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Empirical research

Trusting homeostatic cues versus accepting hedonic cues: A randomized controlled trial comparing two distinct mindfulness-based intervention components

Lindsay M. Martin[a,*], Hallie M. Espel-Huynh[a], Stephanie Marando-Blanck[a], Brittney C. Evans[a], Evan M. Forman[a], Meghan L. Butryn[a], Ruth A. Baer[b], Ruth Q. Wolever[c], James D. Herbert[a]

[a] Drexel University, Department of Psychology, 3141 Chestnut St., Philadelphia, PA 19104, United States
[b] University of Kentucky, Department of Psychology, 115 Kastle Hall, Lexington, KY 40506, United States
[c] Vanderbilt Schools of Medicine and Nursing, 3401 West End Ave. Suite 380, Durham, NC 37203, United States

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ABSTRACT

Objective: Mindfulness-informed cognitive behavioral interventions for obesity are promising. However, results on the efficacy of such treatments are inconsistent which in part may be due to their substantially different methods of practice. This study is the first direct comparison of two theoretically distinct mindfulness-based weight loss approaches: increasing awareness of homeostatic/innate physiological cues versus hedonic/externally-driven cues for eating.

Methods: Overweight adults were randomized to one of three group-based workshops: Mindful Eating (ME; n = 21), Mindful Decision-Making (MD; n = 17), or active standard behavioral control (SC; n = 19). Outcome measures included percent weight change and reduction in caloric intake from baseline to 6 weeks.

Results: Differences in weight loss and calorie reduction did not differ significantly among groups. However, the difference in weight loss between the MD and ME groups trended towards significance, with medium-large effect sizes.

Conclusions: Results provide modest preliminary evidence for the utility of mindful decision-making strategies over mindful eating for short-term weight loss and calorie reduction.

1. Introduction

Obesity is an alarming public health issue (Finkelstein, Trogdon, Cohen, & Dietz, 2009), and gold standard behavioral treatment yields equivocal long-term outcomes (Garner & Wooley, 1991; Wing & Jeffery, 1999). Behavioral interventions incorporating mindfulness have shown recent promise for improving weight loss outcomes and promoting successful long-term maintenance (Forman, Butryn, Hoffman, & Herbert, 2009; Lillis, Hayes, Bunting, & Masuda, 2009; Niemeier, Leahey, Palm Reed, Brown, & Wing, 2012; O'Reilly, Cook, Spruijt-Metz, & Black, 2014). However, reports on the efficacy of the various treatments are inconsistent. One factor clouding the support for these approaches is that mindfulness-based interventions differ substantially in practice (Olson & Emery, 2015; O'Reilly et al., 2014; Tapper, 2017). Mindful Eating (ME) and Mindful Decision-Making (MD) are two such components with promising evidence, but with theoretically distinct conceptualizations of how to apply mindfulness.

2. Mindful Eating in behavioral weight loss interventions

Mindful Eating (ME) is a component of Mindfulness-Based Eating Awareness Training (MB-EAT; Kristeller & Wolever, 2011; Kristeller, Wolever, & Sheets, 2014) that includes training in multiple skills aimed to better engage the body's homeostatic mechanisms and decrease mindless overconsumption. It is based on the theory that increasing awareness and discernment of hunger and satiety cues improves the body's natural ability to self-regulate food consumption (Kristeller & Wolever, 2011). Research has shown that attending to bodily sensations immediately before eating improves awareness of hunger and satiety cues and adjusts further consumption (Van de Veer, Van Herpen, & Van Trijp, 2016). Similarly, tuning in to sensory experiences (e.g., taste, texture, flavor), specifically of tasty, high-calorie foods, enhances enjoyment and awareness of satiety resulting in fewer calories consumed (Arch et al., 2016). Overweight individuals have difficulty recognizing and responding to physical hunger and satiety

* Corresponding
E-mail addresses: lmarti64@jhmi.edu (L.M. Martin), hmespel@drexel.edu (H.M. Espel-Huynh), smm565@drexel.edu (S. Marando-Blanck), bce27@drexel.edu (B.C. Evans), emf27@drexel.edu (E.M. Forman), mlb34@drexel.edu (M.L. Butryn), rbaer@email.uky.edu (R.A. Baer), ruth.wolever@vanderbilt.edu (R.Q. Wolever), jh49@drexel.edu (J.D. Herbert).

