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Successful weight loss with self-help: A stepped-care approach

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Abstract

In a stepped-care approach to treatment, patients are transitioned to more intensive treatments when less intensive treatments fail to meet treatment goals. Self-help programs are recommended as an initial, low intensity treatment phase in stepped-care models. This investigation examined the effectiveness of a self-help, stepped-care weight loss program. Fifty-eight overweight/obese adults (BMI ≥ 27 kg/m²) participated in a weight loss program. Participants were predominately Caucasian (93.1%) and female (89.7%) with a mean BMI of 36.6 (SD = 7.1). Of those completing the program, 57% of participants ($N = 21$) who remained in self-help maintained an 8% weight loss at follow-up. Participants who were stepped-up self-monitored fewer days and reported higher daily caloric intake than self-help participants. Once stepped-up, weight loss outcomes were equivalent between individuals who remained in self-help compared to those who were stepped-up. Individuals who were stepped-up benefited from early intensive intervention when unsuccessful at losing weight with self-help.

Keywords

Weight loss treatment; Obesity; Stepped-care; Self-help

Introduction

Given the scope of the obesity epidemic, the chronic nature of the condition, and the cost of professional care, cost-effective, time-efficient, minimally intrusive treatments will likely be required to effectively manage the obesity epidemic. In a stepped-care (SC) approach, patients are transitioned to more intensive treatments when less intensive treatments are insufficient, thereby reducing the likelihood that some patients will receive unnecessary treatment (Haaga 2000). Stepped-care approaches have been developed for treatment of a variety of conditions, including weight management (Abrams 1993; Carels et al. 2005, 2007; NHLBI 1997; Expert Panel on Detection 2001; Sobell and Sobell 2000; Wadden et al. 2002).

Similarly, given the scope of the obesity epidemic, self-help programs, with or without guidance, may be the only financially viable approach to the wide-spread treatment of obesity (Latner 2001). Self-help refers to any treatment or approach that views the person receiving help as the main agent of change in achieving their behavioral change goals (Latner and Wilson 2007). Self-help programs do not preclude the use of manuals, commercial products, technology, supportive peers, or professional assistance (Latner and Wilson 2007). Self-help weight loss programs have shown promise (Butryn et al. 2007; Latner 2001) and are often a recommended low intensity treatment for initial weight loss efforts in stepped-care models (Wadden et al. 2002). In fact, approximately one-third of the successful dieters in the National Weight Control Registry appear to be self-guided dieters who lost weight on their own (Butryn et al. 2007; Latner 2001). Nevertheless, some individuals require a more intensive treatment that provides greater support and/or accountability than what is provided in a self-help approach.

While stepped-care approaches are generally successful in aiding weight loss (Black 1987; Black and Threfall 1986; Carels et al. 2005, 2007; Wadden et al. 2002), they have, at times, produced mixed (Polley et al. 2002) or null results (Carels et al. 2008c). Simply providing participants with a higher intensity treatment is not always sufficient to encourage successful weight loss. For example, in a recent self-help program, individuals who evidenced weight loss difficulties during 12 weeks of self-help failed to lose weight after being stepped-up to more intensive treatment (Carels et al. 2008c). Thus, developing and utilizing effective stepped-up treatments is also critical.

Research suggests that the “obesogenic” nature of the nation’s current eating and physical activity environment is fueling the obesity epidemic (e.g., Brownell and Horgen 2004; Lowe 2003; Nestle 2004). Interventions are needed to teach individuals how to modify their own personal food and physical activity environments to promote healthy eating and an active lifestyle. Micro-/individual-level changes may be necessary to counteract the deleterious impact of the obesogenic environment. One promising treatment approach is to help obese individuals modify their personal eating and physical activity environments in order to reduce exposure to “obesogenic” cues and increase exposure to “healthy” cues (Carels et al. 2008a).

