J. Behav. Ther. & Exp. Psychiat. 52 (2016) 138–146

Contents lists available at ScienceDirect

Journal of Behavior Therapy and Experimental Psychiatry

journal homepage: www.elsevier.com/locate/jbtep

An open trial evaluating an attention bias modification program for overweight adults who binge eat

Kerri N. Boutelle [a, b, *], Teresa Monreal [a], David R. Strong [c], Nader Amir [d]

[a] Department of Pediatrics, University of California, San Diego, USA
[b] Department of Psychiatry, University of California, San Diego, USA
[c] Department of Family Medicine and Public Health, University of California, San Diego, USA
[d] Department of Psychology, San Diego State University, USA

ARTICLE INFO

Article history:
Received 30 October 2015
Received in revised form
15 April 2016
Accepted 15 April 2016
Available online 16 April 2016

Keywords:
Binge eating
Obesity
Overeating
Attention bias
Attention bias modification
Weight loss

ABSTRACT

Background and Objectives: Binge eating is prevalent and is associated with significant psychiatric and medical comorbidities. To date, the most effective psychological treatments for individuals who binge eat are not effective for all patients and they do not result in significant weight loss. Dual process theories suggest that implicit factors, such as attention bias, may influence behavior, even when the behavior is in opposition to long-term goals. Attention bias modification programs have been tested in other areas of psychopathology, and could be utilized to improve outcomes for people who binge eat. Thus, the aim of this open trial was to conduct a preliminary evaluation of an attention bias modification program (ABM-Food) designed to train attention away from food cues.
Methods: Adults who binge eat and were overweight or obese enrolled in an 8-week ABM-Food program, which consisted of one session in the lab each week and two training sessions at home. Nine participants completed the ABM-Food training program and the post-treatment assessment, and 8 completed the 3-month post-treatment assessment. Results: Results showed that the ABM-Food program is a feasible and acceptable treatment for adults who binge eat. Initial effectiveness data showed decreases in weight, eating disorder symptoms, binge eating, loss of control and responsivity to food in the environment, as well as changes in attention bias. The majority of these effects remained at the 3-month follow-up time point.
Limitations: This study is limited by the single-group open label trial, and the small sample size.
Conclusions: This open trial provides initial evidence for the feasibility, acceptability and effectiveness of ABM-Food for individuals who binge eat and are overweight or obese.

Overeating can be problematic, and is a factor in the development of obesity as well as in eating disorders. Recent data suggest that in the United States, 35.7 percent of adults are overweight and 33.1 percent are obese (Flegal, Carroll, Kit, & Ogden, 2012). By the year 2030, 51 percent of U.S. adults are predicted to be obese (Finkelstein et al., 2012). Obesity is associated with cardiovascular disease, Type II diabetes, cancer, osteoarthritis, psychological impairment, poor quality of life (Dixon, 2010) and all-cause mortality (Flegal & Kalantar-Zadeh, 2013). Rates of overeating, or eating beyond energy requirements, are especially high in overweight samples, with up to 80% of overweight adults regularly endorsing overeating (Thomas, Doshi, Crosby, & Lowe, 2011). Binge eating is a more extreme form of overeating, which is characterized by feelings of loss of control and the consumption of a large amount of food, typically within a discrete amount of time (American Psychiatric Association, 2013). Studies from treatment seeking populations using interview-based assessments suggest that 23%–46% of obese individuals report engaging in binge eating behavior (Spitzer et al., 1992; Dymek-Valentine, Rienecke-Hoste, & Alverdy, 2004; Gormally, Black, Daston, & Rardin, 1982; Marcus, Wing, & Lamparski, 1985). However, evidence from ecological momentary assessment studies suggests that binge eating among overweight individuals is more prevalent (66%–100%) than current research suggests (Greeno, Wing, & Shiffman, 2000; le Grange, Gorin, Catley, & Stone, 2001). Individuals with binge eating are at higher risk for psychiatric comorbidities, health problems, weight gain and poorer

