expected to yield two subgroups of comparable size; one high in negative affect and one low in negative affect. The subtyping of the overweight/obese in high vs. low negative affect was also expected to show a meaningful difference in body-related worrying; the highly negative affect subtype was expected to show significantly more body-related worrying than the subtype that was low in negative affect.

## Method

### Participants and procedure

An advertisement was placed in a popular Dutch women's magazine ('Margriet') to recruit overweight people who wanted to take part in a questionnaire study. The people who applied to participate ($n = 351$) were sent a questionnaire. Of the 351 questionnaires that were sent, 223 respondents (64%) completed and returned the questionnaire.

Participants who were above the age of 60 ($n = 20$) or male ($n = 5$) were excluded from the analyses. The elderly and the males were excluded because they were underrepresented, and earlier studies show that gender and old age might moderate the effect between obesity and depression (Carpenter, Hasin, Allison, & Faith, 2000; Friedman & Brownell, 1995; Heo, Pietrobelli, Fontaine, Sirey, & Faith, 2006; but see Wardle et al., 2006). Three other participants were excluded because of missing body mass index (BMI) or affect

data. Our final sample consisted of 195 overweight or obese female participants. Participants ranged in age from 21 to 60 years ($M = 45.3$, S.D. = 8.6) and in BMI from 26 to 51 ($M = 33.9$, S.D. = 5.6); 24.5% were overweight (BMI between 26 and 30), 75.5% were obese (BMI $\geq$ 30) of whom 16% had a BMI above 40.

The Ethical Committee of the Psychology Faculty approved the study, and the participants were sent a small present after returning the questionnaire.

### Measures

#### Demographics

The first part of the questionnaire asked for demographics, education, weight, height, weight history, dieting, and treatment history. BMI was calculated (weight in kg/height in m$^2$) of the self-reported height and weight.

The *Beck Depression Inventory* (*BDI*; Beck, Steer, & Garbin, 1988) was used to assess the severity of depressive symptoms. The BDI consists of 21 items that are scored on a 4-point Likert scale ranging from 0 to 3 and are summed. A higher score indicates an increasingly depressed mood. Scores below 10 are normal, a score between 10 and 18 is indicative of mild to moderate depression and higher scores indicate moderate to severe depression (Beck et al., 1988). The BDI shows internal consistency (Cronbach's $\alpha = 0.83$ in the current study).

*Positive Affect and Negative Affect* (*PANAS*; Watson, Clark, & Tellegen, 1988). Positive and negative affects were measured with the positive and negative affect subscales of the PANAS. The positive affect (PA) subscale consists of 10 positive mood terms (attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong, and active) whereas the negative affect (NA) subscale consists of 10 negative mood terms (distressed, upset, nervous, scared, hostile, irritable, ashamed, jittery, afraid, and guilty). Participants indicate how often they felt that way during the last 2 weeks on a 5-point Likert-type response scale (from 1 = very slightly or not at all, to 5 = extremely). Each affect score is the sum of the ten items ranging between 10 and 50, with higher scores reflecting more frequent experiences of positive or negative emotions. The validity, internal consistency (PA: $\alpha = 0.88$, NA: $\alpha = 0.88$ in the current study), and test-retest reliability of the PANAS are good (Watson et al., 1988).

*Rosenberg Self-Esteem Scale* (*RSE*; Rosenberg, 1979) is a 10-item measure of general self-worth. Scores range between 10 and 40, with higher scores reflecting higher self-esteem. The validity, internal consistency ($\alpha = 0.91$ in the current study), and test-retest reliability of the RSE are good (Rosenberg, 1979).

#### Body worry scale

Three questions measured the frequency and severity of body-related worrying: (1) my weight worries keep me busy, (2) my weight worries cause trouble, stress or sadness, and (3) the idea that I am too fat causes shame, negative feelings or severe worries. The response format for each question was Yes or No ($\alpha = 0.84$). Participants were also asked how many hours a day they spend worrying about their weight and body (response format: less than 1 h, between 1 and 3 h, more than 3 h a day).

*Eating Disorder Examination Questionnaire* (*EDE-Q*; Fairburn & Beglin, 1994). The EDE-Q is a self-report version of the Eating Disorder Examination that measures specific eating psychopathology. The EDE-Q assesses eating disorder related concerns; shape concerns ($\alpha = 0.93$ in the current study), weight concerns ($\alpha = 0.81$), eating concerns ($\alpha = 0.86$), and eating restraint ($\alpha = 0.77$). Items are rated on a 7-point scale, reflecting the severity or frequency of the symptom (higher scores mean more severe or more frequent symptoms).