While modifying an individual’s personal eating and physical activity environment is likely to improve weight loss treatment outcomes, environmental modification alone may be insufficient to produce successful weight loss. Self-monitoring of energy intake and expenditure, long considered a cornerstone of behavioral weight loss programs, is likely to greatly contribute to successful weight loss outcomes. In fact, consistent self-monitoring is associated with superior weight loss treatment outcomes (Baker and Kirschenbaum 1998; Carels et al. 2008b) and weight loss maintenance (Wing and Hill 2001).

Informed by the self-help study noted earlier (Carels et al. 2008c), this investigation chose to: (1) step-up participants to intensive treatment more rapidly (i.e., 6 vs. 12 weeks to diminish extended demoralization), and (2) emphasize personal environmental modification to combat the “obesogenic” culture. In this investigation, all participants began an 18 week self-help weight loss program. Participants unable to lose 2.5% of their body weight during the first 6 weeks of the program using self-help were stepped-up to a weight loss program that emphasized reducing “obesogenic” cues and increasing “healthy” cues. This investigation examined whether (1) individuals could successfully lose weight with self-help, (2) individuals unsuccessful at losing 2.5% of their body weight during an initial self-help phase could successfully lose weight when stepped-up to more intensive treatment, (3) weight change differences would emerge between self-help and stepped-care participants during and following treatment, and (4) self-monitoring frequency and level of energy intake and expenditure would differentiate individuals who were successful at losing weight.

Methods

Participants

Fifty-eight individuals chose to participate in a locally advertised weight loss intervention. Participants were recruited through advertisements in local newspapers and campus email at a Midwestern university. Participants were included if they were: (a) overweight/obese ($\text{BMI} \geq 27 \text{ kg/m}^2$); (b) nonsmokers, and excluded if they had: (a) cardiovascular disease; (b) severe musculoskeletal problems; (c) Type I diabetes; or (d) uncontrolled hypertension. The investigation was completed between August 2007 and October 2008. Participants received no incentives for participating. This investigation received full human subjects review board approval, and all participants received their physician’s medical clearance. All assessments including baseline and follow-up were conducted by a licensed clinical health psychologist and 1–2 clinical psychology doctoral students. Weight assessments were conducted at baseline, week 6, post-treatment (week 18), and 6 months post-treatment (follow-up).

Participants’ mean age was 47.6 ($SD = 10.3$). Annual income exceeded \$45,000 for 50.4% of the participants, and 46.5% had at least a baccalaureate degree. Most participants were Caucasian (93.1%) and female (89.7%). Mean baseline BMI was 36.6 ($SD = 7.1$) and weight was 214.7 lbs. ($SD = 41.3$; stepped-care: $M = 214.6$, $SD = 42.6$; self-help: $M = 214.8$, $SD = 41.4$).

Study design

Phase I—Participants received a 2.5% weight loss goal for the first 6 weeks. All participants began an 18 week self-help weight loss program. Participants attended an orientation session 1 week prior to the beginning of the program. At the orientation session, participants provided informed consent, received an accelerometer to track energy expenditure, a LEARN weight loss program manual (Brownell 2004), and instructions on how to self-monitor and electronically report diet and physical activity. Participants were instructed to read one chapter of the weight loss manual each week, self-monitor and record diet and physical activity, and create a 500 calorie/day deficit through diet and physical activity.

Body weight was measured using a digital scale. Height was measured in inches to the closest 0.5 inch using a height rod on a standard spring scale. With the exception of a monthly email reminder to submit self-monitoring forms and the weight assessment at week 6 to determine stepped-care eligibility, the self-help program was done completely independently.

Phase II—If participants were unable to achieve a 2.5% weight loss during Phase I, they were stepped-up to a weekly group for 12 weeks. Participants who lost greater than 2.5% total body weight continued with self-help for 12 additional weeks. Self-help participants completed the 12 week LEARN weight loss program manual (Brownell 2004), as well as a 6 week maintenance intervention manual emphasizing taking control of their personal food and physical activity environments (Carels et al. 2008a).

