Published in final edited form as:
Int J Eat Disord. 2009 May ; 42(4): 326–331. doi:10.1002/eat.20611.

Regimented and Lifestyle Restraint in Binge Eating Disorder

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Abstract

Objective—This study tested the psychometric properties of two commonly used measures of dietary restraint, the Three Factor Eating Questionnaire and the Eating Disorder Examination Questionnaire.

Method—Restraint data from 512 overweight/obese participants with binge eating disorder (BED) were subjected to exploratory and confirmatory factor analyses.

Results—Factor analyses of the restraint variables indicated a two-factor solution, interpreted as "Regimented" and "Lifestyle" restraint. Stepwise regression analyses revealed that Regimented restraint was more predictive of eating pathology, whereas Lifestyle restraint appeared to be protective of eating problems. Neither type of restraint was related to binge eating. Cluster analysis of the restraint dimensions yielded three distinct subgroups of patients who differed significantly on several important eating- and weight-related features.

Discussion—Future research is needed to test the significance of these restraint constructs over time in both the development of obesity and binge eating problems as well as their treatment.

Keywords

restraint; binge eating; diet; psychometric

Introduction

The construct of dietary restraint is central to theories of the development of eating and weight problems.[1,2] With regard to binge eating specifically, restraint theory[3] predicts that extreme levels of dietary restraint trigger binge episodes. The mechanism through which dietary restraint may cause binge eating is a matter of some debate. Some theories suggest that overly strict dietary or behavioral restriction (i.e., prolonged caloric restriction) disrupts hunger and satiety cues. Other theories focus on the cognitive elements central to intentions to restrict intake and posit that cognitive restraint contributes to binge eating by engendering maladaptive thinking patterns (i.e., rigid food rules, allor-nothing thinking). Overall, efforts to elucidate the complex interactions between restraint, dietary intake, and binge eating behaviors remain largely inconclusive, owing in part to varying definitions of the restraint construct and well as to problems with the psychometric aspects of the available scales.[4]

Although some research indicates a relationship between dietary restraint and binge eating,[5,6] much research has found no relationship.[7,8] Moreover, recent studies have documented that behavioral weight loss treatments can reduce binge eating[9] and that the induction of a calorie-reduced diet leads to decreases—rather than increases—in binge eating.[10] Although early

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studies of restraint in laboratory test meals showed some relation between restraint (as measured by the Restraint Scale (RS)[11]) and overeating, later studies employing different measures failed to replicate the findings.[4,12] Collectively, psychometric research on commonly used measures of dietary restraint suggests they are not valid indictors of current dieting behavior or actual caloric consumption.[4]

The conflicting literature on dietary restraint, caloric restriction, binge eating, and obesity suggests that currently used measures of dietary restraint probably tap various behavioral and cognitive features other than caloric restriction itself,[4] and may measure something closer to perceived restraint.[13] The complex issues involved in the measurement of dietary restraint—particularly as it pertains to binge eating, dietary intake, and weight—highlight the importance of rigorous examination and confirmation of the psychometric properties of dietary restraint assessments.

This study tested the factor structure of two commonly used measures of dietary restraint, the Eating Disorder Examination–Questionnaire (EDEQ)[14] and the Eating Inventory, or Three Factor Eating Questionnaire (TFEQ)[15] Restraint subscales. This approach, using factor analysis, is intended to identify and group meaningful symptoms (behaviors and cognitions). The empirically derived factors were then tested for their construct validity using weight- and eating-related variables. To our knowledge, no prior study has categorized overweight patients with binge eating disorder (BED) according to these various restraint constructs. Thus, cluster analysis was used to categorize BED participants using the restraint dimensions. The concurrent validity of the cluster-analytic derived restraint subtypes was then tested by comparing the subtypes on a battery of weight, eating, and psychological variables.

Method

Participants

Participants were a consecutive series of 512 overweight (body mass index (BMI) > 25) individuals who met full DSM-IV[16] research criteria for BED. Mean age was 44.6 years (SD = 9.1); mean BMI was 38.2 (SD = 7.4). Seventy-five percent of the sample was female (n = 383). The racial/ethnic distribution was as follows: 81.3% Caucasian (n = 416), 10.7% African American (n = 55), 5.5% Hispanic (n = 28), 0.8% Asian (n = 4), and 1.7% “other” or unknown (n = 9). Educationally, 1.2% (n = 6) completed some high school, 16.0% (n = 82) graduated from high school, 37.3% completed some college (n = 191), 44.3% had a college degree (n = 227), and for 1.2% (n = 6) the degree of educational attainment was unknown.

