Pediatric Obesity: Intervention Outcomes

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By

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Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree of Master of Arts.

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ABSTRACT

Pediatric Obesity: Intervention Outcomes

by

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Childhood obesity is a national epidemic with serious medical and psychological implications. Almost one-fourth of children in the United States are overweight. Children do not typically grow out of obesity and without intervention the majority of overweight children become overweight adults. Further, childhood obesity results in numerous chronic medical conditions. Thus, the prevention and treatment of childhood obesity are paramount to the avoidance of resultant physical and psychological risk factors. Loma Linda University’s Growing Fit Program seeks to serve the critical and urgent needs of the ever-increasing population of obese children with a multi-disciplinary approach to pediatric weight management. Evaluating the outcomes of the children who attend Growing Fit is vital due to the current controversies surrounding the dubious impact of interventions for obese children. This study found that while controlling for BMI at intake, the BMI at time 2 was accounted for by the number of months since participation in the program, but not by the number of months of participation in the program, nor by time 2 psychosocial variables (i.e., depression, self-concept, behavior). The number of sessions of participation in the counseling component was shown to moderate the relationship between psychosocial scores from time 1 and time 2, with questionable results regarding the relationship of the social problems scores. Overall,
psychosocial scores tended to improve from time 1 to time 2 when children attended more counseling sessions. Additionally, children were found to have difficulty continuing and maintaining their weight loss and healthy behaviors as more time elapses from the time of their participation in Growing Fit. Implications of these findings and directions for future research are discussed.
Introduction

As the most common health concern facing children, obesity is an increasingly prevalent and serious problem (Bar-or, et al., 1998; Strauss & Knight, 1999; Baranowski, Mendlein, Resnicow, Frank, Cullen, & Baranowski, 2000). Recent data from the National Health and Nutrition Examination Survey (NHANES) suggest that 31% of children and adolescents in the U.S. are overweight and that 16% are obese (Hedley, Ogden, Johnson, Carroll, Curtin, & Flegel, 2004). Pinhas-Hamiel and Zeitler (2000) state that obesity has not only become more prevalent over the past decades, but that overweight children are becoming even more obese.

Numerous studies attest to the multiple psychological and physical health risks associated with obesity. Overweight children and adolescents appear to be at risk for body image disturbance, negative self-perceptions, and difficulty with peer relationships (Jelalian & Saelens, 1999). Pierce and Wardle (1997) found that clinically overweight children are vulnerable to low self-esteem. Obese adolescents also appear to be at risk for adult morbidity and mortality regardless of their adult weight status (Must, Jacques, Dallal, Bajema, & Dietz, 1992). Formerly considered an adult disease, type II diabetes is now also a concern among children and adolescents who suffer from obesity (Trissler, 1999; Baranowski, et al., 2000).

Children do not typically grow out of obesity and without intervention; the majority of overweight children become overweight adults (LeBow, 1984). In fact, poor lifestyle behaviors (i.e., eating and exercising patterns) acquired during childhood and adolescence often continue into adulthood (Dietz & Gortmaker, 1985). Researchers have had limited success in treating adult obesity (Brownell & Wadden, 1992). Thus, one
method of preventing adult obesity may be to direct more attention towards the study of the development of obesity in children (Epstein, Valoski, Wing, & McCurley, 1994; Gable & Lutz, 2000). Additionally, the prevention and treatment of childhood obesity are paramount to the avoidance of resultant physical and psychological risk factors. Thus, it is essential to identify effective treatments for pediatric obesity (Epstein, Myers, Raynor, & Saelens, 1998).

_Etiology of Pediatric Obesity_

**Genetic Factors**

Although several genes may play a part in the development of obesity, only a few cases of obesity can be attributed to genetics alone. There are a number of rare conditions or syndromes that are associated with obesity. Kedesdy and Budd (1998) provide an overview of such conditions, including Alstrom syndrome, Cohen syndrome, Frolich syndrome (hypothalamic tumors), Cushing syndrome, and Prader-Willi syndrome (PWS). Additionally, some endocrine disorders (e.g., growth hormone deficiency, hypothyroidism) are associated with short stature and mild to moderate obesity. According to Dietz (1987), these syndromes account for less than 1% of all cases of childhood obesity.

Baranowski et al. (2000) state that explanations of health related phenomena have evolved from viewing genetics as essential for describing a disease or condition to including more environmental determinants. In many cases, obesity results from physiological processes that are influenced by interactions among both genetic and environmental factors. However, environmental factors alone are the major contributors in another large percentage of cases (Baranowski et al., 2000).
Numerous studies have reported that obese children frequently have obese parents. Both parents of obese children were obese in an estimated 30% of cases (Bar-or et al., 1998). Strauss and Knight (1999) found maternal obesity to be the most significant predictor of childhood obesity. Despite the fact that the risk of becoming obese is higher if one has obese parents, 25-35% of cases of obesity occur in families with normal weight parents (Bar-or et al., 2000). Thus, environment, regardless of genetics, may play an important role in the development of pediatric obesity.

*Environmental and Social Determinants*

Several studies demonstrate the impact of the home environment in the development of childhood obesity (see Strauss & Knight, 1999 for a review). The risk of obesity greatly increases in homes where there is neglect or dilapidated living conditions. Strauss and Knight (1999) found that independent of SES factors, children raised in environments with high levels of cognitive stimulation had the lowest rates of obesity. Additionally, Baranowski et al. (2000) describe environments in which fast food stores are pervasive and resources for physical activity (e.g. sidewalks, bicycle paths) are nearly absent as “toxic” and contribute to weight gain. It has been suggested that obese children may overeat as a self-stimulatory behavior resulting from environmental deprivation (Christoffel & Forsyth, 1989).

Disparate findings exist in the area of socioeconomic status (SES) and the development of obesity. In a review by Sobal and Stunkard (1989), slightly more than one-third of studies regarding children report no relationship between childhood obesity and SES. Yet, these authors also found that one-third of studies reviewed showed an increase in obesity to be related to high SES, and one-third of studies demonstrated an
increase in obesity to be associated with low SES. Differences in the ages of the participants and measures of SES may account for the discrepancies among these studies (Strauss, & Knight, 1999).

However, SES has been shown to influence weight through health-related behaviors and values, such as education about nutrition. In a study by Elliot, Kjolhede, Gournis, and Rasmussen (1997), being breastfed in infancy was found to have a lasting protective effect on obesity status during adolescence. However, a more recent study with an exclusively low-income population (Bogen & Whitaker, 2002) demonstrated that being breastfed as an infant was not associated with a reduced risk of obesity at age 4 years. Thus, there may be a confounding influence of feeding method on other factors, such as maternal education.

Gable and Lutz (2000) suggest that risk factors that directly affect children (e.g., food intake) are related to other characteristics of the family (e.g., parents’ income) which indirectly contribute to children’s health. These authors summarize research findings to point out that healthy foods are expensive and require time to prepare. Hence single parent or dual-worker households may lack the time to prepare healthy meals and low-income families may lack the income to regularly provide healthy foods.

Gable and Lutz (2000) posit that efforts to reduce childhood obesity should concentrate on educating parents about child nutrition and minimizing children’s time spent viewing television. They found associations between the amount of time children spent watching television and their intake of high sugar and non-nutritious foods. Robinson (1999) argues that television viewing contributes to childhood obesity through multiple mechanisms: children are physically inactive, cognitively under the influence of
television advertising, and have less opportunity to engage in extracurricular activities. In a longitudinal study that tracked children’s television watching and body fat from preschool to early adolescence, Proctor, Moore, and Gao (2003) found that children who watched the most television during childhood were found to have the greatest increase of body fat over time.

In sum, the child’s environment, including the SES of the family, has an impact on children’s weight status, though likely mediated by several factors. These factors may include availability of cognitive stimulation, knowledge of nutrition, opportunities for physical activity, and accessibility of healthful foods (Baranowski et al., 2000). Parents apparently contribute to children’s food intake (by what foods are available in the home), coordinate their extracurricular activities (e.g., team sports), and monitor the amount of time children spend viewing television (Gable & Lutz, 2000).

Mental Health Determinants

Obesity may also develop when eating becomes a means of coping with stressful experiences, or when an individual’s food intake is influenced by emotional states such as anxiety or depression (Striegel-Moore, Morrison, Schreiber, Schumann, Crawford, & Obarzanek, 1999). Research has demonstrated a relationship between emotional eating (overeating in response to emotions) and negative self-esteem in relation to a lack of physical competence in overweight children (Braet & Van Strien, 1997). These authors also found that some parents reported their overweight children eating not only when they are hungry but also in response to external environmental cues which stimulate eating in the absence of physiological need for food. In these cases, the parents also reported
behavioral problems in their children, who, in turn, reported negative feelings of self-worth.

Striegel-Moore et al. (1999), however, identified only a modest relationship between emotional eating and childhood weight among 9- and 10-year-old girls. These authors found higher emotion-induced eating scores for African-American girls than for Caucasian girls, although this difference was small. The young age of the girls may account for the weak relationship between BMI and emotion-induced eating in this study. The authors suggest a stronger relationship may exist once girls have more autonomy over their food choices and portions.

Overall, obese children, when compared to average weight children, appear vulnerable to emotional eating. However, Braet and Van Strien (1997) suggest that dieting restraint may lead to loss of control, which promotes more emotional eating. Thus, these authors recommend teaching obese children coping strategies for external eating situations and emotional moments as treatment goals.

Consequences of Pediatric Obesity

Health Risks

Numerous studies attest to the multiple health risks associated with adult obesity. Obese adolescents also appear to be at risk for adult morbidity and mortality independent of adult weight status (Must, Jacques, Dallal, Bajema, & Dietz, 1992). Pediatric obesity is a risk factor for many health-related conditions as well, including hypertension, hypercholesterolemia, hyperinsulinemia, respiratory disorders, and orthopedic problems (Bar-or, et al., 1998; Pinhas-Hamiel & Zeitler, 2000). Dietz (2004) reports that approximately 60 percent of overweight children and adolescents have at least one
additional risk factor for cardiovascular disease (e.g., elevated blood pressure, hyperlipidemia, hyperinsulinemia), and more than 25 percent have two or more of these risk factors.

Additionally, various dietary components (e.g., saturated fat, fiber), as well as low levels of activity, have been associated with obesity and related chronic diseases. Physical activity promotes low adiposity and proper functioning of various physiological processes, and is a partial determinant of physical fitness as measured by cardiovascular and pulmonary function, strength, and body composition (Baranowski et al., 2000).

