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**A Pilot Randomized Controlled Trial of Acceptance and Commitment Therapy Guided  
Self-Help for Overweight and Obese Adults High in Weight Self-Stigma**

Sarah Potts, Jennifer Krafft & Michael E. Levin

### Abstract

Weight self-stigma, in which individuals internalize stigmatizing messages about weight, is a prevalent problem that contributes to poor quality of life and health. This pilot randomized controlled trial evaluated acceptance and commitment therapy (ACT) guided self-help using *The Diet Trap* (Lillis, Dahl, & Weineland, 2014) for 55 overweight/obese adults high in weight self-stigma. Participants were randomized to the ACT self-help book plus phone coaching (GSH-P;  $n=17$ ), self-help book plus email prompts only (GSH-E;  $n=20$ ), or a waitlist condition ( $n=18$ ), with online self-report assessments at baseline and posttreatment (8 weeks later). Participants reported high satisfaction ratings and engagement with the ACT self-help book, with no differences between GSH-P and GSH-E. Both GSH-P and GSH-E improved weight self-stigma relative to waitlist with large effect sizes. There were mixed findings for health outcomes. The GSH-P condition improved more on healthy eating behaviors and general physical activity, but neither ACT condition improved more than waitlist on self-reported body mass index, emotional eating, and a second measure of physical activity. Results suggest an ACT self-help book with email prompts can reduce weight self-stigma and potentially improve some health behavior outcomes. Phone coaching may provide additional benefits for generalizing ACT to diet and physical activity.

*Keywords:* acceptance and commitment therapy, mindfulness, obesity, overweight, stigma.

## **A Pilot Randomized Controlled Trial of Acceptance and Commitment Therapy Guided Self-Help for Overweight and Obese Adults High in Weight Self-Stigma**

Overweight and obese individuals experience chronic, pervasive stigma, which is a significant contributor to poor health outcomes (Puhl & Heuer, 2010). The negative consequences of stigma are further worsened among overweight and obese individuals who internalize and apply stigmatizing attitudes to themselves, a process called weight self-stigma (Lillis et al., 2010). Research indicates that the negative effects of weight stigmatization from others are mediated by weight self-stigma (e.g., Durso et al., 2012; O'Brien et al., 2016), suggesting that self-stigmatization is a particularly critical factor. A review of the research indicates that weight self-stigma leads to decreased health-related quality of life and poorer mental health, as well as behaviors further contributing to weight, including lower physical activity, higher rates of disordered eating, and poorer response to behavioral weight-loss interventions (Pearl & Puhl, 2018). Weight self-stigma creates a vicious cycle in which stigmatized individuals engage in maladaptive behaviors (e.g. exercise avoidance, disordered eating) in an attempt to avoid negative thoughts and emotions related to their stigma (Tomiya, 2014). Large-scale epidemiological research indicates that weight self-stigma is a common process, being observed in approximately 40% of overweight and obese adults (Puhl et al., 2018). Thus, weight self-stigma is a prevalent and toxic psychological process that contributes to poor health outcomes among overweight and obese individuals.

Despite its prevalence and consequences, there are notably few evidence-based interventions for weight self-stigma (Pearl & Puhl, 2018). To-date, the most studied treatment is acceptance and commitment therapy (ACT; Hayes et al., 2012), a modern cognitive behavioral therapy that has been found effective for treating a wide range of behavioral health concerns in

well over 300 randomized controlled trials (RCTs; ACBS, 2020). ACT is designed to reduce psychological inflexibility, a transdiagnostic pathological process in which behavior is rigidly guided by internal experiences (e.g., cognitions, affect, cravings), or attempts to avoid internal experiences, rather than values or direct contingencies (Hayes et al., 2012). Research has found ACT to be effective for improving weight management and associated health behaviors (Forman et al., 2015; Lillis & Kendra, 2014), which are mediated by reductions in psychological inflexibility (e.g., Lillis et al., 2009; Schumacher et al., 2019).

ACT theoretically applies well to weight self-stigma, teaching acceptance and mindfulness skills that reduce the harmful effects of self-stigmatizing thoughts and feelings, while using values to increase more adaptive motivators for meaningful behavior change. Two previous waitlist controlled RCTs have evaluated ACT for weight self-stigma among overweight and obese adults, using a one-day ACT workshop (Lillis et al., 2009) and a 10-week ACT group format (Palmeira et al., 2017). Both RCTs found that relative to waitlist, ACT significantly reduced weight self-stigma, improved mental health and quality of life, improved eating behaviors, and decreased body mass index (BMI; Lillis et al., 2009; Palmeira et al., 2017). These studies evaluated ACT delivered in-person by trained therapists.

Although ACT is a promising treatment for weight self-stigma, these protocols require a trained therapist (or comparable provider with expertise) to deliver in-person services, which might limit the reach of services to those who would benefit from ACT. For example, the prevalence of weight self-stigma (Puhl et al., 2018) suggests that many more individuals would benefit from interventions than there are likely to be available trained psychologists. Furthermore, many of the contact points for weight-related services do not necessarily include psychologists (e.g., dietary education, bariatric surgery, weight loss medications, exercise

classes, commercial weight loss programs, self-help groups), which further reduces reach. In addition, clients struggling with stigma may be reticent to seek in-person services (e.g., Levin et al., 2018). Alternate treatment modalities may be needed to fully address the public health challenges of weight self-stigma.

