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Exploring process variables through which acceptance-based behavioral interventions may improve weight loss maintenance

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Abstract

Objective—A previously published randomized trial with individuals reporting high internal disinhibition showed significant differences in post-treatment weight change favoring Acceptance-Based Behavioral Intervention (ABBI) when compared to standard behavioral treatment (SBT). This paper examines process variables that might contribute to the observed differences in weight change.

Methods—Participants were 162 adults with overweight or obesity (mean BMI 37.6) randomly assigned to ABBI or SBT. Both interventions provided the same calorie intake target, exercise goal, and self-monitoring skills training. SBT incorporated current best practice interventions for addressing problematic thoughts and emotions. ABBI utilized acceptance-based techniques based on Acceptance and Commitment Therapy. ABBI and SBT were compared on process measures hypothesized to be related to outcome in ABBI and SBT and their association with weight loss outcomes using linear and non-linear mixed models methods and exploratory correlational analyses.

Results—Both the SBT and the ABBI groups showed significant changes over time on all process variables. The only significant between group difference was for values consistent behavior, with the ABBI group improving more as compared to SBT ($t=2.45$, $p=.016$); however, changes in values consistent behavior did not mediate weight change. Exploratory analyses suggest the possibility that changes in process variables were less associated with weight change in ABBI than in SBT after treatment was discontinued.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Registration

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Conclusions—Both conditions produced significant changes in process variables, however there was little difference between groups. Thus, the results do not provide an adequate process account for the observed weight change differences between ABBI and SBT, leaving important questions that need to be addressed by future research.

Keywords

Acceptance; avoidance; obesity; values; randomized trial; weight loss

Behavioral weight loss programs consistently produce an average weight loss of approximately 7–10%; typically resulting in significant health improvements (Butryn, Webb, & Wadden, 2011; MacLean et al., 2015). However, most individuals achieve maximum weight loss between 6–9 months and gradually regain weight thereafter (Barte et al., 2010; Jeffery et al., 2000; Loveman et al., 2011; M. G. Perri, 1998). Participants who report problems with emotional overeating have been shown to fare worse in these programs (Butryn, Thomas, & Lowe, 2009; Niemeier, Phelan, Fava, & Wing, 2007).

Researchers have begun testing interventions that incorporate mindfulness and acceptance-based strategies found in Acceptance and Commitment Therapy (ACT; S. C. Hayes, Strosahl, & Wilson, 1999) within weight loss programs in an attempt to improve long-term outcomes. It is theorized that ACT strategies could lead to better weight loss by increasing acceptance of food cravings and problematic thoughts and emotions (thereby reducing their impact on behavior). In addition, ACT values clarification and commitment strategies could improve outcomes by increasing the degree to which individuals behave consistent with their self-identified values. Previously, changes in acceptance and values have been shown to mediate positive outcomes in ACT research across a broad range of mental and behavioral health intervention studies (S. C. Hayes, Luoma, Bond, Masuda, & Lillis, 2006), however researchers have just begun to apply ACT methods to weight control.

Pilot studies have demonstrated that ACT strategies could be helpful for both weight loss (Forman, Butryn, Hoffman, & Herbert, 2009; Goodwin, Forman, Herbert, Butryn, & Ledley, 2012; Tapper et al., 2009) and maintenance (Lillis, Hayes, Bunting, & Masuda, 2009). The first randomized trial comparing a standard behavioral treatment (SBT) to an acceptance based treatment (ABT) that incorporated mindfulness and acceptance strategies from ACT showed no significant between groups differences in weight loss at 12 months (Forman et al., 2013). A revised version of the ABT intervention, which built on, and expanded, successful strategies from the previous trial was later tested and showed significantly greater weight loss at 12 months as compared to SBT (13.3% vs 9.8%; Forman et al., 2016). The ABT effect was partially mediated by changes in acceptance of food-related cravings and autonomous motivation, a mechanism related to values clarification and attainment.

