



Behavioral treatment of obesity¹⁻⁴

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ABSTRACT

Behavioral treatment is an approach used to help individuals develop a set of skills to achieve a healthier weight. It is more than helping people to decide what to change; it is helping them identify how to change. The behavior change process is facilitated through the use of self-monitoring, goal setting, and problem solving. Studies suggest that behavioral treatment produces weight loss of 8-10% during the first 6 mo of treatment. Structured approaches such as meal replacements and food provision have been shown to increase the magnitude of weight loss. Most research on behavioral treatment has been conducted in university-based clinic programs. Although such studies are important, they tell us little about the effectiveness of these approaches in settings outside of specialized clinics. Future research might focus more on determining how these behavioral techniques can be best applied in a real-world setting. *Am J Clin Nutr* 2005; 82(suppl):230S-5S.

KEY WORDS Behavioral treatment, behavior, weight loss, obesity

INTRODUCTION

Historically, behavioral treatment of obesity developed from the belief that obesity was the result of maladaptive eating and exercise habits, which could be corrected by the application of learning principles (1). Today, investigators realize that body weight is affected by factors other than behavior. These include genetic, metabolic, and hormonal influences (2-4) that probably predispose some persons to obesity and may well set the range of possible weights that an individual can achieve. Some individuals may never be thin, despite Herculean efforts to modify eating and activity habits. Behavior therapy, however, can help such individuals develop a set of skills (such as eating a low-calorie, low-fat diet) to achieve a healthier weight, even if they cannot attain an ideal one.

Behavioral treatment is based primarily on principles of classical conditioning, which posit that eating is often prompted by antecedent events (ie, cues) that become strongly linked to food intake (1). Behavioral treatment, as described below, helps patients identify cues that trigger inappropriate eating (and activity) and learn new responses to them (5, 6). Treatment also seeks to reinforce (or reward) the adoption of positive behaviors.

In the past 20 y, cognitive therapy also has been incorporated in the behavioral treatment of obesity. The underlying assumption of cognitive therapy is that thoughts (or cognitions) directly affect feelings and behaviors (7). Negative thoughts frequently are associated with negative outcomes, as in the case of an individual who overeats thinks, "I've blown my diet," and then

proceeds to eat even more secondary to feelings of failure and hopelessness. With cognitive therapy, patients learn to set realistic goals for weight and behavior change, to realistically evaluate their progress in modifying eating and activity habits, and to correct negative thoughts that occur when they do not meet their goals (6, 8, 9). Cognitive interventions for weight management are based on those developed for the treatments of depression, anxiety, and bulimia nervosa (10-12).

DEFINING CHARACTERISTICS

Behavioral treatment has several distinguishing characteristics (13). First, it is goal directed. It specifies very clear goals in terms that can be easily measured. This is true whether the goal is walking four times per week, lengthening meal duration by 10 min, or decreasing the number of self-critical comments. Specific goals facilitate a clear assessment of success.

Second, treatment is process oriented. It is more than helping people to decide what to change (ie, eating, activity, and thinking habits); it is helping them identify how to change (8). Thus, once a goal is specified, patients are encouraged to examine factors that will facilitate or hinder goal achievement. In cases in which the desired behavior is not implemented, problem-solving skills are used to identify new strategies to overcome barriers. In this view, successful weight management is based on skills that can be learned and practiced, in the same manner that an individual can learn to play the piano through frequent practice. Skill power, not will power, is the key to success.

Third, the behavioral approach advocates small rather than large changes. This is based on the learning principle of successive approximation in which incremental steps are taken to achieve more distant goals. Making small changes gives patients successful experiences on which to build rather than attempting drastic changes that are typically short-lived.

