

THE EFFECT OF TWO LEVELS OF PARENTAL
INVOLVEMENT ON WEIGHT LOSS OF
ADOLESCENTS PARTICIPATING IN
A BEHAVIORAL PROGRAM

CENTRE FOR NEWFOUNDLAND STUDIES

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WEIGHT LOSS OF ADOLESCENTS PARTICIPATING IN A
BEHAVIORAL PROGRAM

BY

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A thesis submitted to the School of Graduate
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ABSTRACT

The present study was designed to determine whether increased parental participation in their teenager's weight loss program would result in greater changes in obesity measures and in maintenance of these changes. Two levels of parental involvement were used, with the Experimental group attending weekly meetings and receiving a parent manual, and the Control group receiving the same manual and a weekly telephone call.

Seventeen adolescents between the ages of 12 and 17 were recruited through advertisements, public service announcements, and through referral by a psychologist and a dietician at the Janeway Child Health Centre. Subjects were required to be at least 20% overweight, have a parent willing to attend weekly meetings, and to show sufficient motivation. Subjects were then randomly assigned to either the Experimental or the Control groups.

All participants took part in a 20-week behavioral weight loss program which included nutrition education and exercise components. At the conclusion of the program and at the three month follow-up, there were no differences found as a result of group membership on the Body Mass Index; skinfold measures, or on Body-Esteem. The expected changes as a result of the program (regardless of group) were also not found at termination or at follow-up. A significant increase in body-esteem was found for the subjects regardless of group membership. A significant decrease in Body Mass Index measures was found in a comparison of initial measures and Week Eight measures.

Reasons for the lack of overall loss of obesity were discussed, with emphasis on why the significant BMI losses for the group as a whole which were found at

Week Eight were not present at termination or at follow-up. Possible reasons include loss of motivation during the Christmas break, or more plausibly, the failure of the program to continue the initial motivation after the break. A possible solution is to present the material in a manner which would be more interesting for this age group.

The lack of parental attendance at weekly meetings was also discussed, as were methods which might be used to overcome the apparent lack of motivation by parents. Suggestions included contingency contracting for parental attendance and the use of techniques to make the material presented more interesting.

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Obesity is prevalent in North America (Garn & Clark, 1975; Lauer, Conner, Leaverton, Reiter, & Clarke, 1975; Grinker, 1981) and there is evidence that the number of obese adolescents and children is increasing (Forbes, 1975; Drabman, Jarvie, & Cordua, 1985). Given that being obese increases one's chances of suffering from a physiological or psychological disorder (Lauer et al., 1975; Clarke, Morrow, Morse, & Keiser, 1970; Bruch, 1980), the high prevalence rates suggest that an effective treatment for adolescent and childhood obesity is needed. The present study addresses a means by which adolescent obesity might be decreased and the subsequent losses maintained. Specifically, the variable being studied is parent participation in weight management and whether or not increased parental participation will result in greater weight loss and maintenance in the teenagers of these parents.

Definition and Measurement of Obesity

Whether or not an individual is obese depends upon the definition of obesity employed and the type of measurement used. Mahoney, Mahoney, Rogers, and Straw (1979) have stated that obesity can be characterized as an excess accumulation of nonessential body fat; however, they go on to point out that in order for this definition to be useful there must be accurate measurement techniques for assessing body fat and standards for determining what constitutes an excess of body fat. Mahoney *et al.* (1979) suggest that neither accurate measurement techniques nor good standards exist. Although this position is perhaps an exaggeration of the situation as regards childhood and adolescent obesity, it can not be denied that the measurement techniques and the standards of what constitutes obesity have varied from study to study and that they have changed over the last several decades.

Regarding what constitutes an excess of body fat, it has until recently been common practice to use weight and percent overweight as dependent variables in obesity research and clinical practice. Using these measures, it was not uncommon to find different researchers using 15%, 20%, or 30% overweight as definitions of obesity. More recently several researchers have put forward classification systems for obesity. Hanna, Loro, and Power (1981) suggested that 10-20% over normed weight be considered "slight" obesity; 21-30%, "mild"; 31-50% "moderate"; 51-75%, "severe"; 76-100%, "massive"; and 101% or greater, "morbid". This system was devised using 158 individuals treated for obesity in a behavioral and dietary weight loss program. It was found that eating habits and weight loss were both related to the degree of overweight.

Stunkard (1984) has proposed a simpler system with only three categories: "mild", 20-40% overweight; "moderate", 41-100% overweight; and "severe", greater than 100% overweight. Unlike the Hanna *et al.* (1981) study, there are no psychological or social correlates related to these cut-off points, and only a crude relationship between exists Stunkard's categories and seriousness of certain physiological disorders. As White (1986) points out, the boundaries of these classes are somewhat arbitrary. However, Stunkard (1984) suggests that there are relationships between degree of obesity and certain physiological disorders. These relationships are discussed in the section, 'Complications Associated with Obesity'.

Given the varying definitions and classifications, it is clear that there is no agreed upon point which is used to define obesity. However, 20% overweight is a point which Stunkard (1984) and Hanna *et al.* (1981) would both classify as mild obesity and which is close to Brownell's (1982) suggestion of 25% overweight or greater as a criterion for inclusion in obesity research.

Assuming that 20% or greater overweight is a valid criterion, it still remains to be determined what can be considered a valid technique for measuring overweight. As already stated, weight and percent overweight were the measures of choice in the past and were in fact the measures used in the above classification systems. However, using these measures fails to take into account height differences among individuals and changes in height of an individual during the course of a treatment program, or it involves the cumbersome simultaneous use of weight tables with height tables. This problem has been addressed through the use of measures such as the Body Mass Index (BMI). This measure is determined by dividing the weight of an individual by his height squared. Mahoney *et al.* (1970) report that there are high correlations between BMI measures and measures of body fat. Using BMI, one can see that not only will decreases in weight result in decreases in this measure, but so too will increases in height. Therefore, BMI measures will result in changes in fat being determined if the individual increases in height during the course of treatment; using weight alone would miss these changes as an individual's weight might stay the same or increase despite a loss of fat.

A number of researchers, having recognised the importance of taking height into account, have used the Body Mass Index or similar measures in research with adolescents and children (Brownell, Kelman & Stunkard, 1983; Edwards, 1978).

Despite the improvement of measures that take height into account over simple measures of weight, any measure using weight is only an indirect measure of fat. Garn, Clark, and Guire (1975) studied the relationship between tricep skinfold thickness (a measure of subcutaneous fat) and relative weight. It was

found that in infancy and early childhood the correlation between the two measures was very low, but that it increased into adolescence and adulthood. From these results Garn *et al.* (1975) suggested that although skinfold measures (tricep and subscapular) are reasonably related to relative weight in adolescence and adulthood, that when studying children from infancy to early adolescence "... there appears to be no alternative but measuring fatness as fatness." (p. 123). While the best technique for measuring the amount of fat of an individual is to weigh him while he is completely immersed in water (densitometry), this is an inconvenient and impractical method. Another more practical means of measuring body fat is to use skinfold measures. That this is a valid technique is supported by Womersley and Durnin (1977) who reported that skinfold measures correlated well with densitometry techniques and were more accurate than other indirect measures of body fat.

Wells and Copeland (1985) suggest that child obesity researchers "... must begin to include measures of skin-fold thickness in treatment studies..." and that these measures "... appear to be the most valid estimates of body fat in the growing child" (p. 147).

Wells and Copeland (1985); Garn *et al.* (1975); and Womersley and Durin (1977) all recommend a combination of skinfold and Body Mass Index measures in studies with children.

Complications Associated with Obesity

There are good reasons for the treatment of obesity. The following sections review various problems that have been associated with obesity. Special attention will be paid to adolescent and childhood obesity and the associated risks and complications.

Physiological Complications. Although there are no absolutes regarding the relationship between adolescent and childhood obesity and physiological complications, a review of the literature shows a relationship between obesity and a number of physiological disorders and discomforts. There is also evidence that as the degree of obesity increases so too does the chance of suffering from a number of physiological disorders.

Obese children and adolescents have been found to suffer from a number of orthopedic problems, including flat feet (Mobbs, 1970), knock knees (Stimbert & Coffey, 1972), and incoordination (Willmore & Pruitt, 1972), as well as having difficulty exercising (Davis, Godfrey, Light, Sargeant, & Zidefard, 1975).

While the above problems are examples of physical discomfort, there are more serious problems found among populations of obese adolescents and children. There is evidence that obese children and adolescents show increased risks of suffering from hypertension, respiratory problems, diabetes mellitus, increased levels of blood cholesterol and plasma lipids (Clarke *et al.*, 1970; Lauer *et al.*, 1975; Court, Hill, Dunlop, & Boulton, 1974; Londe, Bourgoynne, Robson, & Goldring, 1971; Mann, 1974; Mayer, 1970).

Despite the above findings, it has been reported that some of the most severely obese show none of these health problems; as well, individuals who are not obese also suffer from these physiological problems. Court *et al.* (1974) suggest that in the case of hypertension that this state is multidetermined and that obesity is only one of a number of possible determinants. Mallick (1983) in a review of childhood obesity and related health problems states that no firm conclusions can be drawn from the literature as regards the relationship between /

childhood obesity and health hazards. LeBow (1986) points out that the degree of obesity and the length of time which an individual has been obese are likely important factors in determining the presence and the degree of physiological disorders.

While it is true that most, if not all, of the above physiological disorders are multidetermined, and that the conclusion of Mallick (1983) is to some degree valid, it is perhaps too extreme a statement. It is more reasonable to conclude that if one is obese, one is more likely to suffer from one or more of these disorders than if one were not obese, and that because of this, obesity is a health risk and its reduction can be justified. There is support for this conclusion in a number of studies that have treated obese children and adolescents with health problems and have found that decrease in obesity have brought about improved health and fitness (Coates & Thoresen, 1980; Rames, Clark, Connor, Reiter & Lauer, 1978; Brownell, Kelman, & Stunkard, 1983).

Social and Emotional Problems. Similar to the physiological health problems associated with obesity, social and emotional problems are by no means universal among obese children and adolescents or even for the majority of this population.

There are two questions to be covered in this section. The first is whether or not obese adolescents are regarded or treated differently than the non-obese. The second is whether or not obese adolescents and children are different from the non-obese in terms of their psychological well-being. For example, the question of whether or not there are differences in self-esteem between the two populations is one that has been researched fairly extensively.

Regarding the opinions of others about the obese (stereotyping), there appears to be a widespread belief among psychologists that obese individuals are seen in a negative light as compared to the non-obese. (LeBow, 1984; Stafferi, 1967; Lerner & Gellert, 1969). The evidence cited for these beliefs are primarily based upon research in which subjects are required to express preferences for photographs, drawings or silouettes of children and adolescents who differ in terms of their body size. (Stafferi, 1967; Lerner & Schroeder, 1971; Richardson, Goodman, Hastorf, & Dornsbush, 1961). The results of these types of studies found that subjects labelled the representations of the obese as "lazy", "mean", "ugly", and "stupid" (Stafferi, 1967), as being "disliked" or "less likeable" than those with average physiques or physical abnormalities (Lerner & Gellert, 1969; Richardson *et al.*, 1961).