*Binge eating*

The EDE-Q also assesses binge eating and inappropriate compensatory behaviors. Because binge eating (defined as the consumption of an objectively large amount of food in a relatively short period of time during which a loss of control is experienced), is self-reported and might be overestimated, a second binge eating assessment was added. The presence of binge eating thus was determined in two ways. A first indication was derived from the answers on the EDE-Q questions 16 ("Over the past 4 weeks, did you eat a large amount within a short period of time? If yes, how frequently?") and 17 ("Over the past 4 weeks, did you have the feeling that you could not control or prevent what and how much you ate during the eating episodes in item 16? If yes, how often?"). The second indication of binge eating was derived from answers on 9 questions that asked for the presence of the DSM-IV diagnostic criteria for BED. Participants were asked whether, in the past 3 months, they had consumed an objectively large amount of food within a short period of time, lost control over eating, ate more rapidly than normally, ate until they felt uncomfortably full, ate alone, ate without physical hunger, and felt ashamed, guilty and depressed after any such episodes. A participant was considered positive for binge eating disorder if both the EDE-Q questions and the DSM-IV criteria were indicative of objective binge eating at a minimum of two times a week, i.e. participants had to fulfil the criteria of eating an objectively large amount of food within a discrete period of time and a loss of control over eating. For the positive participants, self-reported binge frequency per week was determined and those with two or more of these episodes per week were considered to be binge eaters.

## Results

**Hypothesis 1.** The sample can be subtyped along the affect dimension yielding two subgroups of comparable size; one high in negative affect and one low in negative affect.

To test this hypothesis, the scores on all affect scales were entered in an iterative K-means cluster analysis (Quick Cluster algorithm, SPSS), following the method of Stice and Agras (1999). Cluster analysis classifies a set of observations into two or more mutually exclusive unknown groups based on similarity in scores on a combination of variables. The analysis seeks to identify homogeneous subgroups of cases, that is, cluster analysis seeks to identify a set of groups that both minimize within-group variation and maximize between-group variation. Subgroups are distinguished only if they exist; a priori it is not evident that a sample can be distinguished in two or more relevant subsamples of about the same size. In the iterative (non-hierarchical) cluster analysis, cluster centers are repeatedly recomputed and early misclassifications are detected and corrected (Stice & Agras, 1999). The BDI, RSE, and PANAS (both the PA and NA subscale) were selected as indicators of negative affect. Two clusters were asked for because we hypothesized the existence of a high negative affect and a low negative affect subgroup.

In accordance with the prediction, the analysis identified two clusters of comparable size that minimized within group variation and maximized the differences along the diverse components of negative affect. The first cluster, the 'high negative affect' (HNA) cluster, included 92 cases (47%). The second cluster, the 'low negative affect' (LNA) cluster, included 103 cases (53%). Table 1 shows the descriptives of both clustered subtypes on the affect scales, age, BMI, binge frequency and eating psychopathology. The HNA subgroup was significantly younger than the LNA subgroup. Both subtypes did not differ in current BMI, highest BMI ever (after 18th year of life, excluding pregnancy), lowest BMI ever (after

18th year of life), and target BMI (see Table 1). The difference between actual and target BMI was however significantly larger for the HNA ($M = 8.6$, S.D. = 4.3) than for the LNA ($M = 7.0$, S.D. = 4.2) subtype, $t(191) = 2.55$, $p = 0.01$. Significantly more HNA than LNA participants reported binge eating twice or more a week and could possibly be diagnosed with Binge Eating Disorder, HNA 11% vs. LNA 3%, $\chi^2(1) = 4.9$, $p = 0.03$. The HNA binge eaters binged significantly more frequently than did the LNA binge eaters. The HNA and LNA subtypes did not differ in eating restraint but the HNA subtype showed significantly more eating, shape and weight concerns.

Potential differences between the two subtypes on demographics, dieting, and treatment were examined. Chi-square analyses showed no significant differences between the HNA and LNA subtypes in socio-economic demographics (civil state, level of education, work), current dieting, frequency of dieting and way of dieting. However, the proportion of participants that had ever been in weight loss treatment was significantly larger in the HNA (83%) than in the LNA (63%) subgroup.

**Hypothesis 2.** The high negative affect subtype shows significantly more body-related concerns than the subtype that is low in negative affect.