The authors of the current study recently published findings from a similar randomized controlled trial comparing a standard behavioral intervention to an acceptance-based behavioral intervention (ABBI) that combined ACT and traditional weight loss strategies for adults with overweight or obesity who self-identified as struggling with stress or emotional eating (WITHHELD). In contrast to the results of the Forman 2016 trial, there were no significant differences in mean weight loss between groups after 12 months of treatment.

However, participants in the ABBI group regained significantly less weight during the post-treatment phase (12–24 months) compared to those in the SBT condition (4.6kg vs 7.1kg regain; WITHHELD). In addition, a higher proportion of ABBI participants achieved clinically meaningful weight losses of $\geq 5\%$ at 24 months (38% vs 25%). These results suggest that the acceptance-based strategies may be helpful for maintenance of weight loss.

The current study examined the process measures from this recent trial that might explain between group differences in weight loss outcomes. We hypothesized that the ABBI condition would show larger changes in acceptance, values-consistent behavior, and flexible control of eating, and that these changes would be related to weight loss outcomes in the ABBI condition and would partially mediate observed differences in weight loss maintenance between ABBI and SBT.

METHOD

Design

The study was a randomized controlled trial of 162 participants who were allocated in a 1:1 ratio, stratified by gender, to one of two treatment conditions: (1) Acceptance-Based Behavioral Intervention (ABBI), or, (2) Standard Behavioral Treatment (SBT). The intervention was 32 sessions across one year in a faded contact design. Assessments occurred at baseline, 6, 12, 18, and 24 months. The full details of the study procedures and primary results can be found elsewhere (WITHHELD), however relevant portions are reviewed here.

Participants

Included participants were 18–70 years of age, had a body mass index (BMIs) between 30–50 kg/m², and reported elevated levels of internal disinhibition (defined as a score of 5 or higher for women or 4 or higher for men on the Internal Disinhibition [ID] subscale of the Eating Inventory). A detailed description of the screening process and establishment of the ID cutoff can be found in the study protocol (WITHHELD).

Interventions

The intervention was delivered in group format with 15–16 participants per group. Participants arrived early to be weighed by one of the group leaders and were also given brief feedback on their food diary prior to the start of group. Each session lasted one hour.

The groups were run by co-leader pairs, which include a mix of Ph.D. psychologists, Ph.D. exercise physiologists, and master's level nutritionists. One of the leaders was an expert and the other was a novice (newly trained for the current study). Each leader pair was responsible for running both conditions in the cohort to which they were assigned in order to counterbalance leader effects. All the group leaders had training and experience running standard behavioral weight loss interventions. All group leaders received a 2-day training in acceptance-based interventions and met for weekly supervision with one of the study co-investigators. All sessions were audiotaped for treatment fidelity analysis (treatment fidelity was excellent and results have been presented elsewhere, see WITHHELD).

Shared Components—Both intervention conditions shared core behavioral weight components. Participants were placed on a standard calorie and fat restricted diet, with goals of 1200–1800 kcal/day and 33–42 grams of fat/day (25% calories from fat) depending on their baseline weight, and were encouraged to lose 1 to 2 pounds per week and to achieve and then maintain a weight loss of 10% of initial body weight; consistent with AHA and ADA guidelines (Look AHEAD Research Group, 2006). Participants were instructed to self-monitor their daily calorie and fat intake in their food diaries, which were reviewed each week by the interventionists. Participants were also encouraged to gradually increase their physical activity until they are exercising at least 250 minutes per week at moderate intensity (goal=50–75% of maximal heart rate, not to exceed perceived exertion of 13 on a 6–20 scale) and were given basic information about safe and effective exercise strategies. Participants were taught behavioral strategies to assist in the modification of their eating and exercise habits including self-monitoring (Baker & Kirschenbaum, 1993; Boutelle & Kirschenbaum, 1998), stimulus control, problem-solving (M.G. Perri et al., 2001), assertiveness training, social support (R. Wing & Jeffery, 1999), goal setting (Bandura & Simon, 1977), and relapse prevention (Marlatt & Gordon, 1985). Later lessons included relapse prevention, dealing with motivation erosion, improving the quality of the diet through approaches such as volumetrics, and adding novelty to the physical activity regimen.