Severe obesity poses immediate health risks for the child by stressing both the metabolic and the skeletal systems (Dietz, 1998). During childhood, diet has been related to skeletal growth and bone mineralization. Bone formation and growth and bone mineralization are also promoted by physical activity among children (Baranowski, et al., 2000). Thus, long-lasting effects on bone fitness can result from improved diet and physical activity.

Formerly considered an adult disease, type II diabetes is now also a concern among children and adolescents (Baranowski, et al., 2000). This may be linked to the recent increase in pediatric obesity. A large clinical center in the Midwest reported a 10-fold increase in the incidence of type II diabetes among adolescents over the past decade (Pinhas-Hamiel, Dolan, Daniels, Standiford, Khoury, & Zeitler, 1996). Although there is a paucity of research on the recent epidemic of pediatric type II diabetes, the findings taken from adult data make it clear that this trend has important implications for health risk. For example, in adults, type II diabetes can reduce life expectancy (Pinhas-Hamiel & Zeitler, 2000). It appears that adolescents with this condition may maintain lifestyle
risk factors such as a high-fat, low-fiber diet and minimal involvement in physical activities (Pinhas-Hamiel, Standiford, Hamiel, Dolan, Cohen, & Zeitler, 1999).

Weight loss in children may reduce the risk of adult obesity, and has been associated with improvement in various risk factors (Jelalian & Saelens, 1999). Also, preventing chronic disease can be a cost-effective approach to minimizing medical costs and increasing healthy years and quality of life (Baranowski et al., 2000). While medical costs are physically and financially high, the potential psychosocial consequences of pediatric obesity are another risk factor for these children that must be considered.

Psychological Risks

For children, physical fitness enables performance in many personal and academic endeavors associated with healthy functioning in our society. Also, the absence of obesity has been related to other primary determinants of optimal functioning, such as mental health and emotional adjustment (Baranowski et al., 2000). Yet, even being moderately overweight poses problems for children such as deficits in physical functioning which may lead to social rejection, and subsequently emotional distress (Dietz, 1998). Overweight children and adolescents appear to be at risk for body image disturbance, negative self-perceptions, and difficulty with peer relationships (Jelalian & Saelens, 1999).

Body image. Several studies have found that puberty is an important developmental period with regard to body image and related eating concerns. Brooks-Gunn (1988) has proposed that body image is the psychological variable most affected by puberty. Eating disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder represent significant health problems among adolescent girls, with reported mean
ages of onset ranging from 14 to 19 years (Striegel-Moore, Schreiber, Lo, Crawford, Obarzanek, & Rodin, 2000). Being overweight during adolescence has been related to concerns about shape and eating for girls. This may result from the simultaneous pressure to be thin and the increase in body fat related to puberty that is common to both non-obese and obese girls (Jelalian & Saelens, 1999). Brown, et al. (1998) found that feelings of competence with physical appearance decreased with increasing BMI during adolescence.

Overweight adolescent girls reported lower body-esteem than their younger counterparts, whereas overweight boys demonstrate the opposite trend. Thus, body-esteem tends to recover with age for boys, while body-esteem in overweight girls becomes more negative with age (Stradmeijer, Bosch, Koops, & Seidell, 2000). Smolak, Levine, and Gralen (1993) report that girls who have completed pubertal development report considerably more body image dissatisfaction and dieting efforts than prepubertal girls. For example, in a Canadian study Shore and Porter (1990) found that girls aged 13 years or less reported significantly less body image disturbance than older girls.

Some data suggest that individuals who become obese as adults experience greater improvement in body image following weight loss than those who have been overweight over the course of childhood and adolescence (Brownell, 1984). However, studies demonstrate varied results. For instance, Faubel (1989) found no significant differences in body image disturbance reported among individuals who became obese early as opposed to later in life. However, Mills and Andrianopoulos (1994) demonstrate that individuals who develop obesity in childhood show more psychiatric and psychological problems than those who develop obesity later in life. Thus, treatment of obesity earlier
in life is optimal, given the potential negative psychological consequences for adolescents and adults.

Self-esteem. Findings from studies of self-esteem among obese children are also mixed. Wadden, Foster, and Brownell (1984) found no significant differences between the self-esteem of 210 white obese and average weight children aged 8-13 years. Pierce and Wardle (1997), however, found that clinically overweight children are vulnerable to low self-esteem. They posit that variations in findings across studies may be attributed to the differences in samples. Specifically, a referral to treatment for being overweight may have a negative effect on self-worth; thus, studies dealing with non-clinical samples may demonstrate more positive self-esteem in obese children. A referral may imply to obese children that they are responsible for their obesity and not able to manage their weight correctly, thus inducing lower self-esteem.

Over a 4-year period, Strauss (2000) found that obese children with decreasing levels of self-esteem demonstrated significantly higher rates of sadness, loneliness, and nervousness and were more likely to engage in high-risk behaviors such as smoking or consuming alcohol compared with obese children whose self-esteem increased or remained unchanged. Additionally, Strauss posits that family interaction and support is important to the development of preadolescent self-esteem; whereas in adolescence, self-esteem is more related to approval from peers.

Peer relations. In a small sample of 11-year old obese children entering treatment, 29% were found to meet or exceed clinical levels for psychological problems on the Child Behavior Checklist (CBCL), with the most significant elevations on the Anxiety-Depression and Social Problem Scales (Epstein, Klein, & Wisniewski, 1994).
More specifically, this study reported approximately 20% of obese boys and 13% of obese girls to have difficulty in social situations. Baum and Forehand (1984) discerned from behavioral observation of peer interactions that overweight adolescents were noted to dispense and receive more negative interactions than normal weight adolescents. Rosen, Horowitz, Lin, Liebenstein, and Patel (2002) found that being obese was associated with receiving increased teasing among low SES minority school-aged children. Interestingly, these authors discovered that, regardless of weight, children who reported being teased about weight had lower self-esteem and physical self-concept.

Bell and Morgan (2000) note that obesity is known to be one of the most stigmatizing and least acceptable conditions among children. The likelihood of overweight children being less able to participate fully in recreational activities and the "visibility" of obesity, support the findings that obese children experience lower social acceptance than their peers and are more reluctant to initiate and engage in peer relations (La Greca & Bearman, 2000). Differences in attributions among peers, specifically whether or not overweight youth are responsible for their obesity, may account for why some obese youth are stigmatized and some are not (Dejong, 1980). A medical explanation of obesity was provided to 184 elementary school-aged children, only a slight positive change was noted in children’s attitudes and behavioral intentions toward a hypothetical peer presented as obese (Bell & Morgan, 2000). Overall, findings in this area argue that criticism and social exclusion attributable to weight evoke feelings of shame that undermine a child’s attitudes toward physical activity, social interactions, and school work (Pierce & Wardle, 1997).
**Treatment of Childhood Obesity**

Children do not typically grow out of obesity and without intervention the majority of overweight children become overweight adults (LeBow, 1984). Lloyd, Wolff, and Whelan (1961) assert that approximately 80% of obese adolescents will become obese adults. Often the poor lifestyle behaviors (i.e., eating and exercising patterns) acquired during childhood and adolescence continues into adulthood (Dietz & Gortmaker, 1985).

Clinicians have had limited success in treating adult obesity (Brownell & Wadden, 1992). Thus, one method of preventing adult obesity may be to direct more attention towards understanding the development of obesity in children (Epstein, Valoski, Wing, & McCurley, 1994; Gable & Lutz, 2000). Behavioral approaches to weight loss with adults often achieve only short-term success; the majority of patients return to their pre-treatment weight within 3 years (Cooper & Fairburn, 2001). However, Epstein, Valoski, Wing, and McCurley (1994) cite that for about 30% of children, weight loss can be maintained for periods of at least 10 years with the inclusion of behavioral techniques.

Across several longitudinal studies dealing with eating disorders, common risk factors are evidenced including low self-esteem, body dissatisfaction, depression, negative emotionality, early maturation, and being overweight (Shisslak & Crago, 2001). Thus, programs that include a psychosocial component, in addition to nutrition and exercise education, may increase the potential for greater weight loss results. By overcoming psychological obstacles to the acquisition of and long-term adherence to effective weight-control behavior, Cooper and Fairburn argue that weight regain can be minimized.
It has been suggested that a basic dieting approach to intervention may actually worsen obesity by negatively affecting metabolic rate (Duffy & Spence, 1993). Thus, recent treatments for obesity involve a combination of nutrition education, self-monitoring of exercise and eating activities, and exercise programs.

Parental involvement may improve treatment results among children under the age of 12 years (Fulton, McGuire, Caspersen, & Dietz, 2001). However, results from adolescent weight loss studies that have included parents have been mixed; suggesting that parents may have more influence in controlling younger children’s environments, but as children age, they become less subject to parental supervision (Fulton, et al., 2001). In a review of the literature, Zametkin, Zoon, and Klein (2004), found the most effective treatments for child and adolescent obesity include substantial parental intervention. Additionally, in a family-based behavioral intervention for obesity, children with parents who had the greatest BMI change lost the most weight themselves (Wrotniak, Epstein, Paluch, & Roemmich, 2004).

Some researchers have shown that the length of treatment is positively related to outcome for obese adults (see Brownell & Wadden, 1992). Extending treatment to approximately 25 weeks appears helpful, after which weight loss has been shown to slow considerably. In a review of several clinical weight loss studies involving youth, Epstein, Myers, Raynor, and Saelens (1998) found that, in most cases, longer treatment resulted in greater weight loss. In these studies, treatment lasted between 2 and 14 months, and used weight loss as the outcome.

Few intervention programs exist for children, which is disconcerting considering the epidemic proportions of childhood obesity. Challenges are present among programs
that do exist, however. For example, Epstein (1992) reported that children face similar problems as adults in adherence to long-term exercise programs. Bar-or et al. (1998) likewise discusses the difficulty of adherence to restrictive dieting programs for children. Upon noticing that several children were reluctant participants in treatment and did not view their overweight status as a major concern, Duffy and Spence (1993) suggested that greater attention to motivational issues is necessary when working with overweight children. Overall, evaluation of current intervention programs is critical to the reduction and prevention of childhood obesity.