The behavior change process is facilitated through the use of a variety of problem-solving tools. The behavior chain, an illustration that visually depicts the chain of events that lead to an unwanted behavior such as overeating, is one of the tools commonly used in treatment (**Figure 1**). By examining the cues and

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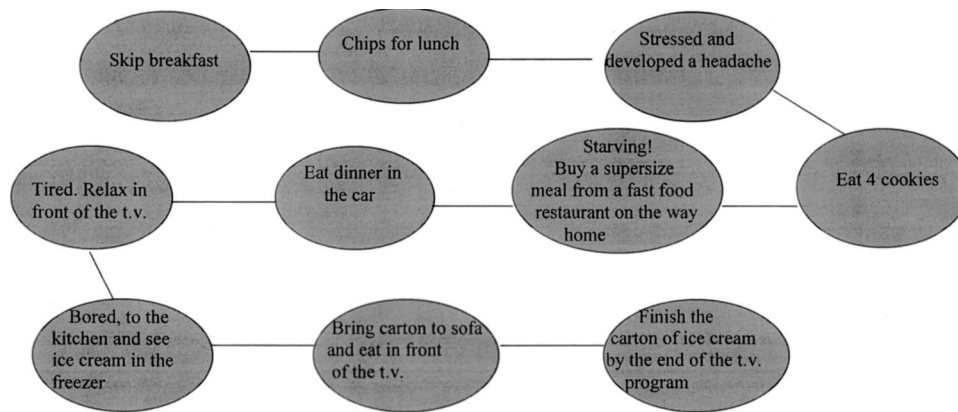


FIGURE 1. Behavior chain.

events that lead up to an overeating episode, one can identify areas in which modifications in behavior can be made to break the chain of events and prevent an overeating episode from occurring in the future. For example, if a patient has identified television watching as part of the sequence of events leading up to an overeating episode, limiting eating to a more appropriate location (ie, table in the kitchen or dining room) can be an effective strategy for weakening the association between eating and television watching. The more often the patient refrains from eating in front of the television, the less likely that television watching will automatically trigger eating.

THE BEHAVIORAL PACKAGE

Behavioral treatment usually includes multiple components, such as keeping food and activity records (ie, self-monitoring), controlling cues associated with eating (ie, stimulus control), nutrition education, slowing eating, physical activity, problem solving, and cognitive restructuring (ie, cognitive therapy) (5, 6). These components comprise the “behavioral package” that has been summarized in manuals such as the *LEARN Program for Weight Management 2000* (6). Studies have shown that two components, self-monitoring (14, 15) and physical activity (16), are consistently associated with better weight control in the short- and long-term, respectively. Additional research is needed to identify the most potent components of the package, as well as additional interventions that might be added (such as body image therapy) to improve efficacy, especially in the long term. In the interim, researchers and practitioners probably will continue to use the behavioral package because it is well validated, as a whole, and different patients are drawn to different components of the intervention.

SHORT-TERM RESULTS OF BEHAVIORAL TREATMENT

A large number of clinical studies have been conducted examining the effects of behavioral treatment on weight loss. The typical design of most behavioral treatment weight loss studies is group meetings weekly for the initial treatment phase (≈ 3 -6 mo), biweekly (every other week) meetings for the maintenance phase (6-12 mo), and monthly or bimonthly for the later phases of the study (12-24 mo) (13, 17, 18).

Wing et al (19) reviewed behavioral weight loss studies from 1996 to 1999, which resulted in a mean short-term weight loss of 10.6% (9.6 kg) during the treatment phase (21 wk) and 8.6% (6.0 kg) at follow-up (18 mo). Studies published from 2000-2004 have produced similar results (20-23).

STRATEGIES FOR AUGMENTING OUTCOMES

Although behavioral treatment provides individuals with a set of skills to handle barriers to eating healthy and being active, overcoming barriers is a difficult endeavor in a fast-paced environment that encourages overconsumption of energy-dense, palatable, low-cost foods and promotes energy-saving devices (24, 25). A healthy lifestyle requires significant planning, proficiency in making healthy choices and estimating portion sizes, and diligence in monitoring caloric intake and activity, all of which take time to develop and maintain. As such, strategies for simplifying and making this process more practical have been investigated and are described below. In general, these strategies provide structure and reduce time spent in meal planning and decision making.

