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Psychological Distress and Change in a Pediatric Obesity Population

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Psychological Distress and Change in a Pediatric Obesity Population

by

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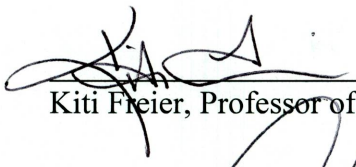
Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree Master of Arts. in Experimental Psychology.



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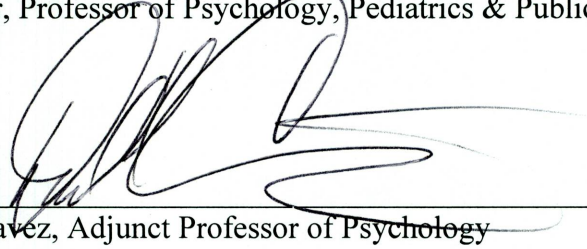

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CONTENTS

TABLES

ABSTRACT OF THE THESIS

Psychological Distress and Change in a Pediatric Obesity Population

by

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Master of Arts, Graduate Program in Experimental Psychology
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Pediatric overweight and obesity is a growing national epidemic with 15 percent of children ages 6-19 considered obese and at least 22 percent considered overweight. While there is considerable research pointing to contributing factors of obesity, there is a paucity of research which elucidates what contributes to successful intervention. Considering that by the year 2050, nearly 50 million Americans may be obese, understanding the factors delineating success of weight loss and prevention is a necessity. The purpose of this study was to utilize archival data from the LLU Growing Fit Program to evaluate the levels of psychological distress experienced by overweight and obese children in a weight management program serving a predominantly Hispanic population. Further this study examined the clinical utility of using a projective measurement for this purpose. This study also examined how distress and other psychological characteristics related to expressed readiness for change and actual physical changes over the course of intervention. Data from 334 children, with an average age of 11 were included. The hypotheses yielded insignificant results for the majority of the analyses, with the exception of a significant inverse relationship between physical self-concept and age, and between gender and self-reported depression. This study reflects that in the pediatric overweight population, younger children express more positive body image than do older

children, and females self-report a higher incidence of depression than do males. Further, this study indicates the need for future research in regards to body image and body esteem in this population.

Introduction

Obesity has become a rampant public health problem in the US, and the pediatric population has not been excluded in the epidemic. Recent estimates indicate 15 percent of children ages 6-19 are considered obese (National Institute of Environmental Health Sciences (NIEHS) Office of Management, 2007). In fact, because children who are obese are likely to remain obese into adulthood, by the year 2050, nearly 50 million Americans could be obese (Dietz, 1998; National Institute of Environmental Health Sciences (NIEHS) Office of Management, 2007). Researchers from many disciplines have been actively seeking any treatment or prevention method that can halt the alarming trend of continued increasing rates of the overweight population. Current treatment interventions include exercise and dieting programs, various support groups and therapy programs, nutrition education, and surgical procedures. However, there is a paucity of information describing successful treatment outcomes, and greater focus appears to be on surgical procedures due to last resort treatment. Consequently, there is a need to understand what factors contribute towards successful pediatric intervention programs and what motivates children to become successful in losing weight.

The first step towards understanding these factors is to better understand the problem. As such, the following literature review will include issues noted in pediatric obesity followed by information on 'Readiness for Change' as an important intervention construct, and lastly a review of psychological distress in relationship to pediatric obesity.

Obesity

Primarily, obesity results from higher energy intake without a concomitant increase in energy expenditure. There are several methods of measuring and determining obesity. Among options such as skinfold thickness, ultrasound, bioelectric impedance analysis, magnetic resonance imaging, and anthropomorphics, body mass index (BMI) has been established as an easy and reliable tool for determining overweight and obesity (Feld & Hyams, 2004). BMI is defined as weight in kilograms divided by height in meters squared. According to both the Centers for Disease Control and Prevention and the World Health Organization, for adults, a BMI of 25 or above is overweight and a BMI of 30 or over is obese (Lobstein, Baur, & Uauy, 2004; Centers for Disease Control and Prevention, 2004b). A BMI of 40 or greater is considered morbid obesity (Torpy, Lynn, & Glass, 2003). Additionally, BMI is more accurate when height and weight are measured by a trained person rather than when self-reported. With BMI, there is low observer error, low measurement error, and good reliability and validity. However, BMI may not be as sensitive in people who are exceptionally short, exceptionally tall, or have an unusual body fat distribution (Lobstein, Baur, & Uauy, 2004).

Pediatric Obesity

For children, BMI is also the most convenient method for assessing adiposity. BMI in this population varies with age and gender. It generally increases during the first months after birth, decreases after the first year, and increases again around age six. The increase in the sixth year is referred to as the "adiposity rebound." Children and adolescents between the 85th and the 95th percentiles based on BMI growth curve

reference charts are usually referred to as overweight. However, some researchers refer to above the 95th percentile as obese, while others use that term for children above the 85th percentile (Lobstein, Baur, & Uauy, 2004).