Self-help books provide a promising alternative modality for providing ACT for weight self-stigma. These books allow for patients to learn ACT at their own pace, at a low cost, in their own living environment, in a private, anonymous format, and without requiring the resources and availability of a trained provider. Recently, a pilot open trial evaluated an ACT guided self-help intervention for weight self-stigma (*citation removed for blind review*). Participants read a self-help ACT book called *The Diet Trap* (Lillis et al., 2014) and participated in weekly phone coaching calls to increase adherence to the book. Coaching was delivered by clinical/counseling psychology doctoral students and was based on an established protocol for increasing adherence to self-guided interventions (Duffecy et al., 2011). This pilot trial found high program engagement rates and self-reported satisfaction as well as large improvements over time on self-reported weight self-stigma, eating behaviors, physical activity, and quality of life as well as a trend for improvements in objectively measured weight.

Research indicates that coaching can enhance outcomes for self-help interventions (Baumeister et al., 2014). However, some research suggests that self-help interventions may be equally effective without more intensive coaching procedures (e.g., Andersson et al., 2003; Berger et al., 2011), including with ACT self-help specifically (e.g., Fledderus et al., 2012). The complexities and resource costs of delivering coaching places a substantial additional burden for implementation. Thus, evaluating the added benefits of phone coaching is needed to further inform cost-effective treatment options that have optimal reach.

The current pilot RCT sought to evaluate *The Diet Trap* ACT self-help book, with guidance from phone coaching or brief email prompts only, relative to a waitlist condition in a sample of 55 overweight/obese adults high in weight self-stigma. The first prediction was that ACT guided self-help would be acceptable (i.e., high adherence to the book, high satisfaction ratings), but with greater acceptability when including phone coaching versus when only receiving brief email prompts. The second prediction was that the ACT guided self-help would be effective relative to the waitlist condition, but with greater effectiveness when including phone coaching. The primary outcome for the study was weight self-stigma, with physical activity, eating behaviors, and BMI as secondary outcomes.

## Methods

### Participants

This pilot study was conducted with a sample of 55 adults who met the inclusion criteria: being at least 18 and no more than 64 years of age, residing in the United States, having a BMI of 27.5 or higher, and having a score of 36 or higher on the Weight Self-Stigma Questionnaire, indicating problematic weight self-stigma (WSSQ; Lillis et al., 2010). A cutoff score of 36 on the WSSQ was used in the previous guided self-help trial (*citation removed for blind review*) and is one standard deviation above the mean for obese, non-treatment seeking adults (Lillis et al., 2010). Potential participants were excluded if they were pregnant, had chest pain, dizziness, or cardiovascular disease, or had a serious psychological diagnosis that affected their functioning (see Figure 1 for participant flow).

The sample had a mean age of 38.65 ( $SD = 12.40$ ) and a mean BMI of 37.01 ( $SD = 6.51$ ) at baseline (see Table 1 for demographics by condition). Participants were mostly female (81.8%, compared to 18.2% male). The sample was 89.09% non-Hispanic/Latino White, 5.45%

Hispanic/Latino White, 3.64% Hispanic/Latino of Other Race, and 1.82% Black. Most participants were married or partnered (60.00%) and employed (65.45%). The median income range of the sample was \$40,000-\$59,999. The majority of participants had previously participated in one or more structured weight loss intervention, with the most frequently endorsed being exercise classes (67%), self-guided diet program (58%), and commercial weight loss program (56%).

## **Procedures**

### ***Recruitment***

Participants were recruited through posting flyers throughout the community, informing health care providers for referrals, and listing the study online through the senior author's clinical trial recruitment website. Recruitment was also conducted by requesting the authors' university extension faculty and staff distribute flyers for the study at various events and services related to health promotion and diet provided throughout the state. Recruitment was conducted from March 2017 to February 2018.

### ***Screening and Consent***

Participants first completed an online self-report screening, which assessed the above inclusion and exclusion criteria, followed by an online consent form.

### ***Baseline***

Participants who consented completed an online baseline self-report survey delivered through Qualtrics. All outcome and process of change measures listed in the Measures section (e.g., measures of weight self-stigma, weight management behaviors, emotional eating, binge eating, physical activity, weight-related psychological inflexibility, and general psychological inflexibility) were administered in this survey. Height and weight were also assessed in the



baseline self-report survey and used to calculate BMI. Demographics (i.e., age, gender, race, ethnicity, marital status, income, and previous weight loss methods attempted) were also assessed in the baseline survey. At the end of this survey, participants were automatically randomly assigned by Qualtrics to one of three conditions: guided self-help with phone coaching (GSH-P), guided self-help with email prompts (GSH-E), or a waitlist condition. Chance of allocation to condition was equivalent between conditions (1:1:1) without blocking or stratifying by any variables.

Participants assigned to GSH-P or GSH-E conditions were asked to read their assigned book over the following eight weeks. Participants assigned to the waitlist condition were asked to simply wait eight weeks before completing the next survey. All participants were asked to complete an online posttreatment self-report survey eight weeks after baseline. After completing the posttreatment survey, participants in the waitlist condition received access to the GSH-P intervention, but no data was collected on their use or responses to the GSH-P intervention. Survey data were collected automatically through the online Qualtrics platform and analyzed by the first and last authors.

### **Guided Self-Help Conditions**

Participants assigned to either the GSH-E or GSH-P conditions were sent a physical copy of *The Diet Trap* (Lillis et al., 2014). *The Diet Trap* is a self-help book that teaches a series of skills from ACT to reduce the harmful effects of weight self-stigma and develop more adaptive motivators for engaging in meaningful health and quality of life improving behaviors. The book teaches key ACT skills and concepts designed to increase psychological flexibility – the capacity to engage in meaningful actions while being mindful and accepting of whatever aversive internal

experiences may arise (e.g., self-stigmatizing thoughts and feelings). Each chapter includes journaling prompts to support applying ACT to oneself.