Weight loss program manual—The self-help weight loss manual used in this investigation was the LEARN weight loss program manual (Brownell 2004). The LEARN self-help weight loss approach is a comprehensive, empirically-supported approach to weight management (Andersen et al. 1999; Wadden et al. 1994). The widely used LEARN program emphasizes gradual weight loss, progressively increasing physical activity, and decreasing energy and fat intake through permanent lifestyle changes.

Stepped-care intervention—Participants who lost less than 2.5% of their total body weight during Phase I discontinued the self-help and were stepped-up to a weekly group intervention. The intervention emphasized having individuals “take control of” (i.e., modify in a healthy manner) their personal food and physical activity environments (Lowe 2003; Carels et al. 2008a). Following an introductory session and two sessions devoted to nutrition basics, the program encouraged participants to take responsibility for their eating and physical activity behaviors and to modify their personal eating and physical activity environments in order to reduce exposure to “obesogenic” cues (e.g., cues that encourage unhealthy eating and sedentary behaviors) and increase exposure to “healthy” cues (e.g., cues that encourage healthy eating and physical activity; Lowe 2003; Carels et al. 2008a). For example, environmental factors empirically recognized to influence eating were targeted for modification, such as portion sizes and food cues (Bell et al. 2003; Della Valle et al. 2005; French et al. 2001; Geier et al. 2006; Kral and Rolls 2004; Rolls et al. 2004a, b; Sobal and Wansink 2007; Stroebele and De Castro 2004; Wansink and Sobal 2007; Wansink 2004; Wansink et al. 2005, 2006; Wansink and Van Itternum 2003). In addition, participants were encouraged to take responsibility for aspects of their eating, such as planning meals and shopping, including finding ways to control their eating experiences when maintaining moderate food consumption was likely difficult (e.g., parties, vacation).

Four sessions were devoted to enhancing motivation for weight loss through the application of principles from self-regulatory theory (Higgins 2000). Trait-like self-regulatory orientation (prevention; promotion) was assessed using the 18-item Regulatory Focus Questionnaire (Lockwood et al. 2002). Participants engaged in activities where their trait regulatory fit (promotion vs. prevention) was matched to positive or negative role models, respectively. For example, depending on the participant’s self-regulatory orientation, participants were asked to imagine how they might gain the benefits of a healthy lifestyle or avoid the consequences of an unhealthy lifestyle.

The weight loss groups (i.e., stepped-care) were a combination of didactic instruction, individual activities, and out-of-class assignments. The 12 week program was administered in weekly, 90 min sessions. All classes were conducted by a licensed clinical health psychologist and 1–2 clinical psychology doctoral students.

Self-monitoring—Participants were instructed how to self-monitor dietary intake and were provided with demonstrations of common food measurement procedures, as well as instructions for estimating food portion sizes. Written instructions for measurement estimation were provided to participants as a reference. Participants used the food and beverage calorie guide provided with the weight loss program manual (Brownell 2004) or Internet dietary analysis programs, such as Calorie King (<http://www.calorieking.com>) or

Nutrition Data (<http://www.nutritiondata.com>), to estimate energy intake from meals, snacks, and beverages. Participants were further instructed on how to electronically submit (or submit by paper and pencil) daily records of energy intake. Daily self-reported physical activity (type and duration of physical activity not including activity associated with daily living, such as occupational exertion or taking the stairs) and energy expenditure (accelerometer readings for total energy expended (kcal) during consecutive 24 h periods) were also submitted. No objective assessments of physical exertion (i.e., sweating, heart rate) were performed, and participants were instructed to record all purposeful physical activity, regardless of intensity.

Energy expenditure—Caltrac accelerometers were provided to participants to assess total daily energy expenditure. The Caltrac accelerometer measures vertical acceleration and converts the measurement into an energy expenditure value. Although Caltrac accelerometers have been shown to mildly overestimate the absolute energy cost (i.e., measured VO_2) of selected activities, they provide a reliable assessment of total energy expenditure (Balogun et al. 1989; Fehling et al. 1999).