Woody (1986) points out, however, that these studies are of the forced-choice or rank-order type, and cites Jarvie, Lahey, Graziano, and Framer's (1983) criticisms that methodologies such as these bias the results in favor of stereotyping. Despite concluding that "...the forced-choice methodologies have outlived their usefulness..." (p. 287), Woody (1986) states that it may be that these stereotypes do exist in real-life environments even though they have not unambiguously been demonstrated in laboratory settings.

There is limited research which suggests that although stereotypes of the obese do exist in "real-life" environments, these stereotypes are moderated by other, more important information. Reaves and Roberts (1983) found that using Lerner & Gellert's (1967) drawings of obese and non-obese physiques, children preferred the non-obese; however, when additional information was given to the

subjects (regarding the character and preferences of the target pictures), the physique type accounted for only 4% of the variance, while character accounted for 49%. These results demonstrate that information other than the physical appearance of an obese individual can strongly influence peer ratings.

Similar results were reported in Woody, Rubin, Hymel, Cheyne, and Reinbolt (1985) (cited in Woody, 1986) in a study which had grade-school children observe an obese or non-obese peer on a television screen. It was found that while males showed the stereotypical negative view of the obese picture, females reported significantly more positive impressions of the obese as compared to the non-obese peers.

To summarize, although obesity can result in negative peer stereotypes, these stereotypes are likely moderated by other factors such as the character and preferences of the obese individual and the gender of the peer doing the judging.

Having looked at how the non-obese regard their obese peers, it remains to address the social, emotional, and psychological characteristics of the obese child and adolescent. Given that there appear to be stereotypes of the obese (even if modified by other factors), it is not unreasonable to hypothesize that these negative views might result in obese individuals differing in certain psychological aspects such as self-esteem. The evidence for this position is equivocal. It has traditionally been the view that obese individuals exhibit a greater prevalence of psychological problems than do the non-obese (Bruch, 1970, 1980). This view is supported by some researchers and rejected by others. Monello and Mayer (1963), in a study carried out at a weight reduction camp, found that a sample of 100 females exhibited withdrawal, passivity, concern with their status, and an

acceptance of the dominant value system. Sallade (1973) measured social and emotional adjustment in a group of 8-16 year olds. Comparing obese and non-obese individuals, no significant differences were found on either social or emotional adjustment. A slight but significant difference was found in self-esteem, with the obese group exhibiting lower scores. This latter difference was not replicated in a later study by Wadden, Foster, Brownell, and Finley (1984), who also used the Piers-Harris scale to measure self-esteem. However, the results, although not significant, were suggested by the authors to be similar to the differences found by Sallade (1973) but neither set of results were considered to be clinically significant by Wadden *et al.* (1984).

Mendelson and White (1982, 1985) looked at self-esteem and body-esteem in a group of obese and non-obese 8-17 year olds. They found sex by age differences in self-esteem; eight to 11 year olds, both male and female, obese and non-obese, were not significantly different in their self-esteem scores. 11.5-14.4 year old, obese males showed poor self-esteem as compared to their non-obese peers, while females in the same age range were similar to non-obese females. However, in the 14.5-17.4 age range the reverse was found; that is, obese females showed poorer self-esteem than non-obese females, while males did not. Regarding body-esteem, the researchers found that obese males and females scored lower than their non-obese peers regardless of age.

Karpowitz and Zeis (1975) compared three groups of adolescents; obese students in a weight loss program, obese students who did not wish to participate in the same program, and a group of non-obese students. As a whole the obese students indicated the same number of problems on the Mooney Problem

Checklist. However, those participating in the weight loss program reported 50% fewer problems as compared to the non-obese and the non-participating obese groups. On the Tasks for Emotional Development (a test of maturity), the non-obese scored highest (most mature), the participating obese next, and the non-participating obese obtained the lowest scores.

Clearly there are mixed results regarding the social, emotional, and psychological aspects of the obese child and adolescent, and it is difficult to draw any firm conclusions. While some of the above studies appear to show no differences in self-esteem (or clinically insignificant differences) between the obese and the non-obese, another shows that this is true only for certain age and sex groups. More specifically, it appears that obese males in early adolescence have lower self-esteem than their peers, but once they reach later adolescence both groups show equal scores. Females, however, show lower self-esteem later in adolescence, while earlier they are equal to their peers in this respect. Woody (1986), in a review of the relevant literature regarding child and adolescent obesity as related to social and emotional characteristics, concludes that females in late adolescence are the main group possibly at risk of having lasting psychological damage resulting from their obese status.

Conflicting results have also been found regarding body image or body-esteem, with some studies finding significant differences between the obese and non-obese and others finding no differences (Woody, 1986). It is clear that regarding the area of social, emotional, and psychological adjustment that the obese are a heterogeneous group, with contrasting results being found depending upon the age and sex studied, and very likely also affected by other, yet unknown

factors. Therefore, one cannot justify a weight loss program purely on the basis that it will improve the social and emotional problems of the obese adolescent or child; for some this may be a valid reason, for others it is not relevant.

Relationship of Childhood and Adolescent Obesity to Adulthood Obesity

There are two main reasons for wanting to look at the relationship between childhood and adolescent obesity and adulthood obesity. First, if a large percentage of obese adults were obese as children or as adolescents, this would be a strong argument for earlier intervention. Secondly, and related to the first point, a strong relationship between childhood and adolescent obesity and adulthood obesity would be a valid reason for increased research into the relationship.

A review of the area reveals that there is a positive correlation between early obesity and adulthood obesity. Further, it appears that as one becomes older and remains obese, the likelihood of being an obese adult increases. There are a number of studies showing strong correlations between untreated obesity in childhood and adult obesity (Abraham & Nordseick, 1960; Garn & LaVelle, 1985; Garn & Clark, 1976). The above studies have found correlations between adolescence and adulthood and between childhood and adulthood obesity.

Abraham and Nordseick (1960) found that of those children who were obese at the ages of 10-13, a full 50% were still obese when reassessed in their 30's. Stunkard and Burt (1967) reexamined the same subjects 10 years later and concluded that if one was obese as a child, the chances were one in four that one would be thin as an adult. Further, if an individual was obese as an adolescent then the chances were only one in 28 that he would be a thin adult.

Hasse and Hosenfield (1956) studied 50 overweight children and determined that 80% were still obese when reexamined when in the 20-36 age range. Lloyd, Wolf, and Whelan (1961) reported similar findings; in a group of 9-11 year olds, 75% were found to be obese when reassessed eight years later.

The conclusions which can be drawn from this literature can be summarized by stating that approximately 80% of obese children and adolescents become obese adults. Further, the longer a child remains obese, the more likely he is to be obese as an adult. These findings would appear to support intervention during childhood and/or adolescence.

Treatments

Non-Behavioral Treatments. Treatments such as medication, dieting, fasting, hormones and surgery have all been deemed as either ineffective or suffering from shortcomings (Israel & Stolmaker, 1980; Brownell & Stunkard, 1980; Coates & Thoresen, 1978).

Anorectic drugs have been shown to produce negative side-effects such as dry mouth, heart palpitations and sweating, as well as bringing about only a moderate weight loss (Douglas & Monro, 1981; Collipp, Schmierer, & Greensher, 1971; Sanborn, Manske, & Schlegel, 1983). Rivlin (1976), in a review of hormonal treatments, found that they have little to recommend them and that they can actually be a health hazard.

Regarding diets, Stunkard (1984) felt that popular fad diets are too numerous. Diets such as the Scarsdale, Water, and Hollywood all can have adverse effects, especially if undertaken by a child. Heald (1972) states that metabolic complications and reduction of lean body mass can result from the

restriction of calories that are required by fad diets. For this reason Heald (1972) recommends that a nutritious, balanced diet is to be supported over an unbalanced or severely restrictive diet.

Given the failures and shortcomings of the methods of treatments discussed above, an alternative is clearly needed. One alternative is behavior therapy.

Behavior Therapy for Obesity. There is a large body of evidence demonstrating the superiority of behavior therapy over non-behavioral treatments (Bellack, 1977; Wilson & Brownell, 1980; Stunkard, 1983; Hall & Hall, 1974). Bellack (1977), in a review of behavior therapy with obese adults, concluded that programs using stimulus control and supplemental reinforcement have resulted in consistent weight loss of a clinically significant nature.

Similar support can be found for the use of behavior therapy with children and adolescents; these studies demonstrating both the short and long-term effectiveness (Rivinus, Drummond, & Combrinck-Graham, 1976; Coates, Killen, & Slinkard, 1982; Aragona, Cassidy, & Drabman, 1975; Brownell, Kelman, & Stunkard, 1983). Behavior therapy with obese adolescents has been shown to be more efficacious than diets (Weiss, 1977), social nutrition groups (Rotatori & Fox, 1980) and no-treatment controls (Kingsley & Shapiro, 1977).

A Typical Behavioral Weight Loss Program

Brownell and Wadden (1984) state that the main components of a behavioral program for adolescents and children include monitoring, nutrition education, stimulus control, modification of eating behavior, exercise, cognitive restructuring and reinforcement. Another component not included by Brownell & Wadden (1984) is contingency contracting. The following sections discuss each of

these components. As the focus of this investigation, parental involvement will be reviewed in the next section.

Self-Monitoring. In Stuart's (1967) behavioral weight control program, the first step required that appropriate and inappropriate behaviors be identified. This was accomplished through the use of monitoring, making use of food and exercise diaries. In this way, not only were eating and exercise activities recorded, but so too were their antecedents and consequences. Thus the diaries were reviewed and it was determined what stimuli were cues for inappropriate eating, the topography of the eating situation (hunger, mood, other activities while eating), as well as what consequences, positive or negative, were maintaining the inappropriate behaviors. In addition, the records were reviewed to determine what cues and reinforcers might be useful to promote physical activity and appropriate eating behaviors. While Stuart (1967) restricted self-monitoring to eating and exercise, other researchers have had obese subjects monitor their daily weight (Geller, 1978) and caloric intake (Rivinus, Drummond, & Combrinck-Graham, 1976).

The use of self-monitoring in adolescent obesity research comes from its success with adults (Mahoney, 1974; Romanczyk, 1974). There does not appear to be any research aimed at determining the efficacy of self-monitoring with adolescents. However, on the basis of the success of self-monitoring with adults, its inclusion in programs with adolescents and children has been widespread, and until there is research testing self-monitoring with a younger population, the adult research will likely continue to be used to justify its use with adolescents and children.

Stimulus Control Techniques. Once cues for inappropriate eating behaviors have been determined, stimulus control procedures can be used to modify and decrease these behaviors. The techniques used vary, but include designated eating places and times, storage of foods so as not to be visible, use of smaller dishes and cutlery, serving food onto a plate rather than placing it in serving dishes on the table, and eating only while not engaging in other activities (Weiss, 1977; Epstein, Wing, Stranchak, Dickson, & Michelson, 1980; Aragona *et al.*, 1975; Coates & Thoresen, 1981).

