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INITIAL INVESTIGATION OF BEHAVIORAL ACTIVATION THERAPY FOR CO-MORBID MAJOR DEPRESSIVE DISORDER AND OBESITY

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More than one-third of treatment-seeking obese patients are clinically depressed. No evidence-based treatments exist for individuals with comorbid depression and obesity. Behavioral activation (BA), an effective treatment for depression, might also facilitate weight loss. The objective of this study is to evaluate the feasibility and efficacy of BA plus nutrition counseling for weight loss among individuals with comorbid major depressive disorder (MDD) and obesity. The BA intervention targeted both weight reduction and depression in 14 obese patients (79% female; 86% Caucasian) who met criteria for MDD. At baseline, mean Beck Depression Inventory (BDI-II) score was 26.71, and mean Hamilton Depression Rating Scale (HDRS) score was 16.00. Significant reductions at 12-weeks in both BDI-II and HDRS were observed with 10 participants reaching full remission at post treatment. Reductions in body weight, daily caloric intake, and physical activity were observed. BA with nutrition counseling appears to have potential as a weight loss treatment in the context of depression. Results support the need for a randomized controlled trial to evaluate the efficacy of BA for both weight loss and depression.

Keywords: obesity, depression, weight loss, behavioral activation

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Obesity, affecting 30% of Americans, is associated with increased risk for chronic diseases (National Heart Lung & Blood Institute Obesity Education Initiative Expert Panel, 1998) and is becoming increasingly prevalent in depressed patients (Roberts, Deleger, Strawbridge, & Kaplan, 2003). Comorbid depression and obesity presents a concerning public health issue and comorbidity rates are higher than coincidence. While depression affects 16.2% of Americans (Kessler et al., 2003), the rate is over twice as high (35%) among treatment-seeking obese samples (Pagoto et al.,

2007). Especially concerning is that depressed patients have been found to lose only about half the weight of nondepressed patients in behavioral weight loss treatment (Pagoto et al., 2007).

A high comorbidity rate between obesity and depression suggests that the two conditions might have common features. When comorbid with depression, obesity may be in part attributable to maladaptive mood regulatory habits involving overeating and inactivity (Pagoto, Spring, Cook, McChargue, & Schneider, 2006). A weight loss treatment that directly addresses the links between mood, eating, and coping behavior may be beneficial for depressed individuals.

Behavioral theory of depression suggests that depression is a result of reduced engagement in reinforcing activities either due to skill deficits or aversive consequences associated with those activities (Lewinsohn, 1974). Behavioral activation (BA) treatment (Hopko, Lejuez, Ruggiero, & Eifert, 2003; Jacobson et al., 1996) aims to increase exposure to the positive consequences of healthy behavior in order to increase the frequency of healthy behavior and reduce the frequency of depressive behaviors (Lejuez, Hopko, & Hopko, 2001). BA could help facilitate weight loss by helping to increase healthy mood regulatory behaviors to break an overreliance on eating for coping with negative moods. Increasing coping behaviors that are physically active or incompatible with eating may help to reduce depressive behaviors and ultimately facilitate weight loss. The efficacy of BA has been demonstrated in a variety of samples (Cullen, Spates, Pagoto, & Doran, 2006; Dimidjian et al., 2006; Hopko, Bell, Armento, Hunt, & Lejuez, 2005; Hopko, Lejuez, & Hopko, 2004; Hopko, Lejuez, LePage, Hopko, & McNeil, 2003; Hopko, Robertson, & Lejuez, 2006; Jacobson et al., 1996; Porter, Spates, & Smitham, 2004) but has not been applied in the context of a weight loss treatment. The present study is an initial investigation into the feasibility of BA with brief nutrition counseling for weight loss and depression treatment. We hypothesized that treatment would result in significant decreases in weight and depression scores from baseline to end of treatment, healthy dietary and physical activity changes, good adherence, and high treatment satisfaction.

Method

Participants

The mean age of participants ($N = 14$; 79% female; 86% Caucasian) was 45.46 years old ($sd = 14.18$) and the average body mass index (BMI) was 37.12 kg/m^2 ($sd = 4.30$). Of 14 participants, 36% were taking antidepressant medications; four (28%) met criteria for binge eating disorder; and four (28%) had Type 2 diabetes. Participants were recruited via flyers and advertisements within a university medical center.