Results

Weight loss

During Phase I of the program, 24 participants (41.4%) lost at least 2.5% of their baseline weight ($M = 4.5\%$, $SD = 0.1$), 21 (36.2%) lost less than 2.5% of their weight ($M = 0.7\%$, $SD = 0.1$), and 13 (22.4%) dropped out of treatment. Baseline factors (age, race, gender, income, education), including weight, were unrelated to stepped-care status. Twenty-one (87.5%) participants who remained in self-help and 16 (76.2%) participants who were stepped-up completed the intervention. Thirty-six (97.2%) participants attended the 6 month post-treatment follow-up. See Fig. 1 for the participant flow diagram.

Differences in weight change between self-help and stepped-care groups during treatment and follow-up

A 2 (stepped-care; self-help) $\times$ 4 (baseline, Phase I, Phase II, follow-up) repeated-measures ANOVA indicated a significant overall treatment effect for body weight (lb), $F(3,32) = 28.7$, $p < 0.001$, Cohen's $d = 1.78$. The time by treatment interaction was also significant, $F(3,32) = 9.8$, $p < 0.001$, Cohen's $d = 1.04$ (See Fig. 2). *Post hoc* contrasts indicated significant differences in weight loss (lbs.; %) between participants who remained in self-help and those stepped-up to a weight loss group during Phase I, $F(1,43) = 104.6$, $p < 0.01$, Cohen's $d = 3.04$, (self-help: $M = -9.8$; $SD = 2.8$; 4.6%; stepped-care: $M = -1.1$; $SD = 2.8$; 0.6%). Group differences did not emerge during Phase II, $F(1,35) = 3.66$, $p = 0.06$, Cohen's $d = 0.64$, (self-help: $M = -9.4$; $SD = 8.5$; 4.4%; stepped-care: $M = -5.2$; $SD = 4.6$; 2.3%). Also, group differences did not emerge during the follow-up period, $F(1,34) = 0.6$, $p = 0.56$, Cohen's $d = 0.26$, (self-help: $M = +1.9$; $SD = 8.1$; +0.8%; stepped-care: $M = +3.5$; $SD = 3.2$; +1.6%). However, significant differences in weight loss (lbs.; %) between participants who remained in self-help and those stepped-up to a weight loss group were observed from baseline through follow-up, $F(1,35) = 12.4$, $p < 0.01$, Cohen's $d = 1.17$, (self-help: $M = -17.4$; $SD = 15.2$; 8.1%; stepped-care: $M = -2.8$; $SD = 6.4$; 1.2%).

Weight change during treatment and follow-up

Post hoc paired sample contrasts indicated significant weight loss (lbs.; %) during Phase I, $t(44) = 7.8$, $p < 0.001$, Cohen's $d = 0.69$, ($M = -6.2$ $SD = 5.2$, 2.9%), and Phase II, $t(36) = 6.2$, $p < 0.001$, Cohen's $d = 0.70$, ($M = -7.7$; $SD = 7.3$, 3.4%), and significant weight gain during follow-up, $t(35) = 2.3$, $p < 0.03$, Cohen's $d = 0.77$, ($M = +2.6$; $SD = 6.5$, 1.2%), regardless of group.

Self-monitoring and energy intake and expenditure

Chi-square and ANOVA were used to examine the impact of self-monitoring and energy intake and expenditure on stepped-care phase eligibility during Phases I and II (see Table 1). During Phase I, individuals stepped-up to more intensive treatment were less likely to self-monitor energy intake and expenditure, $\chi^2(1, N=45) = 12.85, p = 0.001$, Cohen's $d = 1.14$, (Self-help = 100.0% of participants; Stepped-care = 57.1% of participants), self-monitored fewer days, $F(1,35) = 10.26, p = 0.003$, Cohen's $d = 1.06$, and reported higher daily caloric intake, $F(1,35) = 7.86, p = 0.008$, Cohen's $d = 0.93$, compared to individuals who remained in the self-help group.