Participants in both GSH-E and GSH-P conditions were asked to read one of seven book chapters each week for the first seven weeks. An additional eighth week was provided in the event participants fell behind on the weekly reading schedule, based on feedback we received from participants in our pilot trial (*citation removed for blind review*). In addition to the reading, participants in both GSH conditions were asked to complete the journaling activities contained within the book, and to complete a weekly online Qualtrics quiz for each chapter they finished. The quizzes were developed to help monitor comprehension and engagement, and support adherence, with automatic feedback provided for any incorrect quiz responses. However, quizzes were not monitored for accuracy, and thus there was no system in place to confirm participants did read each chapter and/or comprehended its content..

### ***GSH-E***

Participants assigned to the GSH-E condition received a weekly, templated email manually sent by the first author, which reminded them of the tasks to complete that week (i.e., reading, journaling, and quiz). This email also included a brief, tailored, supportive statement (e.g., *It can be hard to be consistent with something like this. You've been doing great on that, well done!*). If a participant did not complete the assigned quiz, suggesting they also may not have completed the weekly reading, up to two reminders were sent with a similar supportive tone and a request to set a new deadline. Thus, emails solely focused on adherence to the book and activities with simple prompts and did not include any other active intervention content (e.g., skills training, discussions of how to apply skills). Emails did not include in-depth interactions or discussions of barriers to adherence, questions about assignments, or similar discussions as

covered in phone coaching. Although researcher contact time was minimal through these brief emails, time spent preparing and tracking emails was estimated at approximately 90 minutes per participant over the 8 weeks.

### ***GSH-P***

Participants assigned to the GSH-P condition received the same email prompts as the GSH-E condition, but also received weekly phone coaching sessions. All phone coaching was conducted by the first author, an advanced clinical/counseling psychology doctoral student at the time of the study. Phone sessions followed a protocol based on the supportive accountability model {Formatting Citation} and aimed to promote engagement with the self-help materials. The protocol consisted of a 30-minute initial coaching session focused on increasing motivation and addressing potential barriers to engagement. The subsequent six weekly calls were 5-10 minutes long and focused on monitoring and reinforcing adherence, answering questions, problem solving non-adherence, and enhancing motivation. Prior to each weekly check-in, the researcher sent an email reminder to complete the chapter reading and related tasks in addition to a prompt for the next scheduled phone check-in. The final, 30-minute phone call in the eighth week focused on reviewing experiences in the program and helping generalize skills and knowledge that were gained. Similar to the email condition, phone coaching thus focused on adherence to the book and activities, rather than introducing additional intervention content. However, phone coaching was much more extended and elaborated than the email condition. The phone check-ins included personalized topics related to increasing motivation and generalizing skills learned in the book to daily life (e.g., how participants can apply strategies from the book to address current challenges, discussing concepts participants were learning from the book). This protocol was previously tested in our initial pilot trial with high satisfaction ratings (*citation removed for blind*

review). Researcher contact time with participants in this condition was estimated at approximately 120 minutes per participant over the 8 weeks.

### **Outcome Measures**

All outcome and process of change measures were assessed through online self-report surveys with the exception of book usage and satisfaction questions, which were only administered to participants in the GSH-E and GSH-P conditions at posttreatment.

#### ***WSSQ (Lillis et al., 2010)***

The WSSQ is a 12-item scale measuring weight self-stigma, including both negative attitudes toward oneself based on weight and fear of being stigmatized by others. Each item is rated from 1 (completely disagree) to 5 (completely agree), and items are summed to generate a total score. The measure has good convergent and divergent validity in addition to good internal consistency ( $\alpha = 0.88$ ), and is sensitive to change (Lillis et al., 2010). Internal consistency was good in this sample ( $\alpha = 0.85$ ).

#### ***Weight Control Strategies Scale (WCSS; Pinto et al., 2013)***

The WCSS is a 30-item measure of effective weight management behaviors. It has four subscales: dietary choices, self-monitoring strategies, physical activity, and psychological coping (e.g., using effective psychological strategies for weight loss). Each item is rated from 0 (never) to 4 (always), for the timeframe of the past month. The WCSS subscales have good internal consistency and validity (Pinto et al., 2013). Internal consistency was adequate in the present sample (dietary choices  $\alpha = 0.74$ , self-monitoring  $\alpha = 0.89$ , physical activity  $\alpha = 0.80$ , psychological coping  $\alpha = 0.76$ ).

#### ***Dutch Eating Behavior Questionnaire-Emotional Eating (DEBQ-EE; van Strien et al., 1986)***

The 13-item Emotional Eating subscale of the DEBQ-EE assessed the degree to which respondents have a desire to eat in response to unpleasant emotions such as sadness or irritation. Each item is rated from 1 (never) to 5 (very often), and items are summed together to generate a total score. The DEBQ-EE has been found to have adequate reliability and validity in previous research (van Strien et al., 2013). Internal consistency was excellent for the DEBQ-EE in this study ( $\alpha = 0.93$ ).

***Eating Disorder Examination Questionnaire-Binge Eating Episodes (EDE; Fairburn & Beglin, 1994)***

A single EDE item assessing binge eating episodes was included. Binge eating episodes were identified as the number of times in the past 28 days in which the respondent ate an unusually large amount of food and concurrently felt a loss of control over their eating. Previous research supports the reliability and validity of this item in assessing binge eating episodes (e.g., Fairburn & Beglin, 1994; Kalarchian et al., 2000; Reas et al., 2006).

***International Physical Activity Questionnaire-Short Form (IPAQ-SF; Craig et al., 2003)***

The IPAQ-SF is a 6-item self-report measure of physical activity. Respondents estimate how many days in the last week they engaged in at least 10 minute bouts of vigorous exercise, moderate exercise, and walking. They then estimate how much time they typically spent on each of these activities on those days. A total physical activity score is calculated by weighting each category by its intensity, then multiplying the estimated minutes by estimated days and summing all categories. The IPAQ-SF has good temporal stability and adequate concurrent validity with objective measures (Craig et al., 2003; Sallis & Saelens, 2000).