Statement of the Problem

The current study evaluated the outcomes for children who have attended the Growing Fit Program at Loma Linda University. With a multi-disciplinary approach to pediatric weight management, this program consists of components discussed above that contribute to weight maintenance and reduction in children; specifically, nutrition education, exercise, and psychosocial elements, and parental involvement. Due to the current controversies around the impact of obesity interventions for children, it is important to determine if there are positive and lasting outcomes for children who are currently participating or who have previously attended the Growing Fit Program. In order to do so this study addressed length of time of participation in the program and the length of time since the last attendance. In addition, improvement of psychosocial functioning of the children was examined in relation to the number of counseling sessions attended. This study aims to provide essential information regarding the effectiveness of the Growing Fit Program, which is especially imperative considering the various negative health, social, and psychological consequences of obesity for children.
Hypotheses

1) While controlling for BMI at intake, the BMI at time 2 (Time of this study) will be accounted for by number of months of participation in the program and number of months since last participation and psychosocial scores at time 2 (see below).

   a) PH total scale score (time 2).
   b) CBCL total scale score (time 2)
   c) CDI total score (time 2).

2) Number of sessions of participation in the counseling component will moderate the relationship between psychosocial scores from time 1 (Intake) and time 2 (Time of this study).

   a) Number of sessions attended will have negative moderating effects on the relationship between intake CDI total scale scores and time 2 CDI total scale scores.
   b) Number of sessions attended will have positive moderating effects on the relationship between intake PH total scale scores and time 2 PH total scale scores.
   c) Number of sessions attended will have negative moderating effects on the relationship between intake CBCL Social Problems scale scores and time 2 CBCL Social Problems scale scores.
d) Number of sessions attended will have negative moderating effects on the relationship between intake CBCL Externalizing scale scores and time 2 CBCL Externalizing scale scores.

e) Number of sessions attended will have negative moderating effects on the relationship between intake CBCL Internalizing scale scores and time 2 CBCL Internalizing scale scores.

f) Number of sessions attended will have negative moderating effects on the relationship between intake CBCL total scale scores and time 2 CBCL total scale scores.
Method

Participants

Approximately 150 children have participated in the Growing Fit Program over the past five years. Children between the ages of 8 and 17 years, who had participated in at least one session of the counseling group, was contacted by the staff of Growing Fit for participation in this study. Twenty-percent (N=31) of the potential participants took part in this study. The majority of children who did not participate had moved, had missing contact information, or were unable to be reached by telephone (35.6%). The transitory nature of this population was somewhat expected because the main referral group was from a lower socioeconomic population based on their medical insurance qualification. Additionally, some children did not meet age or attendance inclusion criteria for this study (Figure 1).

![Pie chart showing participant status](image.png)

Figure 1. Status of Growing Fit subjects for this study.
Children in this study ranged from an age of 8 to 16 years, with a mean age of 12 (SD = 2.32). Consisting of 58% females and 42% males, the participants’ ethnic background was 58% Hispanic, 19% African American, 13% Caucasian, and 10% who were unspecified. Information was also gathered regarding the parents of the children in the study. 71% of the participants’ parents were married, 16% were single, 10% were separated or divorced, and 3% choose not to respond. Over half (58%) of the mothers reported that they were homemakers, and the mean number of hours worked per week by the female parents who worked outside the home was 33.5 (SD = 20.61) with a range from 12 to 86 hours. 91% of the male parents were reported to work outside the home a mean number of hours per week of 42.6 (SD = 7.68).

**Equipment**

A portable weigh scale was used to assess each child’s weight, and a stadiometer was used to assess the child’s height. This information was necessary to obtain the BMI for each child.

**Measures**

*Body Mass Index (BMI).* Robinson and Killen (2001) recommend the use of BMI as the primary outcome measure, on the bases of accessibility, reliability, measurement validity, and clinical validity. The BMI is obtained non-invasively and is therefore more accessible. BMI is defined as the weight in kilograms divided by the square of the height in meters. A BMI equal to or greater than the 85th percentile, or a BMI of 25 or greater, often is used to define overweight, while the 95th percentile, or a BMI of 30, defines obesity.
Among children and adolescents of both sexes and various races, BMI correlates well with estimates of percentage body fat from less accessible measures such as densitometry, total body water, skinfold thickness, and dual x-ray absorptiometry (see Robinson & Killen for a review). BMI has demonstrated clinical validity in its associations with blood pressure and hypertension (Robinson & Killen), and Type-2 diabetes (Pinhas-Hamiel, et al., 1996). Also, adolescent BMI has been associated with future morbidity and mortality (Must et al., 1992).

*Children’s Depression Inventory (CDI).* Developed by Kovacs (1985), this 27-item self-report instrument was modeled after the Beck Depression Inventory. The child endorses one of three statements in a series of items that describe how he or she has been thinking or feeling during the preceding two weeks. Based on these endorsements, a total score ranging from 0-54 is generated. Statements for each item are assigned different numerical values such that higher scores reflect increasingly severe symptoms. Hodges (1990) found support for the use of the CDI as a screening measure and as a symptom inventory. There is evidence of good test-retest reliability and good discriminant validity (Hodges, 1990). Kovacs (1985) provides evidence of concurrent validity, reporting high positive correlations with self-reported anxiety and negative correlations with self-esteem.

The CDI can be interpreted through the total and individual factor scores. The factor scores include Negative Mood, Interpersonal Problems, Ineffectiveness, Anhedonia, and Negative Self Esteem. A T-score of 65 or above has been suggested as a clinical cut-off (Kovacs, 1985). The total scale score was the focus of this study.
Piers Harris Children’s Self-concept Scale (PH). The PH (Piers, 1984) is a self-report questionnaire containing 80 dichotomously scored items, about half of which are negatively worded. It is intended for use by children in Grades 4 through 12. Responses are summarized by a total score and by six scale scores. The total score has a possible range of 0 to 80, and reflects the number of individual items that have been responded to in the direction of positive self-concept. Lower scores are indicative of a lower self-concept (i.e., self-esteem or self regard). Overall, internal consistency reliability tends to be high. A number of subscales suggesting substantially lower reliabilities are suggested in the Piers-Harris manual (Piers, 1984).

The PH can be interpreted through the total and cluster scores. The six cluster scores include Behavior, Intellectual and School Status, Physical Appearance and Attributes, Anxiety, Popularity, and Happiness and Satisfaction. Piers (1985) suggests a T-score of 40 or below should be regarded as a serious indicator of a low self-concept. For the purposes of the current study, the total scale score was utilized.

Child Behavior Checklist (CBCL). Designed to measure behavior problems, the CBCL (Achenbach & Edelbrock, 1983) is one of the most widely used measures of child psychopathology. The total problem score is considered analogous to the construct of general ability as represented by total scores on intelligence tests, with lower scores reflecting less psychopathology. High reliability and validity have been reported (Piacentini, 1993) as well as reliable correlations between CBCL Problem Scales and other assessments apparently designed to measure similar constructs ($r_s = .52$ to .88). Overall, correlations among total problem scores for the CBCL and other instruments have been found to be as high as correlations reported for different measures of general
intelligence. In terms of criterion-related validity, different scale scores and total scores for the CBCL consistently discriminate clinical and non-referred samples after demographic effects are partialled out.

Although three forms of the CBCL (i.e., Teacher Report Form, Parent Report Form, and Youth Self Report Form; Achenbach & Edelbrock, 1983) are available, this study examined only the Parent Report Form. The total scale score, as well as the Externalizing, Internalizing, and Social Problems subscales was included in the current analyses, as suggested by previous childhood obesity literature (i.e., Epstein, Paluch, Gordy, et al. 2000; Stradmeijer, Bosch, Koops, & Seidell, 2000).

Demographic Form. A demographic form (Appendix E) was completed by the parents of the participants. This included questions about socioeconomic status (SES), ethnicity, religious affiliation, marital status, time spent working, and number of children in the home.

Parent Outcome Questionnaire. Developed specifically for this study, this questionnaire (Appendix F) includes 15 self-report items which measure the parents’ satisfaction with the various components of the Growing Fit Program. The items are scored on a 6-point Likert-type scale with responses ranging from (1) strongly disagree to (6) strongly agree for each question. This measure also includes an open-ended question allowing the parents to note any suggestions or comments they had regarding the Growing Fit Program.

Child Outcome Questionnaire. Also developed specifically for this study, this questionnaire (Appendix G) includes 15 self-report items which measure the children’s satisfaction with the various components of the Growing Fit Program. The items are
scored on a 6-point Likert-type scale with responses ranging from (1) strongly disagree to (6) strongly agree for each question. This measure also includes two open-ended questions allowing the children to note both what they liked and disliked about the program and provide any suggestions for improvement of the Growing Fit Program.

Procedure

The parents of all children who had participated for any length of time in the Growing Fit Program exercise or nutrition components, and in at least one counseling session, were contacted by personnel in the Growing Fit Program for participation in this study (see Appendix A for standard script). They were informed of the voluntary nature of the study and information regarding the elements of the study.

For those who agreed to participate an appointment to meet with the child and their parent either in the LLU Kids FARE laboratory, or in the subject’s home was made. Any questions the parents or children had were addressed prior to obtaining informed consent for participation (Appendix B) and authorization for use of private health information (Appendix C). The children were also asked for their assent (Appendix D).

The parent was asked to complete the CBCL, a demographic form (Appendix E), and the Parent Outcome Questionnaire (Appendix F). The child was asked to fill out the CDI, the PH, and the Child Outcome Questionnaire (Appendix G). The child was also weighed and measured to obtain the information needed to calculate the child’s BMI. Ten-dollar gift certificates to ToysRUS were provided to thank the children for their participation in the study.
Results

Archival data was utilized to provide information regarding each of the aforementioned measures collected at intake (time 1). The raw scores from the psychological measures were converted into $T$-scores and entered into SPSS. The data was screened and the parametric assumptions were evaluated.

Upon examination of the missing data, 42% of the Child Behavior Checklists at intake were missing. The mean intake BMIs differed significantly for the CBCL completers ($M = 32.95$) as compared to the non-completers ($M = 29.53$; $t = , df = 29, p = .04$). The mean BMIs at time 2 also differed significantly for the groups (completers' $M = 34.52$, non-completers' $M = 30.58$; $t = 2.53, df = 27.71, p = .02$).

32% of the Child Behavior Checklists at time 2 were also missing. A comparison of means revealed some systematic differences between the groups who completed and who did not complete this measure. For instance, the mean intake BMIs differed significantly for the completers ($M = 29.9$) as compared to the non-completers ($M = 34.9$; $t = -2.65, df = 11.76, p = .02$). The mean number of months since participation also differed significantly for the groups (completers' $M = 14.8$, non-completers' $M = 5.1$; $t = 2.31, df = 29, p = .03$). The groups also differed in terms of their mean responses to a question regarding their satisfaction with participation in Growing Fit. More specifically, children whose parents completed the CBCL reported less satisfaction ($M = 4.4$), whereas their counterparts reported more satisfaction ($M = 5.6$; $t = -2.82, df = 24.18, p = .01$).