Support for the use of stimulus control procedures exists in the work of Weiss (1977). In a study using obese children and adolescents, Weiss compared a control group, a diet group, a diet and reward group, a stimulus control group, and a stimulus control, diet and reward group combined. The findings revealed that although the stimulus control group fared better than the no-treatment control and diet groups, it was initially no more effective than the diet and reward group. However, at a one year follow-up, those subjects receiving stimulus control procedures were the only ones to have continued to lose weight or to have maintained their posttreatment losses.

These findings indicate that stimulus control procedures are an important part of an adolescent weight reduction program both for the increased weight loss and for the maintenance exhibited in the Weiss (1977) study.

Modification of Eating Behavior. Another aspect of behavioral weight loss programs has been the attention paid to the acts of eating and drinking.

themselves. Although there is evidence that there are no differences between the eating and drinking styles of obese and non-obese adults (Adams, Ferguson, & Stunkard, 1978; Stunkard & Kaplan, 1977), the same cannot be said for obese versus non-obese children. Despite some evidence to the contrary (Epstein, Parker, McCoy, & McGee, 1976), it appears that obese children's eating styles differ from their non-obese peers in that the former eat more rapidly and chew less frequently (Waxman & Stunkard, 1980; Drabman, Cordua, Hammer, Jarvie, & Horton, 1979; Keane, Geller, & Scheirer, 1981).

The above research indicates that techniques designed to change eating styles should be included in childhood and adolescent weight loss programs. These techniques include putting down food and utensils between bites; taking a short break during meals, as well as instructing participants to eat more slowly (Epstein et al, 1976; Weiss, 1977).

Contingency Contracting. The use of contingency contracting has been well established in behavioral programs as a whole and in weight reduction programs specifically. Contingency contracts are designed to decrease the rate of attrition and/or to increase compliance to certain aspects of the program. Contingency contracting is in fact a form of reinforcement; if an individual is returned a certain sum of money for carrying out an activity, then that sum of money is serving to reinforce that activity.

Across studies there have been various behaviors targeted for contingency contracting. Epstein *et al.* (1980), Epstein, Wing, Koeske, Andrasik, and Ossip (1981) and Epstein, Wing, Koeske, Ossip, and Beck (1982) have returned money contingent upon self-monitoring, designated food choices, weight loss, and changes

in caloric intake. Coates, Jeffrey, Slinkard, Killen, and Danaher (1982) returned deposits dependent upon both weight loss and changes in caloric intake. Aragona *et al.* (1975) returned refunds of an initial deposit contingent upon attendance, weight loss, and completion of homework assignments.

The targets for contingency contracting have clearly varied from study to study. Since attrition and lack of adherence to desired behaviors are major problems encountered in behavioral weight loss programs (Drabman *et al.*, 1985), any method which can aid in overcoming these problems is a welcome and necessary addition to behavioral weight loss programs.

Support for the efficacy of contingency contracting is supplied by Epstein *et al.* (1980). In this study a comparison was made between a lottery group, a contingency contracting group, and a control group. Both the lottery group and the contingency contracting group attended more sessions than did the control group.

Cognitive Procedures. Cognitive procedures, although included as a component in a number of obesity programs, for the most part have not been described in much detail in most studies. The effects of cognitive procedures have not been assessed independently of other treatment components. Coates and Thoresen (1981) attempted to get subjects to recognize thoughts which were likely to prevent habit change ("fat thoughts") and then to replace these thoughts with those that would help to bring about habit change ("thin thoughts"). Coates *et al.* (1982) and Coates, Killen, and Slinkard (1982), in addition to the above techniques, taught their subjects self-talk, problem-solving, and imagery. Brownell and Kaye (1982) and Brownell *et al.* (1983) also included cognitive components in

their obesity program, including "cognitive control" and "cognitive restructuring" techniques. Again, however, the details of these techniques are not included in the treatment descriptions.

The one major exception to the lack of cognitive treatment description has been the Relapse Prevention approach of Marlatt (1975). Relapse Prevention, as the name indicates, includes a number of techniques aimed at preventing relapse or improving maintenance. Although the approach includes both cognitive and behavioral procedures; it is the inclusion of the cognitive procedures which makes it unique. These procedures, unlike those used in the research cited above, are clearly described for those wishing to make use of them in research.

There has been no research carried out using Relapse Prevention to treat adolescent or childhood obesity. There are, however, two studies which have assessed this approach with obese adults. Sternberg (1985) carried out a study with 43 obese adult females. The program was of nine weeks duration and contrasted a standard behavioral program with the same program plus a Relapse Prevention component. At posttreatment the two groups did not differ in the amount of weight lost (as would be expected, as the Relapse Prevention model addresses problems that are most likely to arise after the completion of the program). At a 60 day follow-up 41% of those in the Relapse Prevention group versus 22% of those in the standard group were found to have continued losing weight. The average weight loss between posttreatment and the follow-up was 13.9 pounds for the Relapse Prevention group and 8.7 pounds for the standard behavioral group. These differences were significant. In addition to the above differences, two times as many in the standard treatment group regained weight.

These results offer support for the use of Relapse Prevention as a component of behavioral weight loss programs. However, the use of only a 60 day follow-up period is a major shortcoming of this study.

Perri, Shapiro, Ludwig, Twentyman, and McAdoo (1984) compared both a behavioral program and a non-behavioral program with and without a Relapse Prevention component. As well, the variable of therapist-client posttreatment contact was included. Again the subjects used were obese adults. The only group to maintain their posttreatment losses at follow-up was the behavior therapy plus Relapse Prevention plus posttreatment contact. Therefore, unlike the results of the Sternberg (1985) study, there were no significant differences found between the behavior therapy alone and the behavior therapy plus Relapse Prevention.

From the above two studies it is difficult to draw any firm conclusions. The use of Relapse Prevention produced better maintenance than behavior therapy alone in one study; in the other, only a combination of behavior therapy, Relapse Prevention and posttreatment therapist contact resulted in better maintenance. However, both studies point in the right direction and the approach is an improvement over other cognitive approaches in that it is well described and it addresses a major problem in obesity: that is, maintenance. Therefore its inclusion in an obesity program can be justified despite the fact that further research is needed to evaluate its effectiveness. Another issue with its use in an adolescent weight loss program is that the Relapse Prevention model was designed with adults in mind; therefore it may need to be modified for use with a younger population, though likely only a simpler choice of examples and language are necessary.

Nutrition Education. Wells and Copeland (1985) suggest that reinforcement of weight loss or a decrease in caloric intake can result in a child or adolescent forgoing a nutritional route to weight loss. LeBow (1986) states that impairing a child's nutritional requirements is one of the major dangers involved in treating the obese child. For this reason nutrition education is an important part of any weight reduction program, especially those with children or adolescents as participants, as these age groups are still growing and inadequate nutrition may retard their linear growth (Rayner & Court, 1975), although there is evidence to the contrary (Schwartz & Sidbury, 1974; Merritt, 1978).

The main emphasis in studies focusing on weight loss and a balanced diet has been on teaching participants the importance of eating from the four major food groups and still cutting back on excess caloric intake. Epstein *et al.* (1978) is one of the few studies in which special importance was paid to the selection of nutritious foods as opposed to non-nutritious foods. In this study children were reinforced for increasing the consumption of low calorie, nutritious foods and for decreasing that of high calorie, non-nutritious foods. Subsequently, Epstein and his colleagues (Epstein *et al.*, 1980; Epstein *et al.*, 1981; Epstein *et al.*, 1982; Epstein, Wing, & Valoski, 1985) have included as a component of their behavioral treatment programs for obese children an assessment of their subject's nutritional habits and advice on how these habits might be changed for the better.

Nutrition education alone, however, does not appear to be of much use in bringing about weight loss. Levitz and Stunkard (1974) compared a nutritional education group to a behavior modification group and reported that the latter subjects lost greater amounts of weight and showed lower levels of attrition than

did those in the nutritional education subjects. Hines (1980), however, did report that a nutritional education group had as great a change in percent overweight as a child-alone behavior therapy group, though less than a child and parent behavior therapy group.

Mahoney (1974) and Romanczyk, Tracey, Wilson, and Thorpe (1973) have determined that in order for nutrition education to be effective it must be accompanied by self-monitoring. In addition, Bellack, Rozensky, and Schwartz (1974) found that nutrition education must be combined with self-monitoring and therapist contact.

Overall, it would appear that nutrition education on its own has little effectiveness; however, combined with other aspects of behavioral programs it does contribute to effective weight loss. Given the conclusions of Wells and Copeland (1985) and LeBow (1986) the inclusion of nutritional education is seen as a necessary component so as to reduce the chances of health risks.

Exercise. If weight is considered a function of excess caloric intake, then a method of losing weight besides (or in addition to) a reduction of caloric intake is to burn more calories: namely, exercise. Exercise considers the other side of what is commonly called the energy balance model; that is, exercise can help result in a negative energy balance - expending more energy than one takes in, consequently losing weight.

An added positive factor of exercise has to do with its effects on metabolic rate. Apfelbaum, Bostsarron, and Lacatis (1971) and Bray (1980) have both reported that reduction in caloric intake results in decreased basal metabolic rate, thus causing a slower rate of weight loss. However, Brownell and Stunkard (1980)

have demonstrated that exercise may counteract this drop through an increase of basal metabolism, perhaps leading to a more consistent weight loss over time.

The exercise which can be engaged in can be divided into two types, lifestyle and programmed. The former refers to any number of activities in everyday life (e.g., walking, using stairs instead of elevators or escalators, not taking shortcuts when walking, getting involved in games and sports). Programmed exercise refers to any form of exercise program, usually aerobics. Epstein *et al.* (1982) looked at the relative efficacy of lifestyle versus programmed exercise. It was found that although there were no differences between the two groups at posttreatment (both were significantly different from initial measures), at follow-up the lifestyle participants not only continued to lose weight, but also maintained their improved fitness levels. The programmed exercise group lost less weight and also failed to maintain their fitness levels. For this reason it would appear that to bring about weight loss and maintain it, a lifestyle exercise component is likely to be more successful than programmed exercise. It would be unwise however to dismiss the use of programmed exercise. In the same Epstein *et al.* (1982) study, at posttreatment equal weight loss was found in both groups and the programmed exercise group exhibited greater fitness levels. For this reason, a combination of both types of exercise might be more successful than lifestyle alone.

There is research to document the positive effects of exercise as regards weight loss. Epstein and Wing (1980) found that the amount of weight loss was directly related to caloric expenditure through exercise. Dahlkoetter, Callahan, and Linton (1979) looked at exercise as a component of a behavioral treatment

program, found that subjects who participated in a behavioral program with exercise lost more weight than a behavioral techniques only group or an exercise only group.

Harris and Halbauer (1973) and Stalonas, Johnson, and Christ (1978) found that exercise was more effective at follow-up than either a standard "behavioral" program or a self-control program alone as regarded weight loss.

In addition to the beneficial effects of exercise on weight loss, other positive effects are reported. Morris, Chave, Adam, Sirey, Epstein, and Sheehan (1973) found a strong positive relationship between regular exercise and decreased cardiovascular morbidity.