During Phase II, compared to individuals who remained in self-help, individuals stepped-up to more intensive treatment were less likely to self-monitor energy intake and expenditure, $\chi^2(1, N=45) = 7.87, p = 0.006$, Cohen's $d = 2.34$, (Self-help = 79.2% of participants; Stepped-care = 38.1% of participants), and self-monitored fewer days, $F(1,35) = 13.27, p = 0.003$, Cohen's $d = 1.21$. There were no differences between self-help and stepped-care participants in energy intake and expenditure.

Throughout the entire intervention, compared to individuals who remained in the self-help group, individuals stepped-up to more intensive treatment self-monitored fewer days, $F(1,35) = 12.27, p = 0.003$, Cohen's $d = 1.17$, and reported higher daily caloric intake, $F(1,35) = 4.98, p = 0.03$, Cohen's $d = 0.74$.

Discussion

Consistent with previous research (Latner 2001; Carels et al. 2008c), many individuals were quite successful at losing weight with self-help (of those completing the program, 57% of participants [$N = 21$] who remained in self-help maintained an 8% weight loss at follow-up). However, 43% of the participants were unsuccessful at losing weight with self-help and were stepped-up to more intensive treatment. Weight loss outcomes were equivalent for self-help and stepped-care participants during Phase II and follow-up.

Consistent self-monitoring appeared to contribute to the success of participants who remained in self-help. Compared to participants who remained in the self-help group, participants eligible for stepped-care were less likely to self monitor energy intake and expenditure and self-monitored less frequently during both Phase I and II of treatment. Additionally, during the self-help phase, participants eligible for stepped-care reported a significantly higher daily caloric intake (400 kcal) than participants who remained in the self-help group.

It is conceivable that while they were far less inclined to self-monitor their weight, the stepped-care participants utilized some of the information presented in the weekly stepped-care intervention to modify their eating and physical activity environments. The reduction in caloric intake (-144 kcal; $p = 0.03$) by the end of Phase II for the stepped-care group suggests some support for this claim. However, additional findings from the study to support this claim are not available. Nevertheless, it appears that stepping-up individuals to a more intensive treatment had a positive impact on energy intake through a means other than self-monitoring. Of course, the greater social support or perceived accountability of a weekly face-to-face group that included weigh-ins, may have contributed to the positive weight loss outcomes.

These findings provide tentative support for a stepped-care approach to weight loss, in which self-help intervention participants are rapidly stepped-up to a weight loss group if initial weight loss is not observed. While self-help participants lost significantly more

weight during Phase I, weight loss outcomes were equivalent for self-help and stepped-care participants during Phase II and follow-up. However, participants stepped-up to the weight loss group may have further benefited from a longer weight loss group to enhance therapeutic gains. Similarly, in the present investigation, Phase I, which occurred over the December holiday season, evidenced high attrition ($N = 13$). Thus, optimal program initiation time and retention of potential drop-outs are critical issues to consider when implementing behavioral change programs.

Although the findings in this investigation suggest that a stepped-care approach to weight loss had a favorable effect on treatment outcomes, these conclusions should be viewed tentatively. The modest sample size, the small number of individuals who participated in stepped-care, and the predominately Caucasian and female sample suggest that replication with a larger, more diverse sample is warranted. Because we are not aware of any validated measures designed to assess modification of the individual's personal eating and physical activity environment, our assessment of the aspects of the stepped-care program that contributed to its success is difficult to ascertain. It is unclear whether the observed benefits in those who received stepped-care were due to additional therapeutic contact or other factors, such as environmental modification and motivation. In addition, this investigation did not assess psychological factors, such as depression, known to be associated with poor weight loss outcomes (McGuire et al. 1999). The association between psychological factors and the likelihood of being stepped-up to more intensive treatment, as well as treatment outcomes, are not known. Finally, this investigation did not examine correlates of successful self-monitoring. Identifying individual differences that predict successful self-monitoring might allow for the modification of weight loss programs in a manner that draw on participants' strengths to help them achieve weight loss goals.

