Chapter 16
Behavioral and Psychological Approaches to Weight Management

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Abstract Since the 1970s, behavioral weight loss approaches have been the preferred treatment for mild to moderate obesity. Patients are taught how to modify eating and exercise behaviors to meet treatment goals. Cognitive elements, such as avoidance of dichotomous thinking, reduction of negative self-talk, and improvement in coping strategies, are also emphasized. Most behavioral weight loss programs achieve a 7–10 % weight loss in 6 months. Losses of this magnitude are often sufficient to prevent or ameliorate obesity-related health concerns; however, long-term maintenance remains a significant challenge. Studies indicate that weight maintenance is associated with the continued application of behavioral modification techniques (Sarwer et al., Curr Opin Endocrinol Diabetes Obes 16(5):347–352, 2009). Initial assessment should screen for behavioral and psychological factors influencing weight control, such as eating frequency, diet quality, portion size, and activity level. Triggers, which cause the patient to eat when not hungry or to overeat, should be assessed and patients taught to avoid or manage them. Likewise, barriers to behavior change should be identified and addressed. Finally, patients should be screened for mood and/or eating disorders. Stepped-care approaches, provisions for increased patient-provider contact, and use of motivational interviewing or acceptance and commitment therapy (ACT) techniques may help improve the efficacy of behavioral interventions (Sarwer et al., Curr Opin Endocrinol Diabetes Obes 16(5):347–352, 2009; Armstrong et al., Obes Rev 12(9):709–723, 2011).

Keywords Behavioral • Psychological • Cognitive-behavioral • Cognitive • Weight management • Lifestyle intervention • Self-monitoring • Stepped care • Motivational interviewing • Maintenance

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Key Points

- Since the 1970s, behavioral weight loss approaches have been the preferred treatment for mild to moderate obesity.
- Cognitive elements, such as avoidance of dichotomous thinking, reduction of negative self-talk, and improvement in coping strategies, are also emphasized.
- Most behavioral weight loss programs achieve a 7–10 % weight loss in 6 months, which are often sufficient to prevent or ameliorate obesity-related health concerns; however, long-term maintenance remains a significant challenge.
- Studies indicate that weight maintenance is associated with the continued application of behavioral modification techniques.
- Initial assessment should screen for behavioral and psychological factors influencing weight control, such as eating frequency, diet quality, portion size, and activity level.
- Triggers that cause the patient to eat when not hungry or to overeat should be assessed and patients taught to avoid or manage them, and barriers to behavior change should be identified and addressed.
- Patients should be screened for mood and/or eating disorders.
- Stepped-care (SC) approaches, provisions for increased patient-provider contact, and use of motivational interviewing (MI) or acceptance and commitment therapy (ACT) techniques may help improve the efficacy of behavioral interventions.

Introduction

In the USA, obesity-related health conditions contribute more than $147 billion to annual health care costs [1]. Nearly two-thirds of adults are overweight (BMI ≥ 25 kg/m^2) and one-third are obese (BMI ≥ 30 kg/m^2) [2]. Many of the chronic and life-threatening health conditions associated with obesity (e.g., diabetes) are increasingly prevalent and potentially reversible in response to weight loss [2–4].

Weight loss in the 5–10 % of total body weight range can greatly improve obesity-related morbidities. A review of short- and long-term studies evaluating the efficacy of weight loss in ameliorating disorders associated with obesity revealed that weight loss can reduce or, in some cases, reverse obesity-related disorders, such as type II diabetes, osteoarthritis pain, dyslipidemia, and blood pressure [5]. Recent large-scale clinical trials have also documented significant health benefits associated with weight loss [4, 6]. The Diabetes Prevention Program was a large multicenter clinical research investigation examining whether modest weight loss through dietary changes and increased physical activity could prevent or delay the onset of type II diabetes among participants at risk for diabetes. Participants in the weight loss intervention group reduced their risk of developing diabetes by 58 %, significantly outperforming participants taking metformin, who reduced their risk of developing diabetes by 31 % [4]. In another significant weight loss multicenter clinical research investigation entitled Look AHEAD, over 5,000 patients with type II diabetes were randomized to either an intensive lifestyle intervention or a diabetes support and education control group. The primary objective of Look AHEAD is to examine the long-term effects of an intensive lifestyle intervention program on cardiovascular outcomes (e.g., heart attack, stroke) over a planned follow-up period of up to 13.5 years. At 4 years, the intensive lifestyle intervention participants maintained greater improvements than diabetes support and education participants in weight, fitness, hemoglobin A(1c) levels, systolic blood pressure, and high-density lipoprotein cholesterol levels [6]. Finally, behavioral weight loss program participants report improvement in depression, anxiety, and body dissatisfaction following treatment [7, 8].