It can fairly safely be concluded that exercise is a beneficial, if not necessary component of a behavioral weight loss program, and that lifestyle exercise appears to be more efficacious than programmed; however, a combination of the two would likely be helpful in bringing about greater initial losses, and would not be harmful as long as moderation is stressed.

Parental Involvement

Graziano (1977) stated that the single most important development in a child's therapy may be parental involvement and that in spite of the fact that there was very little research in the area, the use of parents was appropriate for childhood obesity. Patterson, McNeal, Hawkins, and Phelps (1987) state that in order for social engineering to generalise and persist, parent-child interactions must be modified; that is, significant others must be taught proper reinforcement schedules.

There is substantial documented evidence to support the role of parents in

weight loss programs. First, there are a number of uncontrolled behavioral treatment programs that have been implemented using parents. Rivinus *et al.* (1976) selected 8-13 year old, black children and their mothers for inclusion in a 10 week weight loss program. Parental involvement included instruction in modelling, reinforcement and contracting. An average weight loss of 6.2 pounds was reported, with a two year follow-up showing weight loss in all children involved. The authors concluded that active family involvement, especially that of the mothers may have been an important factor in the successful outcomes.

Gross, Wheeler, and Hess (1976), in another uncontrolled study, included 11 adolescent females in a 10 week program. Parental participation was in the form of maternal positive reinforcement. When the program was evaluated for effectiveness of individual components it was determined that the greatest weight loss resulted when there was a strong element of family cooperation present.

More objective data supporting parental involvement are available. Mahoney and Mahoney (1978) have found positive correlations of 0.92 at 10 weeks and 0.63 at two years between weight loss and social support as measured by family attendance at group meetings and reports of encouragement and cooperation. Aragona *et al.* (1975), in a study with 15 obese children, compared a response-cost group to a response-cost plus reinforcement group. The response-cost only group had money returned to the parents contingent upon attendance, completion of weekly charts and weight loss of their child. The response-cost-plus reinforcement group involved parents receiving instruction and reading material regarding reinforcement of appropriate child behavior, caloric reduction, exercise, use of stimulus control procedures, and for weight loss. While both groups had

lost equal and significant amounts of weight by the end of the 12 week program, by the eight week follow-up, the response-cost plus reinforcement group showed a significantly greater weight loss than the response-cost only group. Furthermore, at 31 weeks the response-cost plus reinforcement group demonstrated a tendency towards regaining their lost weight at a slower rate that is better maintenance.

Also regarding maintenance, Epstein *et al.* (1981) examined a subgroup of children who had achieved non-obese status by the end of a treatment program. Of those in the group that had targeted both child and mother for weight loss, 100% maintained their losses at a 13 month follow-up. This was in comparison to only 30% in the child-alone group, and 33% in the non-specific target group. Epstein *et al.* (1981) attributed these results to increased parental support at posttreatment or to enhanced child self-regulation. Although not mentioned by the experimenters, modelling by the targeted parents could also have contributed to the superior results exhibited by the child and parent target group. Kinsley and Wilson (1977) looked at weight loss in three experimental groups; child only, mother only and both child and mother. In all three groups the children's weight losses were equivalent. There was however, a tendency for children in the mother and child group to have regained less weight at a 20 week follow-up.

Hines (1981) compared the results of a standard behavioral program with parental involvement (using a parent manual and weekly phone calls) to the combined results of a standard behavioral program group and a nutrition education group. It was found that the former group fared better on percent overweight at posttreatment and at a six month follow-up.

Two researchers have directly tested the the role of parents in the treatment

of adolescent obesity. Coates, Killen, and Slinkard (1982) looked at two groups of adolescents. The subjects were assigned to one of two groups: parent participation or no parent participation. Parental involvement consisted of separate classes which were aimed at teaching the development of support skills. As well, parents attended four meetings with their children. In the no parent participation group there was no formal participation of parents in their child's weight loss program. The results indicated that adolescents in the parent participation group lost a greater amount of weight at termination and that they maintained these losses at a nine month follow-up. However, by the follow-up, those in the no parent participation group had "caught up" to the parent participation group; that is, those in the no parent participation group lost more weight between the termination of the program and the follow-up.

Brownell *et al.* (1983) examined the differential effects of three types of parental participation with adolescents. In one group parents and adolescents met separately but learned the same materials and skills. A second group had both parents and adolescents meet together to learn the same materials. The third group had adolescents meet alone with no parental involvement at all. At posttreatment and at a one year follow-up the children in the group that had their parents attend separate meetings showed significantly greater losses of weight than did those who met with their parents or those whose parents were not involved.

In summary, parental involvement in childhood and adolescent obesity programs results in greater amounts of weight loss than similar programs with no parental participation. In addition, with the exception of the Coates, Killen, and

Slinkard (1982) study, these greater losses are still in evidence at follow-up. The Brownell *et al.* (1983) study indicates that the best results using parents comes from having the adolescents and parents attend separate meetings. These researchers suggest that because adolescence is a time when there is a delicate balance between autonomy and dependence, that the adolescent will likely fare better in an environment which parents can learn enough about the program to be supportive and provide reinforcement without taking responsibility for the program as a whole.

Present Study

This investigation was designed to determine whether increased parental participation in their teenager's weight loss program would cause there to be a greater change in obesity measures and in the maintenance of these changes. The main reason for testing an increased degree of parental involvement rests upon the disappointing results that have been found to date regarding weight loss and maintenance of weight loss in adolescent and childhood behavior therapy obesity programs. In the program at Memorial University, the short and long term results of five years of group programs have not been overly impressive, even when parental involvement has been an integral part of most of this program. These weak results have by no means been limited to this program. Reviews of the treatment of obesity have pointed out the lack of clinically significant results and the even poorer findings regarding long term losses (maintenance) (Stunkard & Pennick, 1977). Brownell (1982) reports that the average loss in programs between eight and ten weeks in length is approximately 10-11 pounds; similar results are reported in reviews of the literature by Stunkard and Pennick (1979). Although

these results appear satisfactory and in line with the usual goals of behavioral programs (1-2 pounds loss per week), it has been argued that this amount of weight loss, even if maintained over a lengthy period, is not clinically significant to an individual who is 60% or more overweight. Furthermore, the findings stated above are the average of group programs; what has been found upon closer examination of the data is that the losses are made up of a number of individuals who lose substantially during the program and a larger number of individuals who lose small amounts. Stunkard (1982) reports that only 20% of participants lose 6.8 kilograms or more in behavioral programs, and that these are modest and disappointing results from a clinical perspective. The findings regarding maintenance are even less encouraging; that is, although maintenance appears to be good over a period of a year, these results are made up of a few who lose during the programs and who continue to lose after the program is terminated. There are however a substantial number who lose while taking part in the program and regain their weight after its conclusion.

It appears likely that the lack of initial losses, and even more so the lack of maintenance, is due to a lack of adherence to the necessary behavioral procedures presented during the treatment program. It is often the case that when behaviors are not maintained it is due to a lack of reinforcement in the environment or to the presence of other, competing contingencies. A good example of the latter, in the case of adolescent obesity, is the satisfaction and pleasure gained from eating. There are few, if any, contingencies in the natural environment of the adolescent which are more powerful than this pleasure. If it is the case that there are a lack of viable reinforcers in the obese adolescent's environment, then a possibly

effective way in which to overcome these problems would be to increase the degree of parental participation, thereby hopefully increasing the degree of parental reinforcement and modelling. As well, improvements in the parent's food choices, preparation and storage could also result.

Maladaptive behaviors are invariably acquired and maintained in the child's natural environment; therefore, to change these behaviors, contingencies in this environment must be changed. In addition, any new adaptive behaviors are likely to be extinguished if the natural environmental contingencies are not modified. Since the therapist is usually restricted to one or two hours per week with the client, and at best the behaviors exhibited during this time are only a close approximation of the natural, unobserved behaviors, it becomes apparent that it is necessary for the appropriate contingencies to be provided by others. The parents can provide these contingencies, if they are properly trained by the therapist. In this way the parents can become directly involved in their child's treatment and can serve as co-therapists.

The above reasons for the inclusion of parents in their child's treatment program are relevant to any number of childhood and adolescent problems. Clearly there are reasons more specific and relevant to the distinct problems presented by adolescent obesity and attempts to reduce it and to maintain the subsequent losses. As regards obesity, the parents control many aspects of their child's eating and exercise habits and behaviors. In most families it is the parents who buy, store, cook and serve the food; therefore it is the parents who decide whether or not high or low calorie foods are bought and served to their teenagers, how large the portions are and whether high calorie foods are stored on the

kitchen counter or in opaque containers. In addition, parents can exert a powerful influence through modelling of appropriate eating and exercise behaviors, as well as through reinforcement of these behaviors when exhibited by their children. Therefore, although one can teach an adolescent appropriate eating, exercise and food choice behaviors, these would likely be to no avail if a parent continues to serve large portions of high calorie foods and then chastizes the child when there is an increase in weight.

It is expected that the increased degree of involvement that the parents have in their adolescents weight loss program will result in the parents' feeling a greater degree of commitment and responsibility towards the program. This increased commitment and responsibility is likely to be the result of the parents' seeing their role in the program as being a relevant and important part in their teenager's attempt at losing weight.

One way in which increased involvement of the parents can be achieved would be to have them attend weekly meetings. If attending weekly meetings results in increased commitment and responsibility, it is expected that not only would the parents learn the material presented, but that they will also learn from the other parents what problems might arise, and how other parents have dealt with these problems. In addition, it appears likely that in a group a greater variety of pertinent questions are likely to be asked than by an individually seen parent (due either to reluctance to ask on the part of an individual or to the lack of awareness or experience with a particular problem or situation). As well, the discussions and interactions with other parents will serve to maintain individual interest and enthusiasm.

It is hypothesised that increased parental involvement will result in increased losses in weight among the adolescents of these parents. Further, it is expected that these improved weight losses will be maintained or that further losses posttreatment will be found.

The goals of this program are twofold. One is to bring about greater losses than have been found up to this point at the Memorial University Psychology Clinic. This means raising the average weekly loss into the 1-2 pound range and also maintaining these improved losses.

The other goal is to improve upon the results that have been found in reviews of behavioral weight loss programs. Although the goals are still 1-2 pounds per week and a mean weight loss at the end of the program of approximately 15 pounds, it is expected that these numbers will be the result of a greater number of subjects losing and not just a small number losing a greater number of pounds. A similar goal is expected for maintenance; that is, that maintenance will be found in a majority of participants rather than being due to a small number who continue to lose and the rest regaining their lost weight.

A manner in which the effect of increased parental involvement can be tested is to have two groups that differ in the degree of involvement. This study proposes to test this by having an experimental group in which parents attend weekly meetings and receive a parent manual. Parents in the control group will receive parent manuals and receive a weekly phone call. It is felt that this is a suitable control group as the parents in this group will be involved in their adolescent's program but to a lesser degree than those in the experimental group. Therefore, the hypothesis being tested is that increased parental involvement

results in improved weight loss and maintenance in the adolescent children of these parents.

METHOD

Subjects

Seventeen subjects, 15 females and two males, between the ages of 12 and 17 were solicited through newspaper advertisements, public service radio announcements, and through the cooperation of a dietician and a psychologist at the Janeway Child Health Centre. In addition, radio, television, and newspaper interviews were used to publicise the program.