Table 1 also shows the scores on the EDE-Q concerns subscales. On all EDE-Q concerns subscales, the HNA subtype scored significantly higher than did the LNA subtype. Likewise, the body worry scale showed that the HNA subtype worried significantly more about their weight, and these weight worries caused them to report significantly more negative feelings than did the LNA subtype: 78% of the HNA vs. 41% of the LNA participants indicated that their weight worries kept them busy, $\chi^2(1) = 27.5$, $p < 0.001$. Also, 85% of the HNA vs. 29% of the LNA reported that their weight worries caused trouble, stress or sadness, $\chi^2(1) = 59.1$, $p < 0.001$. Further, 92% of the HNA vs. 53% of the LNA reported that the idea being too fat caused shame, negative feelings or severe worries, $\chi^2(1) = 36.8$, $p < 0.001$. Daily worrying about weight was also significantly longer-lasting in the HNA subtype than in the LNA subtype: 29.7% of the HNA vs. 10.7% of the LNA reported worrying more than 3 h a day, 46.2% of the HNA vs. 18.4% of the LNA worried between 1 and 3 h a day, and 24.2% of the HNA vs. 70.9% of the LNA worried less than 1 h a day, $\chi^2(2) = 42.2$, $p < 0.001$.

**Table 1**
Descriptives for the high vs. low negative affect subtypes from the cluster analysis ($n = 195$)

| | High negative affect subtype ($n = 92$) | | Low negative affect subtype ($n = 103$) | | $t$ (193) |
|---|---|---|---|---|---|
| | M | S.D. | M | S.D. | |
| BDI | 17.0 | 6.2 | 7.2 | 4.4 | 12.8*** |
| PA | 23.6 | 5.3 | 33.9 | 4.9 | 14.2*** |
| NA | 27.7 | 7.2 | 16.2 | 4.2 | 13.8*** |
| RSE | 24.6 | 3.8 | 32.8 | 3.8 | 15.0*** |
| Age | 43.6 | 8.6 | 46.3 | 8.1 | 2.2* |
| Current BMI | 34.5 | 5.5 | 33.4 | 5.7 | 1.4 |
| Highest adult BMI ever | 36.5 | 6.3 | 35.4 | 6.1 | 1.2 |
| Lowest adult BMI ever | 23.5 | 4.3 | 23.1 | 3.1 | <1 |
| Target BMI | 25.9 | 3.1 | 26.4 | 2.6 | 1.1 |
| Binge frequency/week | 0.45 | 1.2 | 0.12 | 0.5 | 2.7** |
| EDE-Q shape concerns | 4.43 | 1.14 | 2.94 | 1.35 | 8.2*** |
| EDE-Q weight concerns | 3.76 | 1.04 | 2.53 | 1.07 | 8.1*** |
| EDE-Q eating concerns | 2.38 | 1.49 | 1.01 | 0.89 | 7.9*** |
| EDE-Q eating restraint | 2.23 | 1.35 | 1.91 | 1.27 | 1.7 |

BDI: Beck Depression Inventory, PA: positive affect, NA: negative affect, RSE: Rosenberg Self-Esteem Scale, BMI: body mass index, EDE-Q: Eating Disorder Examination Questionnaire. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

**Table 2**
Pearson P–M correlations for the variables entered in the regression analysis (n = 195)

|                | BMI   | Binge eating | EDE-Q restraint | Body worrying |
|----------------|-------|--------------|-----------------|---------------|
| BMI            |       |              |                 |               |
| Binge eating   | 0.001 |              |                 |               |
| EDE-Q restraint| −0.01 | 0.03         |                 |               |
| Body worrying  | 0.23* | 0.11         | 0.30*           |               |
| Negative affect| 0.12  | 0.13         | 0.09            | 0.58*         |

Negative Affect reflects the mean of z-scores for the Beck Depression Inventory (BDI), the Positive and Negative Affect Scale (PANAS) and the Rosenberg Self-Esteem Scale (RSE). Body worrying reflects the mean of the weight and shape concern subscales of the Eating Disorder Examination Questionnaire (EDE-Q). BMI: Body Mass Index. *$p < 0.001$.

To test whether body-related worrying uniquely contributed to high negative affect levels, a hierarchical stepwise regression analysis was done in which it was examined whether specifically the shape and weight concerns, and not BMI or binge eating, predict high negative affect. First, a standardized negative affect score was calculated by computing a mean z-score for BDI, PA, NA and RSE z-scores. This standardized negative affect score was the outcome variable. Second, to avoid multicollinearity because of the high intercorrelation between the EDE-Q weight and shape concerns ($r = 0.85$), a mean 'worry-score' was calculated for the shape and weight concern subscales of the EDE-Q. Then, the predictor variables BMI and binge eating were entered in the first block, eating restraint (EDEQ-R) was entered in the second block, and the mean body worry score was entered in the third block. Table 2 shows the Pearson P-M correlations between the variables that were entered. There were no multicollinearity problems: Variance Inflation Factors (VIFs) for binge eating was 1.0, whereas the VIFs for BMI, eating restraint and body worrying were all 1.1 (Field, 2005).