Procedure

BED diagnoses were determined by doctoral-level research-clinicians using a comprehensive assessment battery that included the Structured Clinical Interview for DSM-IV Disorders.[17] Participants were weighed and measured and completed the following assessment battery.

Measures of Dietary Restraint—The Eating Disorder Examination-Questionnaire (EDE-Q)[14] is the self-report version of the Eating Disorder Examination Interview[18] and assesses the features of eating disorders, including the frequency of various forms of overeating and binge eating. The EDE-Q also yields a global score and assesses four features of eating disorders: dietary restraint, eating concerns, weight concerns, and shape concerns. Items are rated on seven point scales (0 to 6), with higher scores reflecting greater severity or frequency. The EDE-Q has received psychometric support, including adequate test–retest reliability[19] and good convergence with the EDE Interview in studies with BED.[20,21] The Eating Inventory, or Three Factor Eating Questionnaire (TFEQ)[15] is a widely used measure of eating behaviors with three factors: cognitive restraint, disinhibition, and hunger. The TFEQ has received some

psychometric support[15] although empirical studies have increasingly raised concerns regarding both the structure and validity of the measure.[4]

Assessments of Eating-Specific and Psychological Functioning—Participants also completed the following self-report questionnaires: The Emotional Overeating Questionnaire (EOQ)[22] a measure of overeating in response to emotions, The Body Shape Questionnaire (BSQ),[23] a widely used instrument for assessing body image dissatisfaction, and The Beck Depression Inventory (BDI),[24] a 21-item measure of symptoms of depression.

Weight-related Variables—Weight cycling and self-reported highest and lowest adult weight were determined by responses on the Questionnaire on Eating and Weight Patterns-Revised (QEWP-R).[25] Weight Suppression[1] was calculated as the difference between current weight and the highest adult weight reported on the QEWP-R, expressed as a percentage of highest weight ((highest – current)/highest × 100). Previous research has found a relationship between weight suppression and prospective weight gain,[26] with greater weight suppression predicting greater weight gain over time. Weight Inflation, or the percent currently over the lowest reported adult weight, was calculated as the difference between current weight and lowest-adult weight reported, expressed as a percentage of lowest weight ((current – lowest)/lowest × 100). Weight inflation could be an index of ineffective weight maintenance and may therefore provide a complementary index to weight suppression.

Results

Exploratory and Confirmatory Factor Analysis

Items from the EDE-Q and TFEQ restraint sub-scales were subjected to exploratory factor analysis (EFA) using a randomly selected half of the sample (n = 227). Because the dichotomous (true/false) items of the TFEQ are inappropriate for factor analytic methods,[27] only the Likert-scale items of the TFEQ were analyzed. Items were retained if they loaded at 0.4 or above on a single factor (i.e., did not cross-load) and factors were retained if they contained more than 2 items. The exploratory factor analysis yielded an 8-item, 2-factor solution that accounted for 60.7% of the variance. This 2-factor model was then subjected to a confirmatory factor analysis (CFA), employing the other half of the sample (n = 285). The CFA was conducted using Lisrel 8.7. The goodness of fit statistics for the CFA indicated a close model fit: RMSEA = 0.03; NNFI = 0.99; CFI = 0.99, overall chi-square with 19 degrees of freedom = 25.19, p = .15. Table 1 summarizes the items and factor loadings.

The two factors were interpreted as Regimented restraint and Lifestyle restraint. Lifestyle restraint appears to tap a construct similar to conscious efforts and preplanned attempts to restrict intake, whereas the Regimented restraint appears to measure rigid, rule-directed behaviors marked by total abstinence of forbidden foods and/or extreme dieting efforts. The Lifestyle restraint factor can be interpreted as measuring a construct similar to the behavioral changes advocated by many weight loss programs. For example, this factor's items measure the likelihood to shop for low-calorie foods or to avoid stocking up foods.

Composite scores for each factor were calculated as an average of the items on that scale. The mean score for Regimented restraint was 2.82 (SD = 1.58). For Lifestyle restraint, the mean score was 2.72 (SD = 0.65). Reliabilities for the subscales were adequate: Cronbach's alpha for the Regimented restraint factor = 0.83; Lifestyle restraint factor = 0.62.

Relationship Between Regimented and Lifestyle Restraint and Eating Variables

The Regimented and Lifestyle restraint factors were significantly correlated (r = .46, p < .01). The correlations of each of the eating-specific and psychological variables with the two

restraint factors appear in Table 2. For all variables except weight suppression, inflation, and cycling, the correlation coefficients significantly differed across restraint categories. In general, Regimented restraint was correlated with other forms of eating pathology (i.e., all EDE-Q subscales, TFEQ disinhibition, and body dissatisfaction), whereas Lifestyle restraint was unrelated to these variables. Lifestyle restraint, however, was negatively correlated with TFEQ hunger and depression, such that higher restraint was associated with lower reported hunger and depressive symptomatology.