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cues (Craighead & Allen, 1995; Lowe, 2003); thus, increasing awareness of bodily cues should reduce consumption by allowing individuals to recognize when they are hungry and/or satisfied by a food (Kristeller & Wolever, 2011; Mathieu, 2009).

ME-based interventions have been shown to reduce overconsumption and promote weight loss in overweight individuals (Miller, Kristeller, Headings, Nagaraja, & Miser, 2012; Sloan, Colleran, & Shelley, 2007; Timmerman & Brown, 2012) and to regulate eating patterns in overweight/obese individuals with binge eating disorder (Kristeller et al., 2014). Components of ME treatment appear to help reduce caloric intake in normal weight individuals (Jordan, Wang, Donatoni, & Meier, 2014; Marchiori & Papies, 2014), decrease specific intake of sweet foods (Mason et al., 2015), and yield reduced drives to consume highly palatable food (Mason et al., 2016) in obese individuals.

Despite the promise suggested by the previously described results, studies evaluating ME-based approaches specifically for weight loss have yielded conflicting findings. The largest, most well-controlled weight loss trial to date (n = 194) comparing an ME-based intervention with an active control produced no significant weight loss differences between groups (Daubenmier et al., 2016). Another smaller study comparing an intensive four-month ME-focused intervention for overweight/obese individuals also reported no significant advantage for weight loss over waitlist control (Daubenmier et al., 2011). One potential explanation for conflicting findings among ME-based interventions is that the positive and null results are driven by different mechanisms, and reflect distinct components of treatment that have been bundled differently. Indeed, as ME is usually packaged with other techniques (e.g., cognitive and behavioral techniques, psychoeducation, other acceptance-based strategies), different results may derive from intervention components other than ME. It is thus unclear which intervention component(s) drive behavioral changes (e.g., Katterman, Goldstein, Butryn, Forman, & Lowe, 2014; Timmerman & Brown, 2012).

It is possible that training awareness of internal processes may not, in fact, improve the ability to distinguish homeostatic cues from hedonic cues (Lowe & Butryn, 2007). People may be unable to discern these signals, and in fact may respond to greater internal awareness with an enhanced hedonic drive to eat that *increases* food consumption. This notion is consistent with the biobehavioral model of obesity, which theorizes that humans possess a biologically-based, evolutionarily-driven tendency to eat energy-dense foods and to default toward behavioral consumption of caloric surplus (Lowe, 2003; Stroebe, Papies, & Aarts, 2008). This promotes exceptional difficulty resisting the highly palatable foods that are persistently available in modern society, and promoting a positive rather than homeostatic energy balance (Blundell & Gillett, 2001; Hill & Melanson, 1999; Lowe, 2003; Stroebe et al., 2008). Drawing attention to these evolutionary drives may serve only to exacerbate the problem of overconsumption. Empirical research also provides support for this theory. While many factors are thought to contribute to development of obesity, responsiveness to hedonic cues for eating (Lowe & Butryn, 2007) rather than physiological hunger/satiety cues (Hall, Hammond, & Rahmandad, 2014) has been implicated as one major contributing factor. Indeed, self-reported hunger is only minimally associated with subsequent consumption (Herman, Fitzgerald, & Polivy, 2003; Mattes, 1990). Moreover, hedonically pleasing foods (e.g., high fat, high sugar) can actually increase physical hunger signals to a degree that suppresses satiety signaling, thus disrupting appetite regulation (Erlanson-Albertsson, 2005). In fact, evidence supporting the biobehavioral model raises the possibility that *discouraging* reliance on homeostatic cues to guide eating decisions may more effectively change consumption than would training to discern and follow the “wisdom” of homeostatic signals.