The regression analyses showed that both BMI and binge eating ($t$'s < 1) did not significantly predict negative affect. They were removed from the model. Eating restraint and body worries remained in the model and did contribute to the negative affect level, $R^2 = 0.33$, $F(2,191) = 46.9$, $p < 0.001$. Eating restraint explained a non-significant 1% of the variance in negative affect, $R^2 = 0.013$, $\beta = 0.08$, $t = 1.2$, NS. However, the worry score explained 32% of its variance, $R^2 = 0.32$, $\beta = 0.6$, $t = 9.5$, $p < 0.001$. This analysis was repeated with the exclusion of possible BED participants (and thus not entering binge eating as a predictor variable because no variance was left) and results were very similar: BMI and eating restraint were both removed from the model and the worry score explained 34% of its variance, $R^2 = 0.34$, $\beta = 0.58$, $t = 9.5$, $p < 0.001$.

To sum up, HNA and LNA subtypes differed significantly on all measures of body-related worrying and body-related worrying was found to be a unique predictor of negative affect in the obese. Binge eating, BMI and eating restraint did not predict negative affect variance.

## Discussion

The present study shows that a non-eating disordered sample of overweight and obese people could be subtyped into a high or a low negative affect group, with each subtype including about half of the sample. There were no differences in BMI between both subtypes but the high negative affect group showed significantly more body-related worrying than did the subtype low in negative affect. The high negative affect subtype also showed more frequent binge eating, although binge eating was rare and did not significantly predict negative affect scores. On the contrary, body-related

worrying was a unique and highly significant predictor of negative affect, explaining 33% of its variance. Thus, subtyping non-eating disordered overweight and obese people in a high and a low negative affect group is a relevant distinction. It is, besides the negative affect, not the actual body weight, binge eating, or dieting that distinguishes both groups, but the worries and concerns related to their bodies.

Although responders to a magazine advert might not be fully representative of a community sample of overweight and obese people, a most intriguing finding of the present study is that negative affect was found to be prevalent in this sample that was found to be largely non-clinical and free of eating disorders. Almost half of the participants scored above 10 on the BDI; 34.3% scored between 10 and 18 indicating a mild to moderate depression in one third of the sample, and 18.5% scored above 18 indicating a moderate to severe depression in one of five participants. This depression apparently was not acknowledged in most cases; only a very small fraction of the participants ($n = 4$, 8.3%) reported professional treatment in mental health care, whereas a quarter of the participants currently consulted a dietician, who is a commonly consulted professional for diet advice and weight reduction in the Netherlands but is not a specialist in the treatment of mental health problems.

Although about 7% of the participants (11% HNA and 3% LNA) might have fulfilled the criteria for a clinical sample because their self-reports were indicative of Binge Eating Disorder, this is only a small fraction of the sample. More important, binge eating did not at all predict negative affect levels in this study and reanalysis of the data without these possibly binge eating disordered participants did not change the results. It is nevertheless a limitation of the present study that all data were self-reported; we did not use diagnostic expert interviews to identify and exclude clinical cases. Likewise, we relied on self-reports of height and weight. Some studies show that self-reported weights are highly correlated with scale weights (see Carr et al., 2007; Darby, Hay, Mond, Rodgers, & Owen, 2007). As 49 of the current participants took part in a laboratory experiment after they completed the questionnaires, we correlated their self-reported BMI with the actual BMI we measured some weeks later. The correlation between actual and self-reported BMI was highly significant ($r = 0.84$) and paired t-tests showed no significant difference between self-reported ($M = 36.3$, S.D. = 5.5) and actual ($M = 36.9$, S.D. = 5.5) BMIs ($t(48) = 1.18$, NS).