Components that differed in ABBI vs SBT—SBT utilized cognitive change strategies to address negative thoughts, emotions, and food cravings that may impede weight loss. For example, participants were taught how to recognize a negative thought, attempt to stop it, and replace it with a positive thought. Participants in the SBT condition were also taught how to reduce stress and avoid impulsive eating using relaxation and distraction techniques.

In contrast, the ABBI intervention taught acceptance, mindfulness, and values-based techniques to address negative thoughts, emotions, and food cravings (S. C Hayes & Lillis, 2012; Lillis, Dahl, & Weineland, 2014). Acceptance strategies focus on illustrating the link between efforts to control or avoid internal experiences and unsuccessful weight control behaviors. For example, emotional eating was discussed as a way to reduce stress or sadness in the short-term, at the expense of more stress and sadness, reduced health, and possibly increased weight over the medium to long-term (referred to as “the cost of avoidance”). A variety of exercises were used to expose participants to unwanted physiological and emotional states (through guided imagery and the presentation of food cues) in order to practice “riding out” these experiences without engaging in unhealthy behavior. Participants were taught mindfulness strategies that included increasing awareness of problematic thoughts through thought labeling (e.g. “self-sabotaging” or “judgment”), guided imagery (e.g. imaging thoughts as leaves on a stream), thought exposure (repeating a problematic thought over and over), and metaphor (e.g. imagining your mind as a “bad motivational speaker”) in order to decouple problematic thoughts and unhealthy behavior. Finally, the ABBI condition utilized basic values clarification and commitment techniques, such as writing about core values related to health, relationships, and work, and setting values-based goals, for the purpose of helping participants identify how weight-related behaviors are central to supporting desired life actions (e.g. being active, nourishing your body, setting a good example for family members, and increasing longevity, being more present during time

with loved ones). A more detailed description of the intervention can be found elsewhere (WITHHELD).

Measures

Anthropometric—Weight was measured to the nearest 0.1 kg using a digital scale and height was measured to the nearest millimeter with a stadiometer, using standardized procedures, and used to calculate BMI (kg/m^2).

Eating Inventory—The Eating Inventory is a widely used measure of eating behavior that includes three subscales, cognitive restraint, disinhibition, and hunger (Stunkard & Messick, 1985) (higher scores indicate greater endorsement of each). The disinhibition scale is divided into two subscales, internal and external disinhibition. An example of an internal disinhibition item is the following true/false question: “When I feel anxious, I find myself eating.” The Eating Inventory has demonstrated adequate internal consistency, test-retest reliability, and sensitivity to change (R. R. Wing et al., 2008; R.R. Wing & Phelan, 2002).

Acceptance and Action Questionnaire-Weight—The AAQ-W is a 22-item questionnaire that assesses experiential avoidance related to body weight, food and eating. Higher scores indicate more weight-related experiential avoidance; one of the main targets of acceptance-based interventions. The AAQ-W has demonstrated good reliability and validity and has been shown to mediate outcomes in ACT interventions for weight control (Lillis & Hayes, 2008; Lillis et al., 2009).

Bull’s Eye—The *Bull’s Eye* (Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012) assesses the ability to take action consistent with one’s stated values and goals. Participants identify their personal values and goals in four areas (health, relationships, work, leisure) and then indicate on a dartboard how consistent their behavior has been with those stated values and goals, with marks closer to the center indicating greater consistency. Marks are converted into a Likert scale from 1–7, with higher scores indicating greater consistency of behavior to stated values. The Bull’s Eye has shown good reliability and validity (Lundgren et al., 2012).

Weight Control Strategies Scale—The WCSS is a 30-item self-report measure used to assess the use of specific strategies for losing or maintaining weight loss (Pinto, Fava, Raynor, LaRose, & Wing, 2013). The WCSS contains 4 subscales: Dietary Choices, Self-monitoring Strategies, Physical Activity, and Psychological Coping. Higher scores indicate greater use of weight control strategies. The WCSS has been shown to have good reliability and validity for use in overweight and obese weight loss treatment seeking samples (Pinto et al., 2013).