Individuals benefited from early intensive intervention when they were unsuccessful at utilizing a self-help approach. Their weight loss during the more intensive treatment phase mirrored those who were successful with self-help although the self-help and stepped-care weight loss groups differed greatly in delivery and content. The self-help program simply provided participants with tools to enable their success, such as the LEARN weight loss manual, an accelerometer, and instructions on how to self-monitor. In addition to general information on exercise and nutrition, the LEARN program teaches individuals when, how, and why their eating and physical activity habits occur and, more importantly, how to incorporate healthier habits into their daily lifestyle. While consistent self-monitoring appeared to contribute to the success of participants who remained in self-help, stepped-care participants evidenced low levels of self-monitoring. However, the weekly face-to-face stepped-care group likely provided greater social support and accountability, including weekly weigh-ins. Similarly, while the self-help participants no doubt learned about the impact of the environment on their eating and physical activity patterns, the stepped-care intervention had a much greater emphasis on the actual modification of the participants' eating and physical activity environments, as well as a much greater focus on enhancing and maintaining motivation. The stepped-care intervention was designed to empower participants to "Take Control" of their personal eating and physical activity environments. Thus, this investigation suggests that alternative approaches to weight loss, such as environmental modification, might produce improved outcomes among individuals who are initially unsuccessful at weight loss. A continued focus on developing effective treatments with varying emphases and therapeutic intensities will be essential for improving weight loss outcomes and combating the obesity epidemic.

Despite the importance of consistent self-monitoring, individuals who are struggling to lose weight with self-help might benefit from an alternative means to achieve weight loss success, such as environmental modification. It may be beneficial for future stepped-care

interventions to target behaviors such as environmental modification, rather than self-monitoring, which many participants struggle to do consistently over the course of treatment.

References

- Abrams DB. Treatment issues in tobacco dependence: Towards a stepped-care model. *Tobacco Control*. 1993; 2:s17–s37.
- Andersen R, Wadden T, Bartlett S, Zemel B, Verde T, Franckowiak S. Effects of lifestyle activity vs. structured aerobic exercise in obese women. *JAMA*. 1999; 281:335–340. [PubMed: 9929086]
- Baker RC, Kirschenbaum DS. Weight control during the holidays: Highly consistent self-monitoring as a potentially useful coping mechanism. *Health Psychology*. 1998; 17:367–370. [PubMed: 9697946]
- Balogun J, Martin D, Clendenin M. Calometric validation of the Caltrac Accelerometer during level walking. *Physical Therapy*. 1989; 89:501–509. [PubMed: 2727075]
- Bell EA, Roe LS, Rolls BJ. Sensory-specific satiety is affected more by volume than by energy content of liquid food. *Physiology & Behavior*. 2003; 78:593–600. [PubMed: 12782213]
- Black DR. A minimal intervention program and a problem-solving program for weight control. *Cognitive Therapy and Research*. 1987; 11:107–120.
- Black DR, Threlfall WE. A stepped approach to weight control: A minimal intervention and a bibliotherapy problem-solving paradigm. *Behavior Therapy*. 1986; 17:144–157.
- Brownell, KD. The LEARN program for weight management. Vol. Vol 10. Dallas, Texas: American Health Publishing Company; 2004.
- Brownell, KD.; Horgen, KB. Food fight: The inside story of the food industry, America's obesity crisis, and what we can do about it. Chicago: Contemporary Books; 2004.
- Butryn, ML.; Phelan, S.; Wing, RR. Self-guided approaches to weight loss. In: Latner, JD.; Wilson, GT., editors. Self-help approaches for obesity and eating disorders. New York: Guilford; 2007. p. 3-20.
- Carels RA, Darby LA, Cacciapaglia HM, Douglass OM, Harper J, Kaplar M, et al. Applying a stepped care approach to the treatment of obesity. *Journal of Psychosomatic Research*. 2005; 59:375–383. [PubMed: 16310019]
- Carels RA, Darby LA, Cacciapaglia HM, Konrad KK, Coit C, Harper J, et al. Using motivational interviewing as a supplement to obesity treatment: A stepped-care approach. *Health Psychology*. 2007; 26:369–374. [PubMed: 17500624]
- Carels RA, Konrad KK, Young KM, Darby LA, Coit C, Clayton AM, et al. Taking control of your personal eating and exercise environment: A weight maintenance program. *Eating Behaviors*. 2008a; 9:228–237. [PubMed: 18329602]
- Carels RA, Young KM, Coit C, Clayton AM, Spencer A, Hobbs M. Can following the caloric restriction recommendations from the Dietary Guidelines for Americans help individuals lose weight? *Eating Behaviors*. 2008b; 9:328–335. [PubMed: 18549992]
- Carels RA, Young KM, Coit C, Darby LA, Clayton AM, Spencer A, et al. The failure of therapist assistance and stepped-care to improve weight loss outcomes. *Obesity*. 2008c; 16:1460–1462. [PubMed: 18356835]
- Della Valle DM, Roe LS, Rolls BJ. Does the consumption of caloric and non-caloric beverages with a meal affect energy intake? *Appetite*. 2005; 44:187–193. [PubMed: 15808893]
- Expert Panel on Detection. Executive summary of the third report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and treatment of high blood pressure in adults. *JAMA*. 2001; 285:2486–2497. [PubMed: 11368702]
- Fehling P, Smith D, Warner S, Dalsky G. Comparison of accelerometers with oxygen consumption in older adults during exercise. *Medicine and Science in Sports and Exercise*. 1999; 31:171–175. [PubMed: 9927026]
- French SA, Story M, Jeffrey RW. Environmental influences on eating and physical activity. *Annual Review of Public Health*. 2001; 22:309–335.