Since the 1970s, behavioral approaches have been the preferred treatment for mild to moderate obesity [9]. While behavioral programs vary, there is often consistency in their delivery and content. For example, it is common for behavioral programs to be delivered in small, weekly closed groups. These groups typically last between 3 months and a year with the most common length about 6 months.

Individual sessions last between 60 and 90 min and consist of a combination of didactics, individual activities, and out-of-class assignments.

Behavioral weight loss programs aim to teach participants how to modify their eating and exercise behaviors to meet the participants' weight loss treatment goals. This is usually accomplished by having patients generate (or by providing patients with) realistic weight loss goals, teaching patients to monitor their eating and exercise behaviors, and helping patients to understand the antecedents and consequences of their eating and exercise behaviors. Consistent with many behavioral-based therapies in the 1970s and 1980s, these programs evolved to emphasize cognitive elements, such as avoidance of dichotomous thinking, reduction of negative self-talk, and improvement in coping strategies, with the increased recognition that cognitive factors are key factors in treatment success [10].

Most behavioral weight loss programs achieve a 7–10 % weight loss in 6 months (e.g., [4]). However, weight regain is a problem with virtually any weight loss intervention, and behavioral programs are not immune [11]. Following behavioral weight loss, weight regain can sometimes approach one-third to one-half of the lost weight during the first 12 months, followed by gradual regain over 5 years [12]. With the inclusion of posttreatment contact or relapse prevention programs, posttreatment weight regain can be improved [13]. Data from the National Weight Control Registry (NWCR), the largest prospective investigation of long-term successful weight loss maintenance, indicate that weight maintenance is associated with the continued application of behavioral modification techniques [14].

Psychological approaches assess and treat disordered eating behavior and comorbid psychological conditions such as depression and anxiety. A recent comprehensive review affirmed the connection between obesity and depression, with evidence of a reciprocal link [15]. People who are obese may be more prone to depression because they experience themselves in poor health and are dissatisfied by their appearance, while people who are depressed may be more apt to become obese because of physiological (hormonal, immune) changes that occur in depression and because self-care is often compromised as a consequence of the condition [15]. Other studies have found connections between obesity and anxiety, post-traumatic stress disorder, bipolar disorder, and schizophrenia [16, 17]. Untreated, mood disorders tend to hinder weight management [18]; however, the integrated treatment of both psychological problems and obesity can improve both conditions [19].

Thus, initial assessment should screen for both behavioral and psychological factors influencing weight. The behavioral assessment should include questions about eating frequency, diet quality, portion size, and physical activity. The assessment should also examine antecedents or triggers which cause the patient to eat when not hungry or to overeat. Triggers might be environmental (e.g., tempting food in the home), mental (e.g., thoughts about food), emotional (e.g., eating for comfort, eating for reward), social (e.g., dining out, alcohol consumption), habitual (e.g., eating at a certain time), or physiological (e.g., poor sleep, hormones). Psychological assessment should screen for eating disorders, including bulimia nervosa, anorexia nervosa, and binge eating disorder. Additionally, the assessment should rule out depression, anxiety, post-traumatic stress disorder, attention deficit disorder, and other relevant psychological conditions. Wadden's Weight and Lifestyle Inventory (WALI) provides an efficient way to assess these variables before beginning treatment [20].