Statistical analysis

All analyses were completed using IBM SPSS Statistics software version 24 for PC in 2017. The study was designed to detect a mean difference of approximately 4 kg at the study endpoint with 160 participants and no greater than 20% attrition. No power analysis was conducted for the mediation analysis as it was an exploratory aim of the trial. Differences in baseline characteristics between groups were examined using t-test and χ^2 .

The effect of the two interventions on changes in process variables over time was compared using linear and nonlinear mixed models. First, unconditional models were used to determine whether a linear or nonlinear trend best fit the longitudinal trajectory of the outcomes (nonlinear was a better fit for the analysis of weight change, linear was better for all other analyses), and to evaluate the variance components associated with the slope of time to determine assignment as fixed versus random effects (intercepts and slopes were treated as random effects in all models). In a second step, treatment condition and the interaction between treatment condition and the slope of time were added to the conditional model in order to account for variability in the trajectory of outcomes. The unit of time was represented as months from baseline. All significance tests were two-tailed, with alpha set to .05. Estimated marginal means and standard errors for changes in study variables were calculated using the linear mixed modeling procedure described above, which allows for comparisons between groups at each time point. The analytic approach accommodated missing data by making use of all available data from all randomized participants.

Mediation analyses were then performed for any process variables that showed between group mean differences by using change in process variable (0–12 months) as a mediator, 24-month percent weight change as the DV, and treatment condition as the IV. Mediation was tested by assessing the significance of the cross product of the coefficients for the treatment group to mediator relation (the *a* path), and the mediator to outcome relation controlling for treatment (the *b* path), using a well-validated and widely utilized bootstrapped procedure (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Preacher & Hayes, 2004, 2008). Parameter estimates were based on 5,000 bootstrap samples. The point estimate of the indirect cross product is the mean for these 5,000 samples which ensures stability of the analyses; the bias corrected and accelerated 95% confidence intervals are similar to the 2.5 and 97.5 percentile scores of the obtained distribution over the samples, but with z-score based corrections for bias due to the underlying distribution (Preacher & Hayes, 2004, 2008). Thus, if the confidence intervals do not contain zero, the point estimate is significant at the level indicated.

Finally, bivariate correlations were conducted to examine the association between change in study variables and change in weight. Correlations were examined separately by condition and for each time period. Change in study variable was correlated with change in weight separately for both the treatment phase (0–12 months) and the posttreatment phase (12–24 months). Results were intended to be descriptive and hypothesis generating, as opposed to formal hypothesis testing.

RESULTS

Baseline Characteristics

Table 1 shows the means and standard deviations for participant characteristics at baseline. There were no significant differences between those randomized to ABBI vs SBT at baseline.

Weight Loss

Weight loss data for this randomized trial have been reported previously (WITHHELD), however they will be briefly reviewed here. Overall (baseline to 24 month) weight change was -4.2% for ABBI and -2.4% for SBT, a non-significant difference. During the treatment phase (0–12 months), the ABBI group lost an average of 8.5kg and the SBT group lost 9.3kg, a non-significant difference. However, during the posttreatment phase (12–24 months) the ABBI group regained significantly less weight than SBT (4.6kg for ABBI vs. 7.1kg for SBT, $p=.005$).

Changes in Process Measures and Between Group Comparisons

Table 2 shows the estimated marginal means for changes in each process variable. Results of the mixed models analyses showed a significant overall time effect for all variables: AAQW ($t=-7.08$, $p<.001$), Bull's Eye ($t=-2.26$, $p=.025$), Eating Inventory Internal Disinhibition ($t=4.03$, $p<.001$), Eating Inventory Flexible Control ($t=-5.70$, $p<.001$), Eating Inventory Rigid Control of Eating ($t=-5.78$, $p<.001$), and the Weight Control Strategies Scale ($t=-9.96$, $p<.001$). The only between groups difference on the changes in process measures over time was observed for the Bull's Eye (time \times condition interaction; $t=2.45$, $p=.016$), where the ABBI group had greater increases in values consistent behavior than the SBT group at 12, 18 and 24 months. The interaction was not significant for the AAQW ($t=0.73$, $p=.466$), Internal Disinhibition ($t=-0.28$, $p=.777$), Flexible Control ($t=1.12$, $p=.265$), Rigid Control ($t=-0.49$, $p=.624$), and Weight Control Strategies ($t=0.72$, $p=.471$).