The data thus point to a high prevalence of negative affect symptoms or increased vulnerability to depression in this 'normal', non-eating disordered overweight and obese sample. Until now, depression in overweight/obesity has been mainly ascribed to co-morbid eating disorders (i.e., Binge Eating Disorder), and increased BMI and binge frequency usually are considered to be the main determinants of negative affect in the obese (e.g., Dingemans et al., 2002). In this mainly non-clinical sample, both BMI and binge frequency did not significantly predict negative affect levels. The present data suggest that body-related worrying and shape concerns are important clinical characteristics; they contribute significantly and uniquely to negative affect levels in overweight/obese people and are able to distinguish the subtypes high and low in negative affect. Because these data are cross-sectional, any inferences on causality are not valid. If depression had been the starting point, it might have been less surprising to demonstrate that high negative affect worriers also worry more about their excessive body weight. However, it might be argued that the prevalence of depressive symptomatology in normal samples is not as high as we found in this community sample, making the primacy of depression less probable. The general view is that body image distress facilitates depression in the overweight/obese

instead of the other way around (Friedman et al., 2002; Kasen et al., 2007; Puhl & Brownell, 2003; Schwartz & Brownell, 2004; Teachman & Brownell, 2001), but as far as the present authors know there are no empirical data on the causal chain of developments. It would thus be of great value to disentangle the causal relationship between body-related worrying and high negative affect, and a third variable explaining the development of both excessive body-related worrying and increasing negative affect should not be ruled out. The present data exclude BMI and binge frequency from being this third variable. It is quite intriguing that overweight/obese individuals differ so extremely in their body related worrying despite their identical BMIs.

Generally, increased levels of positive affect and optimism are considered to be protective factors against depression, whereas decreasing levels of positive affect and pessimism might be considered to be harbingers of depression (Diener & Seligman, 2002; Lyubomirsky, King, & Diener, 2005). At the risk of being tautological, it would be wise to disentangle the relative contributions of positive affect and optimism vs. negative affect and pessimism in the triggering or de-activation of body-related worrying. Although depression and positive affect usually are highly negatively correlated ($r = -0.61$ in the present study), the overlap is not complete and leaves some variance unaccounted for. Indirect evidence for a dissociation of both constructs stems from some treatment studies. Whereas serotonergic antidepressant therapy (Nutt et al., 2007) and cognitive behavior therapy (Kring, Persons, & Thomas, 2007) were found to decrease depression in depressed patients, positive affect levels remained rather unchanged at the end of treatment. Nutt et al. (2007) argued that interventions on other biological mechanisms (noradrenergic and dopaminergic) might be necessary to increase positive affect, whereas Kring et al. (2007) argue that a change in positive affect might be dependent on behavioral activation; only the experience of pleasurable things enable enjoyment of them. In any case, the data show that depression and positive affect are to some extent independent from each other, and it is of great interest to study their course in relation to the development of worries related to overweight/obesity.

Risk factor models do suggest, and experiments have found, that a depressed mood easily triggers overeating (Agras & Telch, 1998; Chua, Touyz, & Hill, 2004; Stice & Agras, 1999) and dysfunctional thinking (Nauta, Hospers, Jansen, et al., 2000) in obese people. In a recent experiment, the present authors found that only the high negative affect overweight/obese subtype – and not the low negative affect overweight/obese subtype – overate after typical triggers of disinhibition, i.e. negative mood induction and tasty high calorie food exposure (Jansen et al., in press), which might be considered predictive validity of this subtyping. Follow up studies, testing whether the present affect subtyping shows further predictive validity, e.g., by following participants and studying their weight course, treatment response and the development of eating psychopathology or psychiatric comorbidity, are needed now.

This subtyping of the non-eating disordered overweight/obese in a happy and an unhappy group along the affect dimension might also be of clinical utility, given that treatment needs might be different for both subtypes. The present data do support expert clinical intuitions that it is extremely important to recognise mood disorders in non-eating disordered overweight and obese people who apply for weight reduction treatment. If people suffer severely from their body worries, a treatment that focuses on reducing the worrying would be appropriate. Cognitive therapy that addresses shape and weight concerns, and possibly other features of depression and anxiety, might be especially relevant for the high negative affect subtypes and should be more widely available then

it is now. Pure cognitive therapy has been found to be beneficial in treating the overweight and obese, in particular in reducing their shape and weight related concerns and depression (Nauta, Hospers, Kok, & Jansen, 2000b; Nauta, Hospers, & Jansen, 2001; Werrij et al., submitted for publication). It was also found that the addition of cognitive therapy to a dietetic group treatment for a non-eating disordered overweight and obese sample prevented weight relapse whereas a control group regained 26% of their initially lost weight (Werrij et al., submitted for publication).

To sum up, this clustering of non-eating disordered overweight and obese participants into a high or low negative affect subtype might be of theoretical and clinical interest and might guide future research and treatment. In particular, follow-up studies into the predictive validity of this subtyping for prognostic course and treatment type and response is important.

## Acknowledgements

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