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Development of a novel mindfulness and cognitive behavioral intervention for stress-eating: A comparative pilot study

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ABSTRACT

Stress-related eating is increasingly cited as a difficulty in managing healthy eating behaviors and weight. However few interventions have been designed to specifically target stress-related eating. In addition, the optimal target of such an intervention is unclear, as the target might be conceptualized as overall stress reduction or changing emotional eating-related thoughts and behaviors. This pilot study compared the effects of three interventions targeting those components individually and in combination on stress-related eating, perceived stress, and weight loss to determine whether the two intervention components are effective alone or are more effective when combined. Fifty-three overweight participants (98% female) who reported elevated levels of stress and stress-eating and were at risk for obesity were randomly assigned to one of three six-week interventions: a modified mindfulness-based stress reduction (MBSR) intervention, a cognitive behavioral stress-eating intervention (SEI), and a combined intervention that included all MBSR and SEI components. All three interventions significantly reduced perceived stress and stress-eating, but the combination intervention resulted in greater reductions and also produced a moderate effect on short term weight loss. Benefits persisted at six week follow-up. The pattern of results preliminarily suggests that the combination intervention (MBSR + SEI) may yield promise in the treatment of stress-related eating.

1. Introduction

Nearly half of all individuals report that they tend to overeat and/or eat hedonically pleasing but calorie-dense/nutrient-poor foods in response to stress (e.g., APA, 2011; Epel, Lapidus, McEwen, & Brownell, 2001; O'Connor, Jones, Conner, McMillan, & Ferguson, 2008). Perceived stress can elicit increased eating through several physiological and behavioral mechanisms, including greater cortisol reactivity and susceptibility to negative mood and/or self-medication (Epel et al., 2001), increased disinhibition (Eysench, Derakshan, Santos, & Calvo, 2007), and increased craving for highly palatable foods (Dallman, Pecoraro, & la Fleur, 2005). Moreover, increased consumption of highly palatable and energy dense foods may be secondary to the combination of life stress and insufficient time, energy, or planning to purchase and prepare healthier food options. Taken together, these factors make those with higher levels of perceived stress more susceptible to choosing the palatable, energy dense, obesogenic foods that are now so readily available in our environment (Horgen & Brownell, 2004).

Stress-induced eating is uniquely positioned to increase weight as well as health-detrimental fat depots. Stress is associated with increased abdominal fat through repeated activation of the hypothalamic-pituitary-adrenal (HPA) axis, which results in the hypersecretion of cortisol and the mobilization of fatty acids to intra-abdominal regions (Dallman et al., 2005). Accumulation of abdominal fat is clearly associated with increased risk of diabetes and cardiovascular disease (Despres, 2006).

Stress levels have increased substantially over the past three decades, with women reporting the highest levels of perceived stress (Cohen & Janicki-Deverts, 2012). Given that high levels of perceived stress puts susceptible individuals at higher risk for maladaptive eating, poor food choices, and weight gain/abdominal fat accumulation through a variety of mechanisms, reducing levels of perceived stress and stress-eating behaviors in individuals prone to stress-eating could have significant effects on eating behavior. This may subsequently reduce or even prevent stress-induced weight gain and disease development.

There are many types of empirically-supported interventions for stress management. One such intervention is Mindfulness-Based Stress Reduction (MBSR, Kabat-Zinn, 1990), an empirically-supported program of stress management that has consistently been shown to reduce perceived stress (Bishop, 2002; Chiesa & Serretti, 2009). The practice of mindfulness and nonjudgmental acceptance of the present experience is thought to decrease emotional reactivity and allow one to respond more calmly and wisely to stressful experiences (Baer, Fischer, & Huss, 2005; Kabat-Zinn, 1990). Mindfulness-based interventions have been adapted to address eating behaviors and have been shown in some

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studies to reduce emotional eating and food cravings, (Alberts, Thewissen, & Raes, 2012) binge eating, (Baer et al., 2005; Courbasson, Nishikawa, & Shapira, 2010; Kristeller & Hallett, 1999) and abdominal fat (Daubenmier et al., 2011). However, many of the studies examining mindfulness-based interventions for eating and/or weight-related behaviors have altered the standard MBSR protocol to include eating-specific mindfulness exercises, nutritional education, or behavioral techniques (e.g., MB-EAT, Kristeller & Hallett, 1999; MABCT for BED, Courbasson et al., 2010). Due to this variability in the intervention components and lack of (or limited use of) active comparison groups, it is difficult to determine which component(s) of the interventions are responsible for any impact on eating or weight. Thus, it is unclear whether the mindfulness component alone (e.g. standard MBSR) may decrease maladaptive eating behaviors simply by decreasing the overall perception of stress, thereby decreasing the need to eat for the purpose of alleviating stress.

Interventions for the treatment of stress eating are rare and most research is extrapolated from the treatment of binge eating. However, stress eating may differ as it does not necessarily involve loss of control over eating or eating excessive quantities. As such, it often goes unrecognized or unaddressed. Cognitive behavioral therapy (CBT) is regarded as one of the most effective psychotherapeutic treatments for binge eating (Sysko & Wilson, 2011; Treasure, Claudino, & Zucker, 2010). Components of CBT programs include psychoeducation about emotions and eating, meal planning and structuring, understanding physical versus emotional hunger, identifying triggers for emotional eating, cognitive restructuring, activity substitution, and relapse prevention (Mitchell, Devlin, de Zwaan, Peterson, & Crow, 2007). Treatment effect sizes in binge eating intervention studies are generally moderate to large (Hilbert et al., 2012). However, it is important to note that stress eating differs from binge eating in significant ways, therefore, the intervention targets may differ.

