Eating Behaviors 20 (2016) 39–42

Contents lists available at ScienceDirect

Eating Behaviors

Meal patterning in the treatment of bulimia nervosa

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ARTICLE INFO

Article history:
Received 19 May 2015
Received in revised form 28 September 2015
Accepted 11 November 2015
Available online 12 November 2015

Keywords:
Bulimia nervosa
Treatment
Meal patterning

ABSTRACT

Objective: This study examined the relationship between changes in meal and snack consumption and eating disorder behaviors in a treatment sample of bulimic adults.
Method: Eighty adults with bulimia nervosa (BN) were randomized to one of two treatments. Meal and snack consumption, binge eating frequency, and purging behavior frequency were assessed at baseline, end-of-treatment, and at four month follow-up using the Eating Disorder Examination (EDE).
Results: Generalized linear models indicated that increased consumption of evening meals over the course of treatment was related to a significant decrease in the rate of binge eating and purging at four month follow-up; these results remained significant when controlling for changes in depression over the course of treatment.
Conclusions: The findings support the importance of focusing efforts on developing a pattern of regular evening meal consumption among individuals in the treatment of BN.

1. Introduction

Efforts to influence weight and shape through caloric restriction have been shown to play an important role in the onset and maintenance of eating disorder behaviors (Fairburn, 2008; Neumark-Sztainer et al., 2007; Stice, Marti, & Durant, 2011; Vannucci et al., 2014). Specifically, caloric restriction has been shown to increase caloric consumption during test meals (Telch & Agras, 1996) and has been linked to increased binge eating in ecological momentary assessment studies of individuals with bulimia nervosa (BN; Zunker et al., 2011).

While restrictive eating has been shown to be related to binge-eating behavior, the consumption of regular meals has been demonstrated to serve as a protective factor against the development of binge eating, with regular meal consumption being negatively associated with eating disorder symptom severity (Godfrey, Rhodes, & Hunt, 2013) and the number of meals consumed being negatively associated with binge eating frequency (Elran-Barak et al., 2014; Masheb & Grilo, 2006; Masheb, Grilo, & White, 2011; Matheson et al., 2012).

Treatment-oriented research has also examined the significance of meal consumption in eating disorder interventions. Treatment studies using CBT-based interventions have shown increases in meals and snacks to be related to increased abstinence from binge eating and purging behaviors among those with BN (Shah, Passi, Bryson, & Agras, 2005) and decreases in binge eating among those with recurrent binge eating behavior (Zendegui, West, & Zandberg, 2014).

While consuming regular meals and snacks appears to be associated with reductions in binge eating and purging behaviors, there is no clear evidence regarding the unique impact of specific meals and snacks on binge eating and purging behaviors. Additionally, the role of potential confounding variables, particularly depression given the appetite symptoms associated with the condition, has not been examined in the meal patterning literature. The present study addressed the relationship between meal patterning and treatment response for individuals with BN who were participating in a randomized controlled comparison of Integrative Cognitive Affective Therapy for BN (ICAT-BN; Wonderlich et al., 2014) and Enhanced Cognitive Behavioral Therapy (CBT-E; Fairburn, 2008). It was hypothesized that increases in meal and snack consumption over the course of treatment would significantly predict reductions in binge eating and purging behavior across both treatments.

2. Materials and method

2.1. Participants

As described in the primary outcome paper (Wonderlich et al., 2014), participants met DSM-IV criteria for BN or partial BN (i.e., purging behavior with objective or subjective binge eating at least once per week). Exclusion criteria were body mass index (BMI) <18, pregnancy, lifetime bipolar or psychotic disorders, current substance use disorder, acute

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http://dx.doi.org/10.1016/j.eatbeh.2015.11.008
1471-0153/

suicide risk, concurrent participation in psychotherapy, and current medical or psychiatric instability. Participants with stable psychotropic medication dosages as defined as six weeks or longer were allowed to participate. Participants were recruited from the community or referred by clinicians in both Fargo, North Dakota and Minneapolis, Minnesota. Eighty participants were randomized to treatment. Data were collected from 64 participants at end-of-treatment and 68 participants at four month follow-up. Individuals missing at end-of-treatment and four month follow-up did not differ from non-missing individuals on demographic (e.g., ethnicity, education history) and baseline clinical variables (e.g., binge or purge frequency). The average participant age was 27.3 years (SD = 9.6); the majority were female (90%) and Caucasian (87.5%). Nearly half of participants had earned a college degree (45%). Lifetime mood and anxiety disorders were diagnosed in 66.3% and 46.3%, respectively. Fifty percent of the sample had a lifetime substance abuse or dependence diagnosis. The average BMI was 23.9 kg/m^2 (SD = 5.5).