The trends and prevalence of child and adolescent overweight and obesity in the United States mirrors that of the adult population. Comprehensive data collected in the 1960s from the NHE I and II surveys and also the four NHANES surveys between 1971 and 2000, show that the combined prevalence of obesity and overweight among children and adolescents has more than doubled. The prevalence of obesity alone has increased fourfold (Lobstein, Baur, & Uauy, 2004). In the years from 1963-1970, approximately four percent of children age 6 to 11 were above the 85th percentile. Approximately five percent of adolescents age 12-19 were above the 85th percentile in these same years. In the year from 1999 to 2000, approximately 14 percent of both children and adolescents were above the 85th percentile (Feld & Hyams, 2004). More globally, surveys on North and South American children compiled past 1990 that utilize International Obesity Task Force Criteria for overweight and obesity revealed that approximately seven percent of boys in both the 5-9 and 13-17 year age groups are obese. Approximately 14 percent of boys ages 5-9 are overweight and approximately 26 percent are overweight from ages 13-17. For girls, about eight percent are considered obese in the 5-9 age range, and about six percent are considered obese in the 13-17 age range. Approximately 16 percent of girls are considered overweight in the 5-9 age range and about 28 percent are overweight from ages 13-17 (Lobstein, Baur, & Uauy, 2004).

The increasing incidence rates of children and adolescents who are overweight and obese becomes much more alarming when considering the fact that overweight

adolescents have a 70 percent chance of becoming overweight or obese adults (Torgan, 2002). Notably, in terms of long-term consequences to the population, according to the Centers for Disease Control and Prevention, poor diet and poor nutrition, both of which combine to form obesity, were the second most common preventable causes of death in the United States in 2000 (Centers for Disease Control and Prevention, 2004a). Therefore, this continuing rise in pediatric obesity will lead to an increased number of overweight and obese adults making this a vital consideration for the impact on the future and survival of the population of the United States.

Medical Consequences

Overweight and obesity is such a distressing problem because, as a medical disease, it has numerous consequences. Individuals who are overweight or obese are much more likely to have severe health problems than individuals with normal weight. Such medical complications include, but are not limited to, diabetes, high blood pressure, osteoarthritis, high total blood cholesterol, gastroesophageal reflux disease, back pain, and/or increased risk for heart disease (Torpy et al., 2003).

Most importantly, the pediatric population is not excluded from this laundry list of medical complications. In fact, recently it has been noted in the medical literature that several risk factors for diseases that are usually considered adult diseases are springing up in childhood. For example, the incidence of type 2 diabetes has substantially increased in the pediatric population over the past decade (Feld & Hyams, 2004). In fact, one estimate describes a ten-fold increase over a 12-year timeframe (Yale-New Haven, 2004). This rise in incidence of type 2 diabetes has paralleled the increased prevalence of childhood obesity. However, even these estimated incidence rates may be low because of

the lack of overt symptoms leading to diagnosis or the tendency to misclassify as type 1 diabetes (Feld & Hyams, 2004).

These figures are even more alarming when considering that long-term effects of early onset type 2 diabetes in children are unknown. In adults, complications associated with diabetes include increased risk of cardiovascular disease, end-stage renal disease, blindness, and vascular insufficiency of the lower extremities. Ten years after diagnosis, more than 20 percent of adult patients will have suffered a major cardiovascular event, about five percent will have developed blindness, and about two percent will have developed end-stage renal disease or had lower-extremity amputation. In fact, according to the American Diabetes Association, diabetes and its complications kill 193,000 Americans each year. Since the incidence of complications from diabetes increases with the duration of the illness and inadequate management, it is likely the children with type 2 diabetes may develop complications at a younger age. Further this may result in the expectancy to see more severe complications and attendant morbidity secondary to type 2 diabetes as it is suggested that these children may present with severe complications as they age past 30 years. Once again, these devastating consequences are detrimental for the individuals, their families, and the health care system (Feld & Hyams, 2004).

In addition to cardiovascular concerns being a complication of diabetes, cardiovascular risk factors such as hypertension is becoming another problem associated with childhood obesity. The American Heart Association has reclassified obesity as a major modifiable risk factor for coronary heart disease. Some studies have reported actual cardiovascular and organ injury in children. The Bogalusa Heart Study found that children with a BMI above the 85th percentile were more likely to have adverse levels of

total blood cholesterol, LDL, HDL, and triglycerides, and high blood pressure than normal weight children (Feld & Hyams, 2004).

Obesity is also a well-known risk factor for obstructive sleep apnea in adults. Obstructive sleep apnea can lead to severe cardiopulmonary as well as other medical problems. While obstructive sleep apnea is already a common condition in childhood, there is increasing evidence that it is a considerable problem in obese children. While further studies are needed, it is likely that the degree of obesity is directly correlated with symptoms in children. Secondary factors to obstructive sleep apnea, such as somnolence and fatigue, irritability and attention problems, further contribute to obesity itself by impairing physical activity and creating an unfortunate positive feedback loop (Feld & Hyams, 2004).

A smorgasbord of orthopedic concerns is also evident in the obese child. For example, Blount disease, which leads to bowing of the legs, and slipped capital femoral epiphysis are not uncommon. About two-thirds of children with Blount disease are obese and approximately 50-70 percent of children with slipped capital femoral epiphysis are obese. As with obstructive sleep apnea, orthopedic concerns limit physical activity and consequently promote obesity (Feld & Hyams, 2004).

A gastrointestinal complication known as non-alcoholic fatty liver disease is found in 60-70 percent of obese adults. In this population, this disease is a common cause of liver fibrosis or cirrhosis. While the prevalence of non-alcoholic fatty liver disease is not known for obese children, some reports indicate up to 25 percent of obese adolescents present warning signs (Feld & Hyams, 2004).

Lastly, while the impact of obesity on mortality from cancer is unknown, associations between adiposity and increased risk have been widely reported. In adults who have BMIs greater than 40, there is a death rate from all cancers that is 52 percent higher for males and 62 percent higher for females when compared to normal weight individuals. Once again, while no prevalence statistics are known for obese children, the possibility for cancer at a young age in this population is a plausible threat (Feld & Hyams, 2004).