- Geier AB, Rozin P, Gheoghe D. Unit bias: A new heuristic that helps explain the effect of portion size on food intake. *Psychological Science*. 2006; 17:521–525. [PubMed: 16771803]
- Haaga DA. Introduction to the special section on stepped care models in psychotherapy. *Journal of Consulting and Clinical Psychology*. 2000; 68:547–548. [PubMed: 10965628]
- Higgins ET. Making a good decision: Value from fit. *American Psychologist*. 2000; 55:1217–1230. [PubMed: 11280936]
- Kral TVE, Rolls BJ. Energy density and portion size: Their independent and combined effects on energy intake. *Physiology & Behavior*. 2004; 82:131–138. [PubMed: 15234601]
- Latner JD. Self-help in the long-term treatment of obesity. *Obesity Reviews*. 2001; 2:87–97. [PubMed: 12119666]
- Latner, JD.; Wilson, GT. Preface. In: Latner, JD.; Wilson, GT., editors. *Self-help approaches for obesity and eating disorders*. New York: Guilford; 2007. p. xi-xiv.
- Lockwood P, Jordan CH, Kunda Z. Motivation by positive or negative role models: regulatory focus determines who will best inspire us. *Journal of Personality and Social Psychology*. 2002; 83:854–864. [PubMed: 12374440]
- Lowe MR. Self-regulation of energy intake in the prevention and treatment of obesity: Is it feasible? *Obesity Research*. 2003; 11:44s–59s. [PubMed: 14569037]
- McGuire MT, Wing RR, Klem ML, Lang W, Hill JO. What predicts weight regain in a group of successful weight losers? *Journal of Consulting and Clinical Psychology*. 1999; 67:177–185. [PubMed: 10224727]
- Nestle, M. *Food politics*. Berkeley: University of California Press; 2004.
- NHLBI. The sixth report of the joint national committee on prevention, detection, and evaluation, and treatment of high blood pressure. Washington, DC: NIH; 1997. Rep. No. no. 98-4080
- Polley B, Wing RR, Sims CJ. Randomized controlled trial to prevent excessive weight gain in pregnant women. *International Journal of Obesity*. 2002; 26:1494–1502. [PubMed: 12439652]
- Rolls BJ, Ello-Martin JA, Tohill BC. What can intervention studies tell us about the relationship between fruit and vegetable consumption and weight management? *Nutrition Reviews*. 2004a; 62:1–17. [PubMed: 14995052]
- Rolls BJ, Roe LS, Kral TVE, Meengs JS, Wall DE. Increasing the portion size of a packaged snack increases energy intake in men and women. *Appetite*. 2004b; 42:63–69. [PubMed: 15036784]
- Sobal J, Wansink B. Kitchenscapes, tablescapes, platescapes, and food scapes: Influences of microscale built environments on food intake. *Environment and Behavior*. 2007; 39:124–142.
- Sobell MB, Sobell LC. Stepped care as a heuristic approach to the treatment of alcohol problems. *Journal of Consulting and Clinical Psychology*. 2000; 68:573–579. [PubMed: 10965632]
- Stroebele N, De Castro JM. Effect of ambience on food intake and food choice. *Nutrition*. 2004; 20:821–838. [PubMed: 15325695]
- Wadden TA, Brownell KD, Foster G. Obesity: Managing the global epidemic. *Journal of Consulting and Clinical Psychology*. 2002; 70:510–525. [PubMed: 12090366]
- Wadden T, Foster G, Letizia K. One-year behavioral treatment of obesity: Comparison of moderate and severe caloric restriction and the effects of weight maintenance therapy. *Journal of Consulting and Clinical Psychology*. 1994; 62:165–171. [PubMed: 8034818]
- Wansink B. Environmental factors that increase the food intake and consumption volume of unknowing consumers. *Annual Review of Nutrition*. 2004; 24:455–479.
- Wansink B, Painter JE, Lee YK. The office candy dish: Proximity's influence on estimated and actual consumption. *International Journal of Obesity*. 2006; 30:871–875. [PubMed: 16418755]
- Wansink B, Painter JE, North J. Bottomless bowls: Why visual cues of portion size may influence intake. *Obesity Research*. 2005; 13:93–100. [PubMed: 15761167]
- Wansink B, Sobal J. Mindless eating: The 200 daily food decisions we overlook. *Environment and Behavior*. 2007; 39:106–122.
- Wansink B, Van Itternum K. Bottoms up! The influence of elongation on pouring and consumption. *Journal of Consumer Research*. 2003; 30:463.
- Wing RR, Hill JO. Successful weight loss maintenance. *Annual Review of Nutrition*. 2001; 21:323–341.