2.2. Measures

The Eating Disorder Examination (EDE; Fairburn, 2008) was used at baseline, end-of-treatment, and four month follow-up to assess frequency of meals and snacks (i.e., pattern of eating item), frequency of objective binge eating episodes (OBEs), and frequency of purging behaviors (i.e., vomiting, laxative misuse, and/or diuretic misuse) during the 28 days prior to each interview. The EDE is based on a detailed description of the past 28 days from the participant, using a calendar to identify pertinent events and schedules in order to increase the accuracy of self-reported data. Using such information, the interviewer and participant estimate the number of days on which each meal and snack were consumed. Similarly, OBE and purging behavior counts (which may occur more than once a day) are estimated based on examples discussed by participant. Trained masters- and doctoral-level interviewers conducted assessments. The EDE has been shown to have strong psychometric properties (Berg, Peterson, Frazier, & Crow, 2012). Inter-rater reliability based on a random subsample of interviews for all subscales and the global score were 0.909 or greater.

The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was used to assess depressive symptoms at baseline, end-of-treatment, and four month follow-up. The BDI includes 21 questions; severity scores range from 0 to 63. The internal consistency of the BDI was calculated at each time point; alpha coefficients were .894 and .949 at baseline and follow-up, respectively.

2.3. Treatment

Treatment randomization was stratified by site, severity of diagnosis, and therapist; there were no significant differences between treatment groups on baseline characteristics. While the two treatments differ in many respects, both emphasize eating regular meals and snacks (Fairburn, 2008; Wonderlich et al., 2014). Both treatments were provided in 21, 50-min sessions over 17 weeks, with twice-weekly sessions for the first 4 weeks. Two doctoral-level psychologists at each site provided both treatments, engaged in weekly supervision, and demonstrated good adherence based on independent tape ratings (Wonderlich et al., 2014).

2.4. Statistical analyses

Separate generalized linear models based upon a negative binomial distribution with a log link were run for changes in binge eating and purging behaviors from baseline to four month follow-up. Changes in each of the following meal patterning variables from beginning to end-of-treatment were entered as predictors: breakfast, mid-morning snack, lunch, mid-afternoon snack, evening meal, and evening snack. All meal patterning variables were entered simultaneously, thus allowing an estimate of the unique variance accounted for by each meal patterning variable. Meal patterning variable means and standard deviations at baseline and end-of-treatment can be seen in Table 1. Table 1 also reports correlations between various meal and snack change-scores from baseline to end-of-treatment. Changes in binge eating and purging behaviors were examined separately as dependent variables, with baseline frequencies of binge eating and purging entered as covariates to control for baseline severity. Results from the separate generalized linear models, including unstandardized beta weights, standard errors, significance levels, and pseudo R^2 are provided in Table 2. Given evidence that depression levels may influence binge/purge behaviors (Steinhausen & Weber, 2009), a depression change score (from baseline to four month follow-up) was entered as a covariate in a separate model. The mean BDI score at baseline was 18.05 (SD = 11.32) and 10.30 (SD = 12.62) at four month follow-up; BDI scores significantly decreased over treatment, t (56) = 4.90, $p < .001$. Due to previous findings indicating that there were no significant differences between the two treatments on the primary outcome variables (Wonderlich et al., 2014), treatment type was not analyzed as an independent predictor. In order to control for the number of statistical analyses run, a conservative alpha of <.01 was used.

3. Results

3.1. Binge eating episodes

As shown in Table 2, initial regression analyses (without the depression covariate) indicated that increased evening meal consumption during treatment significantly predicted decreased binge eating at four month follow-up (B = −.104, Wald = 9.414, $p < .01$). The overall model (as seen in Table 2) accounted for 67% of the variance in changes in binge eating frequency from baseline to four month follow-up.

In order to examine the effects of change in depression on binge eating, a separate model was run with depression change from baseline to four month follow-up entered as a covariate. Decreased depression was found to significantly predict decreased binge eating frequency at four month follow-up (B = .073, Wald = 12.794, $p < .001$). Within the covariate model, increased evening meal consumption continued to significantly predict decreased binge eating frequency at four month follow-up (B = −.133, Wald = 12.447, $p < .001$). No other meal patterning variables were found to significantly predict changes in binge eating frequency in the covariate model. When including the effect of depression, the overall model accounted for 69% of the variance in changes in binge eating frequency from baseline to four month follow-up.

3.2. Purging episodes

Results of the initial regression analyses indicated that increased evening meal consumption significantly predicted decreased purging behavior frequency at four month follow-up (B = −.092, Wald = 8.241, $p < .01$). In contrast to expectations, decreased mid-morning snack consumption predicted decreased purging behavior at four month follow-up (B = .082, Wald = 14.315, $p < .001$). The overall model accounted for 63% of the variance in changes in purging frequency from baseline to four month follow-up.

Consistent with the binge eating analyses, depression change was included as a covariate in a separate model predicting changes in purging behavior. Decreased depression significantly predicted decreased purging behavior frequency at four month follow-up (B = .121, Wald = 34.954, $p < .001$). Within the covariate model, increased evening meal consumption continued to significantly predict decreased purging behavior frequency at four month follow-up (B = −.114, Wald = 11.494, $p < .01$). In contrast to expectations, decreased lunch consumption predicted decreased purging behavior frequency at four month follow-up (B = .072, Wald = 8.095, $p < .01$). When including the effect