Stepwise Regression: Prediction of Eating and Weight Outcomes

We conducted stepwise regression analyses to determine which restraint subscale contributed the most to weight and eating outcomes. Results of the significant regressions appear in Table 3. Results showed that Regimented restraint was the strongest (or only) predictor of weight suppression, EDE-Q subscales, emotional eating, body dissatisfaction, and disinhibition. Lifestyle restraint was inversely associated with current BMI, weight inflation, TFEQ Hunger, and BDI scores. Regimented and Lifestyle restraint tended to predict outcomes in opposite directions—for example, Regimented restraint was positively associated with BDI scores, such that higher Regimented restraint predicted higher depressive symptomatology, whereas higher Lifestyle restraint predicted lower depressive symptomatology.

Cluster Analysis: Classification of BED Patients by Lifestyle and Regimented Restraint Dimensions

Cluster analysis was used to create a typology of patients using the dietary restraint constructs. A cluster analytic approach is a technique for subtyping individuals into distinct categories according to the pattern of responses on the constructs of interest, in this case based on scores on the individual restraint items. A three-cluster solution was most meaningful. The first cluster included patients who reported high responses on the Regimented restraint items (e.g., abiding by food rules and specific food avoidance) as well as high responses on the Lifestyle restraint items (shopping for low calorie foods, remaining conscious of intake). The second cluster, high Lifestyle and moderate Regimented restraint, included patients who reported equally high Lifestyle restraint as the first group, but were less extreme in terms of rule-directed or Regimented restraint. The third cluster included patients who reported low levels of Regimented restraint and low-to-moderate levels of Lifestyle restraint. The three-cluster subtypes were then compared on the eating and general psychosocial variables using one-way analyses of variance; Table 4 summarizes the group descriptive statistics and overall *F*-values. In general, the group scoring high on both types of restraint reported greater eating-specific pathology (i.e., higher scores on the EDE-Q subscales, greater body dissatisfaction, emotional eating, and disinhibition) than the group scoring low on both measures. The High Lifestyle/Moderate Regimented group scores generally fell between the other groups on these measures.

Discussion

This study tested the psychometric properties of two commonly used measures of dietary restraint (TFEQ Restraint and EDE-Q Restraint) in a large series of overweight patients with BED. Analyses indicated a two-factor model of restraint. The first factor, Regimented restraint, is defined by rule-directed behaviors and specific attempts to restrict food intake. The second factor, Lifestyle restraint, assesses global, preplanned attempts to reduce overall intake via environmental management. Although the two types of restraint were moderately correlated, they appear to be distinct constructs. Regimented restraint was associated with heightened eating disorder symptomatology, including elevated eating and weight concerns and body image disturbance. Lifestyle restraint, by contrast, was associated with lower levels of eating-specific and general psychopathology. Finally, cluster analysis of the restraint dimensions yielded three distinct groups of BED patients who differed on important eating-related features.

The different restraint constructs were also uniquely related to the weight variables. Although a low inverse correlation was observed between this Regimented restraint and BMI, the more remarkable relationship was observed between Regimented restraint and weight suppression, or the extent to which the person had achieved a current weight that was below their adult highest weight.[1] Previous research has suggested that weight suppression is predictive of weight cycling and other problems in eating and weight control.[26] Therefore, while weight suppression reflects some weight loss, it may also be a marker of historical and prospective weight gain. In this study, Regimented restraint was also predictive of weight cycling. Taken together, it seems that although Regimented restraint may suppress body weight, it appears to do so in an unhealthy (and possibly temporary) manner.

Lifestyle restraint, by contrast, was the stronger predictor of BMI and was also inversely related to weight inflation, or the proportion of weight gain over a previously attained lower weight. Weight inflation may be a useful complement to weight suppression, as an index of ineffective weight maintenance. By extension, it could be that Lifestyle restraint is more effective at preventing weight gain, perhaps because it can be maintained in the long term. Lifestyle restraint was also inversely related to eating-related symptomatology, perceived hunger, and depressive symptoms. In other words, although Lifestyle restraint appears to be the more effective type of restraint in terms of weight outcomes, elevations do not predict increased depression or eating-disorder symptoms. It seems, therefore, that Lifestyle restraint may be regarded as a “healthy” type of restraint.