* Corresponding author. Pediatrics and Psychiatry, University of California, San Diego, 9500 Gilman Drive, MC 0874, La Jolla, CA 92093, USA.
E-mail address: kboutelle@ucsd.edu (K.N. Boutelle).

http://dx.doi.org/10.1016/j.jbtep.2016.04.005
0005-7916/

quality of life than individuals without binge eating (Rieger, Wilfley, Stein, Marino, & Crow, 2005; Wonderlich, Gordon, Mitchell, Crosby, & Engel, 2009). Not surprisingly, patients with binge eating have more modest weight losses during weight loss programs than those without binge eating (Grilo, Masheb, Wilson, Gueorguieva, & White, 2011; Reas & Grilo, 2008). Since binge eating is highly prevalent among obese individuals and a risk factor for poor treatment outcome, there is a critical need for new treatments designed to explicitly target overeating and binge eating. Directly treating overeating and binge eating could result in enhanced weight loss and weight loss maintenance in overweight adults.

The most well established treatments for individuals who binge eat include cognitive behavioral treatment (CBT) and interpersonal therapy (IPT) (Wilson, Wilfley, Agras, & Bryson, 2010; Devlin et al., 2005; Brownley, Berkman, Sedway, Lohr, & Bulik, 2007; Wilfley et al., 2002). CBT focuses on disrupting the restraint/binge cycle by improving maladaptive thoughts surrounding eating, shape, and weight, and encouraging healthy weight control behaviors (Iacovino, Gredysa, Altman, & Wilfley, 2012; Fairburn, Cooper, & Shafran, 2003). IPT addresses interpersonal difficulties that often accompany and may maintain the symptoms of Binge Eating Disorder (BED) (Rieger et al., 2010). These treatments produce remission rates of 40–60% and improvements in eating disorder psychopathology, but interestingly fail to produce significant weight loss (Grilo et al., 2011; Wilson et al., 2010). Conceptually, talk therapies such as CBT and IPT, assume that individuals can access and consciously control cognitive factors that contribute to and maintain binge eating behaviors. Dual process theories (Kahneman, 2003; Strack & Deutsch, 2004) suggest that implicit processes (i.e. attention and approach biases to food) may exert control over behavior, even when the behavior is in opposition to long-term goals. These implicit processes may not be adequately addressed in CBT or IPT, and may be contributing to the persistence of binge eating.

Calorically-dense foods cues can capture attention (Harrar, Toepel, Murray, & Spence, 2011), and certain individuals, such as those who are overweight or obese or who binge eat, could exhibit hyper-reactivity to the salient properties of food coupled with motivations to engage in appetitive behaviors (Davis et al., 2009). In the brain, responsiveness to food and the general processing of reward and pleasure is mediated by dopamine in the meso-corticolimbic system (Volkow, Wang, Fowler, Tomasi, & Baler, 2012; Berridge, Ho, Richard, & DiFeliceantonio, 2010). Dysregulated dopamine-based reward circuitry has been implicated in both binge eating and obesity (Volkow et al., 2012; Davis et al., 2013). Incentive sensitization theory (Berridge, 1996, 2009; Robinson & Berridge, 1993) suggests that incentive salience (i.e. drive to eat, wanting of food) develops through repeated pairings of food cues with food intake in vulnerable individuals. Over time, through associative conditioning, dopamine-based reward circuitry becomes hyper-sensitized to stimuli associated with food, resulting in biased processing of food-related cues. Food cues become attention grabbing and hyper-salient, triggering motivational states of craving, biased attention in the salience network, and increase the likelihood of consumption (Nijs & Franken, 2012). If cognitive processes are biased towards food temptations, it could become increasingly difficult to ignore and resist these temptations, even when trying to exert behavioral control.