Mediation

Given that the only significant between group difference was change in values consistent behavior, we performed one mediation analysis using change in values consistent behavior as the mediator, percent weight change as the DV, and condition as the IV. Bias-corrected 95% confidence intervals showed that values consistent behavior did not mediate changes in weight ($F=1.59$, $p=.207$; $CI-0.05 - 0.03$). Table 3 shows the path analysis betas, standard errors, and p values. Although the Intervention to Values (a) path was significant, the Values to Weight Change (b) path was not significant and the effect of the Intervention to Weight Change (c path) was not significantly altered when taking into account the mediator (c' or mediated intervention path), indicating that mediation was not observed.

Correlations between changes in process measures and weight change in ABBI and SBT

In order to generate hypotheses that might help explain the reduced weight gain of the ABBI group during the post treatment phase of the study, we conducted a post-hoc, exploratory analysis examining the correlations between changes in the process variables and weight change, looking at the treatment phase and the post treatment phase separately within each group. The within-group correlations between weight loss and changes in process variables are shown in Table 4. In contrast to our hypotheses, there was no evidence that changes in the AAQW nor the Bulls-Eye were more strongly associated with weight loss in ABBI as compared to SBT. Decreases in internal disinhibition and increases in flexible control of eating were strongly associated with weight loss in both interventions at both time periods.

Increases in rigid control were associated with initial weight loss and maintenance in SBT, but were not significantly associated with weight changes in ABBI.

DISCUSSION

This study examined the process data from a recently published randomized controlled trial comparing an acceptance-based behavioral intervention to a standard behavioral intervention to understand the beneficial effect of ACT on weight loss maintenance from 12 to 24 months. Given the focus of ACT on values and acceptance, it was hypothesized that the ABBI condition would produce greater improvements in values consistent behavior and flexible control of eating, and greater reductions in weight-related experiential avoidance, and that these changes would relate to their greater weight loss. Consistent with hypotheses, the ABBI group showed significantly greater improvements in values-consistent behavior at 24 months as compared to SBT. However, this difference in values consistent behavior did not mediate the difference in weight loss. In addition, there were no differences between groups in changes in experiential avoidance and flexible control of eating. Surprisingly, both the ABBI and SBT interventions had a similar and significant impact on experiential avoidance and flexible control.

The Bull's Eye is a measure of values-consistent behavior. Said another way, it is an assessment of self-reported values attainment, as the respondent is first describing their personal values and then indicating the degree of correspondence between their stated values and their behavior. Values-consistent behavior is the ultimate target of ACT, and thus it seemed logical that an overall increase in values-consistent behavior would have an impact on weight management, however results do not support this hypothesis. It is possible that broad changes in behavior do not necessarily correlate with the changes required to manage weight specifically; or, alternatively, the Bull's Eye may simply not be sensitive enough when used in this area. As this is the first study to utilize a measure of values-consistent behavior to predict weight change, more research is needed to clarify what, if any, role this variable plays in weight management.

Despite not being directly targeted, the SBT group showed markedly reduced experiential avoidance similar to the ABBI group in this study and to a pilot study that tested ACT strategies for weight management (Lillis et al., 2009). These results stand in contrast to recent findings reported by Forman and colleagues, which suggest that acceptance-based interventions can produce greater changes in acceptance of cravings when compared to SBT (Forman et al., 2016). One possible explanation is that the measure used in the Forman study specifically focused on acceptance of food cravings, which was heavily targeted in the intervention, and thus may have been more sensitive to differences between groups. The process measure used in the current study (AAQW) was a broad measure of experiential avoidance of weight-related difficulties (which is typically addressed by teaching acceptance-related skills). It is possible that the behavioral changes required in SBT are significant enough to reduce experiential avoidance, even if acceptance-related skills are not taught. Given that this is the first study to compare an acceptance-based intervention to SBT for weight loss using the AAQW as a process measure, further research is needed to clarify this issue.