Food provision

Jeffery et al (26) examined the impact of food provision on weight loss outcome in 202 overweight individuals. Participants who received food along with standard behavioral treatment lost more weight at 6 mo (-10.1 vs -7.7 kg), 12 mo (-9.1 vs -4.5 kg), and 18 mo (-6.4 vs -4.1 kg) than those who were prescribed a reduced calorie diet and standard behavioral treatment. In a subsequent study, Wing et al (27) sought to determine whether food provision itself or limited dietary decision making affected weight loss outcome. In this study, 163 overweight women were randomly assigned to one of four interventions: 1) standard behavioral treatment, 2) standard behavioral treatment plus written meal plans and grocery lists for five breakfasts and dinners each week, 3) standard behavioral treatment plus foods for a charge of \$25.00/wk, and 4) standard behavioral treatment plus foods free of charge. Data were collected for $\approx 90\%$ of participants at the end of active treatment (ie, 6 mo) and at 1-y follow-up (ie, 18 mo after randomization). Weight loss was greater in groups that received food and meal plans compared with the group that received standard behavioral treatment at 6 and 18 mo; however, no differences in weight loss were observed

between the groups that were provided food and the group that received meal plans and grocery lists.

Meal replacements

Similar findings are observed in studies that compared meal replacements (28–31) or prepackaged entrees (32, 33) with self-selected diets. These studies suggested that replacing two of three meals with a liquid and/or solid meal replacement or at least two meals with a portion-controlled entrée resulted in greater weight loss than self-selected diets. Although some weight regain was observed over time, a greater reduction in weight was observed even up to 4 y in individuals receiving meal replacements (28). Based on a meta-analysis by Heymisfield et al, (34) individuals consuming meal replacements lose $\approx 7\text{--}8\%$ body weight, whereas those on a standard self-selected diet lose 3–7% body weight at 1 y. It is unclear whether meal replacements are superior to other structured weight loss approaches that provide menus and recipes, however. Noakes et al (35) found similar decreases in weight in individuals using meal replacements (-9.0 kg or -9.4% body weight) and those following structured diets (-9.2 kg or -9.3% body weight) at 6 mo. These findings suggest that increasing structure may improve dietary compliance.

Pharmacotherapy

Another method used to enhance weight loss outcomes is to couple behavioral and pharmacotherapy approaches. It can be argued that behavioral treatment modifies the external environment, whereas pharmacologic approaches modify the internal environment either centrally (eg, sibutramine) or peripherally (eg, olistat). To test this hypothesis, Wadden et al (36) compared weight loss outcome in women randomized to one of three groups: 1) sibutramine alone, 2) sibutramine plus behavior modification in the context of a self-selected reduced calorie diet conventional diet, or 3) sibutramine plus behavior modification in the context of a portion-controlled diet using meal replacements. Because all patients received the same dosage of sibutramine, this study assessed the dose response of increasing behavioral treatment. These investigators found that, at 6 mo, the group with the most behavioral modification lost approximately three times the amount of weight (-17.7% of initial body weight) than those on drug alone (-5.8% of initial body weight) and were better able to maintain the loss at 1 y (-16.5 vs -4.1% , respectively). These data suggest that increasing the “dose” of behavioral therapy will increase both short- and long-term weight loss.

Commercial weight loss programs

Most research on behavior treatment has been conducted in university-based clinic programs. Although such studies are important, they tell us little about the effectiveness of these approaches in settings outside of specialized clinics. Womble et al (37) reviewed the available literature on commercial approaches and found, in general, that weight losses were less than those observed in the clinical setting. In a recent study that evaluated the effectiveness of the Weight Watchers program, Heshka et al (38) found that those in Weight Watchers lost more weight than those assigned to a self-help group (4.6 vs 1.7%) after 1 y and after 2 y (3.1 vs 0.2%).