Participants were eligible if they met criteria for MDD via a Structured Clinical Interview for *DSM–IV* (SCID); a Hamilton Depression Rating Scale (HDRS) score $\geq$10; and a Beck Depression Inventory-II (BDI-II) score $\geq$10; and if they were 18–65 years; had primary care physician approval to participate in all aspects of the study; and had BMI $\geq$30.

Participants were *excluded* under the following circumstances: 1) currently in psychotherapy; 2) uncontrolled medical disorder or a medical disorder associated with a life expectancy less than 2 years; 3) psychological disorder that limits ability to participate (e.g., psychotic disorder, actively suicidal/high suicide potential, substance abuse or dependence); 4) antidepressant medication initiated or changed in the previous three months or any medication associated with weight loss or gain; 5) were smokers, given nicotine's effect on weight; or 6) had a medical condition that precluded dietary changes.

Of 85 responses to recruitment advertisements, 24 people were eligible for a screening interview. Ineligible responders either were not obese (23%), not interested (23%), on exclusionary medications (16%), denied depression (11%), could not be contacted (10%), had an exclusionary medical condition (5%), smokers (4%), too busy (4%), or in psychotherapy (4%). After the screening interview, 14 were eligible. Of the 10 ineligible candidates, four did not meet criteria for depression; one was in psychotherapy; three had an exclusionary medical condition; and two were not interested. The human subjects review board approved all study procedures.

Measures

Weight. Weight was assessed in stocking feet with a balance beam scale at screening, baseline,

all treatment visits, and end of treatment. BMI was calculated as kg/m^2. A BMI of 30 kg/m^{2}or greater is considered obese.

Seven Day Dietary Recall (7DDR; Hebert et al., 1997). The 7DDR was used for dietary assessment. Similar to a food frequency questionnaire in format, the 7DDR assesses the previous week's diet (Hebert et al., 1997). Nutrient scores, such as total energy, and percentage of energy from fat, protein, and carbohydrate, were computed from the data collected from the 7DDR, and validity has been demonstrated by our group (Ma et al., 2006).

Physical activity. The 7DDR also included a brief physical activity assessment (Matthews et al., 2000). Briefly, the questionnaire asks about leisure-time activities during the previous 28 days. The questionnaire asked subjects to describe leisure activities and estimate total daily duration and weekly frequency. For each activity, total weekly time was calculated by multiplying the duration of the activity by its frequency. The sum of the total weekly time of the activities was calculated.

Structured Clinical Interview for DSM–IV, Nonpatient Version (SCID; Spitzer, Williams, Gibbon, & First, 1992). The SCID is a structured interview with a specific module for mood disorders (Spitzeret al., 1992). Satisfactory reliability data has been reported, and the SCID compares favorably with other diagnostic methods (Williams, 1992).

Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report rating scale used to rate the intensity of depression (Beck et al., 1996). The BDI-II has been used to detect clinical change in both research and clinical settings and has excellent psychometric properties.

Hamilton Depression Rating Scale (HDRS; Hamilton, 1960). The HDRS is a 17-item interview-administered measure of depression severity (Hamilton, 1960). Symptoms are rated from 0 (*absent*) – 4 (*incapacitating*) by a clinician.

Feasibility. Feasibility was operationalized as session attendance and participant satisfaction. Attendance at groups and individual visits was recorded. Participant satisfaction was determined by asking participants anonymously at the end of the program to rate satisfaction from 0 (*not at all satisfied*) to 10 (*extremely satisfied*).

Procedure

Screening. Candidates responding to study advertisements were initially screened via a brief phone interview. A 2-hr screening visit followed where informed consent was obtained; height and weight was assessed; the SCID-IV interview was administered; and questionnaires completed. Participants received $25 for completing the screening visit.