Subjects were required to be 20% overweight for their age, sex, and height as determined by the Canada Health and Fitness norms (Canada Fitness Survey, 1985). As well, participants were required to have a parent or parents willing to attend weekly meetings. In order not to include those with a medical disorder related to their obesity, or one that might be exacerbated by participation in this program, all subjects were required to get the permission of a medical doctor before participating in the program; a Physician Permission Form was used for this purpose.

Prospective subjects or their parents, with the exception of those referred by other professionals, responded to the advertisements (or other publicity) by telephone. All those inquiring were responded to by telephone. The program and its requirements were described, usually to a parent. If further interest was expressed, and if the parent(s) and the adolescent seemed suitable for the program, a screening interview was scheduled for the adolescent and at least one parent. At this interview the program was explained in greater detail and both the adolescent and the parent(s) were questioned regarding their reasons for

wishing to enter this program; special attention was paid to the commitment and motivation of the adolescent and the parent(s). Part of this process included having the adolescents complete a Personal Goals Form which was then discussed. Those who stated a desire to participate primarily due to parental pressure or for other reasons deemed unacceptable would not have been included in the program; however, this situation did not arise. As well, parents who felt that they could not or would not attend weekly meetings did not have their adolescent included in the program. If the adolescent and the parent(s) were still interested, a contract was signed by all three parties stating the requirements and responsibilities of each. A deposit of \$35 was collected and initial assessment measures were obtained from the adolescent. A one-week food diary was given to be completed during the week prior to the start of the program and returned at the first meeting.

Assessment Measures

To obtain a functional analysis of the eating behavior, all participants were required to complete a weekly food diary. This included when, where, and with whom the food was eaten, as well as mood, degree of hunger, other behaviors while eating, and the type and amount of food eaten.

Subjects were weighed to the nearest quarter pound using a Detect-Medico scale. Heights were obtained to the closest quarter inch using the adjustable bar on the Detecto-Medico scale. Skinfold measures were taken from five points; right bicep, right tricep, right medial calf, suprailiac, and subscapular. Skinfold measures were obtained using the procedure described in the Canadian Standardised Test of Fitness Operations Manual (1986). Each skinfold measure was taken twice using Lange calipers and the two scores were averaged to increase

reliability. Girth measurements were made according to the Canadian Standardised Test of Fitness Operations Manual (1986) procedure but were not used in the analyses since they provide a less direct measure of fat than skinfold measures.

From the weight and height measures each participant's Body Mass Index (BMI) was obtained. This was done by converting weight to kilograms, dividing by height in metres squared and multiplying by 10. Normed weights were obtained by determining the average BMI for each individual's age and gender. Age and gender BMI averages were obtained using the Physical Fitness of Canadian Youth, (1985) manual. By taking the actual weight and dividing it by the normed weight, the percent overweight for each individual was determined. Age and gender percentile ranks were available for the sum of the five skinfold measures (Physical Fitness of Canadian Youth, 1985).

Each adolescent completed the Body-Esteem Inventory (Mendelson & White, 1982). This inventory consists of 24 statements regarding physical appearance and attitudes towards physical appearance. Each item can be answered "yes" or "no". The inventory was developed using both obese and non-obese children and was found to differentiate them. Body-Esteem was found to correlate with relative weight. The device's construct validity was determined using the Pier's-Harris Children's Self-Concept scale.

All of the assessment measures described in this section were made on three separate occasions: at the initial interview, at the termination of the program, and at a three-month follow-up.

Procedure

Experimental Group (Increased Involvement Group). The Experimental Group parents were asked to attend weekly meetings conducted by the group leader and his supervisor. The dietician and fitness coordinator were present at the initial meeting. At these meetings material was presented in a lecture and parents were encouraged to raise questions regarding the material presented and to describe personal experiences and problems. Discussion of these experiences, problems and of the program among the parents and between the parents and the group leaders was encouraged.

The material presented at the meetings included explanations of the material taught to the adolescents (the rationale and experimental support for certain behavioral methods and nutrition information). In addition, parents were taught the importance of positive reinforcement and modelling. The goal was to help parents aid their teenagers in the implementation of new behaviors, weekly goals, nutrition information, and the fitness component of the program. Parents also received a chapter of the Parent Manual (Kelman, Brownell, & Stunkard, 1979) each week which covered the same topics presented in the weekly lectures.

Standard Treatment Program (Control Group). The parents in the Control Group received the same Parent Manual as those given to the Experimental group. The manuals were sent home each week with their teenager. Parents in this group were also telephoned each week at an agreed upon time. At this time parents were encouraged to ask any questions or discuss problems regarding any components of the program. This is the procedure used in the past at the Memorial University Psychology Clinic following the Hines (1981) study.

Adolescent Involvement. Prior to the start of the program the 17 participants were randomly assigned to one of the two parent groups. Statistical comparisons were made to check that the two groups did not differ in weight, percent over average BMI, age, or skinfold percentile (Table 1).

Each week participants attended on their regular meeting day, either Monday or Wednesday. Each adolescent was weighed and given a partial refund of the initial deposit, \$1.00 for attendance and \$1.00 for completion of their food diary. After the weigh-in, each participant was seen by their counsellor (each adolescent was normally seen by the same counsellor each week). At this time behavior checklists were reviewed and food diaries were scored for adherence to the Canada Food Guide's recommended number of servings for this age group. The counsellor and the participant then agreed upon two goals that the adolescent would attempt to meet during the ensuing week; the first to decrease a food in the diet that was undesirable (either excessive consumption or too high in calories) and the second to increase a nutritious food that was lacking in the diet. It was emphasised to the participants (as it was to the counsellors during their training) that these goals were to be approached in small steps and gradually made larger, this being consistent with the program's goal of 1-2 pounds loss per week.

After individual counselling sessions were completed, a group session was held, at which time the behavioral and nutritional approaches to weight loss were presented. These sessions were made interactive through role-play, by providing opportunities for asking and answering questions, and through general group discussions.

Table 1. One way analysis of variance on pretreatment characteristics of experimental and control groups before dropout.

Age

Source	d.f.	SS	MS	F
Between Groups	1	0.3581	0.3581	0.1112
Within Groups	15	45.07	3.22	

Weight

Source	d.f.	SS	MS	F
Between Groups	1	133.6	133.6	0.2084
Within Groups	15	8978.3	641.3	

Percent Over
Average BMI

Source	d.f.	SS	MS	F
Between Groups	1	191.2	191.2	0.4908
Within Groups	15	5453.8	389.5	

Skinfold Total (Centimeters)

Source	d.f.	SS	MS	F
Between Groups	1	21.1	21.1	0.0937
Within Groups	15	3158.6	225.6	

eating habits, monitoring, and cognitive procedures. These were based primarily on Kelman *et al.* (1979) manual for adolescent weight loss programs; Walsh-Doran (1983) provides a full description of this program and its materials. In addition to the above, certain components of Marlatt's (1976, 1985) Relapse Prevention approach were used, including labelling and monitoring high-risk situations, discussion of the differences between lapse and relapse and discussion of the Abstinence Violation Effect (described by Marlatt (1985) as a set of cognitive and emotional reactions resulting from a lapse or slip following a period of controlled substance use [in this case reduction of food intake]), as well as means by which these reactions might be handled.

The weekly nutrition lessons were based on the Canada Food Guide, with emphasis being placed on how to reduce caloric intake and at the same time maintain a balanced and healthy diet.

The complete session, including the weigh-ins, individual counselling, and group sessions took between one and two hours, depending upon how early the participants arrived. A total of 16 sessions were held over a period of 21 weeks; this included a five week break during the Christmas season. At this time participants were encouraged to continue the use of their behavior checklists and food diaries, and were urged to continue to use the information they had learned to the best of their ability. Special emphasis was placed on how to deal with the tempting food that would be present during this time; techniques were discussed and role play used to help the participants to better deal with the Christmas season as it applied to their weight loss attempts.

Exercise. Exercise consisted of three one hour sessions weekly at the

Aquarena Nautilus Health and Fitness Centre. Sessions primarily consisted of aerobics; however, additional time on the Nautilus equipment was open to the adolescents if they wished to use it. The exercise sessions began at the same time as the rest of the program, but continued throughout the Christmas season and for several weeks after the completion of the other components of the program so that participants were scheduled to attend for a period of six months. For this part of the program the participants were required to pay \$160; an initial payment of \$90 and a further payment of \$70 after three months.

Therapists. The author (a senior Master's student), a dietician from the Janeway, and six undergraduate psychology students served as individual counsellors. The author and the dietician conducted the group sessions on the behavioral and nutritional information. The undergraduate counsellors were required to attend 2-4 training sessions prior to taking part in the program. The training included keeping a food diary for one week in order that they would become familiar with this assessment procedure. During the training sessions counsellors role played an individual counselling session; they reviewed a food diary and scored it according to the recommended portions, and then set two goals for that week. Through this procedure the author and his supervisor (who role played the parts of the adolescents) could determine whether or not each individual understood how to score the food diaries and how to set the weekly goals. In addition, the counsellors were encouraged and briefly coached on how to interact with the adolescents in a positive manner; this emphasised praising any losses in weight or meeting of goals.

RESULTS

Attrition

Of the 17 initial subjects, only 12 were included in the final analysis. Of the five who were not included, four can be considered dropouts; that is, they did not complete the program. Of these four, one was diagnosed as suffering from a mild form of diabetes three weeks into the program, one found that she could not get to the meetings in time for the program to be worthwhile as she lived too far from St. John's, and two lost interest in the program and failed to return after the eighth week (after the Christmas break). The fifth individual not included in the analysis completed the program but did not attend the final session or the follow-up session and therefore only initial data were available for this subject.

A one way analysis of variance comparing the Experimental and Control groups was performed on the data of the remaining 12 subjects in order to determine the effect of their loss on the initial random assignment. No significant differences in age, weight, percent over average BMI, or skinfold totals were revealed (Table 2). Means and standard deviations of the two groups can be found in Table 3.

All of the four subjects who dropped out of the program were in the Control group but the differential rate was not significant ($\chi^2 = 2.118$, d.f.=1, N.S.).

A one way analysis of variance was performed to determine whether there were significant differences between the pretreatment characteristics of the dropouts and those remaining in the program. The results indicated no significant

differences between the two groups on age, percent over BMI, weight, or skinfold totals (Table 4).

Posttreatment and Follow-up Results

A repeated measures analysis of variance (BMDP P4V) was performed to determine whether the expected reduction in obesity was found for subjects regardless of experimental group. Using the data gathered initially, at termination, and at the three month follow-up, no significant reductions were found over these times for BMI or for skinfold measures. A significant increase in Body-Esteem was ($F(2,20) = 5.34, p < .05$) (Table 5). A repeated measures analysis of variance performed on BMI measures from Week Eight (the end of the first phase of the program) revealed a significant decrease from initial measures to Week Eight ($F(1,10) = 15.10, p < .05$) (Table 6).

The effect of Group membership (Experimental or Control) was not significant for the measures taken initially, at termination, and at follow-up, for BMI, for skinfold, or for Body-Esteem (Table 5).

