



## Short communication

## Subtyping undergraduate women along dietary restraint and negative affect

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## ABSTRACT

Cluster-analytic studies of clinical populations of eating disordered women who binge eat have yielded two subtypes – pure dietary restraint and mixed dietary restraint-negative affect – consistent with etiologic and maintenance models of binge eating. This study aimed to replicate this subtyping scheme in university women. The scores of 623 undergrad females on the TFEQ-restraint and BDI scales were submitted to a cluster analysis and revealed three subtypes, “healthy” (47.4%), restrained (36.3%) and mixed (16.3%). In addition, comparisons between subtypes on bulimic behaviors showed that the mixed and restrained subtypes were characterized by greater likelihood than the healthy group to engage in fasting, purging and exercise to control weight, as well as in disinhibition of eating. The mixed subtype revealed higher scores than the restrained subtype on eating disinhibition and purging, and the restrained group was more likely than the mixed subtype to exercise to control weight. These findings provide further support for the reliability and validity of this subtyping scheme, in which the confluence of even mild levels of negative affect and dietary restraint differentiated a more “disturbed” group of undergraduate females. Findings also put into question the dietary restraint theory of eating pathology and suggest the need to control negative affect when studying eating behavior.

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Restrained eating has long been considered one of the most potent and consistent risk factors for binge eating and related bulimic pathology in young females. However, negative mood on its own or in interaction with restraint is also shown to predict binge eating and other related eating symptoms (Grilo, 2004; Peterson, Miller, Crow, Thuras, & Mitchell, 2005; Stice & Agras, 1999; Steiger et al., 2005; Stice et al., 2001; Van Strien, Engels, Van Leeuwe, & Snoek, 2005). Restrained eating refers to the volitional and sustained effort to restrict caloric intake as a weight control technique, either to lose weight or avoid weight gain (Laessle, Tuschl, Kotthaus, & Pirke, 1989). Dietary restraint is hypothesized to increase the risk for onset and maintenance of binge eating and bulimic symptoms (Polivy & Herman, 1985) via metabolic and psychological pathways (Lowe, 2002). This hypothesized restraint-induced loss of control over eating, in turn, may precipitate other compensatory behaviors to control weight such as exercise, fasting and purging. However, despite the vast evidence prospectively supporting this leading model on the link between dietary

restraint and binge eating and related disordered symptoms (Leon, Fulkerson, Perry, Keel, & Klump, 1999; Santonastaso, Friederici, & Favaro, 1999), experimental studies do not replicate it (Lowe & Kleifield, 1988; Sysko, Walsh, & Wilson, 2007). Moreover, successful dietary restriction (high restraint in combination with a 10% decrease in BMI) has been shown to decrease binge eating and related psychopathology (Stice, Martinez, Presnell, & Groesz, 2006), suggesting that restraint may not be a necessary precursor of binge eating, as has been shown for a percentage of patients (Bulik, Sullivan, Carter, & Joyce, 1997), that restraint might in fact have a protective quality, and/or that restraint is a multidimensional construct with the potential for negative and positive effects. By extension, the validity of one of the most used measures to test this model, the Restraint scale of the Three Factor Eating Questionnaire (TFEQ-R, Stunkard & Messick, 1985), has been recently put into question (Stice, Cooper, Schoeller, Tappe, & Lowe, 2007; Stice, Fisher, & Lowe, 2004), since it is not negatively correlated with objective measures of short to long-term caloric intake. The latent construct measured by the TFEQ-R remains unknown. One possibility is that it measures *intention* to restrict rather than actual restrictive eating behavior.

On the other hand, negative mood is emerging as an important factor to explain binge eating in both restrained (Steiger et al., 2005) and unrestrained eaters (Peterson et al., 2005). Furthermore,

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depression, which is frequently comorbid in eating disorder (ED) patients, has been the only consistent factor across studies associated with worse outcome (Berkman, Lohr, & Bulik, 2007) in bulimia nervosa (BN), an ED characterized by recurrent binge eating followed by maladaptive weight control methods such as purging and fasting (DSM-IV, American Psychiatric Association, 2000). In support of the key role of negative mood in binge eating syndromes, cluster-analytic studies have consistently yielded two reliable diagnostic subtypes, the pure restraint and the mixed restraint-negative mood, where the latter is representative of about one third of ED patients who binge eat (BN and Binge Eating Disorder) and signals a more severe variant of these disorders and a poorer outcome (Chen & Le Grange, 2007; Grilo, 2004; Stice & Agras, 1999; Stice et al., 2001). Because these diet-negative affect subtypes are consistent with etiologic and maintenance models of binge eating, they may capture not only clinical but also at-risk individuals.