Intervention. The 12-week BA treatment was adapted from the originally published protocol and involved self-monitoring daily activities, identifying the context of depressive behavior, understanding the impact of behavior on mood, assignment of activity goals, and problem solving (Addis & Martell, 2004). BA was modified to emphasize overeating as a depressive behavior and participants were encouraged to target some pleasure and mastery activities that are 1) incompatible with eating and 2) that expend energy, either in the form of active lifestyle behaviors or structured physical exercise. Physical activity was introduced gradually during BA sessions beginning with light intensity activities that generate a sense of pleasure and/or mastery. Participants received step counters to monitor activity and to provide immediate feedback on progress. BA was delivered by four Master's degree therapists (3–4 participants per therapist).

Diet counseling protocol. Participants attended 6 biweekly, 90-minute groups lead by a registered dietitian. Sessions involved didactic material, group discussion, and group meal preparation. Material covered included increasing nutrient density, diet self-monitoring, portion control, healthy preparation instruction, and menu planning. The diet protocol emphasized increasing healthy food consumption (fruits and vegetables, whole grains) to avoid engendering feelings of deprivation. Participants were asked to decrease calories by reducing intake of foods high in fat.

Results

Weight

Because presence of binge eating disorder was related to weight change, $F(1, 12) = 9.48$, $p = .01$, it was entered as a covariate in the model. Repeated measures ANOVA for weight was significant, $F(1, 12) = 18.25$, $p = .001$, $\eta^2 = .60$.

The mean weight change was −5.55 pounds (sd = 6.04), with a range of −13.50 to + 5.00.

Diet and physical activity outcomes

Repeated measures ANOVA for average daily caloric intake neared significance, $F(1, 10) = 4.77$, $p = .054$, $\eta^2 = .32$. Daily caloric intake decreased from a baseline mean of 2357.09 kcal (sd = 1674.71) to an end of treatment mean of 1582.69 kcal (sd = 775.15), a difference of 774.50 kcal per day. Repeated measures ANOVA for mean daily calories from fat was significant, $F(1, 10) = 10.44$, $p = .009$, $\eta^2 = .51$; however, models for mean daily calories from carbohydrate and protein were not significant. Mean total daily calories from fat decreased from 786.47 (sd = 529.93) at baseline to 445.19 (sd = 272.08) at end of treatment.

An increase in leisure time physical activity from baseline to end of treatment was observed and neared significance, $F(1, 13) = 4.37$, $p = .06$, $\eta^2 = .26$. Weekly minutes of leisure time physical activity increased on average by 98.84 minutes (sd = 170.46).

Depression

Repeated measures ANOVA revealed that change in BDI-II scores from baseline to 12 weeks was significant, $F(1, 13) = 137.12$, $p < .001$, $\eta^2 = .91$. Mean BDI-II at baseline was 26.71 (sd = 7.72) and then declined to 6.71 (sd = 4.76) at end-of-treatment. To determine whether the improvement in BDI-II scores was clinically significant, baseline and end-of-treatment BDI-II scores were compared with norms for depressed and nonpatient samples using t tests (Jacobson, Roberts, Berns, & McGlinchey, 1999). At baseline, the mean BDI-II score of the current sample was 26.71 (sd = 7.72) and did not differ significantly from the mean for depressed outpatients ($mean$ = 28.64; sd = 11.75; $t(222) = -0.60$, *ns;* Steer, Ball, Ranieri, & Beck, 1999). The baseline mean BDI-II score in the present study was significantly greater than the mean for undergraduate students ($mean$ = 12.55; sd = 9.93; $t(132) = 5.16$, $p < .001$; Beck et al., 1996). Next, we found that mean end of treatment BDI-II score was significantly lower than the mean for depressed outpatients ($t(222) = -6.81$, $p < .001$; Steer et al., 1999). The mean end of treatment BDI-II score was also significantly lower than the mean for undergraduate students ($t(132) = -2.17$, $p < .05$; Beck et al., 1996).

The repeated measures ANOVA for change in HDRS scores from baseline to 12 weeks was also significant, $F(1, 13) = 58.90$, $p < .001$, $\eta^2 = .81$. Mean HDRS at baseline was 16.00 (sd = 3.32) and then declined to 5.85 (sd = 3.77) at end of treatment. An HDRS cutoff score of ≤7 is considered full remission (Zimmerman, Chelminski, & Posternak, 2005). All 14 participants achieved clinically significant reductions in depression. A total of 10 participants (72%) were remitted and the remaining four participants (28%) were considered mildly depressed by end of treatment.