3. Mindful Decision-Making in behavioral weight loss

Mindful Decision-Making (MD) is a mindfulness-based approach theoretically in line with Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 2011) and other acceptance-based behavioral treatments (ABTs) specifically targeting weight loss (Forman, Butryn et al., 2013; Niemeier et al., 2012). The approach aligns with the biobehavioral model of obesity and suggests that consumption is primarily cued by hedonic hunger (appetitive drive to consume highly palatable foods; Lowe et al., 2009). Thus, training an awareness of cues that trigger urges to eat highly palatable foods and increasing one's willingness to experience (versus avoid) these food-related internal experiences will facilitate the behavioral control necessary to *override* hedonic drives.

Converging evidence has demonstrated that ABT interventions (that include MD) may be equally or more effective than traditional or standard cognitive-behavioral interventions for the modification of eating and weight-control behavior (Forman et al., 2009). One RCT of 128 overweight individuals comparing ABT to standard behavioral treatment (SBT) found that ABT achieved superior weight loss and maintenance at 6 months follow-up when delivered by clinicians with weight-control experience (Forman, Butryn et al., 2013). A similar, larger comparison of ABT and SBT (n = 190) found greater weight losses at 6-months mid- and 12-months post- treatment in the ABT condition, as well as a greater likelihood of maintaining 10% weight losses at 12-months (Forman, Butryn et al., 2016). Lillis et al. (2016) evaluated ABT and SBT across 24-months and showed that ABT participants had a greater mean weight loss and a higher proportion of participants maintaining 5% weight loss at 24-months. Notably, MD-based interventions have effectively reduced chocolate consumption in normal weight (Forman et al., 2007; Jenkins & Tapper, 2014) and overweight samples (Forman, Hoffman, Juarascio, Butryn, & Herbert, 2013) and compared to a psycho-educational control, reduced salty snack food consumption (Forman, Martin, et al., 2013).

The mechanism by which ABT interventions provide an advantage over traditional cognitive-behavioral approaches is still unclear. Some have proposed that these interventions may be more effective at targeting problematic eating patterns that are associated with poorer treatment response (Forman & Butryn, 2015; Lillis & Kendra, 2014), including hedonic hunger (appetitive drive to consume highly palatable foods; Lowe et al., 2009) and emotional eating (tendency to eat in response to negative affective states; Oliver, Wardle, & Gibson, 2000). Forman, Butryn et al. (2013) found that individuals high in hedonic hunger lost more weight in ABT relative to SBT only, a benefit that was further mediated by changes in acceptance. Relative to receipt of SBTs, individuals high in both hedonic hunger and emotional eating (either alone or in combination) have also been shown to better minimize their chocolate intake after learning awareness and acceptance-based (versus control-based) strategies for managing strong cravings (Forman et al., 2007; Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012). Additional evidence suggests that individuals high in hedonic hunger who are assigned to ABTs versus SBTs also lose more weight and maintain their losses better (Niemeier et al., 2012).

Similar to ME, most studies examining the efficacy of MD-based interventions to date have utilized multi-component interventions that include additional acceptance-based strategies (e.g., defusion, values clarification; Forman et al., 2007; Forman & Hoffman, et al., 2013; Forman, Martin, et al., 2013) or a combination of acceptance-based and standard-behavioral strategies (Forman et al., 2009; Forman, Butryn et al., 2013; Niemeier et al., 2012). Thus, no conclusions can be drawn as to which specific strategies account for the changes observed.

Proponents of the ME component might argue that MD's emphasis on intentionally abstaining from eating in response to urges to eat can be counterproductive in that attention to external cues and not acting on innate drives would disconnect individuals from their interoceptive awareness, leading to further overeating in the long-term. ME is meant