In addition, there were no differences between groups on flexible control of eating. Behavioral flexibility is a target of ACT, and thus it seemed logical that the use of acceptance-based strategies would foster greater increases in flexible control of eating behavior, however the results do not support this hypothesis. Interestingly, however, flexible control was one of the few variables showing a strong correlation with weight change for the ABBI group in the post-treatment phase, indicating that this may be a potential avenue for future study.

Overall the exploratory analyses of the correlations between changes in the process variables and weight change suggest that changes in many of the process variables were associated with initial weight loss (months 0–12) in both SBT and ABBI. Although most of these variables continued to be associated with weight maintenance in SBT, there were fewer associations with better maintenance in ABBI. The use of the weight control strategies was more strongly associated with weight loss maintenance in SBT. This is encouraging given that this would be the expected putative mechanism of change for SBT, however it could also reflect the fact that SBT condition spent relatively more time reviewing and encouraging the use of traditional weight control strategies.

Participants in this study were selected for having high internal disinhibition, a subgroup of weight loss treatment seeking individuals that typically do poorer in weight loss interventions. Expected weight loss for a comprehensive behavioral intervention with a non-selected sample is about 5% at 24 months, suggesting that the ABBI group approached the expected mean while the SBT group showed poorer weight loss consistent with previous research on high internal disinhibition. There is no known theoretical or empirical reason to believe the weight losses obtained in this study could explain the null results of the process analyses.

Of note, the correlations between internal disinhibition change and weight change were strong for both conditions during both the treatment and posttreatment phases, suggesting that those that made the largest changes in internal disinhibition on average lost more weight. These results suggest that perhaps internal disinhibition might be a good target for improving weight loss and maintenance interventions and that future treatment innovations might want to more directly focus on changing and maintaining change in internal disinhibition.

These results leave us with more questions than answers. First and foremost, we do not have a credible process account for the observed significant between group differences in weight regain after treatment between ABBI and SBT. We did see differences in values consistent-behavior, however change in values were not related to weight change and the difference in change in values between ABBI and SBT did not mediate the difference in weight change. It is possible that an alternative ACT-related variable that was not measured could have accounted for the differences. For example, we did not assess for mindfulness, self-as-context, or cognitive defusion, which are all specified mechanisms of action for ACT treatment, although somewhat less frequently measured and reported in outcome studies.

Another unanswered question is to what degree should we expect changes in experiential avoidance from participation in SBT? It could be that SBT produces general increases in acceptance, which reduced experiential avoidance, despite not directly teaching acceptance-related skills. It could also be that the AAQW is not sensitive enough to detect group differences in an SBT vs ABBI study. Future research is needed to address these questions.

This study had many strengths, including a randomized design, a gold standard comparison group, objective measurement of weight, blinded assessors and standardized assessments of process variables at multiple time points. The study also had limitations. The sample was primarily middle-aged, Caucasian women, limiting the generalizability of the findings. The sample was selected on the basis of having a high internal disinhibition score, likely limiting the range of scores for the Eating Inventory. In addition, some of the analyses were exploratory and post hoc, and thus may have been underpowered. One final note of caution, given the nature of the analyses results should not be interpreted rigidly but rather used for hypothesis generation for future empirical research.

This study was an analysis of the process data from a recently published randomized trial that showed a significant impact on weight loss maintenance of an acceptance-based behavioral intervention when compared to a standard behavioral intervention. Both conditions produced similar changes in process measures leaving no clear explanation for weight outcome differences.

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Highlights

- Presented process data results for an RCT for weight loss
- Both conditions produced significant changes in experiential avoidance
- The acceptance-based condition showed greater change in values
- Values did not mediate weight change