However, while causal statements cannot be made about obesity and all medical complications, nevertheless, the assertion can be made that each of these medical complications has an increased likelihood of onset in the adult and pediatric overweight and obese populations. These other medical complications may develop via the same pathways by which overweight and obesity develop.

Etiologies of Obesity

Overweight and obesity develop in both children and adults in a predictable course. There are three consistent factors that contribute to the odds of becoming overweight and obese. These three factors are genetics, nutrition, and exercise.

There is clear evidence that certain genes are associated with obesity phenotypes. In fact, over 250 obesity-associated genes have been identified. However, there is no magic gene that explains obesity in all people. Nevertheless, there is a 75 percent chance that children will be overweight if both parents are obese and there is a 25-50 percent chance if just one parent is obese. It is generally estimated that 50-70 percent of a person's BMI and degree of adiposity is determined by genetic influences (Feld & Hyams, 2004).

Genetic makeup influences individual hormone levels that also play a role in the chances of becoming overweight or obese. Hormone levels are the main players in the mechanisms of appetite and energy balance. The Agouti-related protein and Neuropeptide Y neurons lead to stimulation of appetite and reduction of metabolism via antagonism of the alpha melanocyte-stimulating hormone. These appetite stimulating hormones are activated by signals such as ghrelin, which is secreted by the stomach, and inhibited by both leptin and Peptide YY, which originate from adipose tissue and the gastrointestinal tract, respectively. Appetite inhibition is mediated by Pro-opiomelanocortin and Cocaine-amphetamine-regulated transcript neurons. Pro-opiomelanocortin attaches to the alpha melanocyte-stimulating hormone and stimulates hormones in the hypothalamus that decrease appetite and inhibit energy storage. Insulin also plays a role in appetite suppression. After eating, insulin activates Pro-opiomelanocortin and Cocaine-amphetamine-regulated transcript neurons and inhibits the agouti-related protein and Neuropeptide Y. In recent years, researchers have highlighted the roles of leptin, Melanocortin 4 Receptor, and insulin in the development of obesity. Results have indicated that obese youth have elevated leptin levels, demonstrating leptin's relationship to fat mass and increasing adipocity. In another study, nearly six percent of children with severe childhood obesity had a mutation in the Melanocortin 4 Receptor. Lastly, research has shown that the peripheral effects of insulin play a large role in the development of obesity, as evidenced during phases of insulin resistance (Feld & Hyams, 2004).

Genetics are not the sole source of obesity. The prolific rise of obesity within the past several decades speaks to the existence of other very influential factors, because

genetic shifts themselves do not occur so quickly. These other very influential factors are nutrition and exercise (Feld & Hyams, 2004).

There are several reasons why current Western diets are so nutritionally poor and contribute to levels of obesity. Over the past 20 years, the United States has fostered a boom in fast and convenient food options. These options, be they fast food, pre-packaged food, or snacking items, have become very common in the Western diet. Many calories come from sweetened beverages or colas that have minimal, if any, nutritional content. In fact, children are taking in less calcium and vitamins and more refined sugars and saturated fats as compared to children in previous generations. Fiber intake has also decreased. The birth of low-fat food products in the 1980s and 1990s was an attempt to combat this burgeoning nutritional issue. However, while the intake of fat did decrease, there was an accompanying increase in calorie and carbohydrate intake. Unfortunately, high carbohydrate foods and sugar increase serum glucose levels, which exaggerate the hunger response, and can lead to overeating. Additionally, over these same years, the overall caloric intake has increased approximately 200 kilocalories per day. To put this change in perspective, an increase of 120 kilocalories per day, which is the amount in one can of soda, will produce a 50 kilogram increase in weight over 20 years. Research also indicates increased snacking on items that tend to be more energy dense and take the place of more nutritious foods. Another concurrent change is the increase of calories in a typical fast food restaurant meal. One single meal, which weighs in at about 2000 calories, 84 grams of fat, and 12 grams of fiber, accounts for the daily caloric and fat requirements for most children. Fast food comprises more than 30 percent of the meals eaten by families in the United States. Lastly, school meals made available for children

tend to be very high in total and saturated fat. Many schools also have vending machines full of high-calorie and high-fat snacks for students to supplement or replace their lunches, and only approximately 21 percent of schools sell items such as yogurt, fruit, or vegetables. (Feld & Hyams, 2004).

While poor nutrition by itself is enough to trigger substantial weight gain and maintenance, when it is combined with sedentary activity, overweight and obesity is all but guaranteed. Only 6-8 percent of school-age children are in daily physical education classes, and only 27 percent of high school students participate in moderate activity five or more days per week. There has been a 35 percent decline in daily activity levels that parallel the doubling of obesity rates for children and adolescents between nine and 19 years of age. The time not spent in moderate activity has been replaced by sedentary activities, namely watching television, playing video games, or even doing homework. Watching television appears to be the most detrimental of the sedentary activities. Children tend to eat while they watch television, opting for higher calorie, fat, and sugar snacks. The television programs themselves also influence obesity via the advertisements for unhealthy foods and products that children will request. Many times these requests made on increasingly busy parents are honored, adding to the increasing amount of unhealthy snacks and meals these children consume. Unfortunately, television and other sedentary activities are being promoted by parents who are working longer hours and cannot supervise children outdoors, or who live in environments where it is not safe to be outside at all (Feld & Hyams, 2004).