No significance was found in the analysis performed on the Week eight BMI data as a function of Group membership (Table 6).

No Group by occasion of measurement interactions were found in either of the analyses (Tables 5 and 6).

In order for the results of the program to be more readily interpretable, weight, BMI, and skinfold measures taken initially, at termination, and at the three month follow-up are provided for all subjects completing the program, as are BMI and weight for Week Eight (Tables 7, 8 and 9).

Table 2. One way analysis of variance on pretreatment characteristics of experimental and control groups on subjects included in final analysis.

Age

Source	d.f.	SS	MS	F
Between Groups	1	0.0595	0.0595	0.0161
Within Groups	10	36.9	36.9	

Weight

Source	d.f.	SS	MS	F
Between Groups	1	116.3	116.3	0.1827
Within Groups	10	6366.7	636.7	

Percent Over
Average BMI

Source	d.f.	SS	MS	F
Between Groups	1	424	424	1.079
Within Groups	10	3929.7	392.9	

Skinfold Total (Centimeters)

Source	d.f.	SS	MS	F
Between Groups	1	99.1	99.1	0.4151
Within Groups	10	2386.9	238.7	

Table 3. Means and standard deviations for BMI, body-esteem and skinfold total for experimental and control groups initially, at termination, and at 3-month follow-up.

	<u>Experimental (N=7)</u>		<u>Control (N=5)</u>	
	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>
<u>Initial</u>				
BMI	305	46.18	279	21.27
Skinfold (centimeters)	113.4	17.5	106.8	12.55
Body-Esteem	7	6.5	6.8	1.3
<u>Termination</u>				
BMI	288	46.5	280	23.99
Skinfold	105.4	27.9	96	13.04
Body-Esteem	9.85	6.93	10.2	3.27
<u>3-Month Follow-Up</u>				
BMI	296	4.77	288	22.86
Skinfold	111.47	27.4	102	13.96
Body-Esteem	10.28	7.31	8	2.23

Table 4. One way analysis of variance on pretreatment characteristics of dropouts and non-dropouts.

Age

Source	d.f.	SS	MS	F
Between Groups	1	2.5	2.5	0.8223
Within Groups	14	42.9	3.1	

Weight

Source	d.f.	SS	MS	F
Between Groups	1	20.0	20.0	0.0308
Within Groups	14	9091.9	649.4	

Percent Over
Average BMI

Source	d.f.	SS	MS	F
Between Groups	1	58.5	58.5	0.1467
Within Groups	14	5586.4	399.0	

Skinfold Total (Centimeters)

Source	d.f.	SS	MS	F
Between Groups	1	60.7	60.7	0.2727
Within Groups	14	3119.0	222.8	

Table 5. Repeated measures multivariate analysis of variance on treatment measures for experimental and control groups taken initially, at termination, and at three-month follow-up.

Body Mass Index

Source	d.f.	SS	MS	F
Groups	1	1752.5	1752.5	0.40
Subjects	10	43398.0	4339.8	-
Time	2	505.5	252.7	2.22
Group x Time	2	629.3	314.6	2.76
Time x Subjects	20	2277.0	113.9	-

Body Esteem

Source	d.f.	SS	MS	F
Groups	1	4.5	4.5	0.05
Subjects	10	820.3	82.0	-
Time	2	60.7	30.4	5.34*
Group x Time	2	11.2	5.6	0.89
Time x Subjects	20	113.6	5.7	-

Skinfold Total (Centimeters)

Source	d.f.	SS	MS	F
Groups	1	627.2	627.2	0.55
Subjects	10	11390.8	1139.0	-
Time	2	527.6	263.8	3.02
Group x Time	2	15.1	7.5	0.09
Time x Subjects	20	1750.0	87.5	-

* $p < .05$

Table 6. Repeated measures analysis of variance on BMI for experimental and control groups taken initially and at week/eight (on the 12 subjects included in final analysis).

Body Mass Index

Source	d.f.	SS	MS	F
Groups	1	2725.2	2725.2	0.32
Subjects	10	24835.0	2483.5	-
Time	2	748.6	748.6	15.10*
Group x Time	2	119.6	119.6	2.41
Time x Subjects	10	495.8	49.5	-

* $p < .05$

Table 7. Individual weight loss data for all subjects completing program.

Clinic ID	Initial Weight in kg	Change in kg at wk 8	Change in kg at termination	Change in kg at follow-up
556	96.5	-4.7	-7.5	-6.5
552	76.5	-1.5	-4.0	-6.0
548	90.5	-7.5	-9.25	-9.0
551	62.5	-4.5	-6.0	-4.0
560	70.0	-3.0	-1.0	+3.5
545	67.0	+1.0	+2.0	+5.0
550	86.75	-7.75	+0.25	+0.75
562	66.0	+2.5	+5.0	+7.0
561	72.0	-2.5	0	+2.0
543	76.0	-3.0	-2.5	-3.5
549	89.5	-3.5	+2.5	+4.0
547	74.5	-1.5	-2.0	-1.0

Table 8. Individual BMI for all subjects completing program.

Clinic ID	Initial BMI	Week Eight BMI	Termination BMI	Follow-Up BMI
556	354	337	327	331
552	291	286	274	269
548	343	315	307	304
551	244	223	216	225
560	290	281	270	295
545	258	258	265	277
550	356	325	358	360
562	257	261	271	274
561	280	271	280	289
543	279	269	270	265
549	313	300	321	326
547	266	260	259	260

Table 9. Individual skinfold total data for all subjects completing program.

Clinic ID	Initial Skinfold Totals (Centimeters)	Termination Skinfold Totals	Follow-UP Skinfold Totals
556	112.5	114.0	119.0
552	110.0	92.5	93.5
548	141.75	119.5	125.0
551	85.0	58.25	63.5
560	121.5	146.0	149.25
545	103.0	90.0	96.0
550	120.0	117.5	125.0
562	95.0	99.0	105.5
561	122.5	95.0	112.0
543	107.0	84.0	88.0
549	115.5	116.0	117.5
547	93.75	86.0	87.0

DISCUSSION

The findings of this study fail to support the experimental hypothesis that increased parental involvement in their adolescent's obesity program will result in increased weight loss at termination of treatment and at follow-up.

The most important factor involving the lack of significant Group effects is the failure to demonstrate a significant reduction in obesity for the subjects regardless of experimental group. There are a number of possible reasons for the failure to find an effect of the program as a whole at termination or at follow-up. The most likely reason is related to the results of the analysis comparing initial measures to measures taken at Week Eight (Table 6). This analysis demonstrated a significant difference between initial BMI measures and Week Eight BMI measures. Therefore, significant effects were present at Week Eight but not at termination or at follow-up. Two factors, possibly contributed to the loss of significance from Week Eight to termination and follow-up. The first involves the procedures used in the program. Although the material used in the first eight weeks of the program was for the most part based on the manual used by Kelman *et al.* (1979), the major part of the material presented to the parents and adolescents after this point was organised for this study specifically. As a result, the material that was not a part of the Kelman *et al.* (1979) program was planned and presented for each new session and may not have been as well planned and as organised as the earlier material. It is the case that the material used by Kelman *et al.* (1979) has been demonstrated to be effective with an obese adolescent population (Kelman *et al.* 1979; Walsh-Doran, 1983), while the material used after this was primarily based on Marlatt's Relapse Prevention approach. This latter

approach, as discussed in the Introduction, has not been used with obese adolescents and has limited support even with an obese adult population.

Another factor regarding the use of the Relapse Prevention approach is the fact that this material is aimed at reducing relapse and improving maintenance once weight is already lost. It may be that too much emphasis was placed on the use of this approach, and therefore it may be unreasonable to expect continued weight and fat loss to result from an approach aimed at maintenance and relapse prevention. However, given that the aim of Relapse Prevention is to help prevent the discontinuation of behaviors necessary to weight loss, it was felt that presenting this instruction would result in continued weight loss due to the continued use of necessary behaviors.

A further factor relating to the loss of a significant effect after the eight week period is the fact that there was a five week break over the Christmas period. Although the adolescents were expected to continue to attend exercise sessions, with the exception of a brief weigh-in session they had no contact with the program over this period except for the food diaries which they took home with them over the break. It may be the case that this break resulted in a decrease of interest, motivation, and commitment on the parts of the adolescents and the parents. That this may be so is supported by the fact that two individuals dropped out after the Christmas break although up to this point they had been regular attenders. It was also reported by the exercise coordinator that attendance at the exercise sessions dropped substantially over this period. Several parents commented on the fact that the break was quite long and that their adolescents found it difficult to go to the exercise sessions when they were not attending their

regular weekly behavioral and nutritional sessions. However, the loss of significance and the loss of motivation cannot be explained simply by the fact that the adolescents overindulged during the Christmas period. Although it is not known how the two dropouts fared regarding their weight over this break, it was observed that all but two of the 13 participants had not gained more than two pounds over this period, and some in fact had continued to lose. Therefore, it appears as if the participants' motivation and commitment were sustained over the break. It may be the case that motivation declined following the break.

The problem of motivation is not an uncommon one when dealing with individuals attempting to deprive themselves of an enjoyable substance, be it food, alcohol, or cigarettes. This is likely even more of a problem with an adolescent population. Even though there is the urge to look better and to participate more in physical activities, there is also the urge to eat what one's peers are eating and not to appear different from others. Therefore it is likely necessary to devise some way in which adolescents can be better motivated to use the necessary behaviors, eat the right foods, and to continue to attend sessions.

A factor that may also have reduced the effectiveness of the program was the inexperience of the therapists. The undergraduate therapists had only 2-4 training sessions in which to learn the necessary aspects of their roles. The author, although having completed one year of a Masters program (including a four month internship and working with two adolescent obesity groups) may not have been as effective as a more experienced therapist. It is likely that the therapists involved lacked at least some of the subtle skills necessary for effective individual and group counselling.

A point that may not be as directly relevant to the lack of significant overall treatment results is the variability displayed by the subjects regarding weight and fat loss. Stunkard and Pennick (1977) point out that the significant posttreatment and maintenance results found by most researchers are made up of some who lose a great deal and others who lose only a small amount. As regards maintenance, the significant results are made up of some who continue to lose and some who regain their losses. Table 7 shows that in the case of this program the results were extremely variable, with the change in pounds from initial assessment to the three-month follow-up ranging from -19.8 to +15.5. As was suggested by Stunkard and Pennick (1977) and Stunkard (1983), it appears as if behavioral weight loss programs offer a viable method of fat and weight loss for some, have no effects on others, and from the present results could even have a detrimental effect on others. It is possible that with such a small number of subjects that there were a disproportionate number of participants in this study who would either not be affected by the program or would be negatively affected.