Boxplots were inspected to assess univariate outliers. No true outliers (greater than 3.5 $SD$) were detected. Histograms were examined to assess univariate normality, which was approximated. Multivariate normality was examined by inspecting bivariate
scatterplots, which revealed moderate violations of multivariate linearity, normality, and homoscedasticity.

Hypothesis 1 stated that while controlling for BMI at intake, the BMI at time 2 would be accounted for by number of months of participation in the program, number of months since last participation, and psychosocial scores at time 2 (PH, CBCL, and CDI). This hypothesis was analyzed by hierarchical multiple regression. Redundancy may have been a threat, as bivariate correlations revealed moderate correlations among some predictor variables (Table 1).

For instance, intake BMI was associated with months of participation ($r = -0.23$), months since participation ($r = -0.26$), final self concept ($r = 0.33$), and final depression ($r = -0.38$). Additionally, intake BMI highly correlated with the outcome variable ($r = -0.86, p < 0.001$), which will reduce the amount of residual variance in the regression equations. Months of participation also correlated moderately with final self-concept ($r = 0.47, p = 0.05$), final depression ($r = -0.26$), final behavior ($r = 0.36$), and with the outcome variable ($r = -0.27$). Months since participation was moderately correlated with final self-concept ($r = -0.31$). Final depression scores and self-concept scores revealed a strong relationship ($r = -0.84, p < 0.001$), and were moderately correlated with the outcome variable ($rs = -0.24$ and $0.21$, respectively).
Table 1

Correlation Matrix and Descriptive Statistics for Hypothesis 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake BMI</th>
<th>Months of Intake</th>
<th>Months Since Participation</th>
<th>Final PH</th>
<th>Final CDI</th>
<th>Final CBCL</th>
<th>Final BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake BMI</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months of Intake</td>
<td>-0.23</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months Since Participation</td>
<td>-0.26</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final PH</td>
<td>0.33</td>
<td>0.47</td>
<td>-0.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final CDI</td>
<td>-0.38</td>
<td>-0.26</td>
<td>0.11</td>
<td>-0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final CBCL</td>
<td>0.12</td>
<td>0.36</td>
<td>-0.14</td>
<td>0.19</td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final BMI</td>
<td>-0.86</td>
<td>-0.27</td>
<td>0</td>
<td>0.21</td>
<td>-0.24</td>
<td>0.10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Intake</th>
<th>Months of Intake</th>
<th>Months Since Participation</th>
<th>Final PH</th>
<th>Final CDI</th>
<th>Final CBCL</th>
<th>Final BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>21</td>
<td>22</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>31.5</td>
<td>6.3</td>
<td>11.8</td>
<td>56.0</td>
<td>44.6</td>
<td>55.5</td>
<td>32.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.6)</td>
<td>(7.3)</td>
<td>(11.7)</td>
<td>(9.6)</td>
<td>(7.5)</td>
<td>(11.4)</td>
<td>(5.0)</td>
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</table>

To determine the best combination of the independent variables (duration of time in program, time since last participation, and psychosocial variables) to predict the BMI at time 2, five separate analyses were run. After entering intake BMI on the first block, each variable of interest was entered on the second block. This procedure was used to
reduce the threat of an overfit present due to the amount of variables investigated in this hypothesis.

While controlling for BMI at time 1, the number of months since participation in the program was the only variable that contributed significantly to the overall model. Although intake BMI accounted for 75% of the variance, the number of months since participation in the program captured 5% above and beyond intake BMI (Table 2; $R^2 = .053$, $R^2_{adj} = .784$, $F(1,28) = 7.37, p = .01$). Time 2 BMI increased as time since participation increased.

Table 2

\textit{Hypothesis 1: Results of Regression Analyses with Months Since Participation in Program}

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>$R^2_{adj}$</th>
<th>$R^2_{Change}$</th>
<th>$F_{Change}$</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake BMI</td>
<td>.745</td>
<td>.736</td>
<td>.745</td>
<td>84.75</td>
<td>.0001</td>
<td>.86</td>
<td>9.21</td>
<td>.0001</td>
</tr>
<tr>
<td>Intake BMI</td>
<td>.798</td>
<td>.784</td>
<td>.053</td>
<td>7.37</td>
<td>.01</td>
<td>.93</td>
<td>10.53</td>
<td>.0001</td>
</tr>
<tr>
<td>Months Since Participation</td>
<td>.24</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Table 3 shows that months of participation in Growing Fit was not predictive of the time 2 BMI ($R^2 = .005$, $R^2_{adj} = .732$, $F(1,28) = .51, p = .48$). Likewise, the overall model including final depression scores was not significant (Table 4; $R^2 = .010$, $R^2_{adj} = .729$, $F(1,19) = .79, p = .39$). Self-concept scores at time 2 did not contribute to the predictive value of intake BMI on time 2 BMI (Table 5; $R^2 = .006$, $R^2_{adj} = .723$, $F(1,18) =$
.43, p = .52). Table 6 shows that final behavior scores was not predictive of the time 2 BMI ($R^2 = .0001, R^2_{adj} = .717, F(1,18) = .001, p = .98$).

---

Table 3

**Hypothesis 1: Results of Regression Analyses with Months of Participation in Program**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>p</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake BMI</td>
<td>.745</td>
<td>.736</td>
<td>.745</td>
<td>84.75</td>
<td>.001</td>
<td>.86</td>
<td>9.21</td>
<td>.001</td>
</tr>
<tr>
<td>Intake BMI</td>
<td>.750</td>
<td>.732</td>
<td>.005</td>
<td>.51</td>
<td>.48</td>
<td>.85</td>
<td>8.71</td>
<td>.001</td>
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<tr>
<td>Months of Participation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.07</td>
<td>-.71</td>
<td>.48</td>
</tr>
</tbody>
</table>

---

Table 4

**Hypothesis 1: Results of Regression Analyses with Final Depression Scores**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>p</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake BMI</td>
<td>.745</td>
<td>.732</td>
<td>.745</td>
<td>58.45</td>
<td>.001</td>
<td>.86</td>
<td>7.65</td>
<td>.001</td>
</tr>
<tr>
<td>Intake BMI</td>
<td>.755</td>
<td>.729</td>
<td>.010</td>
<td>.79</td>
<td>.39</td>
<td>.91</td>
<td>7.36</td>
<td>.001</td>
</tr>
<tr>
<td>Final CDI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.11</td>
<td>.89</td>
<td>.39</td>
</tr>
</tbody>
</table>
Table 5

**Hypothesis 1: Results of Regression Analyses with Final Self-concept Scores**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake BMI</td>
<td>.745</td>
<td>.732</td>
<td>.745</td>
<td>55.53</td>
<td>.001</td>
<td>.86</td>
<td>7.45</td>
<td>.001</td>
</tr>
<tr>
<td>Intake BMI</td>
<td>.751</td>
<td>.723</td>
<td>.006</td>
<td>.43</td>
<td>.52</td>
<td>.89</td>
<td>7.15</td>
<td>.001</td>
</tr>
<tr>
<td>Final PH</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>-.08</td>
<td>-.66</td>
<td>.52</td>
</tr>
</tbody>
</table>

Table 6

**Hypothesis 1: Results of Regression Analyses with Final Behavior Scores**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake BMI</td>
<td>.745</td>
<td>.732</td>
<td>.745</td>
<td>55.53</td>
<td>.001</td>
<td>.86</td>
<td>7.45</td>
<td>.001</td>
</tr>
<tr>
<td>Intake BMI</td>
<td>.745</td>
<td>.717</td>
<td>.000</td>
<td>.001</td>
<td>.98</td>
<td>.86</td>
<td>7.20</td>
<td>.001</td>
</tr>
<tr>
<td>Final CBCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.01</td>
<td>.03</td>
<td>.98</td>
</tr>
</tbody>
</table>

Hypothesis 2 was examined using moderated linear regression to provide information regarding the nature of length of time in the counseling program as moderating the relationship between psychosocial functioning from time 1 to time 2.

Table 7 displays the descriptive statistics for each variable involved in this hypothesis.

The mean number of counseling sessions attended was 6.8 ($SD = 7.3, N = 31$). Bivariate correlations between each of the predictor variables and with the outcome variable were
examined for threats of overlap, and are discussed for each regression analysis below. Additionally, bivariate scatterplots for all variables exhibit approximate linearity among the variables.

Table 7

_Hypothesis 2: Descriptive Statistics_

<table>
<thead>
<tr>
<th>Psychosocial Variable</th>
<th>Time 1</th>
<th>Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD), N</td>
<td>M (SD), N</td>
</tr>
<tr>
<td>Depression</td>
<td>48.6 (9.0), 27</td>
<td>44.5 (7.5), 22</td>
</tr>
<tr>
<td>Self-Concept</td>
<td>51.6 (11.2), 23</td>
<td>56.0 (9.6), 21</td>
</tr>
<tr>
<td>Behavior</td>
<td>56.3 (8.8), 18</td>
<td>55.5 (11.4), 21</td>
</tr>
<tr>
<td>Internalizing Behavior</td>
<td>56.3 (9.9), 18</td>
<td>55.5 (12.8), 21</td>
</tr>
<tr>
<td>Externalizing Behavior</td>
<td>54.6 (8.7), 18</td>
<td>53.2 (9.0), 21</td>
</tr>
<tr>
<td>Social Problems</td>
<td>37.4 (7.5), 17</td>
<td>42.1 (10.6), 20</td>
</tr>
</tbody>
</table>

_Z scores were calculated for each variable involved in the analyses. For each psychosocial variable, time 2 scores were entered as the outcome variable. Time 1 scores were entered in the first block, followed by the number of counseling sessions attended on the next block, and finally the product term was entered (number of sessions attended x intake psychosocial scores) to test the interaction._

_Hypothesis 2a stated that participation in the counseling sessions would have a negative moderating effect on the relationship between intake CDI total scale scores and_
time 2 CDI total scale scores. For this hypothesis, the predictor variables (intake CDI, number of sessions, and the product term) showed moderate to high bivariate correlations with the outcome variable (Table 8; \( r = .51; -.37; \) and \( -.31 \), respectively). Intake CDI and the product term also had a moderate correlation of -.24. A small interaction effect in the predicted direction was found for the number of sessions attended moderating the relationship between intake CDI and time 2 CDI scores (Table 9; \( R^2 = .016, R^2_{adj} = .252, F(1,16) = .40, p = .54 \). This was confirmed by the graphic representation of the standardized residuals for this hypothesis (See Appendix H).