Treatment

With the increasing number of children becoming obese and no end of the trend in sight, treatment and prevention are goals that must be achieved. Again, overweight adolescents have a 70 percent chance of becoming overweight or obese adults (Torgan, 2002). At present, there are many types of programs designed to counteract childhood overweight and obesity, several of which strive to increase physical activity and promote healthy eating habits (Hawley, Beckman, Bishop, 2006; Council on Sports Medicine and Fitness and Council on School Health, 2006). Some programs implement additional psychological components. Almost all of the programs also combine an element of educational programming. However, the acquisition of such knowledge does not always parlay into actual improvements and changes (Hawley, Beckman, Bishop, 2006). Even more importantly, if obesity is considered a chronic disease, then treatment and intervention programs may become lengthy and ongoing, which could potentially metamorphosis into a greater societal burden than currently expected. Therefore, existing treatment programs must be examined to better understand what variables in this population lend themselves to manipulation through treatment to facilitate greater positive change. Not all programs include psychological and psychosocial components, however, those that do potentially yield the most thorough data to be evaluated. Greater understanding of the psychological characteristics of overweight and obese children, and how these characteristics relate to treatment, may provide another, and possibly better, avenue to tackle this public health issue.

Readiness for Change

One of the most important constructs of a profile to better understand childhood obesity and overweight is what contributes to a child's motivation, or readiness, to make positive changes towards a healthier lifestyle. Such positive changes include increased exercise and better nutrition. Although there are several theories about how people institute behavior change into their lives, one of the more prominent theories is the Transtheoretical Model of Behavior Change.

Transtheoretical Model of Behavior Change

The Transtheoretical Model of Behavior Change is a six-stage model that explains how people, regardless of therapeutic approach, tend to modify behavior. The model arose from a comparative analysis of the major systems of psychotherapy, in which 10 of the most powerful approaches to affecting change were delineated. From these 10 approaches, a process of six stages, independent of any specific therapeutic approach, was discovered. These six stages are: Precontemplation, Contemplation, Preparation, Action, Maintenance, and Termination (Prochaska, 1999; Prochaska, DiClemente, & Norcross, 1992).

Precontemplation is the stage in which people have no intent to make changes in the near future, which is generally defined as a period of six months. Individuals may be at this stage for many different reasons, such as indifference, lack of or incorrect information, demoralization from prior failure, or defensiveness. Contemplation is the stage in which people have the intent to make a change within the next six months. These individuals are aware of the benefits as well as the losses of making changes. However, the discrepancy between the two can lead to ambivalence, and a state of

chronic contemplation or procrastination. Preparation is the stage where individuals intend to initiate change within the upcoming month. People in this stage typically have a legitimate plan for action, such as speaking to a professional or purchasing an informative book. These individuals are best suited for short-term action-oriented treatment programs because they are ready to utilize them. Action is the stage in which people have made specific changes to their ways of living. Maintenance is the stage of relapse prevention. This stage can last anywhere from six months to five years. Termination is the stage where individuals are past relapse and are 100% self-efficacious. Termination is not achieved by all, but rather many people complete lifestyle changes by remaining in the maintenance stage (Prochaska, 1999).

While these six stages build on each other theoretically, in reality, people do not always progress in a stair-step fashion. Many people develop through the stages in a spiral, as relapse tends to occur during the different stages. According to Prochaska, DiClemente, and Norcross (1992), cross-sectional data from patients in treatment utilizing the University of Rhode Island Change Assessment Scale (URICA), the gold standard for assessing stages of change, indicates that over time, patients in treatment tend to progress from the contemplation stage to the action stage. Also, as treatment continued, precontemplation scores decreased, indicating potential reduction of defensiveness and resistance. Another study from the same authors evaluated patients in a behavioral therapy program for weight control. Again, those entering treatment could be classified as falling in the contemplation stage when they began, but moved solidly towards action as treatment progressed. In fact, the earlier in treatment that the clients

progressed into action, the more successful they were at losing weight by the end of treatment. Lastly, the stages of change scores were the second best predictors of outcome.

While there is some research on the relationship between readiness of and stages for change for the weight management population, much of it has centered on adults. As such there is limited information about readiness for change on pediatric overweight and obese populations.

Current applications

Research by Beck, Stevens, Hamai, and Freier (2006) revealed that a child's self-reported readiness to change, as measured by a questionnaire based on the transtheoretical model at the beginning of a weight management program, is not significantly related to his or her actual percentage of body fat or actual body mass index. However, it is more significantly associated with his or her perception of him or herself—specifically his or her perception of his or her social, intellectual, and physical selves. A confirmatory factor analysis by Freier, Ramirez, Krishnamurthy, Kuehfuss, and Riggs (2004) on the same self-report readiness for change questionnaire based on the transtheoretical model indicated that there were two distinct factors: cognitive and behavioral/emotional. The cognitive factor represented a child's awareness of a problem of obesity and his or her consideration of change. The behavioral/emotional factor represented a child's identification of internal feelings and situations that promote change for him or herself. Additional research with this same scale by Beck, Dueñas, Nedilskyj, Hamai, and Freier (2006) demonstrated that each factor related to a particular psychosocial profile in overweight and obese children beginning a weight management program. Children cognitively ready to make healthy changes experienced positive

relationships with others and fewer negative beliefs about themselves and their environment than those not ready to change. In contrast, children emotionally ready to change displayed less acting out behaviors, and felt more comfortable and in control of themselves, regardless of their surroundings when compared to those not ready to change. Additionally, children who are more ready for change, regardless of type of readiness for change, were less likely to report a desire to harm themselves.