Therefore, the present study first examines if a large population of undergraduate females can be also categorized into three different subtypes: the two previously found in clinical samples of eating disordered women, the dietary-restraint and the mixed dietary-restraint-negative mood, and a “healthy” one characterized by low scores on dietary restraint and negative affect. Secondly, it examines the validity of this subtyping scheme by comparing these subtypes on self-reported disinhibition of eating and weekly frequency of binge eating (BE) and weight control behaviors (fasting, purging and exercise). It was hypothesized that women in the restrained group will report significantly more concurrent eating disorder pathology than those in the healthier group, and that the mixed group would report greater severity of eating pathology than the other two groups.

## Methods

### Participants

Participants were volunteer undergraduate women from the University of Extremadura. There were no exclusion criteria. Six hundred twenty-three women between the ages of 18 and 28 (mean  $20.7 \pm 2.1$ ) participated in the study after giving their written informed consent. All were Caucasian. Reported mean body mass index was  $21.4 \pm 3.0$  (range 18.0–37.0) calculated from weight (kg)/height ( $m^2$ ). This protocol was approved by the University of Extremadura ethics committee.

### Measures

They completed Spanish translations of three self-report measures in the order listed below. All measures have demonstrated acceptable internal consistency and test–retest reliability (e.g., Laessle et al., 1989; Rivas, Bersabé, & Jiménez, 2004; Sanz & Vazquez, 1998), and in all cases higher scores reflect more pathological attitudes and behaviors.

*Three-Factor Eating Questionnaire* (TFEQ; Stunkard & Messick, 1985) is a self-report measure with three subscales. Only the cognitive (dietary) restraint of eating, TFEQ-R, and the emotionally based disinhibition of eating subscales were included for the present study.

*Bulimic Investigatory Test, Edinburgh* (BITE; Henderson & Freeman, 1987). For the present study only the BITE severity scale was used to determine the frequency of binge eating, fasting, and purging behaviors (use of vomiting, diet pills, laxatives and diuretics) to control weight. The BITE does not distinguish objectively large binge eating and subjectively large episodes.

Another item was included at the end of BITE severity scale to assess frequency of exercise behavior to control weight.

*Beck Depression Inventory* (BDI; Beck, Rush, Shaw, & Emery, 1979) is a 21-item self-report inventory used to assess the severity of cognitive, behavioral, affective, and somatic symptoms related to negative mood. For each item, respondents select among four responses ranging from 0 to 3 (from absence to severity of symptoms), where a score between 10 and 18 indicates mild depression, and higher, moderate to severe.

### Data analyses cluster

Participants' scores on the TFEQ-R scale and the BDI scales were submitted to a cluster analysis as in previous studies (Stice et al., 2001). Cluster analysis groups cases on the basis of similarity in absolute levels on one or more variables. We performed a *K*-Means cluster analysis using the Quick Cluster algorithm from SPSS. The *K*-Means algorithm selects *k* participants, where *k* is the number of clusters requested. Given our a priori hypothesis, three clusters were specified. Squared Euclidean distances were used as the distance measure, and a nonhierarchical (iterative) clustering algorithm, rather than a hierarchical algorithm, because the latter does not detect and correct early misclassification and is more sensitive to the presence of outliers. A multivariate analysis of variance with Bonferroni corrections was conducted to compare the resulting subtypes on TFEQ-R and BDI scores, as well as on bulimic behaviors derived from the BITE severity scale, and the TFEQ-eating disinhibition. In addition, Fisher's exact tests were used to compare differences between subtypes on categorical data (rate of women within each subtype that engaged in each bulimic behavior).

## Results

### Cluster analysis

Table 1 shows a three factor solution for this population: the first cluster (47.4%) reflected a “healthy” subtype characterized by low restraint and low negative mood, the second cluster reflected a “dietary-restraint” subtype with high restraint and low negative affect (36.3%), whereas the third cluster (16.4%) represented a “mixed” group with affective disturbances and moderate dietary restraint. Thus approximately half of the population ( $N = 328$ , 52.6%) presented with moderate to high dietary restraint in this study, 31% of which also presented with moderate negative mood. The mean TFEQ-R score for the restraint subtype ( $M = 12.5$ ) is close to and within one standard deviation of the mean for dieters ( $M = 14.3$ ) in the original validation study for this measure (Stunkard & Messick, 1985); the mean TFEQ-R score for the mixed subtype ( $M = 7.8$ ) falls between the means for non-dieting group ( $M = 6.0$ ) and dieting groups in the original study. The mean BDI score ( $M = 14.3$ ) for the mixed subtype falls within the mild depression range (10–18; Beck et al., 1979).

### Comparison of the three subtypes on bulimic behaviors

Table 1 also shows the rate of females (expressed in percentage) within each group that engaged in each of the bulimic behaviors. The rate of women who engaged in BE, fasting, and purging was similar across the mixed and dietary restraint subtypes, and significantly higher in these groups than in the “healthy” group, who also reported a high rate of individuals engaging in BE at least once a month. With regard to exercise, a higher rate of women in the pure restrained group reported using exercise to control weight, which was higher than the rate of women in the mixed

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