Table 8

_Hypothesis 2a: Correlation Matrix_

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake CDI</th>
<th>Number of Sessions</th>
<th>Intake CDI X Sessions Attended</th>
<th>Time 2 CDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CDI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Sessions</td>
<td>-.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake CDI X Sessions</td>
<td>-.24</td>
<td>-.04</td>
<td></td>
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</tr>
<tr>
<td>Attended</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 2 CDI</td>
<td>.51</td>
<td>-.37</td>
<td>-.31</td>
<td></td>
</tr>
</tbody>
</table>
Table 9

**Hypothesis 2a: Results of Regression Analyses**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>B</th>
<th>t</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CDI</td>
<td>.256</td>
<td>.215</td>
<td>.256</td>
<td>6.20</td>
<td>.02</td>
<td>.506</td>
<td>2.49</td>
<td>.02</td>
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<tr>
<td>Sessions Attended</td>
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<td>.279</td>
<td>.099</td>
<td>2.60</td>
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<td>.472</td>
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<td></td>
<td></td>
<td>-.316</td>
<td>-1.61</td>
<td>.13</td>
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<tr>
<td>Intake CDI X Sessions</td>
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<td>.016</td>
<td>.397</td>
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<td></td>
<td>-.129</td>
<td>-.63</td>
<td>.54</td>
</tr>
</tbody>
</table>

Hypothesis 2b stated that the number of sessions attended would have a positive moderating effect on the relationship between intake Piers-Harris Self-concept total scale scores and time 2 Piers-Harris Self-concept total scale scores. This hypothesis revealed moderate to high bivariate correlations with the outcome variable for each of the predictor variables (Table 10; intake PH, $r = .34$; number of sessions, $r = .50$; product term, $r = -.65$). The number of sessions attended highly correlated with the product term ($r = -.59$). Despite the non-significance shown by the $p$-value, a large effect was found in the predicted direction; thus, the number of sessions attended was found to moderate the relationship between intake PH scores and time 2 PH scores (Table 11; $R^2 = .136$, $R^2_{adj} = .433$, $F(1,13) = 3.85$, $p = .07$). This was confirmed by examination of the graphic representation of the standardized residuals (See Appendix H).
### Table 10

**Hypothesis 2b: Correlation Matrix**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake PH</th>
<th>Number of Sessions</th>
<th>Intake PH X Sessions Attended</th>
<th>Time 2 PH</th>
</tr>
</thead>
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<tr>
<td>Intake PH</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Sessions</td>
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<td></td>
</tr>
<tr>
<td>Intake PH X Sessions Attended</td>
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<tr>
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<td>-.65</td>
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</table>

### Table 11

**Hypothesis 2b: Results of Regression Analyses**

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>$B$</th>
<th>$t$</th>
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</thead>
<tbody>
<tr>
<td>Intake PH Scale</td>
<td>.117</td>
<td>.058</td>
<td>.117</td>
<td>1.98</td>
<td>.18</td>
<td>.342</td>
<td>1.41</td>
<td>.18</td>
</tr>
<tr>
<td>Sessions Attended</td>
<td>.403</td>
<td>.318</td>
<td>.287</td>
<td>6.73</td>
<td>.02</td>
<td>.400</td>
<td>1.93</td>
<td>.08</td>
</tr>
<tr>
<td>Intake PH X Sessions Attended</td>
<td>.540</td>
<td>.433</td>
<td>.136</td>
<td>3.85</td>
<td>.07</td>
<td>.324</td>
<td>1.68</td>
<td>.12</td>
</tr>
<tr>
<td>Time 2 PH</td>
<td>.255</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.255</td>
<td>1.07</td>
<td>.30</td>
</tr>
</tbody>
</table>

Intake PH Scale $R^2$ Change and $F$ Change results are shown with $p$ values.
Hypothesis 2c stated that participation in the counseling component would have a negative moderating effect on the relationship between intake CBCL Social Problems scale scores and time 2 CBCL Social Problems scale scores. The intake CBCL Social scale scores and the number of sessions attended showed a high and a moderate bivariate correlation with the outcome variable (Table 12; $r = .84$ and .22, respectively). Intake CBCL Social scale scores and the number of sessions attended also moderately correlated with the product term ($r = -.38$ and -.32, respectively). A statistically significant interaction effect and a large effect size was found for the number of sessions attended and the intake Social scale scores on the CBCL, accounting for 19% more than intake CBCL Social scale scores alone in predicting time 2 CBCL Social scale scores (Table 13; $R^2 = .115$, $R^2_{adj} = .850$, $F(1,8) = 8.5, p = .02$). However, further examination of this regression reveals questionable results. Specifically, one of the standardized regression coefficients ($\beta$) has a value greater than zero, and, as noted previously, the correlation between intake and time 2 CBCL Social scale scores is extremely high. Additionally, examination of a graphic representation of the standardized residuals (Appendix H) does not support the validity of this interaction term.
Table 12

**Hypothesis 2c: Correlation Matrix**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake CBCL Social Scale</th>
<th>Number of Sessions</th>
<th>Intake CBCL Social Scale X Sessions Attended</th>
<th>Time 2 CBCL Social Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Social Scale</td>
<td>_</td>
<td>- .07</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Number of Sessions</td>
<td>- .07</td>
<td>_</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Intake CBCL Social Scale X Sessions Attended</td>
<td>- .38</td>
<td>- .32</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Time 2 CBCL Social Scale</td>
<td>.84</td>
<td>.22</td>
<td>- .13</td>
<td>_</td>
</tr>
</tbody>
</table>
Table 13

_Hypothesis 2c: Results of Regression Analyses_

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>$\text{Adjusted } R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>$B$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Social Scale</td>
<td>.697</td>
<td>.666</td>
<td>.697</td>
<td>22.97</td>
<td>.001</td>
<td>.835</td>
<td>4.79</td>
<td>.001</td>
</tr>
<tr>
<td>Sessions Attended</td>
<td>.776</td>
<td>.726</td>
<td>.079</td>
<td>3.18</td>
<td>.11</td>
<td>.854</td>
<td>5.40</td>
<td>.0001</td>
</tr>
<tr>
<td>Intake CBCL Social Scale</td>
<td>.891</td>
<td>.850</td>
<td>.115</td>
<td>8.46</td>
<td>.02</td>
<td>1.02</td>
<td>7.85</td>
<td>.0001</td>
</tr>
<tr>
<td>X Sessions Attended</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.421</td>
<td>3.34</td>
<td>.01</td>
</tr>
</tbody>
</table>

Hypothesis 2d states that participation would have a negative moderating effect on the relationship between intake CBCL Externalizing scale scores and time 2 CBCL Externalizing scale scores. Table 14 shows the high bivariate correlations with the outcome variable for intake CBCL Externalizing scale scores ($r = .54$) and for the product term ($r = -.61$) for this hypothesis. The number of sessions attended and the intake CBCL Externalizing scale scores correlated with the product term (Table 14; $r = -.51$ and -.43, respectively). Although the $p$-value does not indicate significance, there is a large effect size in the predicted direction. Thus, the number of sessions attended was found to moderate the relationship between intake CBCL Externalizing scale scores and time 2 CBCL Externalizing scale scores (Table 15; $R^2 = .148$, $R^2_{adj} = .30$, $F(1,9) = 2.55$, $p = .15$).
This was additionally confirmed by examination of the graphic representation of the standardized residuals (See Appendix H).

Table 14

_Hypothesis 2d: Correlation Matrix_

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake CBCL Externalizing Scale</th>
<th>Number of Sessions</th>
<th>Intake CBCL Externalizing Scale X Sessions Attended</th>
<th>Time 2 CBCL Externalizing Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Externalizing Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Sessions</td>
<td>-.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake CBCL Externalizing Scale X</td>
<td></td>
<td>-.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessions Attended</td>
<td></td>
<td></td>
<td>-.51</td>
<td></td>
</tr>
<tr>
<td>Time 2 CBCL Externalizing Scale</td>
<td>.54</td>
<td>.09</td>
<td>-.61</td>
<td></td>
</tr>
</tbody>
</table>
Table 15

**Hypothesis 2d: Results of Regression Analyses**

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intake CBCL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Externalizing Scale</strong></td>
<td>.292</td>
<td>.228</td>
<td>.292</td>
<td>4.55</td>
<td>.06</td>
<td>.541</td>
<td>2.13</td>
<td>.06</td>
</tr>
<tr>
<td><strong>Sesssions Attended</strong></td>
<td>.329</td>
<td>.195</td>
<td>.037</td>
<td>.54</td>
<td>.48</td>
<td>.576</td>
<td>2.19</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intake CBCL</strong></td>
<td>.477</td>
<td>.302</td>
<td>.148</td>
<td>2.55</td>
<td>.15</td>
<td>.264</td>
<td>.84</td>
<td>.42</td>
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<tr>
<td><strong>Externalizing Scale X</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sessions Attended</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 2e stated that number of counseling sessions attended would have a negative moderating effect on the relationship between intake CBCL Internalizing scale scores and time 2 CBCL Internalizing scale scores. The predictor variables (intake CBCL Internalizing scale scores, number of sessions attended, and the product term) showed moderate to high bivariate correlations with the outcome variable (Table 16; $r = .58$, .31, and -.72, respectively). The product term had moderate correlations with intake CBCL Internalizing scale scores ($r = -.38$) and with number of sessions attended ($r = -.43$). Intake CBCL Internalizing scale scores also showed a moderate relationship with number of sessions attended ($r = -.23$). Table 17 illustrates that although the $p$-value suggests non-significance, a large effect size indicates that the number of sessions attended moderates the relationship between intake CBCL Internalizing scale scores and
time 2 CBCL Internalizing scale scores ($R^2 = .115$, $R^2_{adj} = .547$, $F(1,9) = 3.05$, $p = .12$).

This was also confirmed by examination of the graphic representation of the standardized residuals (See Appendix H).