SETTING THE STAGE

Talking with patients about weight control

No matter what type of obesity treatment is ultimately recommended, effective and compassionate treatment of obese patients requires an understanding of the cultural context in which treatment occurs. As Stunkard and Sobal (39) have suggested, disparagement of obese individuals is the last socially acceptable form of prejudice. It is not surprising, therefore, that health care providers seem to share the negative view of the overweight by society. Studies suggest that a large proportion of physicians consider obesity a behavioral problem (ie, lack of willpower or lack of physical activity) and view obese patients as lazy, awkward, unattractive, and ugly (40, 41). Other health care providers, such as dietitians, also have negative or at best ambivalent attitudes toward the obese (42–44). Such characterizations are likely to lead to behaviors that may be discriminatory. There are numerous clinical anecdotes about how obese patients have been treated disrespectfully in the health care setting.

Toward more empathic encounters

It can be argued that overweight patients are “just too sensitive,” and their perceptions about medical visits reflect their own frustration with their weight rather than any systemic bias by health care professionals. Even if patients’ bad experiences are partly attributable to their inaccurate perceptions, such experiences need to be remedied. This is necessary because these inaccurate perceptions lead to interactions that, at best, provide health care at the expense of a patient’s self-esteem or, at worst, prevent obese patients from seeking health care altogether. The following recommendations seek to put obese patients at ease in the health care setting and promote competent, compassionate care (45).

Assume that obese individuals know they are overweight. If they have not heard it from a health care professional, they have probably been told by friends, family or even strangers. Simple phrases such as, “What do you think about your weight?” will allow you to assess the patient’s interest and/or motivation for weight control in a nonjudgmental manner. They also allow you to hear the patient’s perspective before making any recommendations for weight loss or describing the ill effects of excess weight.

Be empathetic about dissatisfaction with weight and/or shape. It is reassuring for patients to hear from their health care providers things such as “Weight control is really tough work, isn’t it?” or, “It must be frustrating to have worked so hard and still be unhappy because you haven’t lost as much weight as you wanted.” Such phrases let patients know that you understand their difficulties and that you will not be judgmental.

Listen carefully to the patient’s presenting problem, independent of weight. Few patients consider weight to be their primary problem. As Stunkard (45) points out, patients define the presenting problem. If weight is a precipitating condition, focus on the factors that affect the presenting problem and weight. For example, it is not likely to be useful to tell an obese patient with dyslipidemia to lose weight. Encouraging the same patient to decrease the intake of saturated fat and make small changes in activity, however, will likely influence weight and lipids.



Create a user-friendly office

Just as airline seats are frequently too small for significantly obese patients, so are the equipment and furnishings found in many health care settings. Attention to the following details facilitates an environment that is receptive to obese patients (13).

Have a scale that can weigh all patients. Getting weighed is among the most unpleasant experiences for an obese patient in the health care setting; it becomes humiliating if a patient weighs more than the scale can accommodate.

Have gowns available that fit larger patients. Many obese patients report the experience of waiting for a physician examination in a gown that barely covers them.

Use larger blood pressure cuffs when appropriate. Office and/or hospital staff should know when to use larger cuffs with patients. Inappropriate cuff sizes will lead to inaccurate measurements and treatment recommendations. Moreover, having a cuff inflate off a patient's arm is awkward for both the patient and practitioner.

Provide some armless chairs in the waiting room. Obese patients should not be made to feel uncomfortable in chairs made for lean persons.