Fig. 1.
Participant treatment flow diagram

$p < .01$,¹Phase I, ²Baseline through follow-up.
Non-significant, Phase II, Phase II through follow-up

Fig. 2.
Percent weight change during Phase I, Phase II, and follow-up in self-help and stepped-care participants

Table 1
Comparison of self-monitoring and energy intake and expenditure between self-help and stepped-care participants

Factors	Phase I		Phase II		Total	
	Self-help	Stepped-care	Self-help	Stepped-care	Self-help	Stepped-care
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Self-monitoring frequency (days/week)	6.5 (1.6) *	4.1 (3.1)	6.2 (2.6)	2.2 (2.7)	6.3 (2.5) *	2.8 (2.8)
Caloric intake (daily)	1,547 (426) *	1,947 (310)	1,605 (375)	1,803 (464)	1,568 (429) *	1,883 (339)
Caloric expenditure (kcal/daily)	2,439 (1,166)	2,369 (550)	2,323 (373)	2,321 (488)	2,271	2,369 (488)
Activity expenditure (kcal/daily)	614 (355)	567 (235)	622 (489)	557 (255)	619.8 (380)	559 (255)
Exercise minutes	26.9 (20.9)	19.7 (22.1)	33.0 (26.2)	33.9 (31.3)	27.2 (22.5)	21.4 (24.8)

Note Phase I: First 6 weeks; Phase II: Second 12 weeks; Total: Baseline to end of treatment

* $p < 0.05$ (Self-help group vs. Stepped-care group)