A problem contributing to the lack of differences between the Experimental and Control groups was the motivation and commitment of the parents in the Experimental Group. As the hypothesis being tested was that increased parental participation would result in increased fat loss and maintenance, it was felt that having parents more involved by attending weekly meetings would increase their motivation and commitment to their adolescent's weight loss program. It was further hypothesised that the increase in motivation and commitment would in turn bring about the improved results for the adolescents of these parents. However, except for the first two meeting and one meeting prior to the Christmas

break (all three of which were fully attended), most of the meetings were attended by only three or four parents. This was despite the fact that all parents had initially displayed motivation and commitment by responding to the advertisements which stated the role of the parent in the program and had expressed a commitment to attend weekly meetings at the screening interviews and by signing a contract. Parents were also telephoned when they missed a meeting to remind them of the next meeting. As with the adolescents, it may be that more than just an initial commitment and motivation are necessary to sustain interest.

Recommendations

Perhaps the biggest problem with the lack of success in this program is the loss of significant results of the program as a whole after the Christmas period. Since it may have been the effect of the five week break which reduced the amount of fat and weight lost after this period, a method of either avoiding this break altogether or of maintaining participant enthusiasm and motivation over this period would likely solve this problem. Solutions include continuing meetings over this period, scheduling programs so as to avoid lengthy breaks, or arranging some form of therapist contact over this period: telephone calls or postcards for example.

However, since the adolescents did not regain their lost weight over this break, it is more likely that the break just precipitated or exacerbated the loss of commitment that would have been experienced anyway. If this is the case then a way in which to increase and sustain the interest of the adolescents is necessary to bring about continued loss of fat. Although the information was presented in a

manner in which the adolescents could participate (role-play, discussion, questions), it may be necessary to make the material even more appealing. This could be done with audiovisual and other aids, but likely requires more ingenious methods to keep the adolescents interested in a time when they are used to being entertained by rock videos. Part of the ingenuity required will no doubt come from those who have more experience with an adolescent population; however, any method which might serve to increase the interest of the participants and which would make learning the necessary materials less drab and school-like would be an improvement that would hopefully increase the motivation and commitment of the participants and therefore improve fat and weight loss over a program of this length.

Regarding the lack of parental attendance at weekly meetings, there are a number of possible solutions. One would be to use a better method of screening to determine parent interest and motivation. However, it was felt that an initial telephone call and a screening interview (at which time the importance of the parental role was explained), the signing of a contract, as well as the monetary investment which parents were putting into their adolescent's program would be sufficient to ensure parental participation. As well, the meetings themselves were designed to increase motivation; that is, it was expected that parents would attend enough meetings to develop the necessary motivation. Therefore, a method is needed only to increase the motivation to attend the meetings; this in turn would hopefully increase overall motivation. A method which would likely increase motivation to attend meetings would be contingency contracting. It is not uncommon for researchers and clinicians to use contingency contracting to

increase attendance (it was used in this study to increase adolescent attendance and completion of food diaries and homework), and the procedure has been used successfully with the parents of obese children and adolescents both to increase attendance at parent meetings and to increase the completion of parent homework (Coates *et al.*, 1982b; Brownell *et al.*, 1983).

Like the adolescent motivation, the parent motivation might be improved by presenting the material in a more appealing manner and by making the meetings more enjoyable; contingency contracting might be sufficient to improve attendance, but if the parents find the meetings boring, it is likely that this is a stronger punishment than the return of a deposit is a reinforcer. As with the adolescents, ingenuity is necessary to make the meetings more interesting. Possible methods would be to use materials such as movies, overheads, and other audiovisual presentations, or even to offer wine and cheese.

REFERENCES

Abraham, S., & Nordseick, M. (1960). Relationship of excess weight in children and adults. Public Health Reports, 75, 273-284.

Adams, N., Ferguson, J., & Stunkard, A.J. (1978). The eating behavior of obese and nonobese women. Behaviour Research and Therapy, 16, 225-232.

Apfelbaum, M., Bostsarron, J., & Lacatis, D. (1971). Effect of caloric restriction intake on energy expenditure. American Journal of Clinical Nutrition, 24, 1404-1409.

Aragona, J., Cassidy, J., & Drabman, R.S. (1975). Treating overweight children through parent training and contingency management. Journal of Applied Behavioral Analysis, 8, 269-278.

Bellack, A. (1977). Behavior therapy for weight reduction: An evaluative review. Addictive Behaviors, 1, 73-82.

Bellack, A., Rozensky, R., & Schwartz, J. (1974). Comparison of two forms of self-monitoring in a behavioral weight reduction program. Behavior Therapy, 5, 523-532.

Bray, G.A. (1969). Effect of caloric restriction on energy expenditure. Lancet, 2, 397-398.

Brownell, K.D. (1982). In: C. Franks, G.T. Wilson, & P.C. Kendall (Eds.). Annual Review of Behavior Therapy, Volume 8, 208-272. New York: The Guilford Press.

Brownell, K.D. & Kaye, F.S. (1982). A school-based behavior modification, nutrition education, and physical activity program for obese children. American Journal of Clinical Nutrition, 35, 277-283.

Brownell, K.D., Kelman, J.H., & Stunkard, A.J. (1983). Treatment of obese children with and without their mothers: Changes in weight and blood pressure. Pediatrics, 71, 515-523.

Brownell, K.D. & Stunkard, A.J. (1980). Physical activity in the development and control of obesity. In: A.J. Stunkard (Ed.) Obesity, 415-437, Philadelphia: W.B. Saunders.

Brownell, K.D. & Wadden, T.A. (1984). Confronting obesity in children: Behavioral and psychological factors. Pediatric Annals, 13, 473-480.

Bruch, H. (1970). Obesity in childhood. III. Physiological and psychological aspects of food intake in children. American Journal of Diseases in Childhood, 59, 739-748.

Bruch, H. (1980). The importance of overweight. In P.J. Collipp (Ed.), Childhood obesity (2nd ed., pp113-119). Littleton, Mass.: PSG Publishing.

Canadian Standardised Test of Fitness Operations Manual (1986). Government of Canada, Fitness and Amateur Sport, Publication # FAS 7378.

Clarke, R.P., Morrow, S.B., Morse, E.H., & Keiser, A.S. (1970). Interrelationships between plasma lipids, physical measurements, and body fatness of adolescents in Burlington, Vermont. American Journal of Clinical Nutrition, 23, 754-763.

Coates, T.J., Jeffrey, R.W., Slinkard, L.E., Killen, J.D., & Danaher, B.G. (1982). Frequency of contact and monetary reward in weight loss, lipid change, and blood pressure reduction in adolescents. Behavior Therapy, 13, 175-185.

Coates, T.J., Killen, J.D., & Slinkard, L.E. (1982). Parent participation in a treatment program for overweight adolescents. International Journal of Eating Disorders, 1, 37-48.

Coates, T.J. & Thoresen, C.E. (1978). Treating obesity in children and adolescents: A review. American Journal of Public Health, 68, 143-151.

Coates, T.J. & Thoresen, C.E. (1980). Obesity among children and adolescents: The problem belongs to everyone. In: B. Lahey, & A.E. Kazdin, (Eds.), Advances in Child Clinical Psychology (pp 215-264). Vol. 3. New York: Plenum Press.

Collipp, P.J., Schmieder, B., & Greensher, J. (1971). Childhood obesity - to treat or not to treat. Medical Times, 99, 155-156.

Court, J.M., Hill, G.J., Dunlop, M., & Boulton, T.J.C. (1974). Hypertension in childhood obesity. Australian Pediatric Journal, 10, 209-200.

Dahlkoeter, J., Callahan, E.J., & Linton, J. (1979). Obesity and the unbalanced energy equation: Exercise versus eating habit change. Journal of Consulting and Clinical Psychology, 47, 898-905.

Davies, C.T.M., Godfrey, S., Light, M., Sargeant, A.J., & Zeidifard, E. (1975). Cardiopulmonary responses to exercise in obese girls and women. Journal of Applied Psychology, 38, 373-376.

Douglas, J.C. & Munro, J.F. (1981). The role of drugs in treatment of obesity. Drugs, 21, 362-373.

Drabman, R.S., Cordua, G.D., Hammer, D., Jarvie, G.J., & Horton, W. (1979). Developmental trends in eating rates of normal and overweight preschool children. Child Development, 50, 211-216.

Edwards, A.K. (1978). An index for assessing weight change in children: Weight/ height ratios. Journal of Applied Behavior Analysis, 11, 421-429.

Epstein, L.H., Parker, L., McCoy, J.F., & McGee, G. (1976). Descriptive analysis of eating regulation in obese and nonobese children. Journal of Applied Behavior Analysis, 9, 407-415.

Epstein, L.H., & Wing, R.R. (1980). Aerobic exercise and weight. Addictive Behaviors, 5, 371-378.

Epstein, L.H., Wing, R.R., Koeske, R., Andrasik, F., & Ossip, D.J. (1981). Child and parent weight loss in family based behavior modification programs. Journal of Consulting and Clinical Psychology, 49, 674-685.

Epstein, L.H., Wing, R.R., Koeske, R., Ossip, D., & Beck, S. (1982). A comparison of lifestyle change and programmed aerobic exercise on weight and fitness changes in obese children. Behavior Therapy, 13, 651-665.

Epstein, L.H., Wing, R.R., Steranchak, L., Dickson, B., & Michelson, J. (1980). Comparison of family-based behavior modification and nutrition education for childhood obesity. Journal of Pediatric Psychology, 5, 25-36.

Epstein, L.H., Wing, R.R., & Valoski, A. (1985). Childhood obesity. Pediatric Clinics of North America, 32, 363-379.

Forbes, G.B. (1975). The prevalence of childhood obesity. In: G.A. Bray (Ed.), Obesity in perspective (DHEW Publication # NH 75-788). Washington D.C.: U.S. Government Printing Office.

Garn, S.M. & Clark, D.C. (1975). Nutrition, growth, development, and maturation: Findings from the ten-state nutrition survey of 1968-1970. Pediatrics, 56, 306-319.

Garn, S.M. & Clark, D.C. (1976). Trends in fatness and the origin of obesity. Pediatrics, 57, 433-456.

Garn, S.M., Clark, D.C., & Guire, K.E. (1975). Growth, body composition, and development in obese and lean children. In: M. Winick (Ed.), Childhood obesity. New York: Wiley.

Garn, S.M. & LaVelle, M. (1985). Two-decade follow-up of fatness in early childhood. American Journal of Diseases of Children, 139, 181-185.

Geller, S.T. (1978). Behavioral weight control for obese adolescents: Preliminary findings and future considerations. Psychological Reports, 42, 1233-1234.

Graziano, A. (1977) Parents as behavior therapists. Progress in Behavior Modification, 4, 212-217.

Grinker, J.A. (1981). Behavioral and metabolic factors in childhood obesity. In: M. Lewis & L.A. Rosenblum (Eds.), The uncommon child. New York: Plenum.

Gross, I., Wheeler, M., & Hess, K. (1976). The treatment of obesity in adolescents using behavioral self-control: An evaluation. Clinical Pediatrics, 15, 920-924.

Hall, S.M. & Hall, R.G. (1974). Outcome and methodological considerations in behavioral treatment of overweight. Behavior Therapy, 5, 352-364.

Hanna, C.F., Loro, A.D., & Power, D.D. (1981). Differences in the degree of overweight. Addictive Behaviors, 6, 61-62.

Harris, M.B. & Hallbauer, E.S. (1973). Self-directed weight control through eating and exercise. Behavior research and Therapy, 11, 523-529.