Counseling skills

Although behavioral change is the responsibility of the patient, it is the responsibility of the health care provider to facilitate change through effective counseling (46). Counseling is not an innate talent; it requires practice and fine-tuning. Many providers may feel that their primary role is to give advice to patients about healthy methods of weight control. Although some education and advice is useful, most weight control patients are well aware of what they "should" eat; the problem is doing so in an environment that encourages otherwise. Therefore, an emphasis on asking questions to clarify barriers and their solutions is more effective than giving advice about how to "fix" the problem. The former approach models for patients the manner in which a problem can be managed effectively rather depending on getting the right advice. As a rough indicator, the more a clinician speaks during the session, the less effective the session will be for the patient. If the clinician is talking >50% of the session, it is important to reassess the balance between advice giving and problem solving (46).

Improving adherence

Several straightforward guidelines can help patients improve their adherence to the behaviors necessary for effective weight control (13, 46). They are discussed below.

Be clear that the patient knows the rationale for changing behavior (WHY). It is important to ensure that patients understand the rationale for a specific behavior change. Statements such as "Why do you think I'm asking you to keep food records? Have you found them useful in the past?" will clarify whether the patients see any value in record keeping. Patients are adult learners who need to be engaged in the process of behavior change. Simply telling them that "it is important" or "good for them" does not suffice.

Identify a goal and establish a specific plan (WHAT). Short-term goals should be based on behavior rather than weight because many factors other than behavior (salt, fluid, and humidity) affect weight in the short term. When helping patients select goals, it is important to describe the behavior in concrete and

specific terms: help patients select a specific plan (eg, limit eating to 300 kcal between 7:00 and 10:00 PM or walk three times for 20 min after dinner on Monday, Wednesday, and Friday) rather than a general platitude (eg, eat less at night or exercise more). The more specific the goal, the better.

Identify facilitators and barriers to success (HOW). To successfully execute the plan, the process must be thought through from beginning to end. It is rare that any plan will proceed without an occasional glitch; therefore, it is important to help patients think through the steps that will be necessary to achieve their goal (eg, purchasing alternative foods for evening consumption and having a spouse help with household duties after dinner), including steps to avoid or overcome potential barriers.

Have the patient make a written record of the plan and key steps in its implementation. In addition, make a brief note in the chart documenting the specific plan. At the next visit, review the patient's progress with the specific plan rather than asking generally, "How did it go?" Was the behavior accomplished or not? If successful, what strategies did the patient use to achieve the goal? If unsuccessful, what things got in the way and how can they be removed in the future? Patients benefit more from examining how behavior changed or did not change rather than focusing on why things did not go as planned.

Dealing with nonadherence

In an ideal world, the steps described above would reliably produce adherence, weight loss, and satisfied patients and practitioners. The reality is that effective weight control is a learned skill. Like the development of any other skill, setbacks are to be expected. Effectively managing nonadherence is an essential skill for both patients and practitioners. The following suggestions are designed to help the health care provider and patient deal with nonadherence (13).

Assume that a lack of planning or skills rather than a lack of motivation is the reason for nonadherence. When things do not go as planned, it is important to focus on what can be done differently in terms of planning or coping skills. This emphasizes a plan of action rather than fruitless discussions about motivation. Motivation (the ratio of benefits to costs) can be addressed after multiple attempts at planning and skill building have faltered, but the first assumption should be that skills, rather than motivation, need to be enhanced.

Analyze what happened and how it can be prevented in the future. Cast setbacks as an opportunity to refine weight control skills. Ask enough questions to understand how things did not go as planned (eg, time, place, activity, emotions, and the sequence of events). What specifically got in the way and how can it be removed? Instilling hope is an essential feature of an effective therapeutic relationship. Having patients think through how they would deal with same situation in the future will increase self-efficacy and give hope.

Help patients recognize nonadherence and assume responsibility for their actions. Patients may attribute nonadherence to factors that are beyond their control (eg, people and activities). Identifying behaviors that can be managed not only empowers the patient, it also underscores that the patient is responsible for problem solving.

Avoid criticizing patients. Weight control is tough work, and patients need to know that you will not give up on them. Criticizing patients or questioning their motivation does little for



improving adherence and has adverse effects on the patient-health care provider relationship. Patients will struggle, and they need to know that your support is unconditional and you will not give up on them.