***BMI***

Body mass index was calculated through self-reported weight in pounds and height in

inches. Height was assessed in feet and inches at baseline. Weight was assessed at each time point with the question “What is your current weight (please enter numerically in pounds)?” BMI was calculated using the formula (weight in lbs/height in inches<sup>2</sup>)\*703.

### **Process of Change Measures**

#### ***Acceptance and Action Questionnaire for Weight-Related Difficulties (AAQW; Lillis & Hayes, 2008)***

The AAQW is a 22-item measure of psychological inflexibility as it relates to thoughts and feelings about one’s weight. Each item is rated from 1 (never true) to 7 (always true). The AAQW has good internal consistency, is sensitive to treatment, and has support for concurrent validity (Lillis & Hayes, 2008). Internal consistency was also good in this sample ( $\alpha = 0.85$ ).

#### ***Comprehensive Assessment of Acceptance and Commitment Therapy Processes (CompACT; Francis et al., 2016)***

The CompACT is a 23-item measure of general psychological flexibility (i.e., not framed in relation to weight or other specific concerns). Each item is rated from 0 (strongly disagree) to 6 (strongly agree). The CompACT has support for convergent and divergent validity, incremental validity, and superior factor structure compared to other general measures of psychological flexibility (Francis et al., 2016). Internal consistency was good in this sample ( $\alpha = 0.88$ ).

### ***Book Usage and Satisfaction***

A series of self-report items were adapted from previous studies (*citation removed for blind review*) to examine self-reported use and satisfaction with the self-help book. Satisfaction items were rated on a 6-point scale: 1 (*strongly disagree*), 2 (*mostly disagree*), 3 (*slightly disagree*), 4 (*slightly agree*), 5 (*mostly agree*), and 6 (*strongly agree*). This forced choice

format was designed such that a 4 or higher indicates a positive rating. Items assessed features including overall satisfaction (“Overall, I was satisfied with the quality of the book”), perceived helpfulness (“The book was helpful to me”), ability to understand concepts (“I was able to understand the concepts presented in the book”), and perceived fit (“I felt the book was made for someone like me”). The primary question for book usage (“How much of The Diet Trap book did you read? (answer from 0% to 100% - all 7 chapters)”) provided an open entry response to enter the percentage of the book read.

### **Data Analysis**

All dependent variables were inspected for normality, and variables that were not normally distributed (IPAQ and EDE variables) were transformed to approximate a normal distribution. Next, conditions were compared on demographic and outcome/process variables at baseline using one-way analysis of variance (ANOVA) and chi-square tests to identify any failures of randomization. Program engagement and satisfaction were assessed with descriptive statistics, and *t*-tests were used to identify any differences in program engagement and satisfaction between the two GSH conditions.

Analyses of outcomes and processes of change were conducted using mixed model repeated measures (MMRM) analyses. These analyses account for missingness using restricted information maximum likelihood estimation, which uses all observations present in the data and adjusts for the non-independence of repeated measures. Thus, analyses were included with the full intent to treat sample randomized to condition. Each MMRM model tested within-subject effects (baseline to posttreatment), between-subject effects (assigned condition), and the interaction of time and condition. If a significant omnibus interaction of time and condition was found, post-hoc tests were used to determine if there was significant change within any condition

and if the conditions differed at posttreatment. Cohen's  $d$  was calculated with these post hoc analyses in order to characterize the size of any significant between- or within-condition effects.

## Results

### Preliminary Analyses

Overall, 17 participants were randomly assigned to GSH-P, 20 to GSH-E, and 18 to waitlist. Of the 55 enrolled participants, 36 completed the posttreatment assessment, with no difference between conditions on rates of assessment completion (see Figure 1 for participant flow).

The IPAQ physical activity and EDE binge eating variables were highly skewed and kurtotic due to a large portion of participants at baseline reporting 0 binge episodes (45%;  $M = 4.40$ ,  $SD = 7.63$ , range = 0-35) and low physical activity (47% scoring below 1,000 on the IPAQ;  $M = 2086.67$ ,  $SD = 2288.81$ , range = 0 – 8838.00). These variables approximated a normal distribution with an exponential transformation (EDE) and a square root transformation (IPAQ), with skewness and kurtosis values being below 1 with these transformations. There were no significant baseline differences between conditions on outcome, process, or major demographic variables (see Tables 1 and 2).

### Self-Reported Engagement With the Book

Participants who completed the posttreatment assessment (GSH-P  $n = 12$ ; GSH-E  $n = 12$ ) reported reading an equally large percentage of the book on average in the GSH-P ( $M = 94.09\%$ ,  $SD = 14.97$ ) and GSH-E conditions ( $M = 81.50\%$ ,  $SD = 26.52$ ),  $t(21) = 1.38$ ,  $p > .10$ ,  $d = .58$ ). The majority of participants read the entire book (GSH-P 73%; GSH-E 58%). Only 17% in the GSH-E read less than half of the book and 0% in GSH-P read less than half. There were no statistical differences in reading engagement rates between conditions.



Participants reported equal engagement in the book between conditions including percentage of exercises completed in the book (GSH-P  $M = 74.09\%$ ,  $SD = 19.34$ ; GSH-E  $M = 77.67\%$ ,  $SD = 20.33$ ), how carefully they read the book (GSH-P  $M = 5.00$ ,  $SD = 1.00$ ; GSH-E  $M = 5.17$ ,  $SD = .94$  on 6-point scale with 5 = “quite a lot” and 6 = “very much”), and number of journaling pages written (GSH-P  $M = 14.36$ ,  $SD = 8.13$ ; GSH-E  $M = 12.42$ ,  $SD = 12.27$ ). The only engagement difference between conditions at posttreatment was for the 6-point self-report item “I intend to use the skills and concepts I learned in the program,” which was higher for the GSH-P than GSH-E condition (GSH-P  $M = 5.55$ ,  $SD = .69$ ; GSH-E  $M = 4.50$ ,  $SD = 1.45$ ;  $t[21] = 2.18$ ,  $p < .05$ ,  $d = .92$ ).