Hasse, K.E. & Hosenfield, H. (1956). Zur Fettsucht im Kindesalter. Zeitschrift für Kinder heilkunde, 78, 1-27.

Heald, F.P. (1972). Treatment of obesity in adolescence. Postgraduate Medicine, 15, 109-113.

Hines, A.L. (1981). Parental participation in behavior therapy for adolescent obesity. Unpublished master's thesis, Memorial University of Newfoundland, St. John's, Newfoundland.

Israel, A.C. & Stollmaker, L. (1980). Behavioral treatment of obesity in children and adolescents. Progress in Behavior Modification, 10, 81-109.

Jarvie, G.J., Lahey, B., Graziano, W., & Framer, E. (1983). Childhood obesity and social stigma: What we know and what we don't know. Developmental Review, 3, 237-272.

Karpowitz, D.H. & Zeis, F.R. (1975). Personality and behavior differences of obese and nonobese adolescents. Journal of Consulting and Clinical Psychology, 43, 886-891.

Keane, T.M., Geller, S.E., & Schreier, C.J. (1981). A parametric investigation of eating styles in obese and nonobese children. Behavior Therapy, 12, 280-286.

Kelman, S.J., Brownell, K.D., & Stunkard, A.J. (1979). The role of parental participation in the treatment of obese adolescents. Unpublished Manuscript, University of Pennsylvania.

Kingsley, R.T. & Shapiro, J. (1977). A comparison of three behavioral programs for the control of obesity in children. Behavior Therapy, 8, 30-36.

Kingsley, R.T. & Wilson G.T. (1977). Behavior therapy of obesity: A comparative investigation of long-term efficacy. Journal of Consulting and Clinical Psychology, 45, 288-298.

Lauer, R.M., Conner, W.E., Leaverton, P.E., Reiter, M.A., & Clarke, W.R. (1975). Coronary heart disease risk factors in school children: The Muscatine study. Journal of Pediatrics, 88, 697-700.

LeBow, M.D. (1984). Child obesity. New York: Springer.

LeBow, M.D. (1986). Child obesity: Dangers. Canadian Psychology, 27, 275-285.

Lerner, R.M. & Gellert, E. (1969). Body build identification, preference, and aversion in children. Developmental Psychology, 1, 456-462.

Lerner, R.M. & Schroeder, C. (1971). Physique identification, preference, and aversion in kindergarten children. Developmental Psychology, 5, 538.

Levitz, L.S. & Stunkard, A.J. (1974). A therapeutic coalition for obesity: Behavior modification and patient self-help. American Journal of Psychiatry, 131, 423-427.

Lloyd, J.K., Wolf, O.H., & Whelan, W.S. (1961). Childhood obesity: A long-term study of height and weight. British Medical Journal, 2, 145-148.

Londe, J., Bourgoynne, J.J., Robson, A.M., & Goldring, D. (1971). Hypertension in apparently normal children. Journal of Pediatrics, 78, 569-577.

Mahoney, M.J. (1974). Self-reward and self-monitoring techniques for weight control. Behavior Therapy, 5, 48-57.

Mahoney, M. & Mahoney, J. (1978). Treatment of obesity: A clinical exploration. In: B. Williams, S. Martin, & P. Foreyt (Eds.). Obesity: Behavioral approaches to dietary management. New York: Bruner/Mazel.

Mallick, M.J. (1983). Health hazards of obesity and weight control in children: A review of the literature. American Journal of Public Health, 73, 78-82.

Mann, G.V. (1974). The influence of obesity on health. New England Journal of Medicine, 291, 178-185.

Marlatt, G.A. (1976). The Drinking Profile: A questionnaire for the behavioral assessment of alcoholism. In: E.J. Mash & L.G. Terdal (Eds.), Behavior therapy assessment: Diagnosis, design and evaluation. New York: Springer.

Marlatt, G.A. (1985). Relapse Prevention: theoretical rationale and overview of the model. In: G.A. Marlatt & J.R. Gordon (Eds.), Relapse Prevention: maintenance strategies in the treatment of addictive behaviors. New York: The Guildford Press.

Mayer, J. (1970). Some aspects of the problem of regulating food intake and obesity. International Psychiatry Clinics, 7, 255-334.

Mendelson, B.K. & White, D.R. (1982). Relation between body-esteem and self-esteem of obese and normal children. Perceptual and Motor Skills, 54, 899-905.

Mendelson, B.K. & White, D.R. (1985). Development of self-body-esteem in overweight youngsters. Developmental Psychology, 21, 90-96.

Merritt, R.J. (1978). treatment of pediatric and adolescent obesity. International Journal of Obesity, 2, 207-214.

MoKbs, J. (1970). Childhood obesity. International Journal of Nursing Studies, 7, 3-18.

Monello, L. & Mayer, J. (1963). Obese adolescent girls: An unrecognized 'minority' group. American Journal of Clinical Nutrition, 13, 35-39.

Morris, J.N., Chave, S.P., Adam, C., Sirey, C., Epstein, L., & Sheehan, D.J. (1973). Vigorous exercises in leisure time and the incidence of coronary heart disease. Lancet, 779, 333-339.

Patterson, G., McNeal, S., Hawkins, N., & Phelps, R. (1967). Programming the social environment. Journal of Child Psychology and Psychiatry, 8, 181-186.

Perri, M.G., Shapiro, R.M., Ludwig, W.W., Twentyman, C.T., & McAdoo, W.G. (1984). Maintenance strategies for the treatment of obesity: An evaluation of Relapse Prevention training and posttreatment contact by mail and telephone. Journal of Consulting and Clinical Psychology, 52, 404-413.

Physical Fitness of Canadian Youth (1985). Canada Fitness Survey. Ottawa, Canada.

Rames, L.K., Clarke, W.R., Connor, W.E., Reiter, M.A., & Lauer, R.M. (1975). Normal blood pressures and the elevation of sustained blood pressure elevation in childhood: The Muscatine study. Pediatrics, 61, 245-251.

Rayner, P.W. & Court, J.M. (1975). The effect of dietary restriction and anorectic drugs on linear growth velocity in childhood obesity. Postgraduate Medical Journal, 51, 120-125.

Reaves, J.Y. & Roberts, A. (1983). The effect of type of information on children's attraction to peers. Child Development, 54, 1024-1031.

Richardson, S.A., Goodman, N., Hastorf, A.H., & Dornbusch, S.M. (1961). Cultural uniformity in reaction to physical disabilities. American Sociological Review, 23, 241-247.

Rivinus, T.M., Drummond, T., & Combrinck-Graham, L. (1976). A group behavior treatment program for overweight children: Results of a pilot study. Pediatric and Adolescent Endocrinology, 1, 212-218.

Rivlin, R.S. (1976). The use of hormones in the treatment of obesity. In: M. Winick (Ed.), Childhood obesity. New York: Wiley.

Romanczyk, R.G. (1974). Self-monitoring in the treatment of obesity: Parameters of reactivity. Behavior Therapy, 5, 531-540.

Romanczyk, R.G., Tracey, D.W., Wilson, G.T., & Thorpe, G.L. (1973). Behavioral techniques in the treatment of obesity: A comparative analysis. Behavior Research and Therapy, 11, 629-640.

Rotatori, A. & Fox, R. (1980). The effectiveness of a behavioral weight reduction program for moderately retarded adolescents. Behavior Therapy, 11, 410-416.

Sallade, J. (1973). A comparison of the psychological adjustment of obese versus nonobese children. Journal of Psychosomatic Research, 17, 89-96.

Sanborn, M.D., Manske, S.R., & Schlegal, R.P. (1983). Obesity in family practise: Is treatment effective? Canadian Family Physician, 29, 543-549.

Schwartz, R.P. & Sidbury, J.B. (1974). Childhood obesity. Connecticut Medicine, 38, 660-663.

Stafferi, J.R. (1967). A social stereotype of body image in children. Journal of Personality and Social Psychology, 7, 101-104.

Stalonas, P.M., Johnson, W.G., & Christ, M. (1978). Behavior modification of obesity: The evaluation of exercise, contingency management, and program adherence. Journal of Consulting and Clinical Psychology, 46, 463-469.

Stenberg, B. (1985). Relapse in weight control: Definitions, processes, and prevention strategies. In: G.A. Marlatt & J.R. Gordon (Eds.), Relapse Prevention: Maintenance strategies in the treatment of addictive behaviors, New York: The Guildford Press.

Stimbert, V.E. & Coffey, K.R. (1972). Obese children and adolescents: A review. (Bulletin # 30, 1-30). ERIC Clearing-House on Early Childhood Education Research Relating to Children.

Stuart, R. (1967). Behavioral control of overeating. Behavior Research and Therapy, 5, 357-365.

Stunkard, A.J. (1983). Obesity. In: A.S. Bellack, M. Hersen, & A.E. Kazdin (Eds.), International Handbook of Behavior Modification and Therapy. New York: Plenum Press.

Stunkard, A.J. (1984). The current status of treatment for obesity in adults. In: A.J. Stunkard & E. Stellar (Eds.), Eating and its disorders. New York: Raven.

Stunkard, A.J. & Burt, V. (1967). Obesity and the body image. American Journal of Psychiatry, 123, 1443-1447.

Stunkard, A.J. & Kaplan, D. (1977). Eating in public places: A review of the reports of the direct observation of eating behavior. International Journal of Obesity, 1, 89-101.

Stunkard, A.J. & Pennick, B. (1979). Treatment of obesity: The problem of maintaining weight loss. Archives of General Psychiatry, 36, 801-806.

Wadden, T.A., Foster, G.D., Brownell, K.D., & Finely, E. (1984). Self-concept in obese and normal weight children. Journal of Consulting and Clinical Psychology, 52, 1104-1105.

Walsh-Doran, M. (1983). The effect of posttreatment telephone contact upon adolescent weight losses achieved in a multicomponent behavioral treatment program. Unpublished master's thesis, Memorial University of Newfoundland, St. John's, Newfoundland.

Waxman, M. & Stunkard, A.J. (1980). Caloric intake and expenditure of obese boys. Journal of Pediatrics, 96, 187-193.

Weiss, A.R. (1977). A behavioral approach to the treatment of adolescent obesity. Behavior Therapy, 8, 720-726.

Wells, K.C. & Copeland, B. (1985). Childhood and adolescent obesity: Progress in behavioral assessment and treatment. Progress in Behavior Modification, 10, 145-176.

White, R.D. (1986). Treatment of mild, moderate, and severe obesity in children. Canadian Psychology, 27, 262-274.

Willmore, D.W. & Pruitt, B.A. (1972). Fat boys get burned. Lancet, 23, 631-632.

Wilson, G.T., & Broynell, K.D. (1980). Behavior therapy for obesity: An evaluation of treatment outcome. Advances in Behavior Research and Therapy, 3, 49-86.

Womersley, J. & Durin, J.V. (1977). A comparison of the skinfold method with the extent of overweight and various weight-height relationships in the assessment of obesity. British Journal of Nutrition, 38, 271-284.

Woody, E.Z. (1986). The obese child as a social being and developing self. Canadian Psychology, 27, 286-298.