Table 1

Baseline characteristics of participants in the ABBI study

Characteristics	ABBI (N=81)	SBT (N=81)
<i>Sex, N (%)</i>		
Female	69 (85%)	69 (85%)
Male	12 (15%)	12 (15%)
<i>Race/ethnicity, N (%)</i>		
Black/African American	6 (7.5%)	2 (2.5%)
Hispanic	5 (6%)	5 (6%)
Asian	2 (2.5%)	0 (0%)
Caucasian (Non-Hispanic)	68 (84%)	74 (91.5%)
<i>Education, N (%)</i>		
High School/G.E.D.	6 (7%)	6 (7%)
Some college/Vocational	24 (30%)	20 (25%)
Bachelor's degree	29 (37%)	29 (37%)
Graduate or professional	21 (26%)	24 (31%)
Age (year)	50.7 ± 11.3	49.8 ± 10.7
Weight (kg)	102.5 ± 17.3	102.2 ± 17.7
BMI (kg/m ²)	37.46 ± 5.35	37.66 ± 5.25
Weight-Related Experiential Avoidance (AAQW)	90.29 ± 17.55	90.38 ± 17.45
Values Consistent Behavior (Bull's Eye)	12.03 ± 4.28	13.63 ± 4.41
Eating Inventory: Internal Disinhibition	6.25 ± 1.55	6.15 ± 1.57
Eating Inventory: Flexible Control	2.67 ± 1.44	2.60 ± 1.62
Eating Inventory: Rigid Control	2.93 ± 1.56	2.79 ± 1.37
Weight Control Strategies Scale Total (WCSS)	1.25 ± 0.46	1.31 ± 0.55

Values shown are mean ± standard deviation

Table 2
 Mean Changes for the AAQW, Bull's Eye, Eating Inventory, and Weight Control Strategies

Measure	6 Month		12 Month		18 Month		24 Month	
	M	SE	M	SE	M	SE	M	SE
Weight-Related Experiential Avoidance (AAQW)								
ABBI	-22.66	2.09	-22.25	2.09	-21.84	2.21	-21.43	2.49
SBT	-22.41	2.07	-22.76	2.08	-23.11	2.22	-23.46	2.47
Values Consistent Behavior (Bull's Eye)								
ABBI	3.06	0.46	3.33*	0.44	3.61*	0.47	3.87*	0.54
SBT	1.96	0.45	1.93	0.43	1.89	0.47	1.86	0.54
Eating Inventory: Internal Disinhibition								
ABBI	-2.73	0.24	-2.41	0.21	-2.10	0.22	-1.78	0.26
SBT	-2.50	0.23	-2.15	0.21	-1.79	0.21	-1.44	0.26
Eating Inventory: Flexible Control								
ABBI	1.87	.24	1.56	.21	1.25	0.21	0.94	0.24
SBT	2.49	.23	2.06	.20	1.63	0.21	1.19	0.23
Eating Inventory: Rigid Control								
ABBI	2.09	.19	1.88	.18	1.46	0.18	1.04	0.21
SBT	2.41	.18	2.22	.17	1.85	0.17	1.47	0.19
Weight Control Strategies (WCSS) Total								
ABBI	1.26	0.08	1.01	0.07	0.75	0.07	0.49	0.08
SBT	1.29	0.08	1.01	0.07	0.72	0.07	0.44	0.08

* Indicates between group differences at the $p < .05$

Table 3

Path Results for Testing Change in Values Consistent Behavior as a Mediator for BMI Change.

	Path <i>a</i> (Intervention--> Values)	Path <i>b</i> (Values--> Weight Change)	Path <i>c</i> '(Mediated Intervention Effect)	Path <i>c</i> (Intervention--> Weight Change)
<i>β</i>	-1.65	-0.05	0.66	0.74
<i>S</i>				
<i>E</i>	0.79	0.05	0.49	0.48
<i>p</i>	0.037	0.379	0.175	0.122

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Table 4

Bivariate Correlations with Percent Weight Change by Condition During the Treatment and Post-Treatment Phases

Variable	Treatment (0–12)		Follow-up (12–24)	
	ABBI	SBT	ABBI	SBT
Weight-Related Experiential Avoidance (AAQW)	.223	.371**	.265*	.498**
Values Consistent Behavior (Bull's Eye)	-.328**	-.443**	-.176	-.382**
Internal Disinhibition	.503**	.547**	.301*	.530**
Flexible Control	-.293*	-.450**	-.369*	-.286*
Rigid Control	-.204	-.293*	-.036	-.255*
Weight Control Strategies Scale Total (WCSS)	-.404**	-.569**	-.176	-.518**

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