Preserve the patient's self-esteem and be patient. Realize that patients often feel frustrated and discouraged when they have not followed their intended plan. Feelings of failure are likely to occur when one expects to achieve perfection. Identifying small and positive accomplishments and pointing out that the goal is not to achieve perfection will help boost morale and self-esteem. Both the health care provider and the patient should keep in mind that long-term changes do not occur overnight.

Share your frustration with colleagues so it does not affect your work with patients. Treating refractory conditions such as obesity can undermine your own professional self-esteem. Read the scientific literature regularly to be reassured that no one has yet cured obesity! Discussing frustrations with colleagues can have positive therapeutic benefits and reduce the potential for burnout and ineffective patient care.

Unrealistic expectations

One of the greatest challenges in the clinical management of obese patients is addressing the significant disparity between actual and expected weight losses. Although professionals generally accept a 10% weight loss as successful (based on the associated improvements in comorbidities), patients typically seek weight losses that approximate 30% reductions in body weight (9, 47–49). Several recommendations may help patients accept more modest weight loss outcomes as successful.

Be clear about what weight loss does and does not. Weight loss will make you healthier, but it does not guarantee a better job, a happier marriage, or other things that many patients seek through weight loss. Discussing (before treatment) what else patients expect to change besides their weight will help identify any unrealistic expectations or magical thinking regarding weight loss.

Focus on nonweight outcomes. Focus on the many nonweight changes, such as improvements in serum lipids, blood pressure, and glycemic control. In addition, prompt patients to assess changes in their quality of life, such as increased energy, being able to keep up with children or grandchildren, and climbing stairs without shortness of breath.

Discuss biological limits. In short, acknowledge what patients already know: not everyone who eats the same and exercises the same weighs the same. Weight is not infinitely malleable, and there are likely biological boundaries that set limits for weight loss. Help patients focus on behavioral changes that improve health and worry less about the ultimate number of pounds lost. Patients will need your help to counter the cultural myth that “you can weigh whatever you want.”

A FINAL NOTE

Health care providers can provide a great service to obese patients by reminding them that their worth is not measured on the scale. Patients should be encouraged to take themselves, their health, and, thus, their weight seriously rather than attempting to lose weight so they can like themselves. Reaffirming the patient's self-worth, independent of body weight, is perhaps one of the most powerful interventions a health care provider can provide an obese patient. As Stunkard (45) suggests, “As with any

chronic illness, we rarely have an opportunity to cure, but we do have an opportunity to treat the patient with respect. Such an experience may be the greatest gift that [we] can give an obese patient.”