We note potential strengths and limitations in our study to consider as context for interpreting the findings. In this study, neither Regimented nor Lifestyle restraint was associated with the frequency of binge eating. However, we note that all participants met criteria for BED, and the relationship between restraint and binge eating may therefore be obscured due to a restricted range. Because all participants were overweight (i.e., BMI > 25), our sample precluded investigation of the constructs among lean persons. A relative strength, particularly for this psychometric study, is that our study group consisted of a large sample of overweight individuals with BED. Therefore, internal validity of the measurement of these refined constructs in BED is maximized.

In summary, the results of this study support the existence of two distinct yet related restraint constructs. Regimented restraint, defined by rigid food rules and dieting imperatives, is associated with elevated eating pathology and does not contribute substantially to decreased weight. Lifestyle restraint, however, is more strongly associated with favorable weight outcomes while having a protective effect on eating-specific and general psychological features. A clear understanding of the interrelationships between dietary restraint, eating pathology, and weight outcomes is important to inform treatment decisions. This study suggests that in order to optimize positive weight outcomes without contributing to eating disturbances in this clinical population, interventions should focus on increasing Lifestyle restraint. Longitudinal studies are needed to definitively test how these restraint constructs relate to weight outcomes over the course of treatment.

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TABLE 1

Factor loadings for exploratory and confirmatory (italics) factor analyses

		EFA	*CFA*	EFA	*CFA*
EDEQ-R	On how many days out of the past 28 days have you been consciously trying to restrict the amount of food you eat to influence your shape or weight?	0.95	*0.83*		
EDEQ-R	On how many days out of the past 28 days have you attempted to follow definite rules regarding your eating in order to influence your shape or weight; for example, a calorie limit, a set amount of food, or, rules about what or when you should eat?	0.87	*0.83*		
EDEQ-R	On how many days out of the past 28 days have you attempted to avoid eating any foods which you like in order to influence your shape or weight?	0.86	*0.80*		
TFEQ-R	How often are you dieting in a conscious effort to control your weight?	0.59	*0.56*		
TFEQ-R	How frequently do you avoid stocking up?			0.81	*0.50*
TFEQ-R	How likely to shop for low calorie foods?			0.78	*0.55*
TFEQ-R	Self-rating of restraint: On a scale of A to E, where A means no restraint in eating (eating whatever you want, whenever you want it) and E means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself? (A = usually or always eat whatever you want, whenever you want it, B = often eat whatever you want, whenever you want it, C = often limit food intake, but often “give in”, D = usually limit food intake, rarely “give in”, E = constantly limiting food intake, never “giving in”)			0.61	*0.61*
TFEQ-R Not included:	How conscious are you of what you are eating?			0.53	*0.40*
EDEQ-R	On how many days out of the past 28 days have you gone for long periods of time (8 hours or more) without eating anything in order to influence your shape or weight?				
EDEQ-R	On how many days out of the past 28 days have you wanted your stomach to be empty?				
TFEQ-R	Would a weight fluctuation of 5 lbs. affect the way you live your life?				
TFEQ-R	Do your feelings of guilt about overeating help you to control your food intake?				
TFEQ-R	How likely are you to consciously eat slowly in order to cut down on how much you eat?				
TFEQ-R	How likely are you to consciously eat less than you want?				

TABLE 2

Magnitude of correlation coefficients between restraint subscales and eating variables

	Regimented restraint	Lifestyle restraint	*t*	*p*
BMI	−.11*	−.20**	1.98	.05
EDE-Q—Binge eating	.07	−.04	2.44	.02
EDE-Q—Loss of control	.07	−.07	2.98	<.01
Weight suppression (%)	.22**	.14**	1.72	.09
Weight inflation (%)	−.14**	−.19**	1.12	.26
Weight cycling	.15**	.08	1.55	.12
EDE-Q—Eating Concern	.31**	.06	5.71	<.01
EDE-Q—Shape Concern	.28**	.04	5.36	<.01
EDE-Q—Weight Concern	.25**	.06	4.44	<.01
EOQ—Emotional Eating	.19**	−.02	4.74	<.01
TFEQ disinhibition	.19**	.06	2.79	<.01
TFEQ hunger	−.02	−.22**	4.42	<.01
Body Dissatisfaction (BSQ)	.21**	.06	3.43	<.01
Depression	.08	−.16**	5.51	<.01

Notes: $N = 512$ for all analyses except BDI ($n = 396$). No correction for multiple analyses.