As mentioned, stress-eating is rarely targeted for intervention, despite the fact that it is problematic for a large number of people and can lead to significant weight gain. And while some previous studies have examined the effects of interventions that include mindfulness and eating-related behavioral/educational components on binge eating and weight, none have directly addressed stress eating. Moreover, previous studies have not compared the intervention components (individually and combined) in a randomized study in order to begin to identify the mechanisms of effective treatment for stress eating. This three arm study was designed to compare the effects of mindfulness-based treatment (MBSR), a tailored cognitive-behavioral intervention (stress eating intervention, SEI), and the combination intervention (MBSR + SEI) on perceived stress, stress and emotional eating, and weight. A second goal was to evaluate the feasibility of the interventions.

2. Methods

2.1. Participants

Participants were recruited via advertisements soliciting people who "eat poorly when stressed and worry about weight gain," which were distributed throughout an urban academic medical center and the surrounding community. Eligible participants were those who reported a high level of stress and were at high risk for weight gain and/or obesity, defined as having at least one first degree relative who was overweight or obese, as well as having self-reported (via verbal screening questions) difficulty with one of the following problem eating behaviors: binge eating, frequent emotional or stress eating, intense and irresistible food cravings, or food addiction. Participants were also required to have a BMI over 23 kg/m^2 (to allow for the possibility of weight reduction). Individuals were not eligible if they had a current eating disorder or psychotic disorder, were taking medications affecting weight or appetite in the past month, had participated in a mindfulness training program, or were currently enrolled in a formal treatment program for weight loss or an eating disorder.

2.2. Procedure

Interested individuals completed a brief study eligibility screening over the phone prior to being scheduled for an in-person visit, at which time informed consent was obtained and physiological and self-report assessments were conducted. Participants were then randomized to one of three groups: (1) Mindfulness-based stress reduction (MBSR) training, (2) Stress-eating intervention (SEI), or (3) MBSR + SEI. All groups met once per week for 50 (MBSR and SEI groups) or 80 (MBSR + SEI group) minutes for six consecutive weeks. Six groups were held in total (two per condition) and the study therapists, clinical psychologists with post-doctoral training in both MBSR and the treatment of disordered eating behaviors (JC and MH), led one group in each of the three conditions. Post-treatment and follow up assessment data were gathered at the end of the sixth session (post-treatment) and at six weeks following the conclusion of treatment (follow-up), respectively.

2.3. Measures

The *Perceived Stress Scale* (PSS-10; Cohen, Karmarck, & Mermelstein, 1983) is a well-validated 10-item, one-factor inventory that is frequently used to measure perceived stress in MBSR and other clinical intervention studies (e.g., Carmody, Crawford, & Churchill, 2006; Chang et al., 2004). The scale measures the extent to which participants perceive their life circumstances over the past month as stressful (i.e., unpredictable, uncontrollable, and overloading). Items are rated on a 4-point scale ranging from 0 (never) to 4 (very often), with higher scores reflecting greater perceived stress. The PSS-10 has demonstrated adequate internal consistency (alpha = .75), test–retest reliability, and construct validity (Cohen et al., 1983). The alpha of the PSS-10 in this study was .87.

The *Eating and Appraisal Due to Emotions and Stress Questionnaire* (EADES; Ozier et al., 2007), Emotion- and Stress-Related Eating subscale (EADES-ESE, one of three subscales on the EADES) is comprised of 24 questions that evaluate the extent to which individuals use food to cope with emotions and stress, and includes questions related to both eating behaviors and eating-related self-efficacy. Scores range from 24 to 120, with lower scores represent poorer functioning. The EADES exhibited good reliability in the standardization sample (alpha = .95, Ozier et al., 2007) and the alpha for the EADES-ESE in this sample was .92.

Weight was measured with shoes off in light street clothing on a medical grade scale during each visit. Height was self-reported.

2.3.1. End of program assessment form

Participants in the mindfulness groups responded to four questions inquiring how often they read the materials and completed formal (body scan, sitting meditation, mindful self-inquiry, mindful yoga, loving kindness meditation) and informal practice (everyday mindfulness, weaving mindfulness throughout the day, mindful eating, mindful listening, etc). Possible responses were once/week, 2–3 x/week, 4–5x/week, 6–7x/week, and multiple times a day.

2.4. Interventions

2.4.1. Mindfulness based stress reduction training

This empirically supported intervention was based on Jon Kabat-Zinn's Mindfulness Based Stress Reduction (Kabat-Zinn, 1990) program, adapted to a 6-session format. A workbook (A Mindfulness-Based Stress Reduction Workbook by Stahl & Goldstein, 2010) was provided to each group member to read and reference for homework assignments. The content of each MBSR session is detailed in Table 1. Each session began with a review of the previous session material as well as between