---

**Table 16**

*Hypothesis 2e: Correlation Matrix*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake CBCL Internalizing Scale</th>
<th>Number of Sessions</th>
<th>Intake CBCL Internalizing Scale X Sessions Attended</th>
<th>Time 2 CBCL Internalizing Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Internalizing Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Sessions</td>
<td>-.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake CBCL Internalizing Scale X Sessions Attended</td>
<td>-.38</td>
<td>-.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 2 CBCL Internalizing Scale</td>
<td>.58</td>
<td>.31</td>
<td>-.72</td>
<td></td>
</tr>
</tbody>
</table>
Table 17

Hypothesis 2e: Results of Regression Analyses

<table>
<thead>
<tr>
<th>Predictors</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>( F ) Change</th>
<th>( p )</th>
<th>( \beta )</th>
<th>( t )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Internalizing Scale</td>
<td>.338</td>
<td>.278</td>
<td>.338</td>
<td>5.62</td>
<td>.04</td>
<td>.582</td>
<td>2.37</td>
</tr>
<tr>
<td>Sessions Attended</td>
<td>.546</td>
<td>.455</td>
<td>.207</td>
<td>4.56</td>
<td>.06</td>
<td>.691</td>
<td>3.15</td>
</tr>
<tr>
<td>Intake CBCL Internalizing Scale X Sessions Attended</td>
<td>.661</td>
<td>.547</td>
<td>.115</td>
<td>3.05</td>
<td>.12</td>
<td>.464</td>
<td>1.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.222</td>
<td>.91</td>
<td>.39</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>-.448</td>
<td>-1.75</td>
<td>.12</td>
</tr>
</tbody>
</table>

Hypothesis 2f stated that participation in the counseling sessions would predict a negative relationship between intake CBCL total scale scores and time 2 CBCL total scale scores. This hypothesis revealed moderate to high bivariate correlations between each of the predictor variables and the outcome variable (Table 18; intake CBCL Total scale scores, \( r = .52 \); number of sessions, \( r = .34 \); product term, \( r = -.77 \)). The predictor variables were also moderately associated with one another; the product term correlated with intake CBCL Total scale scores (\( r = -.49 \)) and with number of sessions attended (\( r = -.45 \)), and the number of sessions attended correlated with intake CBCL Total scale scores (\( r = -.20 \)). Although the \( p \)-value suggests non-significance, a large effect size indicates
that the number of sessions attended negatively moderates the relationship between intake CBCL Total scale scores and time 2 CBCL Total scale scores (Table 19; $R^2 = .153$, $R^2_{adj} = .505$, $F(1, 9) = 3.70, p = .09$). Additional support for this hypothesis was provided by examination of graphic representation of the standardized residuals (See Appendix H).

Table 18

*Hypothesis 2f: Correlation Matrix*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intake CBCL Total Scale</th>
<th>Number of Sessions</th>
<th>Intake CBCL Total Scale X Sessions Attended</th>
<th>Time 2 CBCL Total Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Total Scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Sessions</td>
<td>-.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake CBCL Total Scale X Sessions Attended</td>
<td>-.49</td>
<td>-.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 2 CBCL Total Scale</td>
<td>.52</td>
<td>.34</td>
<td>-.77</td>
<td></td>
</tr>
</tbody>
</table>
Table 19

Hypothesis 2f: Results of Regression Analyses

<table>
<thead>
<tr>
<th></th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>$F$ Change</th>
<th>$p$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake CBCL Total Scale</td>
<td>.268</td>
<td>.202</td>
<td>.268</td>
<td>4.03</td>
<td>.07</td>
<td>.518</td>
<td>2.01</td>
<td>.07</td>
</tr>
<tr>
<td>Sessions Attended</td>
<td>.476</td>
<td>.371</td>
<td>.208</td>
<td>3.96</td>
<td>.07</td>
<td>.612</td>
<td>2.62</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.466</td>
<td>1.99</td>
<td>.07</td>
</tr>
<tr>
<td>Intake CBCL Total Scale</td>
<td>.629</td>
<td>.505</td>
<td>.153</td>
<td>3.70</td>
<td>.09</td>
<td>.258</td>
<td>.93</td>
<td>.38</td>
</tr>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.131</td>
<td>.49</td>
<td>.64</td>
</tr>
<tr>
<td>Sessions Attended</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.585</td>
<td>-1.92</td>
<td>.09</td>
</tr>
</tbody>
</table>
Supplemental Analyses

In addition to the hypotheses addressed in this study, several other aspects of the Growing Fit Program were investigated. The standard classification for obesity (i.e., BMI between 25 and 29.9 are overweight; BMI of 30 or more are obese) was initially utilized in this study. According to BMI at intake, 7% were not overweight, 32% were overweight, and 61% were obese, and at time 2, 32% were overweight and 68% were obese.

However, the Centers for Disease Control and Prevention (CDC) posit that because children's body fatness changes over the years as they grow, and because girls and boys differ in their body fatness as they mature, BMI-for-age should be used to classify risk for obesity this population. BMI-for-age is a gender and age specific percentile, plotted on growth charts used for children and teens 2 – 20 years of age. Using this classification, 97% of participants' BMI was greater than the 95th percentile for gender and age at intake. This classification remained unchanged for all children at time 2.

Two children out of a total of 27 respondents scored within the clinical range on the CDI at intake, as compared to zero out of 22 children at time 2. On the PH, 5 children's scores fell within the clinical range out of 23 respondents; at time 2, only one child's score was in this range out of 22 respondents. On the CBCL total scale scores, four out of 18 parents at intake, and four out of 21 parents at time 2 rated their children's behavior in the clinical range.

The findings from further investigation into the mean differences in BMI and psychosocial scores from time 1 to time 2 are presented in Appendix I, which displays the
results of paired $t$-tests for each variable. The change in mean BMIs is significant ($t = 2.11, df = 30, p < .006$); although the BMIs increased over time. The difference between time 1 and time 2 mean scores for the CBCL Social Problems scale scores was significant ($t = -2.43, df = 11, p < .033$) and indicate a decrease in social problems. CDI and PH mean scores show an improvement in both depression and self-concept over time ($t = 2.11, df = 19, p < .048; t = -1.66, df = 16, p = .116$, respectively).

Additional information regarding the program was assessed through the use of the Parent Outcome Questionnaire and the Child Outcome Questionnaire. As stated previously, both Likert-type scales and open-ended questions were used to assess satisfaction with the program in parents and children. Appendix J shows the descriptive statistics for each of the questions asked on the forms, organized by area of improvement within the components of the Growing Fit Program, as well as for the overall program itself. Responses ranged from (1) strongly disagree to (6) strongly agree for each question. The mean responses reflect the perceived efficacy of the Growing Fit Program. For both parents and children, the means range from 3.7 (slightly agree) to 5.1 (somewhat agree). Further, 74% of both children and parents reported they would recommend Growing Fit to a friend. Additionally, 81% of children and 78% of parents reported they were happy they participated in the Program (See Appendix K for boxplots).

Examination of the open-ended questions revealed that the majority of children who responded enjoyed the exercise portion of the program. Others stated they enjoyed the activities and the games, the support group, and the nutrition classes. The majority of parents stated that they most benefited from the whole family getting involved in exercise.
Some children reported that they disliked the nutrition classes, and other children who were disruptive. Some participants reported a desire to use more of the equipment in the gym or exercise more often than the program allowed. Suggestions from the children include more games and more activities in the nutrition classes. Some parents expressed difficulties with transportation related to the time of the classes, the distance from their home, and problems with their vehicles. Some suggestions from the parents include more support for parents, a portion that involves the entire family, and carpool networking.
Discussion

As the most common health problem facing children today, obesity is an increasingly prevalent and serious problem. In fact, it has reached epidemic proportions with 31% of U.S. children and adolescents classified as overweight and 16% as obese. Research has shown that not only has pediatric obesity become more prevalent over the past decades, but obese children are becoming even more obese.

Few intervention programs exist for children, and challenges are present among programs that do exist. Thus, evaluation of current intervention programs is critical to the reduction and prevention of childhood obesity. Therefore, the current study sought to evaluate the outcomes for children who have attended the Growing Fit Program at Loma Linda University.

Hypothesis 1 proposed that while controlling for BMI at intake, the BMI at time 2 will be accounted for by number of months of participation in the program, number of months since last participation, and psychosocial scores at time 2 (PH, CBCL, and CDI). Due to the nature of the data and the small sample size, Hypothesis 1 was broken down into five separate analyses.

While controlling for BMI at intake, the BMI at time 2 was not accounted for by number of months of participation in the program. This does not support research that has shown that the length of treatment is positively related to weight loss for obese youth and adults (Brownell & Wadden, 1992; Epstein, Myers, Raynor, & Saelens, 1998). This discrepancy may be related to the range of months of participation in this study (from 1 month to 37 months), with the majority of children (55%) participating for less than four months. Previous research suggests that extending treatment to approximately 25 weeks
appears helpful in continuing weight loss in adults (Brownell & Wadden), which was not achieved in this study. Children who participated for more than 25 weeks in this study were no different in terms of weight loss than those who were involved in the program for a shorter duration of time.

The number of months since participation in the Growing Fit Program, while controlling for intake BMI, accounted for BMI at time 2. This finding may support previous research done with adults, which states that behavioral approaches to weight loss often achieve only short-term success. The current study supports the finding that the majority of patients return to their pre-treatment weight within 3 years (Cooper & Fairburn, 2001).

Time 2 psychosocial variables (i.e., depression, self-concept, behavior) were also not shown to account for time 2 BMI. However, several unexpected problems may have contributed to the results which do not support Hypothesis 1. For instance, the association between the BMIs at intake and at time 2 was stronger than expected. This finding does support previous literature which has shown a strong correlation between obesity in childhood and obesity in adulthood. For instance, Lloyd, Wolff, and Whelan (1961) assert that approximately 80% of obese adolescents will become obese adults. The relationship between intake BMIs and BMIs at time 2, however, left very little variance to be accounted for by the time 2 psychosocial variables or the months of participation in Growing Fit.

Hypothesis 2 proposed that the number of sessions of participation in the counseling component would moderate the relationship between psychosocial scores from time 1 (Intake) and time 2 (Time of this study). This hypothesis, for the most part,
was supported in this study. Specifically, the relationship between depression scores at time 1 and time 2 was shown to be dependent on the number of counseling sessions attended. Further, the association between self-concept scores from intake to time 2 was better accounted for with information regarding the number of counseling sessions attended. Depression and self-concept scores tended to improve with increased attendance in the counseling component.