Treatment

Psychological

Should assessment reveal an underlying eating disorder such as bulimia or anorexia nervosa, it is imperative that the patient receive treatment for the condition before entering a behavioral weight loss program. Binge eating disorder and other psychological conditions, such as depression or anxiety, may be treated either before or concurrent with lifestyle intervention for weight loss. While

behavioral weight loss programs appear to benefit individuals with mild to moderate binge eating disorder, some individuals may require additional treatment before they can enter into such a program. Cognitive-behavioral treatment of eating disorders, depression, and anxiety is often effective [21–24]. Additionally, patients may benefit from psychotropic medication and/or referral to specialized mental health services. Some psychotropic medications (e.g., amitriptyline) may exacerbate weight problems, whereas others (e.g., bupropion) are more likely to be weight neutral or associated with weight loss [25].

Dietary Prescriptions

Participants in behavioral weight loss programs are often given calorie, and sometimes fat gram, goals designed to produce modest and healthy weekly weight loss (1–2 lb per week). To achieve a 1–2 lb weight loss through calorie reduction, a participant is often given a calorie intake prescription based on a variety of factors, such as their current weight and level of activity. Most behavioral programs are guided by the estimate that 3,500 cal is equivalent to 1 lb of body fat. Therefore, an individual who wants to lose 1–2 lb each week would strive to create a weekly caloric deficit of 3,500–7,000 cal each week (500–1,000 cal a day deficit). Several methods can be used to determine an appropriate daily calorie goal that takes into consideration the participant's daily caloric expenditure and results in a meaningful caloric deficit. For example, one basic method is to assume that the individual consumes 12 kcal/lb to maintain their body weight. For example, a 250-lb person would be estimated to burn 3,000 cal per day (250 lb × 12 kcal/lb = 3,000 cal). If the 250-lb person wanted to lose two pounds (approximately 7,000 cal), he/she would aim to decrease their daily caloric intake by 1,000 cal (i.e., they would consume 2,000 cal a day rather than 3,000 cal a day). Alternative strategies include having participants wear devices capable of assessing daily caloric intake (e.g., pedometers, accelerometers) to provide an estimate of caloric expenditure. The caloric expenditure estimates can be used to derive meaningful caloric intake goals designed to achieve a specific caloric deficit. Other programs estimate resting metabolic rate using formulas, such as Harris-Benedict and Mifflin-St Jeor, and then add additional calories for physical activity expenditure. In the absence of formulas and accelerometers, participants can be encouraged to adhere to a calorie goal of 1,000 kcal/day for participants who weigh less than 200 lb and 1,800 kcal/day for participants who weigh more than 200 lb.

Traditional behavioral treatment (BT) programs commonly sought to achieve a specific level of caloric restriction. Advice on the macronutrient composition of the diet typically reflected published dietary standards (55–60 % cal from carbohydrates; 10–15 % cal from protein; 20–30 % cal from fat) [26], with early attention devoted to limiting dietary fat. Early emphasis on limiting dietary fat was driven by the fact that fat is more energy dense (1 g = 9 kcal) than protein and carbohydrates (1 g = 4 kcal), linked to cardiovascular disease, and overrepresented in the American diet (approximately 40 % of their calories from dietary fat) [26]. However, in the last several decades, the notion that "all calories are created equal" has been replaced with much greater concern for the macronutrient content of the diet. For example, some diets emphasize limiting carbohydrates rather than fat (Atkins diet [27]), others emphasize limiting fat rather than carbohydrates (Ornish Diet [28]), and others emphasize increasing protein [29]. In addition, recommendations to increase in the consumption of whole grains and decrease levels of added sugars have become commonplace [30]. Despite renewed interest in the macronutrient content of diets, the results from several studies indicate that no one approach to diet is clearly superior to any other [31]. What appears to be most important is adherence to whatever prescribed diet an individual is following, with greater adherence predicting greater weight loss.