This same readiness for change questionnaire was also utilized to predict treatment outcomes in a pediatric overweight and obese weight management program. However, the self-reports of the children at the beginning of the program did not predict the improvement in physical measures, including BMI, body fat percentage, and systolic blood pressure percentile (Harrigan, Beck, Hamai, & Freier, 2006). The authors stated that normal physical development occurring between the beginning and end of the treatment program may have confounded the results. Another potential reason for the poor predictive power of the self-report of readiness for change for physical outcomes of treatment may center on psychosocial factors, potentially psychological distress, related to readiness for change.

Psychological Distress

Psychological distress is a term encompassing symptomology related to depression, anxiety, and other mental health concerns. Common symptoms are feelings of nervousness, guilt, lethargy, hopelessness, irritability, and worthlessness. Other concerns include difficulty maintaining appropriate relationships and exhibiting conduct problems. Distress can be evaluated in various ways, including common objective

checklists and questionnaires (Joiner, Schmidt, & Barnett, 1996; Beato-Fernandez, Rodrıguez-Cano, Pelayo-Delgado, & Calaf, 2007).

There have been numerous studies evaluating psychological functioning and/or distress in the pediatric obese/overweight population. Mitchell (2006) determined that although participants in a pediatric weight management clinic as a whole did not exhibit elevated depression, measured by the Children's Depression Inventory (CDI) or low self-concept symptoms, measured by the Piers-Harris Children's Self-Concept Scale, there was an unexpectedly high (30 percent) rate of positive suicidal ideation and/or intent as endorsed on the CDI. Research by Young-Hyman et al. (2006) and Viner et al. (2006) revealed that in pediatric overweight/obese populations, there are differences among ethnicities and genders in self-reported psychological distress. However, Young-Hyman et al. concluded that regardless of ethnicity or gender, increasing weight is related to emotional and weight-related psychological distress (2006). Franklin, Denyer, Steinbeck, Caterson, and Hill in a 2007 article detailed that by the age of 11, obesity has a distinct impact on self-esteem, specifically athletic competence, physical appearance, and global self-worth. However, there were certain domains and specific children were more affected than others. The authors concluded that even with such patterns, it is inappropriate to conclude the generalization that all obese children have low self-esteem. The authors continued to postulate what factors contributed towards resilience in the portion of the obese population who did not report poor competency. They speculated that such resilience arises from protective factors stemming from within the children, within their families, and within their communities and cultures. A study by Zeller, Saelens, Roehrig, Kirk, & Daniels (2004) indicated that a pediatric weight management

group on average did not endorse significantly more maladaptive behaviors or symptoms of distress compared with the general normative sample on the Behavior Assessment System for Children—Self Report (BASC—SRP). However, a significant number of adolescents did endorse greater somatic concerns and lower self-esteem when compared to the normal population. Interestingly, although not much pathology or distress was endorsed by the children, their mothers tended to describe their children with more psychological characteristics in the at-risk or clinically significant ranges when compared to other children. Many of these mother-reported concerns correlated with the mothers' own levels of psychological distress, mirroring similar results from previous studies.

Work by Beck et al. (2005), added support to the notion that obese and overweight children in treatment as a whole do not present with significantly above average depression scores as self-reported on the CDI. However, these children on average did experience a significant decrease in depressive symptomology after 12 weeks of treatment. In this study, the children were administered the CDI before and after treatment. They were also given the Draw-A-Person-in-the-Rain (DAPIR) pre and post-treatment, and the drawings were evaluated for indicators of psychological distress, as well as indicators of protection from distress both times. Just as the children's self-reported depressive symptomology decreased with treatment, the number of indicators of protection from distress significantly increased. However, the number of indicators of distress after treatment did not significantly change.

Projective Measurement of Distress

The Draw-A-Person-in-the-Rain is an example of projective measurement. Projective measurement differs from objective measurement in that drawings or verbal

responses to pictures or drawings are evaluated by trained raters and scores are determined based on those ratings. Objective measurement, such as the BASC-SPR, CDI, and Piers-Harris, does not require additional ratings, but rather scores are generated based on the participant's responses, which usually involves forced-choices. Although projective measurement is frequently utilized, especially when evaluating children, there has been much debate its clinical utility (Joiner, Schmidt, & Barnett, 1996).

Joiner, Schmidt, and Barnett (1996) designed a study to analyze the reliability and convergent/discriminate validity of size, detail, and line heaviness as indicators of psychological distress in children's drawings when compared to accepted and commonly used measurements of psychological distress, such as the CDI, Roberts Depression Scale, Roberts Anxiety Scale, and the Roberts Apperception Test for Children. In their population of child and adolescent psychiatric inpatients, interrater reliability was adequate with coefficients in the 0.90 range, but validity was almost non-existent. Mitchell (2006) obtained similar results when studying convergent validity between the DAPIR and the CDI. Lastly, Abreu in 2006 sought to evaluate particular characteristics delineated by Van Hutton's research in 1994 on the Draw-A-Person Projective Test to distinguish between groups of sexually abused, physically abused, and non-abused children. Although some of the selected indicators, such as "hair emphasized and elaborated" and "omission of hands" did differentiate between groups, no indicator could differentiate among all of the groups. Further research is needed to more conclusively determine the clinical utility of such measures.

Statement of the Problem

Studies examining psychological distress experienced by overweight and obese children, particularly those in a weight management program, yield mixed results. Importantly, there has been little to no research highlighting such characteristics in a predominantly Mexican-American/Latino population, one of the groups of highest risk for obesity. Even more specifically, the clinical utility of projective measurement for evaluating distress has not been thoroughly examined for this population. Lastly, how distress is related to self-expressed readiness for change, as well as actual physical change in this population has not been thoroughly evaluated.