### **Self-Reported Satisfaction With the Book**

Participants reported equally high satisfaction ratings for the program between the GSH-P and GSH-E conditions for individual items, which were rated on a 6-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*), with 4 (*slightly agree*) or higher indicating agreement/satisfaction. This included overall satisfaction with the book (GSH-P  $M = 5.45$ ,  $SD = .69$ ; GSH-E  $M = 5.00$ ,  $SD = 1.41$ ), perceived helpfulness of the book (GSH-P  $M = 5.55$ ,  $SD = .69$ ; GSH-E  $M = 4.92$ ,  $SD = 1.44$ ), ability to understand concepts in the book (GSH-P  $M = 5.64$ ,  $SD = .51$ ; GSH-E  $M = 5.50$ ,  $SD = .67$ ), and perceived fit (i.e., that the book was made for them; GSH-P  $M = 5.36$ ,  $SD = 1.12$ ; GSH-E  $M = 5.00$ ,  $SD = 1.28$ ).

Participants in the GSH-P condition provided high ratings for overall satisfaction with coaching ( $M = 6.00$ ,  $SD = .00$ ) and helpfulness of coaching ( $M = 5.90$ ,  $SD = .32$ ), while disagreeing with the statement that the book would have been just as helpful without any phone coaching ( $M = 2.40$ ,  $SD = .84$ ). Participants in the GSH-E condition similarly provided high ratings for email support including overall satisfaction ( $M = 5.17$ ,  $SD = 1.27$ ) and helpfulness ( $M$

= 4.17,  $SD = 1.59$ ), although GSH-E participants slightly agreed that the book would have been just as helpful without email support ( $M = 4.17$ ,  $SD = 1.27$ ).

### **MMRM Analyses of Outcomes and Processes of Change**

A series of MMRM analyses tested for time by condition effects from baseline to posttreatment across the three conditions (see Tables 2 and 3). A significant time by condition interaction was found for the primary outcome of weight self-stigma. Post hoc analyses indicated large, significant within condition improvements in the GSH-P and GSH-E conditions, with no significant improvement in the waitlist condition. Significant, large effects were found at posttreatment, with the GSH-P and GSH-E conditions both having lower weight self-stigma than waitlist, with no differences between the GSH-P and GSH-E conditions.

For secondary health behavior outcomes, significant time by condition effects were found for WCSS physical activity and dietary choice. For WCSS dietary choice, only the GSH-P condition improved significantly from baseline to posttreatment (i.e., large effect size), with a significant difference at posttreatment only between the GSH-P and GSH-E conditions (i.e., large effect size favoring the GSH-P condition). For WCSS physical activity, there was a trending medium effect for activity to improve within the GSH-P condition, and deteriorate in the waitlist condition, with no change in the GSH-E condition. At post, the only trending difference was a medium effect for higher physical activity in the GSH-P versus waitlist condition.

In addition, two trending time by condition interactions were observed for secondary health behavior outcomes: WCSS psychological coping and EDE binge eating episode frequency. For EDE binge eating, there were significant within condition improvements in the GSH-P and GSH-E conditions (i.e., medium effect sizes), but not in the waitlist condition. At

posttreatment, both the GSH-P and GSH-E conditions were significantly lower on binge eating than waitlist (i.e., large effect sizes), with no difference between GSH conditions. For WCSS psychological coping, both the GSH-P and GSH-E conditions improved on using effective coping strategies for weight management from baseline to posttreatment (i.e., large effect sizes), with no change in the waitlist condition. However, none of the conditions differed at posttreatment on WCSS psychological coping. There were no significant (or trending) time by condition interactions for four secondary health outcomes: WCSS self-monitoring, DEBQ-EE emotional eating, IPAQ physical activity, and self-reported BMI.

With regards to process of change measures, a significant time by condition interaction was found for AAQW psychological inflexibility with weight-related concerns. Post hoc tests indicated large within-condition improvements in both the GSH-P and GSH-E conditions, with no change in the waitlist condition. At posttreatment, both the GSH-P and GSH-E conditions were significantly lower on the AAQW relative to waitlist, with no difference between GSH conditions. A time by condition interaction was not found for general psychological inflexibility as measured by the CompACT.

### **Discussion**

This pilot study sought to evaluate the feasibility and effectiveness of ACT guided self-help, with phone coaching or email prompts only, for weight self-stigma. Consistent with the previous pilot open trial (*citation removed for blind review*), participants reported high engagement and satisfaction with the book. Inconsistent with predictions, the addition of phone coaching did not improve engagement or satisfaction ratings with the self-help book, relative to less resource-intensive email prompts. Both guided self-help conditions equally reduced weight self-stigma relative to the waitlist condition, but the phone coaching condition more consistently

improved eating and physical activity outcomes than the email condition. Some secondary health outcomes did not improve in the ACT guided self-help conditions relative to waitlist including emotional eating, BMI, and a second measure of physical activity. Overall, results provide preliminary evidence for the potential effectiveness of ACT guided self-help for reducing weight self-stigma and improving some health outcomes, with mixed findings regarding the added benefit of phone coaching compared to email.