Adherence and program satisfaction. Of 18 total sessions, mean attendance was high at 15.64 sessions (sd = 3.58). Individual session attendance was particularly high (M = 11.00 of 12 total sessions; sd = 2.18) and 72% of participants attended all 12 individual sessions. One participant relocated to another state at visit 7 and one discontinued participation at visit 5. The average program satisfaction rating was high (M = 9.33; sd = .86) on a scale from 0 (*not at all satisfied*) to 10 (*extremely satisfied*).

Discussion

To our knowledge, this represents the first attempt to apply BA to the treatment of comorbid obesity and depression. Results suggest that BA is a feasible and acceptable weight loss treatment in the context of depression. Significant decreases in weight and caloric intake were observed. Increase in physical activity neared significance. Clinically significant reductions in depression were observed, with the majority achieving remission. Session attendance and satisfaction ratings were both high.

Results are consistent with previous studies that have demonstrated the efficacy of BA in the treatment of depression (Cullen et al., 2006; Dimidjian et al., 2006; Hopko et al., 2004; Hopko, Lejuez, LePage et al., 2003; Jacobson et al., 1996; Porter et al., 2004). The present study extends the current literature by adapting BA to address both weight loss and depression. Depression psychotherapies typically do not address weight and pharmacotherapies often have weight gain side effects. Depression treatments that can be modified to facilitate weight loss are needed for the increasing number of patients who have both depression and obesity.

The combined BA treatment impacted dietary composition. Participants decreased their overall caloric intake by an average of 775 kcal per day, a difference that appeared to be accounted for largely by reductions in fat intake. To the extent that dietary and weight changes were facilitated primarily by BA, dietary counseling, or some combination is not possible to disentangle. While goals relevant to diet and maladaptive eating habits were addressed in BA, diet counseling is a staple of all weight loss interventions, thus it was deemed necessary to include diet counseling as an adjunct to BA in the context of obesity.

Weight loss was modest in the present study. Mean weight loss was 5 pounds in 12 weeks. This pace of weight loss was about 70% of that of highly intensive evidence-based weight loss programs, such as the Diabetes Prevention Program (DPP), where participants lost on average 14.33 pounds in 24 weeks (DPP Research Group, 2002). The DPP included 16 sessions of individual nutrition and physical activity counseling, was administered to nondepressed participants, and had no documented effects on depressive symptoms. That BA, with only six group visits of nutrition counseling, was effective in reducing depression and having a clinically meaningful effect on weight is noteworthy. Future studies should extend treatment and increase the intensity of dietary counseling to observe longer-term trends in weight loss.

This investigation has some limitations. Given the lack of a control group, it is impossible to determine whether changes could be attributed to the entire intervention, BA, or dietary counseling. However, the goal of this investigation was to demonstrate feasibility and acceptability of this treatment approach as a first step toward justifying a fully powered randomized trial. The dietary component was much less intensive than traditional weight loss interventions, which increases the likelihood that BA contributed to the observed changes in weight, diet, and physical activity. An additional limitation is the lack of long-term outcome data. Longer term effects on weight loss should be examined in future studies. Finally, the sample size in the present study was small, but not appreciably smaller than other studies that aim to demonstrate feasibility and acceptability (e.g., Abbass, 2006; Deacon & Abramowitz, 2006).

Evidence for the efficacy of behavioral approaches to depression is mounting, but how to administer treatments in the presence of comorbid medical conditions is a pressing question. Diseases co-occur more often than not, but the evidence base is largely comprised of disease-specific interventions. Multiple behavior change approaches are economical and efficient for reducing health risk and maximizing public health impact (Orleans, 2004). Mental health practitioners have a unique opportunity to increase their impact by becoming proficient in treatments that can affect both mental and physical health outcomes. The results of this initial investigation affirm that BA shows promise as a treatment for weight loss and depression.

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