This study examined this constructs in order to promote a better understanding of these issues which may allow weight management and treatment programs for overweight and obese children to more appropriately and efficiently target interventions. As long as the prevalence of pediatric obesity continues to increase, research to better understand and combat the problem is a requirement.

Hypotheses

Hypothesis 1: The first hypothesis predicts that there will be significant relationships between psychological distress and age, gender, and ethnicity in a pediatric obesity population. And further that ethnicity will explain self-reported psychological distress above and beyond the issues of age and gender.

Depression. Hypothesis 1a: There will be a significant relationship between child's self-reported depression (CDI) and age.

Hypothesis 1b: There will be a significant relationship between child's self-reported depression and gender.

Hypothesis 1c: There will be a significant relationship between child's self-reported depression and ethnicity.

Hypothesis 1d: Ethnicity will explain variance above and beyond the variables of age and gender in the child's self-reported depression.

Self-concept. Hypothesis 1e: There will be a significant relationship between child's self-reported self-concept (Piers-Harris)* and age.

Hypothesis 1f: There will be a significant relationship between child's self-reported self-concept and gender.

Hypothesis 1g: There will be a significant relationship between child's self-reported self-concept and ethnicity.

Hypothesis 1h: Ethnicity will explain variance above and beyond the variables of age and gender in the child's self-reported self-concept.

*The Piers-Harris Total scale, as well as the Happiness and Satisfaction, Popularity, Intellectual and School Status, and Physical Attributes and Appearance scales will each be analyzed individually.

Behavior. Hypothesis 1i: There will be a significant relationship between the child's self-reported behavior (BASC)* and age.

Hypothesis 1j: There will be a significant relationship between the child's self-reported behavior and gender.

Hypothesis 1k: There will be a significant relationship between the child's self-reported behavior and ethnicity.

Hypothesis 1l: Ethnicity will explain variance above and beyond the variables of age and gender in the child's self-reported behavior.

* The BASC composite scales of School Maladjustment, Emotional Symptoms Index, Personal Adjustment, and Clinical Maladjustment will each be analyzed individually.

Projective distress. Hypothesis 1m: There will be a significant relationship between the child's indicators of distress (DAPIR) and age.

Hypothesis 1n: There will be a significant relationship between the child's indicators of distress and gender.

Hypothesis 1o: There will be a significant relationship between the child's indicators of distress and ethnicity.

Hypothesis 1p: Ethnicity will explain variance above and beyond the variables of age and gender for the child's indicators of distress.

Hypothesis 2: The second hypothesis predicts that there will be significant relationships between readiness for change and distress. Further age, gender, and ethnicity will be examined in relationship to readiness for change and distress.

Hypothesis 2a: There will be a significant relationship between readiness for change (RFC)* and distress (DAPIR)*

Hypothesis 2b: There will be significant age effects on the relationship between readiness for change and distress.

Hypothesis 2c: There will be significant gender effects on the relationship between readiness for change and distress.

Hypothesis 2d: There will be significant ethnicity effects on the relationship between readiness for change and distress.

Hypothesis 2e: Ethnicity will explain variance above and beyond the variables of age and gender on the relationship between readiness for change and distress.

*The Readiness for Change Cognitive and Emotional factors (RFC) and the Indicators of Distress and Protection Against Distress scores (DAPIR) will each be analyzed individually.

Hypothesis 3: The third hypothesis predicts that there will be significant relationships between physical changes over the course of treatment and distress with age, gender, and ethnicity effects in a pediatric obesity population.

Hypothesis 3a: There will be a significant relationship between changes in physical variables* over the course of treatment and distress.

Hypothesis 3b: There will be significant age effects on the relationship between changes in physical variables over the course of treatment and distress.

Hypothesis 3c: There will be significant gender effects on the relationship between changes in physical variables over the couse of treatment and distress.

Hypothesis 3d: There will be significant ethnicity effects on the relationship between changes in physical variables over the course of treatment and distress.

Hypothesis 3e: Ethnicity will explain variance above and beyond the variables of age and gender in the changes in physical variables over the course of treatment and distress.

* The physical variables of BMI, percent of body fat, and resting systolic blood pressure percentile and the Indicators of Distress and Protection Against Distress scores (DAPIR) will each be analyzed individually.

Method

Participants

This was an archival study utilizing data from children at the Growing Fit Program. The Growing Fit Program is a Loma Linda University Children's Hospital Department of Pediatrics treatment clinic for overweight/obese children. The program has served and collected data on approximately 300 children since 1998. These children do not represent a random sampling, but rather a convenience sample that was referred to the clinic by their pediatricians for weight loss. Further, due to the type of insurance coverage available for the program, the majority of the participants have been Hispanic and Medi-Cal eligible.

Materials

Draw-A-Person-in-the-Rain (DAPIR)

Draw-A-Person-in-the-Rain is a projective test measuring aspects of psychological distress. The test is administered to all children in the clinic, regardless of age, by asking a child to draw a picture of a person in the rain. No other prompting or guidance is offered. The completed drawing is evaluated based on the presence or absence of 10 particular features. The features that are indicators of distress are: large rain drops/getting wet, lightening, monochromatic (no use of color), absence of sun/clouds, frowning facial expression, and puddles. The features that are indicators of protection against distress are: protection against the rain (weather gear, umbrella, etc.), vegetation, use of color, sun, smiling facial expression, and a rainbow.

Readiness for Change (RFC)

The Readiness for Change Questionnaire is a 5-choice Likert scale derived by the Growing Fit Program staff and based on the University of Rhode Island Change Assessment (URICA) (DiClemente & Hughes, 1990) and is administered to children 11-18 years of age. Example questions include: "compared to other times you have tried to lose weight, how ready are you to lose weight this time?" (not at all ready to extremely ready), "how often do you eat because your body feels hungry?" (always to never), "when you think about exercising, does it make you feel pretty good, or not good at all?" (good to not good at all).