In terms of behavioral concerns, as measured by the CBCL, the number of counseling sessions attended demonstrated a general trend of moderating the relationship between time 1 and time 2 externalizing behaviors, internalizing behaviors, and total behaviors. Behavior scores tended to improve with increased attendance in the counseling component. The relationship between the social problems at intake and time 2 was also affected by the number of counseling sessions attended; however, various statistical peculiarities indicated questionable reliability of this result. Previous literature shows that 29% of obese children entering treatment were found to meet or exceed clinical levels for psychological problems on the CBCL, with the most significant elevations on the Social Problem Scales (Epstein, Klein, & Wisniewski, 1994). Thus, it would not be surprising to find increased participation in a supportive social group, such as Growing Fit, to be related to improvement in the area of behavioral and social problems.

Post-hoc analyses do indicate a decrease in social problems, along with an improvement in both depression and self-concept over time in the program. Since many of the children included in this study were recent graduates of the program, or were currently participating in the program, this finding supports the previously cited literature
stating that the most improvement in functioning will occur closer to the time of the intervention.

Post-hoc analyses also revealed that the majority of parents and children were satisfied with their experience in Growing Fit. Additionally, most children reported enjoying the exercise portion of the program, along with the activities and the games. This is encouraging in light of previous research which shows that lifestyle behaviors (i.e., eating and exercising patterns) acquired during childhood and adolescence continues into adulthood (Dietz & Gortmaker, 1985).

The majority of parents stated that they most benefited from the whole family getting involved in exercise. In a review of the literature, Zametkin, Zoon, and Klein (2004), found the most effective treatments for child and adolescent obesity include substantial parental intervention. Additionally, in a family-based behavioral intervention for obesity, children with parents who had the greatest BMI change lost the most weight themselves (Wrotniak, Epstein, Paluch, & Roemmich, 2004).

**Implications**

This study provided valuable information regarding the effectiveness and the perceived efficacy of the Growing Fit Program. For instance, participation in the program appears to improve depression and self-concept in some of the children; a finding with which the participants and their parents agree. Additionally, the parents and children enjoy many aspects of the program, and most would recommend this program to others. This may be a result of a reduction in behavioral problems over the course of the program.
Another significant finding of this study was that children are having difficulty continuing and maintaining their weight loss and healthy behaviors as more time elapses from the time of their participation in Growing Fit. This finding, along with suggestions for improvement made by the parents and children, has potential implications for modifications of the program. For instance, many parents reported an appreciation for involving the entire family in the activities, which may have a greater impact on the maintenance of the acquired healthy behaviors of the participants.

Some children reported that the access to the gym during hours outside of the clinic's operating hours would be beneficial in achieving and maintaining their weight loss goals. Providing a list of local resources where children can increase their physical activity level may assist the parents in supplementing the activities of the program, even beyond the duration of Growing Fit. Additionally, emphasizing the importance of maintenance and addressing potential barriers to maintaining newly acquired behaviors may be necessary in each of the components of the program.

**Limitations**

It is important to note several methodological inadequacies in the design of the current study. The difficulty in contacting children who had previously participated in Growing Fit reduced the sample size, thus limiting statistical power of the analyses. Additionally, several of the participants of this study were recent graduates of the program, thus impacting the results. Various threats to validity reduce the reliability of the findings, as well as the generalizability of the results, such as using a correlational and longitudinal design, using self-report measures, and collecting some of the data in participants' homes versus in the clinic. Also, the measures utilized in this study,
especially BMI may be challenged on the grounds that additional measures, such as percentage of body fat, or skin-fold thickness, should have been included.

**Future Research**

The importance of determining whether there are positive and lasting outcomes for children who are currently participating or who have previously attended the Growing Fit Program guided this research. This study had several limitations addressed previously; thus further research is warranted. For instance, growth curve analyses may provide more accurate information regarding the change in BMI or psychosocial variables over time, while taking into account the amount of participation in the program for each individual. Measuring the percentile change in BMI may also capture additional information regarding weight loss in growing children.

Motivation and readiness for change, in both the children and parents, may affect participation in a pediatric obesity program. This aspect would add to the effectiveness of obesity interventions for children by tailoring the intervention to the stage of change of the individual participants. Further research is needed in the area of family interventions, as suggested by Wrottiak, Epstein, Paluch, and Roemmich (2004).

In conclusion, some of the hypotheses were supported in this study. While controlling for BMI at intake, the BMI at time 2 was accounted for by the number of months since participation in the program, but not by the number of months of participation in the program, nor by time 2 psychosocial variables (i.e., depression, self-concept, behavior). Time 2 BMI increased as more time elapsed since participation in the program. The number of sessions of participation in the counseling component was shown to moderate the relationship between psychosocial scores from time 1 and time 2,
with questionable results regarding the relationship of the social problems scores.

Overall, psychosocial scores tended to improve from time 1 to time 2 when children attended more counseling sessions.

Additionally, valuable information regarding the effectiveness and the perceived efficacy of the Growing Fit Program was obtained through post-hoc analyses. Participation in the program appears to improve depression, self-concept, and social problems in some children. Another significant finding of this study was that children are having difficulty continuing and maintaining their weight loss and healthy behaviors as more time elapses from the time of their participation in Growing Fit. Some implications of these findings include the possible inclusion of the entire family in the program, mentoring of new participants by children who have graduated from the program, or “booster” sessions for children who would come for maintenance for a 12 week program each year to keep them on track. These suggestions may contribute to a greater, lasting impact on the acquired healthy behaviors of the participants. Overall, it is hoped that the findings of this study illuminated potential modifications to ensure the on-going success of the Growing Fit Program and to assist in promoting this program as a model program for the critical circumstances facing obese children today.
References


Telephone Script

Appendix A
Hello, my name is __________, and I am calling from Loma Linda University’s Growing Fit Program. We are doing a study to find out how well the program is working, and I am calling you because your child has participated in Growing Fit in the past. I would like set up an appointment so that both you and your child will be able to provide us with feedback about the program. Also, during this appointment, I will be asking you and your child to fill out a few questionnaires; the same ones you completed during your first appointment at Growing Fit. I will also be asking your son/daughter to complete a short exercise task; again similar to the one done at their first appointment. It will take about an hour. We can set up a time that is convenient for you to come here, to Loma Linda University, or I can come to your home. Whatever works better for you and your child. I do want you to be aware that your participation is completely voluntary, and that whether or not you decide to participate will not affect your relationship with Growing Fit in any way. I also would like to remind you that your responses to the questionnaires will be kept confidential. Lastly, as a way of expressing our thanks for your participation in this study, your child will be given a ten dollar gift certificate to Toys R US at the end of the appointment. Would you be interested in providing us feedback in this manner? (If yes: Let’s set up an appointment time). Thank you very much for your time.
Appendix B

Consent Form: Parent or Guardian
Pediatric Obesity: Intervention Outcomes

INFORMED CONSENT

We would like to invite you and your son/daughter to participate in a research study entitled: "Pediatric Obesity: Intervention Outcomes." This study is being conducted by Loma Linda University and the Growing Fit Program.

Purpose
The purpose of this study is to evaluate the effects of participating in the Growing Fit Program. It is very important to determine how our clients feel about the various components of this program and how this may affect a child's weight status and self-esteem. The information gained from this study will be used in order to revise and make Growing Fit a more successful program for children with weight problems. We will also use this information to talk to or train other professionals who may want to work with children who have weight problems.

Procedure
With your consent, your son/daughter will answer questions about himself/herself, and complete a brief fitness exam, that includes a three-minute step exercise and heart rate/weight measurements. Also, you will be given some questionnaires to complete regarding your child. Participation for your child will take about 1 hour. This procedure is much like your first visit to Growing Fit. Also, as an appreciation for participating in this study, you will be given a $10.00 gift certificate to ToysRUs for your child, whether or not you fully complete the study.

Risks
The types of questions you and your son or daughter will be asked are personal and sometimes they can make people feel some discomfort. However, both you and/or your child may stop at any time or not answer questions that you find too personal. Any information you or your child provides on the questionnaires will remain confidential.

Benefits
While it is unlikely that your child will directly benefit personally from this study, the results will help improve the programs at the Growing Fit clinic for all future participants.

Page 1 of 2 ____________ please initial
Participants’ Rights
You and/or your son/daughter are free to withdraw from the study at any time. Participation is completely voluntary and will not affect your family’s relationship with the Growing Fit Program.

Confidentiality
All information from this study about your child or yourself will be kept strictly confidential, and any report of the study will not personally identify you or your child. All information disclosed may not be revealed to anyone outside the Growing Fit staff. The only exceptions are when disclosure is required or permitted by law. Those situations typically involve substantial risk of physical harm to oneself or to others, or suspected abuse of children.

Impartial Third Party Contact
If you wish to contact an impartial third party not associated with this study regarding any complaint you may have about the study, you may contact the Office of Patient Relations, Loma Linda University Medical Center, Loma Linda, CA 92354, (909) 558-4647, for information and assistance.

Informed Consent
Please read the following and sign below to consent to yourself and your child’s participation in this study:

“I have read the contents of the consent form. My questions have been answered to my satisfaction. I hereby consent to participation in this study. I also give voluntary consent for my son/daughter to participate in this study. Signing this consent document does not waive my rights nor does it release the investigators or institution from their responsibilities. I may call Dr. Kiti Freier at (909) 558-8725 if I have any additional questions or concerns. I have been given a copy of this consent form.”

__________________________   ______________________
Signature of Parent or Guardian   Date

__________________________
Name of Child

__________________________   ______________________
Signature of Child (If 12 years old or older)   Date

Page 2 of 2 please initial
Appendix C

Authorization for Use of Private Health Information
INSTITUTIONAL REVIEW BOARD

Authorization for Use of Private Health Information

Per 45 CFR §164.508(b)

OFFICE OF SPONSORED RESEARCH
Loma Linda University • 11188 Anderson Street • Loma Linda, CA 92350
(909) 558-4531 (voice) / (909) 558-0131 (fax)

TITLE OF STUDY: Pediatric Obesity: Intervention Outcomes

PRINCIPAL INVESTIGATOR: Kiti Freier, PhD

Others who will use, collect, or share PHI: Kristy Kuehfuss, and LLU Growing Fit clinic staff

This study uses personal information relating to your health in order to invite you to participate. Medical information. Therefore, by signing this form, you specifically authorize your medical information to be used or shared as described below.

The following personal information, considered "Protected Health Information" (PHI) is needed to conduct this study and may include, but is not limited to: Name, date of birth, medical records, and charts, including the results of all tests and procedures performed.