The research on attention bias to food cues and binge eating is in its infancy, relative to other disorders, such as anxiety. It is important to note that research on individuals who are obese without diagnosed BED indicates that weight exerts a differential influence on attention biases (Doolan, Breslin, Hanna, & Gallagher, 2015). Data on overweight patients with BED also shows that they have impaired attention biases compared to obese patients without BED. To date, there are five studies that have directly compared overweight BED participants to overweight non-BED participants (Svaldi, Tuschen-Caffier, Peyk, & Blechert, 2010; Schag et al., 2013; Schmitz, Naumann, Trentowska, & Svaldi, 2014; Svaldi, Naumann, Trentowska, & Schmitz, 2014; Seeley et al., 2007). Two studies evaluated initial orientation to food cues; one found that both BED and non-BED groups initially fixated on food versus neutral stimuli (Schag et al., 2013), while the other found an early stimulus orientation effect only among BED participants compared to overweight females without BED (Schmitz et al., 2014). BED participants correctly identified food stimuli targets presented shortly after neutral targets more than overweight non-BED controls, demonstrating increased (biased) food perception in BED (Svaldi et al., 2014). Two studies found differences in sustained attention processes among women with BED versus overweight women without BED using event related potentials and eye tracking methods (Svaldi et al., 2010; Schag et al., 2013), suggesting potentially heightened and longer attention processing of food stimuli. Similarly, one study showed individuals with BED had more difficulties disengaging from and inhibiting responses to food stimuli (Seeley et al., 2007). Furthermore, one study using the antisaccade task indicated that individuals with BED might be more "visually impulsive," suggesting less control over their attention, than both obese non-BED and healthy weight participants (Schag et al., 2013). Interpretation of this research is limited by differing measures (eye tracking (Schag et al., 2013), antisaccade (Schag et al., 2013), ERP (Svaldi et al., 2010), clarification task (Schmitz et al., 2014), spatial cueing task (Schmitz et al., 2014)), small sample sizes, and varying motivational states (hunger vs satiety). However, this emerging body of data suggests that attention biases to food could be along a spectrum, with healthy weight participants having the least impaired and overweight patients with BED having the most impaired.

Considering that attention bias may play a role in maintaining the underlying motivational salience of food cues, it is possible that by reducing attention bias to approach foods, the drive to eat and binge eating will decrease. Cognitive researchers developed computer programs to train attention resources away from salient stimuli by implicitly training attention away from salient stimuli toward neutral stimuli. These Attention Bias Modification Programs (ABM) theoretically improve an individual's ability to disengage attention from stimuli (MacLeod & Clarke, 2015; Kuckertz & Amir, 2015). ABM programs have been examined primarily in anxiety disorders and have been related to changes in activation of the prefrontal cortex to emotional stimuli, implying improved top down control of attention as a result of training (Browning, Holmes, Murphy, Goodwin, & Harmer, 2010). More recently, ABM programs have been developed for appetitive stimuli, including substance use disorders (McGeary, Meadows, Amir, & Gibb, 2014; Lopes, Pires, & Bizarro, 2014; Schoenmakers et al., 2010). However, there is very little research on ABM for food.

Meta analyses show that ABM programs have reliable effects in changing attention bias to engage salient cues in anxiety and depression (Beard, Sawyer, & Hofmann, 2012; Heeren, Mogoase, Philippot, & McNally, 2015; Linetzky, Pergamin-Hight, Pine, & Bar-Haim, 2015; Mogoaşe, David, & Koster, 2014). At this time, there are too few studies to conduct metanalyses for appetitive stimuli. Interestingly, recent research suggests that the direction of the contingency between probes and cues may not be as important as originally thought (Heeren, Mogoase, McNally, Schmitz, & Philippot, 2015; Klumpp & Amir, 2009). For example, one study assigned individuals with social anxiety disorder to one of three ABM conditions; training toward non-threat, training toward threat, or no-contingency condition (Heeren et al., 2015b). All groups showed decreases in self-report and behavioral indices of