In a confirmatory factor analysis, the scale broke into two distinct factors, cognitive and emotional. The cognitive scale is described as the child's awareness of a problem of obesity and their consideration of change. The emotional scale is the child's identification of internal feelings and situations that promote change for themselves. The coefficient alpha for the total scale is 0.79, the subscale alpha for the cognitive component is 0.76, and the subscale alpha for the emotional component is 0.80 (Freier, Ramirez, Krishnamurthy, Kuehfuss, & Riggs, 2004).

For both factors and the total score, higher scores indicate greater motivation to change.

Body Mass Index (BMI).

This is calculated by weight in kilograms divided by height in meters squared. The Growing Fit Program staff pediatrician and nurse attain these measurements and calculations.

Percent Body Fat

Body fat percentage is calculated via the method detailed by the US Navy (Hodgdon & Beckett, 1984). This is a method that utilizes equations for height and body circumferences to estimate percentages, as opposed to the skin-fold based methods. The Growing Fit Program staff pediatrician and nurse attain these measurements and calculations.

Resting Systolic Blood Pressure Percentile

Systolic blood pressure is the pressure when the heart is contracting. This pressure at rest is compared to that of other children of a particular age and gender. The Growing Fit Program staff pediatrician and nurse attain these measurements and calculations.

Children's Depression Inventory

The Children's Depression Inventory is a measure of the severity and extent of depressive symptoms, such as negative mood, interpersonal problems, ineffectiveness, anhedonia, negative self-esteem, and suicidal ideations, in children aged 7-17. The format used is child self-report. The self-report form reflects appropriate reliability, validity, and sensitivity to change. Specifically, the internal consistency coefficients range from .71 to .89 and the test-retest coefficients range from .74 to .83 (time interval two-three weeks). However, there are significant ethnicity effects, with Hispanic children scoring higher than non-Hispanic children. The manual suggests that ethnicity should always be considered when interpreting the results (Kovacs, 1992). The subscale that will be utilized in this analysis is the Total T Score.

Piers-Harris Self-Concept Scale for Children

The Piers-Harris Self-Concept Scale for Children is designed to examine the children's self report of how they feel about themselves in different realms of their lives. It is administered to children age 10 and older, and utilizes a dichotomous (yes/no) response scale. The reliability of this scale has an alpha reliability coefficient ranging from .88 to .93 (Lorenzo, Bilge, Reinherz, & Frost, 1995). The subscales that will be utilized in this analysis are the Total T Score, as well as the Happiness and Satisfaction, Popularity, Physical Appearance and Attributes, and Intellectual and School Status T Scores. Each of the chosen subscales has demonstrated clinical utility in this population.

Behavior Assessment System for Children

The Behavior Assessment System for Children is a multimethod, multidimensional approach to evaluating behavior and the self-perceptions of children aged 2.5 to 18 years. There are forms for self-report, parent report, and teacher report. Each format has strong psychometric properties individually, but they also have strong properties as a unit. The majority of BASC components have reliabilities greater than .80. The median internal consistencies (coefficient alpha) indicate that the scales are more reliable for older children (Flanagan, 1995).

The form utilized for this study will be the self-report inventories for both the children (ages 8-11) and the adolescents (12-18). Only the Clinical Maladjustment, School Maladjustment, Personal Adjustment, and Emotional Symptoms composite T scores from both age versions will be considered for analysis. With the exception of the Personal Adjustment composite, higher scores indicate more symptomology. The Clinical Maladjustment composite reflects the cumulative clinical, internalizing problems

a child may be experiencing. The School Maladjustment composite is a broad measure of adaptation to school, specifically to the structure of the schooling process and to teachers. Because school is such a significant portion of children's lives, problems in the school environment can be indicative of larger concerns. The Personal Adjustment composite reflects a child's overall positive adjustment. Lower scores suggest difficulties with coping skills, poor self-acceptance, poor identity development, and lacking support systems. The Emotional Symptoms Index is the most global indicator of serious emotional disturbance, particularly of internalized disorders. High scores signal the presence of serious emotional disturbance that is vast in its impact on the thoughts and feelings of the individual (Reynolds & Kamphaus, 1992).

Demographics

Each child's ethnicity, gender, and age are reported by parents and attained from intake information.

Procedure

This study utilized archival data from the Growing Fit Program. Only those participants whose parents consented for their data to be used for research purposes were included. Participants who were too young to be included in standardized norms, and participants with missing demographic data were excluded. All identifying information was stripped from the data set that was obtained for this study.

Results

Data Screening

For the first two hypotheses, data was screened at the univariate level. First, all subjects below the age of seven were deleted because although there was data available for these subjects, it was not utilized for this research as the standardized measures did not have norms below that age. Secondly, although this dataset underwent a systematic data check and correction, histograms were created to assess normality and screen for overlooked data entry errors, and these errors were corrected. Thirdly, univariate outliers were defined as scores above or below three standard deviations from the mean, and were deleted (Mertler & Vannatta, 2002). Additionally, there were only eight subjects whose ethnicity did not fall into either the Caucasian, Hispanic, or African-American categories, so their information was deleted. Also, while there were many subjects who had missing ages, the majority of these subjects also had no other usable data. It is likely that these subjects were entered into the database when their intake appointments were scheduled, but they never made the appointment. Therefore, although there were 359 subjects eligible for the study, 25 subjects, 13 of them being outliers, were removed, leaving 334 available for analysis.