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REFERENCES

1. Stuart RB. Behavioral control of overeating. *Behav Ther* 1967;5: 357–65.
2. Snyder EE, Walts B, Perusse L, et al. The human obesity gene map: the 2003 update. *Obes Res* 2004;12:369–439.
3. Comuzzie AG. The genetic contribution to human obesity: the dissection of a complex phenotype. In: Johnston FE, Foster GD, eds. *Obesity, growth and development*. London: Smith-Gordon, 2001;21–36.
4. Tataranni PA, Ravussin E. Energy metabolism and obesity. In: Wadden TA, Stunkard AJ, eds. *Handbook of obesity treatment*. New York: Guilford Press, 2002;42–72.
5. Wing RR. Behavioral weight control. In: Wadden TA, Stunkard AJ, eds. *Handbook of obesity treatment*. New York: Guilford Press, 2002; 301–16.
6. Brownell KD. *The LEARN program for weight management 2000*. Dallas: American Health Publishers Co., 2000.
7. Beck AT. *Cognitive therapy and the emotional disorders*. New York: International Universities Press, 1976.
8. Foster GD. Goals and strategies to improve behavior-change effectiveness. In: Bessesen DH, Kushner RF, eds. *Evaluation and management of obesity*. Philadelphia: Hanley & Belfus, 2002;29–32.
9. Foster GD, Wadden TA, Vogt RA, Brewer G. What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcomes. *J Consult Clin Psychol* 1997;65:79–85.
10. Beck AT, Rush A, Shaw B, Emery G. *Cognitive therapy of depression*. New York: Guilford Press, 1979.
11. Beck AT, Emery G, Greenberg R. *Anxiety disorders and phobias: a cognitive perspective*. New York: Basic Books, 1985.
12. Fairburn CG, Wilson GT. *Binge eating: nature, assessment and treatment*. New York: Guilford Press, 1993.
13. Wadden TA, Foster GD. Behavioral treatment of obesity. *Med Clin North Am* 2000;84:441–61.
14. Baker RC, Kirschenbaum DS. Self-monitoring may be necessary for successful weight control. *Behav Ther* 1993;24:377–94.
15. O'Neil PM. Assessing dietary intake in the management of obesity. *Obes Res* 2001;9(suppl):361S–6S.
16. Jakicic JM. Exercise in the treatment of obesity. *Endocrinol Metab Clin North Am* 2003;32:967–80.
17. Ryan DH, Espeland MA, Foster GD, et al. Look AHEAD (Action for Health in Diabetes): design and methods for a clinical trial of weight loss for the prevention of cardiovascular disease in type 2 diabetics. *Control Clin Trials* 2003;24:610–28.
18. Jeffery RW, Wing RR, Thorson C, Burton LR. Use of personal trainers and financial incentive to increase exercise in a behavioral weight-loss program. *J Consult Clin Psychol* 1998;66:777–83.
19. Wing RR. Behavioral weight control. In: Wadden TA, Stunkard AJ, eds. *Handbook of obesity treatment*. New York: Guilford Press, 2002; 301–16.
20. Jeffrey RW, Wing RR, Sherwood NE, Tate DF. Physical activity and weight loss: does prescribing higher physical activity goals improve outcome? *Am J Clin Nutr* 2003;78:684–9.
21. Melin I, Karlstrong B, Lappalainen R, Berglund L, Mohsen R, Vessby B. A programme of behavior modification and nutrition counseling in the treatment of obesity: a randomized 2-year clinical trial. *Int J Obes Relat Metab Disord* 2003;27:1127–35.
22. Ramirez EM, Rosen JC. A comparison of weight control and weight control plus body image therapy for obese men and women. *J Consult Clin Psychol* 2001;69:440–6.
23. Watkins LL, Sherwood A, Feinglos M, et al. Effects of exercise and weight loss on cardiac risk factors associated with syndrome X. *Arch Intern Med* 2003;163:1889–95.
24. Wadden TA, Brownell KD, Foster GD. Obesity: responding to the global epidemic. *J Consult Clin Psychol* 2002;70:510–25.