* $p < .05$

** $p < .01$.

TABLE 3

Stepwise regression analyses of outcomes

Variable	Predictor	*R*	R^2	Beta	*F* (change)	*p*	Zero-order	Partial	Semi-partial
BMI	Lifestyle	0.197	0.039	−0.197	20.505	.000			
Weight suppression	Regimented	0.221	0.049	0.221	26.182	.000			
Weight inflation	Lifestyle	0.191	0.036	−0.191	18.073	.000			
Weight Cycling	Regimented	0.155	0.024	0.155	12.163	.001			
EDEQ total	Regimented	0.601	0.362	0.648	288.996	.000	0.601	0.586	0.575
	Lifestyle	0.608	0.370	−0.100	6.385	.012	0.199	−0.111	−0.089
Eating concern	Regimented	0.311	0.097	0.359	54.797	.000	0.311	0.319	0.318
	Lifestyle	0.325	0.105	−0.103	4.724	.030	0.063	−0.096	−0.091
Shape concern	Regimented	0.276	0.076	0.327	41.922	.000	0.276	0.290	0.290
	Lifestyle	0.293	0.086	−0.111	5.398	.021	0.040	−0.102	−0.098
Weight concern	Regimented	0.252	0.063	0.252	34.532	.000			
Emotional eating	Regimented	0.188	0.035	0.188	7.439	.007			
TFEQ disinhibition	Regimented	0.187	0.035	0.187	18.528	.000			
TFEQ hunger	Lifestyle	0.219	0.048	−0.266	25.710	.000	−0.219	−0.236	−0.236
	Regimented	0.237	0.056	0.101	4.331	.038	−0.022	0.092	0.090
BSQ	Regimented	0.213	0.045	0.213	24.192	.000			
BDI	Lifestyle	0.162	0.026	−0.257	10.644	.001	−0.162	−0.228	−0.227
	Regimented	0.242	0.059	0.203	13.532	.000	0.084	0.182	0.180

Int J Eat Disord. Author manuscript; available in PMC 2009 August 26.

TABLE 4

Comparison of restraint-defined clusters on eating-related and general psychosocial variables

	High Lifestyle, High Regimented (*n* = 159)		High Lifestyle, Moderate Regimented (*n* = 170)		Low Lifestyle, Low Regimented (*n* = 178)		Total (*n* = 507)[a]			
	M	**SD**	***M***	**SD**	***M***	**SD**	***M***	**SD**	***F***	***p***
Regimented restraint	4.7*	0.6	2.8**	0.6	1.1***	0.6	2.8	1.6	1625.6	<.001
Lifestyle restraint	3.0*	0.6	2.9**	0.5	2.3***	0.6	2.7	0.7	88.9	<.001
BMI	37.9	7.7	37.4	7.3	39.2	7.2	38.2	7.4	2.93	.05
EDEQ binge episodes	16.1	10.9	13.6	13.5	13.4	8.8	14.3	11.3	2.80	.06
EDEQ loss of control	20.9	13.2	18.0	16.5	18.1	12.2	18.9	14.1	2.20	.11
Weight suppression (%)	6.6*	8.4	4.8*	7.6	2.5**	6.6	4.5	7.7	12.37	<.001
Weight inflation (%)	59.0*	27.4	58.8*	26.6	68.1**	31.0	62.1	28.7	5.69	<.001
Weight cycling	3.2	0.9	3.1	0.9	2.9	1.1	3.1	1.0	4.8	<.01
EDEQ total	4.4*	0.7	3.6**	0.8	3.1***	0.8	3.7	1.0	112.32	<.001
Eating concern	4.0*	1.2	3.4**	1.3	3.1**	1.3	3.5	1.3	22.63	<.001
Shape concern	5.2*	0.8	4.8**	1.0	4.6**	1.1	4.8	1.0	15.94	<.001
Weight concern	4.4*	0.9	4.0**	1.0	3.8**	1.1	4.1	1.0	14.55	<.001
Emotional eating	2.8*	1.6	2.5	1.5	2.1**	1.4	2.4	1.5	3.49	.03
TFEQ disinhibition	13.9*	1.9	13.5	2.0	13.0**	2.2	13.5	2.1	7.75	<.001
TFEQ hunger	9.6	3.3	9.9	3.0	9.8	3.3	9.8	3.2	0.43	.65
BSQ	143.3*	26.2	136.0	29.0	130.7**	30.2	136.4	29.0	8.25	<.001
BDI	19.0*	9.5	16.0**	8.0	17.4	9.1	17.4	9.0	3.54	.03

Notes: Significant post-hoc differences (Scheffe) are denoted with unique asterisks.

[a] *n* = 5 participants were not categorized due to incomplete listwise data (i.e., missing one or more item responses subjected to cluster analysis).