This study replicated previous findings that ACT is effective for reducing weight self-stigma (*citation removed*; Lillis et al., 2009; Palmeira et al., 2017). Weight self-stigma is a prevalent problem (Puhl et al., 2018) that leads to poor health outcomes, including behaviors that contribute to longstanding weight challenges (Pearl & Puhl, 2018). Weight self-stigma also impairs behavioral weight loss outcomes (Pearl & Puhl, 2018). For example, individuals higher in weight self-stigma adhere more poorly to prescribed physical activity (Mensing & Meadows, 2017) and dietary behavior changes (Mensing et al., 2016) and lose substantially less weight (Durso, 2013; Lillis et al., in press). Current weight management and health promotion programs that do not address stigma may not be sufficient for improving the health and well-being of individuals struggling with weight self-stigma. This study provides further support for the potential effectiveness of ACT to address this critical problem in a highly scalable format.

This study also partially replicated previous findings that ACT interventions targeting weight self-stigma can improve physical activity and eating behaviors (*citation removed*; Lillis et al., 2009; Palmeira et al., 2017). This is noteworthy in part because, in contrast to typical weight management protocols, these ACT interventions tend to have minimal content focused on increasing physical activity, decreasing maladaptive eating patterns, or other weight-loss related

activities. Rather, the focus is on reducing psychologically inflexible ways of responding to weight self-stigma, such as cognitive fusion (in which stigmatizing thoughts dominate one's actions and experiences) and experiential avoidance (in which the focus is on avoiding stigmatizing thoughts and feelings, even if it has negative consequences). ACT for weight self-stigma teaches individuals to respond more flexibly to self-stigmatizing thoughts and feelings, so that these experiences are acknowledged simply for what they are in a compassionate, accepting way, without having a significant impact on one's actions. Concurrently, these ACT protocols aim to increase more adaptive, intrinsically motivating guides for one's actions linked to personal values, which may include a range of quality of life improving activities. These results add to a literature suggesting that reducing weight self-stigma and psychological inflexibility can lead to improved health behaviors.

That said, the results were more mixed on secondary health outcomes than in previous ACT for weight self-stigma trials (*citation removed*; Lillis et al., 2009; Palmeira et al., 2017). For example, both broad engagement in healthy eating behaviors and binge eating improved, but emotional eating did not. Similarly, broad engagement in physical activities that support weight maintenance improved, but total physical activity time as measured by the IPAQ did not. BMI also did not improve, although we did not necessarily expect a between-group effect on self-reported BMI over the brief, 8-week intervention period. These results may be due in part to measurement challenges (i.e., reliance on imprecise self-report measures) and limited power to detect effects due to the low sample size. That said, it may also be that ACT guided self-help is less effective than therapist-delivered ACT for improving health outcomes.

Of note, improvements on secondary health outcomes were primarily found only for the condition that included both *The Diet Trap* and phone coaching, with the condition including

only email prompts failing to improve over time on most health behaviors. These results suggest that phone coaching may enhance the effectiveness of ACT self-help. Yet, differences were not found for phone coaching versus email prompts for the primary targets of weight self-stigma and psychological inflexibility with weight. This might suggest the self-help book with minimal email prompts, or even the book alone, could be sufficient for learning key ACT skills that reduce weight self-stigma, but that adding phone coaching assists with generalizing this to facets of health behavior such as dietary choice. Consistent with this, participants in the phone coaching condition reported greater intent to use the ACT skills they learned at posttreatment than the email condition, suggesting phone coaching supported ongoing use of ACT skills.

Surprisingly, phone coaching did not enhance adherence to reading the self-help book relative to email prompts alone. The phone coaching protocol was primarily focused on increasing motivation to adhere to the self-help book and problem-solving barriers to adherence. One recent review found significantly higher completion rates for guided compared to unguided interventions (Baumeister et al., 2014), although another suggested that the degree of human contact needed for efficacious treatment may vary depending on the treatment target (Newman et al., 2011). Overall, these results suggest that the ACT self-help book with minimal email prompts is sufficient for reducing weight self-stigma and is likely to have adequate adherence, but that it may be worth the additional resource costs and complexities for phone coaching to support generalizing this to health behavior change. That said, in some contexts where phone coaching is not practical, these results suggest that providing the book with email prompts (that could be automated) may be sufficient for addressing weight self-stigma. A self-help book alone might also be integrated into an existing behavioral weight loss or health promotion program that does not currently offer ACT, thus ensuring that individuals concurrently receive skills and

guidance on how to translate these improvements in weight self-stigma to personally-valued behavior change efforts.

This is the first RCT evaluating ACT guided self-help for weight self-stigma and suggests that *The Diet Trap*, a publicly available self-help book, can be used to address weight self-stigma. This is critical in providing a readily available resource that meets the scale of weight self-stigma as a public health concern. Individuals and health service entities can access *The Diet Trap* anywhere and at a low cost, providing a promising alternative for those who do not have ready access to providers trained in ACT for weight self-stigma. Furthermore, the privacy of a self-help format may be desired by some individuals struggling with stigma who otherwise may be unwilling to seek in person services (Levin et al., 2018). Finally, *The Diet Trap* could be integrated into existing weight management and health promotion programs to help improve the fairly modest effects found for behavioral weight loss (MacLean et al., 2015) and subsequent high rates of weight regain (Loveman et al., 2011). Targeting weight self-stigma in existing weight management programs could help address a highly prevalent problem (Puhl et al., 2018) that has been found to contribute to poorer weight management and treatment outcomes (e.g., Durso, 2013; Lillis et al., in press; Mensinger et al., 2016; Mensinger & Meadows, 2017; Pearl & Puhl, 2018).

It is worth noting that although ACT guided self-help improved psychological inflexibility with weight-related concerns, it did not improve general psychological inflexibility. This is consistent with previous research indicating that domain-specific measures of psychological inflexibility are often more predictive and sensitive to detecting treatment effects than general measures (Ong et al., 2019). A recent study found specifically that an ACT weight management intervention had greater effects on weight-related measures of psychological

inflexibility than general psychological inflexibility and that only these weight-related measures of inflexibility mediated weight loss outcomes (Schumacher et al., 2019). These results might suggest that ACT for weight-related concerns teach more narrow applications of ACT processes and that additional interventions may be needed to support generalization to other areas impacted by psychological inflexibility.