25. Drewnowski A, Specter SE. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutr* 2004;79:6–16.
26. Jeffery RW, Wing RR, Thorson C, Burton LR. Strengthening behavioral interventions for weight loss: a randomized trial of food provision and monetary incentives. *J Consult Clin Psychol* 1993;6:1038–45.
27. Wing RR, Jeffery RW, Burton LR, Thorson C, Nissinoff KS, Baxter JE. Food provision vs structured meal plans in the behavioral treatment of obesity. *Int J Obes Relat Metab Disord* 1996;20:56–62.
28. Ditschuneit HH, Flechtner-Mors M. Value of structured meals for weight management: risk factors and long-term weight maintenance. *Obes Res* 2001;9(suppl 4):284S–9S.
29. Ditschuneit HH, Flechtner-Mors M, Johnson TD, Adler G. Metabolic and weight loss effects of a long-term dietary intervention in obese patients. *Am J Clin Nutr* 1999;69:198–204.
30. Rothacker DQ, Staniszewski BA, Ellis PK. Liquid meal replacement vs traditional food: a potential model for women who cannot maintain eating habit change. *J Am Diet Assoc* 2001;101:345–7.
31. Ashley JM, St Jeor ST, Perumean-Chaney S, Schrage J, Bovee V. Meal replacements in weight intervention. *Obes Res* 2001;9:312S–20S.
32. Hannum SM, Carson L, Evans EM, et al. Use of portion-controlled entrees enhances weight loss in women. *Obes Res* 2004;12:538–46.
33. Metz JA, Stern JS, Kris-Etherton P, et al. A randomized trial of improved weight loss with a prepared meal plan in overweight and obese patients. *Arch Intern Med* 2000;160:2150–8.
34. Heymsfield SB, van Mierlo CAJ, van der Knaap HCM, Heo M, Frier HI. Weight management using meal replacement strategy: meta and pooling analysis from six studies. *Int J Obes* 2003;27:537–49.
35. Noakes M, Foster PR, Keogh JB, Clifton PM. Meal replacements are as effective as structured weight-loss diets for treating obesity in adults with features of metabolic syndrome. *J Nutr* 2004;134:1894–9.
36. Wadden TA, Berkowitz RI, Sarwer DB, Prus-Wisniewski R, Steinberg C. Benefits of lifestyle modification in the pharmacologic treatment of obesity: a randomized trial. *Arch Intern Med* 2001;161:218–27.
37. Womble LG, Wang SS, Wadden TA. Commercial and self-help weight loss programs. In: Wadden TA, Stunkard AJ, eds. *Handbook of obesity treatment*. New York: Guilford Press, 2002;395–415.
38. Heshka S, Anderson JW, Atkinson RL, et al. Weight loss with self-help compared with a structured commercial program. *JAMA* 2003;289:1792–8.
39. Stunkard AJ, Sobal J. Psychosocial consequences of obesity. In: Brownell KD, Fairburn CG, eds. *Eating disorders and obesity: a comprehensive handbook*. New York: Guilford Press, 1995;417–21.
40. Price JH, Desmond SM, Krol RA, Snyder FF, O'Connell JK. Family practice physicians' beliefs, attitudes, and practices regarding obesity. *Am J Prev Med* 1987;3:339–45.
41. Foster GD, Wadden TA, Makris A, et al. Primary care physicians' attitudes about obesity and its treatment. *Obes Res* 2003;11:1168–77.
42. Maiman LA, Wang VL, Becker MH, Finlay J, Simonson M. Attitudes toward obesity and the obese among professionals. *J Am Diet Assoc* 1979;74:331–6.
43. Oberrieder H, Walker R, Monroe D, Adeyanju M. Attitudes of dietetics students and registered dietitians toward obesity. *J Am Diet Assoc* 1995;95:914–6.
44. McArthur L, Ross J. Attitudes of registered dietitians toward personal overweight and overweight clients. *J Am Diet Assoc* 1997;97:63–6.
45. Stunkard AJ. Talking with Patients. In: Stunkard AJ, Wadden TA, eds. *Obesity: theory and therapy*, 2nd ed. New York: Raven Press, 1993;355–63.
46. Foster GD, Makris A. Behavioral treatment, Part B, Practical applications. In: Foster GD, Nonas CA, eds. *Managing obesity: a clinical guide*. Chicago: American Dietetic Association, 2004;76–90.
47. O'Neil PM, Smith CF, Foster GD, Anderson DA. The perceived relative worth of reaching and maintaining goal weight. *Int J Obes* 2000;24:1069–76.
48. Jeffery RW, Wing RR, Mayer RR. Are smaller weight losses or more achievable weight loss goals better in the long term for obese patients? *J Consult Clin Psychol* 1998;66:641–5.
49. Foster GD, Wadden TA, Phelan S, Sarwer DB, Sanderson RS. Obese patients' perceptions of treatment outcomes and the factors that influence them. *Arch Intern Med* 2000;161:2133–9.