Exercise Prescriptions

Given that creating a negative energy balance is essential to losing weight, behavioral programs focus on both reducing energy intake and enhancing energy expenditure. Beyond enhancing weight loss and weight maintenance, regular exercise is associated with numerous physical and psychological health benefits unrelated to weight loss [32]. The CDC recommends that American adults engage in 150 min of moderate to intense physical activity each week with higher levels potentially needed to maintain weight loss [33]. It is very common for behavioral weight loss participants to be encouraged to engage in regular physical activity that they enjoy for 60–90 min a day most days of the week. These programs typically recommend increasing both lifestyle and structured exercise. For example, participants are encouraged to look for small opportunities throughout their waking hours to increase lifestyle physical activity (e.g., taking the stairs, parking further away). Regarding structured exercise, weight loss programs commonly recommend aerobic activities, particularly walking.

It is important to note that increasing exercise alone without attention to calorie restriction has been shown to produce only modest weight losses of 1–2 kg [34]. Similarly, the benefits of adding exercise to a diet program are likely to yield only modest benefits [36]. However, in the end, sustaining long-term weight loss appears to benefit from attention to both diet and exercise, compared to diet or exercise alone [34]. Research also indicates that higher exercise goals are superior to lower exercise goals in encouraging better long-term weight control [35] and that short bouts of exercise lead to better exercise adherence and are equally effective as long bouts of exercise in promoting weight loss without compromising cardiorespiratory fitness [36, 37].

Self-Monitoring

Weight loss is achieved by taking in fewer calories than one expends. To achieve this goal, a foundational skill taught in behavioral programs is self-monitoring. The most common type of self-monitoring is to track progress toward calorie goals. However, some behavioral weight loss programs ask participants to track progress toward physical activity goals, and if the participant has been provided with a pedometer or accelerometer that estimates caloric expenditure, the participant is asked to report caloric expenditure and to compute their daily caloric deficit or excess. In addition, self-weighing is increasingly considered by many as an essential part of self-monitoring. Self-weighing allows participants to assess the effectiveness of their current weight loss strategies and to make corrective action if necessary. Regular self-weighing is associated with lower BMI and greater weight loss [38, 39]. Furthermore, some behavioral programs encourage participants to record thoughts and feelings during eating, exercise, dietary lapses, etc., in order to evaluate their eating behaviors to discover important antecedents to overeating or sedentary behaviors. Participants are commonly instructed to complete diaries immediately following eating and exercise to improve accuracy. The availability of smart phone, tablet, and Internet technologies provides innovative and convenient ways for participants to self-monitor both diet and exercise.

The benefits of regular self-monitoring have been well documented. In the NWCR, which include individuals who have successfully maintained a weight loss of at least 30 lb for at least 1 year, 75 % of subjects report weighing themselves more than once per week and 50 % count calories [40]. Another study that compared successful weight losers and maintainers with those unsuccessful at weight loss found that individuals who are successful plan meals more days of the week (35.9 % successful vs. 24.9 % unsuccessful), track calories (17.7 % vs. 8.8 %), track fat (16.4 % vs. 6.6 %), measure portions (15.9 % vs. 6.7 %), and weigh themselves daily (20.3 % vs. 11.0 %) [41]. Despite these benefits, the frequency of self-monitoring behaviors commonly decreases over time in weight

loss programs and is related to diminished weight loss or weight regain. For example, a study that examined predictors of weight regain 1 year following treatment found that those who gained weight decreased the frequency of self-monitoring compared to those that maintained their weight loss [42]. Therefore, efforts toward minimizing the decline in these behaviors and increasing adherence to self-monitoring may be important in achieving long-term weight loss.

Additional Behavioral Treatment Techniques

Stimulus control. Stimulus control techniques are an effective tool for modifying eating and physical activity environments to encourage weight loss. Evidence for the impact of the food and physical activity environment on eating and sedentary behaviors is well documented [43–59]. Eating cues in the environment are numerous, ever-present, and often outside of an individual's conscious awareness [45, 47]. Food-related salience, variety, serving utensils, abundance, and convenience can dramatically influence consumption [49]. In fact, individuals are often forced to make in excess of 200 daily food-related decisions [46]. Helping an individual to modify their personal food and exercise environment in a manner that minimizes unhealthy food-related decisions and maximizes healthy food-related decisions can greatly aid weight loss.