Only Dr. Freier and Kristy Kuehfuss will use or share this PHI in the course of this study to the Institutional Review Board (IRB) of Loma Linda University. The main reason for sharing this information is to be able to conduct the study as described earlier in the consent form. In addition, it is shared to ensure that the study meets legal, institutional, and accreditation standards.

All reasonable efforts will be used to protect the confidentiality of your PHI, which may be shared with others to support this study, to carry out their responsibilities, to conduct public health reporting and to comply with the law as applicable. Those who receive the PHI may share with others if they are required by law, and they may share it with others who may not need to follow the federal privacy rule.

No new information that this study may produce about your health will be included in your medical record. This authorization does not expire, and will continue indefinitely unless you notify the researchers that you wish to revoke it.

You may change your mind about this authorization at any time. If this happens, you must withdraw your permission in writing. Beginning on the date you withdraw your permission, no new personal health information will be used for this study. However, study personnel may continue to use the health information that was provided before you withdrew your permission. If you sign this form and enter the study, but later change your mind and withdraw your permission, you will be removed from the study at that time. To withdraw your permission, please contact the Principal Investigator or study personnel at 909-558-8725.

You may refuse to sign this authorization. Refusing to sign will not affect the present or future care you receive at this institution and will not cause any penalty or loss of benefits to which you are entitled. However, if you do not sign this authorization form, you will not be able to take part in the study for which you are being considered.

I agree that my personal health information may be used for the study purposes described in this form.

Signature of Patient or Patient’s Legal Representative

Date

Printed Name of Legal Representative (if any)

Representative’s Authority to Act for Patient

Signature of Person Obtaining Authorization

Date
Child Assent Form

Appendix D
Pediatric Obesity: Intervention Outcomes

CHILD ASSENT FORM
(Ages 8-11)

You are invited to help in a study about how it was for you to be in the Growing Fit Program. To do this, you will be asked questions about yourself, you will be weighed, and you will do a short exercise. This will be very much like your first visit was at Growing Fit.

The types of questions you will be asked are personal. For example, you will be asked if you like yourself and if you have trouble making friends. You may stop or skip a question if it makes you feel too sad or uncomfortable.

Whether or not you help with this study will not change your relationship with the Growing Fit Program.

Your parents will not know the answers you give. All answers you give will be private. If we tell others about our results, no one will be told the answers you gave.

Your answers may not be given to anyone outside the Growing Fit staff, except when the law requires it. This would happen if we are concerned that you may harm yourself or someone is harming you. Please know that you have a choice whether or not you want to be part of this study.

If you have read this form, agree to help with this study, and have had all of your questions answered by one of the assistants, please sign your name at the bottom. Thank you for your help.

__________________________  _______________________
Signature                  Date
Appendix E

Demographic Form
(Demographic Form)

Your answers to the following questions will help us to continue to provide quality services through the Growing Fit Program. Thank you.

GENERAL INFORMATION

1) Your relationship to the child participating in the Growing Fit Program:
   _____________________________________________

2) Your age: _______

3) Number of children living in your home: _______
   Ages: ____________________________________

4) Please indicate your cultural or ethnic identity: ____________________________________________

5) Please indicate your religious affiliation: _________________________________________________

6) What is your current marital status? (Check one.)
   Married                      Living with significant other
   Single                      Separated or divorced

7) Your current occupation: _____________________________________________________________
   a) Number of hours worked per week_______

8) Spouse/partner’s current occupation: _________________________________________________
   a) Number of hours worked per week_______

9) Length of time your child has participated in Growing Fit: ____________ Weeks

10) When was the last time your child participated in Growing Fit: ____________ (Date)
Appendix F

Parent Outcome Questionnaire
**Parent Form:**
*Your answers to the following questions will help us to continue to provide quality services through the Growing Fit Program. Thank you.*

**QUESTIONS ABOUT GROWING FIT**

*Please respond to each of the following statements by circling the number that most closely corresponds to what you believe to be most accurate, on a scale ranging from (1) strongly disagree to (6) strongly agree.*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  My child’s health has improved through participation in Growing Fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2.  My child views his/her own body more positively through participation in Growing Fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3.  The exercise program helped my child see that physical activity can be fun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4.  My child feels better about himself/herself through participation in Growing Fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5.  Growing Fit helped my child to reach their weight loss goals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6.  The counseling program helped my child feel good about him/herself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7.  Growing Fit was successful in helping my child eat healthier.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8.  The exercise component taught my child the importance of being active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9.  The nutrition program helped my child eat healthier.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
### 10. The support group helped my child become motivated to reach their goals.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### 11. Growing Fit was successful in helping my child become more active.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### 12. Growing Fit was successful in helping my child be more accepting of him/herself.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### 13. The nutrition classes showed my child how to make healthy food choices.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### 14. I would recommend the Growing Fit Program to a friend.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

### 15. I was happy with my child’s experience with Growing Fit.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Please note any suggestions or comments you have regarding the Growing Fit Program.
Appendix G

Child Outcome Questionnaire
Child Form:

What you think about the Growing Fit Program is important to us. Your answers to the following questions will help us to make the Growing Fit clinic a better program. Thank you.

QUESTIONS ABOUT GROWING FIT

After reading each statement, please circle the number that most closely matches with what you believe to be most true, on a scale ranging from (1) strongly disagree to (6) strongly agree.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My health has gotten better through being a part of Growing Fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Growing Fit has helped me to feel better about my body.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>The exercise program helped me see that physical activity can be fun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>I feel better about myself through being a part of Growing Fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>Growing Fit helped me to reach my goal of losing weight.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>The counseling part of Growing Fit helped me to feel good about myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7.</td>
<td>I eat healthier foods because of being a part of Growing Fit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>The exercise part of Growing Fit taught me how important it is to be active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9.</td>
<td>The nutrition part of Growing Fit helped me learn to eat healthier.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
10. The support group encouraged me to reach my Growing Fit goals.

11. Growing Fit was able to help me become more active.

12. Growing Fit helped me to like myself better.

13. The nutrition classes showed me how to make healthy food choices.

14. I would recommend the Growing Fit program to a friend.

15. I am happy I was a part of Growing Fit.

Please tell us what you liked and what you didn’t like about Growing Fit.

What would make Growing Fit better?
Appendix H

Plots of Standardized Residuals for Hypothesis 2
Number of times attended GF counseling

Number of times attended GF counseling
Number of times attended GF counseling
Appendix I

Mean Differences from Time 1 to Time 2 in Psychosocial Variables and BMI
Mean Differences from Time 1 to Time 2 in Psychosocial Variables and BMI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time 1</th>
<th>Time 2</th>
<th>$t_{corr}$</th>
<th>df</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>48.1 (8.8)</td>
<td>44.20 (7.8)</td>
<td>2.11</td>
<td>19</td>
<td>.048</td>
</tr>
<tr>
<td>Self-Concept</td>
<td>52.1 (11.7)</td>
<td>56.9 (9.1)</td>
<td>-1.66</td>
<td>16</td>
<td>.116</td>
</tr>
<tr>
<td>Behavior</td>
<td>56.1 (9.0)</td>
<td>57.8 (10.1)</td>
<td>-0.65</td>
<td>12</td>
<td>.529</td>
</tr>
<tr>
<td>Internalizing Behavior</td>
<td>55.8 (10.4)</td>
<td>58.3 (10.6)</td>
<td>-0.95</td>
<td>12</td>
<td>.360</td>
</tr>
<tr>
<td>Externalizing Behavior</td>
<td>54.7 (8.9)</td>
<td>54.5 (8.8)</td>
<td>0.07</td>
<td>12</td>
<td>.949</td>
</tr>
<tr>
<td>Social Problems</td>
<td>36.3 (7.7)</td>
<td>39.8 (8.8)</td>
<td>-2.43</td>
<td>11</td>
<td>.033</td>
</tr>
<tr>
<td>BMI</td>
<td>31.5 (4.6)</td>
<td>32.9 (5.0)</td>
<td>-2.96</td>
<td>30</td>
<td>.006</td>
</tr>
</tbody>
</table>
Appendix J

Parent and Child Perceptions of Effectiveness of Growing Fit and its Components
**Parent and Child Perceptions of Effectiveness of Growing Fit and its Components**

<table>
<thead>
<tr>
<th>Growing Fit Program Component</th>
<th>Child</th>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area of Child’s Improvement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Program:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>4.7 (1.3)</td>
<td>4.5 (1.8)</td>
</tr>
<tr>
<td>Body image</td>
<td>4.6 (1.6)</td>
<td>4.4 (1.7)</td>
</tr>
<tr>
<td>Self esteem</td>
<td>4.4 (1.5)</td>
<td>4.4 (1.6)</td>
</tr>
<tr>
<td>Self acceptance</td>
<td>4.7 (1.5)</td>
<td>4.5 (1.5)</td>
</tr>
<tr>
<td>Weight loss</td>
<td>4.3 (1.7)</td>
<td>3.7 (1.8)</td>
</tr>
<tr>
<td>Activity level</td>
<td>4.9 (1.4)</td>
<td>4.4 (1.7)</td>
</tr>
<tr>
<td>Healthier food choices</td>
<td>4.4 (1.5)</td>
<td>4.0 (1.6)</td>
</tr>
<tr>
<td><strong>Exercise Component:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoyment of exercise</td>
<td>5.1 (1.5)</td>
<td>4.8 (1.7)</td>
</tr>
<tr>
<td>Importance of exercise</td>
<td>4.9 (1.3)</td>
<td>4.7 (1.8)</td>
</tr>
<tr>
<td><strong>Nutrition Component:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthier eating habits</td>
<td>4.7 (1.5)</td>
<td>4.1 (1.7)</td>
</tr>
<tr>
<td>Healthier food choices</td>
<td>4.8 (1.5)</td>
<td>4.6 (1.6)</td>
</tr>
<tr>
<td><strong>Counseling Component:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self esteem</td>
<td>4.6 (1.4)</td>
<td>4.4 (1.5)</td>
</tr>
<tr>
<td>Motivation</td>
<td>4.6 (1.5)</td>
<td>4.4 (1.4)</td>
</tr>
</tbody>
</table>

*Note.* Scale ranges from (1) strongly disagree to (6) strongly agree with the statement regarding the area of improvement due to the component of inquiry.
Appendix K

Supplemental Analysis: Boxplots for Outcome Questionnaire Items
"I would recommend this program to a friend."

"I am happy I participated in Growing Fit."