This study had some notable limitations. The sample size was relatively small and was underpowered to compare effects between two active experimental conditions. This was worsened by the relatively low response rate of participants for the posttreatment assessment. Limited power may have contributed to the mixed effects on secondary health outcomes and between the two active conditions. A fully powered confirmatory efficacy trial is needed to further determine the effects of ACT self-help on health outcomes and to evaluate the added benefit of phone coaching.

The study relied on broad self-report measures of health behaviors and BMI. These variables are likely to be biased in a self-report format and future studies would benefit from using objective (e.g., weight, pedometer) or more precise measures (e.g., food recall). This issue may have been heightened with the use of a single EDE item to assess binge eating. Similarly, book adherence was assessed by self-report, which is a natural limitation of studying self-help books relative to online platforms that provide objective tracking of program usage. Finally, this study did not include a long-term follow up assessment of at least one-year, which is needed to determine whether effects of the intervention are sustained and if they apply to long-term weight maintenance.

This study did not include a self-help book only condition without any emails or online quizzes to promote adherence. Thus, it is not clear the degree to which individuals would adhere



to *The Diet Trap* or that the book would produce positive effects on weight self-stigma without at least email prompting and online quizzes. Highlighting this concern, research suggests that adherence to self-help programs is substantially lower when examined naturalistically, outside the context of research studies with additional features that promote adherence (Baumel et al., 2019). A strength of this study was its focus on a readily available self-help book, but the current results cannot disentangle the effects of researcher contact from that of the book alone, which is a typical way self-help is used. This raises a broader issue in that the study did not include an active control condition. Thus, these pilot results should be interpreted with caution as a number of other uncontrolled variables may account for the effects of the guided self-help intervention relative to no intervention (e.g., demand characteristics, placebo).

This pilot study adds to a growing literature indicating ACT is an evidence-based intervention for weight self-stigma. The primary added findings from this study were that ACT may be effective when delivered in a guided self-help format for weight self-stigma and that phone coaching could have some modest incremental benefits, particularly on health behavior change. Weight self-stigma is a critical target for ongoing treatment development research, particularly in scalable formats that can meet the scope of this public health challenge.

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**Table 1***Participant Demographics by Condition*

Measure	GSH-P <i>M (SD)</i> /%	GSH-E <i>M (SD)</i> /%	Waitlist <i>M (SD)</i> /%
Age	37.44 (12.52)	35.85 (20)	42.83 (11.55)
Gender			
<i>Female</i>	82.4%	75.0%	88.9%
<i>Male</i>	17.6%	25.0%	11.1%
Race			
<i>White</i>	100%	90.0%	94.4%
<i>Black</i>	0%	5.0%	0.0%
<i>Other</i>	0%	5.0%	5.6%
Ethnicity			
<i>Hispanic/Latino</i>	11.8%	5.0%	11.1%
<i>Non-Hispanic/Latino</i>	88.2%	95.0%	88.9%
BMI	36.68 (6.77)	36.62 (6.72)	37.76 (6.33)
Married	53%	60%	67%
Employed	65%	75%	66.7%
Income			
<i>Less than \$20,000</i>	23.5%	30.0%	16.7%
<i>\$20,000-39,999</i>	11.8%	25.0%	11.1%
<i>\$40,000-59,999</i>	11.8%	10.0%	16.7%
<i>\$60,000-79,999</i>	17.6%	10.0%	38.9%
<i>\$80,000-99,999</i>	17.6%	5.0%	5.6%
<i>\$100,000 or more</i>	11.8%	10.0%	11.1%
<i>Not sure</i>	5.9%	10.0%	0.0%
Past weight loss methods			
<i>Commercial weight program</i>	64.7%	40.0%	66.7%
<i>Physician</i>	29.4%	45.0%	44.4%
<i>Registered dietician</i>	11.8%	25.0%	33.3%
<i>Psychologist or counselor</i>	0%	15.0%	5.6%
<i>Personal exercise trainer</i>	11.8%	35.0%	22.2%
<i>Exercise classes</i>	64.7%	70.0%	66.7%
<i>Prescription/over-the-counter diet pills</i>	41.2%	35.0%	44.4%
<i>Self-guided diet program</i>	64.7%	45.0%	66.7%
<i>Self-help group</i>	5.9%	10.0%	16.7%

Note. GSH-P = guided ACT self-help with phone coaching, GSH-E = guided ACT self-help with email prompts,

BMI = Body Mass Index.