Goal Setting. Research clearly demonstrates that goals can favorably enhance performance [60], including weight loss outcomes [61]. Whether the goal is a target weight loss goal or a daily calorie or exercise goal, goal setting is a common component in behavioral weight loss treatment. Larger goals can often be broken down into smaller more manageable goals which are easier to implement and monitor. Likewise, behavioral shaping procedures utilize differential reinforcement of successive approximations to bring about desired responses. For example, a participant is initially praised for switching from whole milk to 2 %; later, praise is delivered for switching from 2 % to skim milk.

Cognitive Techniques. Behavioral-based therapies have evolved over time to emphasize cognitive elements with the increased recognition that cognitive factors are key factors in weight loss treatment success. For example, participants may be taught to stop dichotomous thinking (e.g., I blew my diet; I'm off the program), to ban perfectionist attitudes and imperatives (e.g., I will *never* eat more than 1,200 cal a day), and to be aware of attitude traps (e.g., my life will be perfect when I lose weight; I can't wait for the program to end so I can get back to normal eating) [62]. Mindfulness-based (e.g., acceptance) and control-based (e.g., distraction and delay) techniques may be taught as a means of helping participants manage cravings or thoughts about food [63]. In addition, problem-solving techniques are often taught to patients to help them to break down more difficult or larger barriers to successful behavioral change [64].

Social Support. Social support has been recognized as a potentially important factor in successful weight loss. An early meta-analytic evaluation of weight loss programs that formally involved partners in treatment indicated that couple programs were superior to subject-alone programs at posttreatment and brief follow-up [65]. Support from friends and coworkers can also encourage weight loss. For example, Wing and Jeffrey [66] recruited 166 participants for a 4-month treatment to one of the four conditions (recruited alone and standard behavioral therapy; recruited alone and SBT plus social support; recruited with friends and SBT; recruited with friends and SBT plus social support). Results indicated that the social support condition with four people that signed up together or the condition where members that were recruited alone were assigned to teams were superior to the conditions that did not emphasize social support. Finally, Gorin [67] showed that not only do participants in weight loss programs lose weight, but their spouses do as well demonstrating a "ripple effect" for health benefits within a family.

Contingencies. One contingency management technique used to enhance motivation is incentives (usually money). A recent review evaluated studies conducted over the past 30 years that used financial incentives to promote weight loss [68]. Empirical research strongly supports the ideas that providing financial incentives for losing weight motivates people to engage in behaviors that produce weight loss, particularly when participants are required to provide a deposit (e.g., $150) that they can potentially earn back.

Habit Formation and Disruption. A number of health behaviors are independently predicted by the degree to which a behavior is habitually performed, even after controlling for important variables, such as the intention to perform the behavior [69]. Habits are behavioral tendencies to repeat well-practiced acts in response to stable environmental cues [69]. Therefore, as behaviors become habitual, the likelihood of regularly performing them increases. Once habits are developed, an individual can forgo a laborious, rational, contemplative decision in favor of a quick, automatic, and effortless habitual response to engage in healthy behavior [70]. A recent weight loss treatment program that taught environmental modification, health habit formation, and unhealthy habit disruption demonstrated superior weight loss maintenance when compared to a more traditional weight loss program [71].

Self-Care. Behavioral interventions targeting self-care focus on improving sleep hygiene, time management, and stress management. Sleep and stress are closely and reciprocally linked. In addition, both sleep and stress appear to affect weight. One recent study, involving a 6-month behavioral weight loss intervention, found that lower baseline stress levels and longer sleep duration predicted greater weight loss over the course of the intervention [72].

Time management techniques (e.g., planning, prioritization, scheduling) involve improving self-regulation and can help reduce stress and make time for health-promoting activities, such as meal preparation and physical activity.

Both emotional stress (e.g., interpersonal conflict, job-related concerns) and physiological stress (e.g., insomnia, illness, injury) often result in weight gain and/or make it difficult for overweight individuals to make the lifestyle changes necessary for weight loss/management. Indeed, researchers have consistently found an association between stress and obesity [73]. There is evidence that stress-mediated hormonal changes (i.e., cortisol, ghrelin) may impact appetite, cravings, and metabolism [74]. Stress is also linked to potentially adverse effects on eating patterns (e.g., skipping meals, binging) and food preference [75]. Stress management interventions include training in cognitive restructuring techniques, mindfulness/acceptance techniques, relaxation training, assertiveness training, and problem solving.