**Table 2***Estimated Marginal Means from MMRM Analyses for Outcome and Process Measures*

Measure	GSH-P		GSH-E		Waitlist	
	Pre <i>M</i> ( <i>SD</i> )	Post <i>M</i> ( <i>SD</i> )	Pre <i>M</i> ( <i>SD</i> )	Post <i>M</i> ( <i>SD</i> )	Pre <i>M</i> ( <i>SD</i> )	Post <i>M</i> ( <i>SD</i> )
Weight Self-Stigma (WSSQ)	43.94 (6.36)	32.42 (9.72)	44.90 (5.87)	36.25 (10.03)	45.44 (9.59)	43.75 (10.56)
Physical Activity (WCSS-PA)	14.00 (4.96)	16.67 (5.47)	12.60 (5.46)	13.75 (5.22)	14.89 (4.64)	11.75 (3.33)
Dietary Choice (WCSS-DC)	30.35 (5.48)	36.42 (5.21)	29.75 (6.67)	31.42 (9.44)	31.89 (6.61)	33.17 (6.99)
Psychological Coping (WCSS-PC)	14.41 (3.92)	20.42 (4.76)	14.45 (5.37)	18.92 (5.09)	16.94 (4.94)	17.50 (5.18)
Self-Monitoring (WCSS-SM)	11.24 (4.58)	13.92 (6.14)	12.00 (6.77)	14.50 (5.95)	12.83 (5.95)	15.58 (6.27)
Binge Eating (EDE)	4.12 (8.63)	.25 (.45)	2.85 (3.82)	.92 (1.93)	6.39 (9.57)	6.83 (9.02)
Emotional Eating (DEBQ-EE)	47.47 (10.54)	42.58 (11.65)	43.98 (10.93)	41.42 (15.26)	44.61 (9.42)	48.17 (8.57)
Physical Activity (IPAQ)	2308.12 (2943.93)	2537.79 (2690.05)	1174.73 (1167.32)	1948.00 (1412.69)	2890.81 (2290.96)	2911.00 (4125.87)
BMI	36.68 (6.77)	34.07 (6.30)	36.62 (6.72)	34.49 (6.81)	37.76 (6.33)	37.93 (6.08)
Psychological Inflexibility with Weight (AAQ-W)	95.88 (14.68)	61.42 (16.22)	94.45 (17.78)	67.92 (22.32)	95.06 (21.06)	91.00 (20.55)
General Psychological Inflexibility (CompACT)	91.12 (18.23)	107.67 (19.67)	93.99 (17.33)	108.25 (20.93)	100.67 (25.39)	108.50 (21.28)

Note. IPAQ and EDE descriptive statistics are provided with non-transformed scoring. WSSQ = Weight Self-Stigma

Questionnaire (range = 14 - 46), WCSS-PA = Weight Control Strategies Scale - Physical Activity (range = 6 - 20),

WCSS-DC = Weight Control Strategies Scale - Dietary Choice (range = 7 - 31), WCSS-PC = Weight Control

Strategies Scale - Psychological Coping (range = 7 - 22), WCSS-SM Weight Control Strategies Scale - Self

Monitoring (range = 7 - 27), EDE = Eating Disorder Examination Questionnaire-Binge Eating Episode (range = 0 -

35), DEBQ-EE = Dutch Eating Behavior Questionnaire-Emotional Eating (range = 17 - 48), IPAQ = International



Physical Activity Questionnaire-Short Form (range = 0 - 12852), BMI = Body Mass Index (range = 24.67 – 26.57), AAQ-W = Acceptance and Action Questionnaire for Weight-Related Difficulties (range = 28 - 106), CompACT = Comprehensive Assessment of Acceptance and Commitment Therapy Processes (range = 53- 90).

**Table 3**

*MMRM Results with the Full ITT Sample*

Measure	Time x Condition		Pre-Post Within Condition <i>d</i> [95% CI]			Between Condition Post <i>d</i> [95% CI]		
	<i>F</i>	<i>d</i>	Phone	Email	Waitlist	Phone vs. Waitlist	Email vs. Waitlist	Phone vs. Email
Weight Self-Stigma (WSSQ)	5.90**	.84	1.59*** [1.01, 2.18]	1.30*** [.71, 1.88]	.26 [-.32, .85]	1.13** [.38, 1.89]	.82* [.07, 1.56]	.32 [-.43, 1.07]
Physical Activity (WCSS-PA)	3.60*	.62	.51† [-.05, 1.07]	.20 [-.35, .75]	-.51† [-1.07, .04]	.70† [-.07, 1.46]	.13 [-.63, .88]	.57 [-.19, 1.33]
Dietary Choice (WCSS-DC)	4.40*	.72	1.18*** [.60, 1.76]	.14 [-.44, .72]	.14 [-.44, .72]	.54 [-.21, 1.30]	-.30 [-1.04, .45]	.84* [.09, 1.59]
Psychological Coping (WCSS-PC)	2.82†	.56	1.04** [.48, 1.61]	.91** [.36, 1.47]	.18 [-.38, .74]	.39 [-.41, 1.20]	.27 [-.53, 1.06]	.13 [-.67, .93]
Self-Monitoring (WCSS-SM)	.01	.03						
Binge Eating (EDE)	2.64†	.50	.59* [.05, 1.13]	.56* [.04, 1.09]	-.17 [-.71, .37]	1.06* [.26, 1.87]	.94* [.14, 1.75]	.12 [-.68, .92]
Emotional Eating (DEBQ-EE)	1.65	.43						
Physical Activity (IPAQ)	.89	.31						
BMI	.40	.22						
Psychological Inflexibility with Weight (AAQ-W)	10.42***	1.07	2.06*** [1.48, 2.63]	1.55*** [.98, 2.11]	.29 [-.28, .86]	1.50*** [.72, 2.27]	1.12** [.36, 1.89]	.37 [-.40, 1.14]
General Psychological Inflexibility (CompACT)	.87	.30						

*Note.* Positive effect size scores indicate effects consistent with predictions (i.e., improvement within conditions, Phone post scores > Email post scores >

Waitlist post scores). WSSQ = Weight Self-Stigma Questionnaire, WCSS-PA = Weight Control Strategies Scale - Physical Activity, WCSS-DC = Weight

Control Strategies Scale - Dietary Choice, WCSS-PC = Weight Control Strategies Scale - Psychological Coping, WCSS-SM Weight Control Strategies Scale -

Self Monitoring (range = 7 - 27), EDE = Eating Disorder Examination Questionnaire-Binge Eating Episode, DEBQ-EE = Dutch Eating Behavior Questionnaire-

Emotional Eating, IPAQ = International Physical Activity Questionnaire-Short Form, BMI = Body Mass Index, AAQ-W = Acceptance and Action Questionnaire for Weight-Related Difficulties, CompACT = Comprehensive Assessment of Acceptance and Commitment Therapy Processes. † $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ ;

\*\*\* $p < .001$ .

**Figure 1**

*Participant Flow Diagram*