A recent pilot randomized controlled trial examined the effects of a stress management-augmented lifestyle intervention for weight management, compared to a lifestyle intervention alone in overweight/obese African American women. The results suggested that the addition of stress management components to a behavioral weight control intervention may be beneficial for overweight/obese AA women with moderate to high stress levels [76].

Relapse Prevention. Given the high rates of dietary relapse following weight loss, researchers have attempted to provide relapse prevention training to improve long-term weight loss maintenance. Based on models, such as Marlatt and Gordon's relapse prevention model [77], weight loss researchers have attempted to help participants to identify situations with high risk for a dietary lapse and to teach coping skills to successfully cope with the relapse crisis. While some studies show that providing participants with training in relapse prevention is beneficial [78], a more recent clinical trial comparing two extended therapy programs (relapse prevention training, problem-solving therapy) for weight management with standard behavioral treatment (BT) without additional therapy contacts failed to show improved long-term outcomes with the extended therapies [79].

Treatment Advances

Motivational Interviewing. Emerging research suggests that motivational interviewing (MI), a patient-centered directive approach to counseling for behavior change, can be a beneficial adjunct to standard multicomponent behavioral intervention. The goal of this empathic and collaborative form of counseling is to strengthen patient autonomy, improve self-efficacy, and increase readiness to change by helping patients identify and strengthen personally relevant reasons for change [80]. MI also seeks to help patients better understand and resolve ambivalence about change, often via identification of barriers to change and problem solving. MI techniques were first developed and tested in the context of substance abuse [81] but have since been adapted for use with a number of health-related behaviors. A recent meta-analysis of 11 studies examining the effect of MI on weight management found that MI was associated with a greater reduction in BMI and body weight, as compared to controls. The conclusion was that MI appears to enhance weight loss in overweight and obese patients [82].

Mindfulness/ACT. Mindfulness and ACT have received increased attention as promising techniques to improve long-term weight loss outcomes. Mindfulness-based interventions, which encourage non-judgmental acceptance of experience, are gaining increasing empirical support in the area of eating disorders [83]. Similarly, ACT which uses acceptance and mindfulness strategies together with commitment and behavior change strategies has also shown promise. Two small pilot treatment outcome studies suggest that ACT approaches are feasible to implement and well accepted by participants and may contribute to improved long-term weight loss maintenance [84, 85].

Stepped-Care Approaches. Given the scope of the obesity epidemic, the chronic nature of the condition, and the cost of professional care for obesity-related diseases, many researchers suggest that cost-effective, time-efficient, and minimally intrusive treatments are greatly needed [86]. Applying a stepped-care (SC) approach to the treatment of obesity represents one effort to efficiently allocate treatment resources. In a SC approach to treatment, patients are transitioned (stepped-up) to more intensive treatment when they are unable to meet treatment goals with less intensive treatment [87, 88]. SC approaches have been developed for a variety of conditions, including weight management [88–94]. While stepped-care approaches are generally successful in aiding weight loss [93, 94] they have, at times, produced mixed findings [95, 96]. For example, in the largest weight loss, stepped-care, randomized clinical trial to date (i.e., Step-Up Study), a standard behavioral weight loss intervention was compared to a stepped-care weight loss intervention. Even though the stepped-care intervention was more cost-effective, weight loss outcomes favored the standard behavioral weight loss intervention [95].

Conclusion

Comprehensive psychological and behavioral treatment for obesity is generally effective in bringing about and maintaining modest, yet clinically significant losses of approximately 10 % of pre-intervention weight. Losses of this magnitude are sufficient to prevent or ameliorate obesity-related health concerns, such as hypertension, hyperlipidemia, and/or type II diabetes. However, long-term maintenance remains a significant challenge. Stepped-care approaches, provisions for increased patient-provider contact (either through in-person visits or telephone, text, or email communication), and use of motivational interviewing or ACT techniques may help improve the efficacy of behavioral interventions [14, 82].

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