For the third hypothesis, data was also screened at the univariate level. However, because no assessments with standardized age requirements were utilized, participants below the age of seven were not removed. Histograms were created to assess normality and outliers. All scores beyond three standard deviations from the mean were deleted. Because inclusion criteria for this hypothesis mandated use of only participants who completed the program, the available subjects decreased substantially to 55. Therefore,

with such a small number of subjects, participants with ethnicity not classified as Caucasian, Hispanic, or African-American were not deleted, but remained available for analysis.

Study Sample

Overall, the sample was 53 percent female and 47 percent male, with an average age of 11. Of the 334 subjects, 37 percent were Hispanic, 15 percent were Caucasian, and 6.6 percent were African-American. Unfortunately, 41 percent of the sample had missing ethnicity information that could not be recovered. Therefore, when evaluating the valid ethnicity breakdown of the sample, 63.5 percent were Hispanic, 25 percent were Caucasian, and 11 percent were African-American. According to Mertler and Vannatta (2002), the percentage of missing data indicates an unusable variable. However, to prevent removing such a significant portion of the hypotheses, this variable was dummy-coded into known ethnicity and unknown ethnicity, and the hypotheses were evaluated with independent t-tests for possible group differences for those subjects who had listed ethnicity and those who did not.

Because the third hypothesis utilized a significantly smaller group of subjects, the ethnicity breakdown was slightly different. Hispanics comprised the majority of the 55 subjects at 18 percent, followed by Caucasians at 15 percent, and African-Americans at 11 percent. However, 56 percent of the small sample had missing ethnicity data, making the valid ethnicity breakdown 42, 33, and 25 percent for Hispanic, Caucasian, and African-American respectively.

Table 1.

Subject Demographics

Characteristic	**N**	**%**
Gender[a]		
Male	153	47
Female	175	53
Ethnicity[b]		
Caucasian	50	25
African-American	22	11
Hispanic	125	63.5

Note. N=334, Average age=11
[a]6 subjects had missing Gender data. [b]137 subjects had missing Ethnicity data.

Hypotheses

The first hypothesis stated that there would be significant relationships between psychological distress and age, gender, and ethnicity in a pediatric obesity population. In order to evaluate the hypothesized significant relationships between the measures (CDI, Piers-Harris, BASC, and DAPIR) and age and gender, bivariate correlations were used. To evaluate the hypothesized relationships between these same measures and ethnicity a univariate analysis of variance (ANOVA) was proposed, however, because of the disproportionate number of Hispanic subjects when compared to both Caucasian and African-American subjects, the sample was dummy-coded into Hispanic and non-Hispanic, and ethnicity effects were evaluated with independent t-tests. The assumptions of both an ANOVA and an independent t-test of independent groups, normal distribution,

and homogeneity of variance were evaluated for each related hypothesis. To determine if ethnicity explained variance above and beyond both age and gender for this hypothesis, analysis of covariance (ANCOVA) was utilized.

Depression

There were no significant relationships found between age or ethnicity when examining the Children's Depression Inventory Total T Score, thus not supporting these hypotheses. There was a significant ($r=-0.143$, $p<0.05$, $n=266$) inverse relationship between the Children's Depression Inventory Total T Score and gender, supporting this hypothesis. Because of the nonsignificant relationship of ethnicity with the Children's Depression Inventory Total T Scores, utilizing both ANOVA and an independent t-test, to compute the ANCOVA would be statistically inappropriate, and as such was not done.

Self-concept

There were no significant relationships found among age, gender, or ethnicity when examining the Total, Popularity, Intellectual and School Status, and Happiness and Satisfaction T Scores on the Piers Harris Children's Self Concept Scale, thus not supporting those hypotheses. There was a significant ($p=-0.159$, $r<0.05$, $n=187$) inverse relationship between the Piers Harris Children's Self-Concept Scale Physical Appearance and Attributes T Score and age, supporting that hypothesis. Because of the nonsignificant relationship of ethnicity with the Piers Harris T Scores, to compute the ANCOVA would be statistically inappropriate, and was not done.

According to the independent t-test, there were significant group differences between subjects with known and subjects with unknown ethnicity among the Total

(t=2.313, p<0.05, n=192) and Physical Appearance and Attributes T Scores (t=2.084, p<0.05, n=192). Subjects with unknown ethnicity reported higher Total T Scores (*M*=54.710) than did subjects with known ethnicity (*M*=51.177). Subjects with unknown ethnicity reported higher Physical Appearance and Attributes T Scores (*M*=51.984) than did subjects with known ethnicity (*M*=48.754).

Behavior

There were no significant relationships found among age, gender, or ethnicity when examining the Clinical Maladjustment, School Maladjustment, Personal Adjustment, or the Emotional Symptoms Index T Scores on the Behavior Assessment System for Children, thus not supporting those hypotheses. Because of the lack of ethnicity relationships with the BASC T Scores, to compute the ANCOVA is statistically inappropriate.

According to the independent t-test, there were significant group differences between subjects with known and subjects with unknown ethnicity among the age 8-11 Personal Adjustment (t=3.327, p<0.05, n=46) and Emotional Symptoms Index (t=-2.145, p<0.05, n=47) T Scores on the BASC. Subjects with unknown ethnicity reported higher Personal Adjustment T Scores (*M*=54.300) than did subjects with known ethnicity (*M*=48.056). Subjects with unknown ethnicity reported lower Emotional Symptoms Index T Scores (*M*=44.636) than did subjects with known ethnicity (*M*=51.833).

Projective Distress

There were no significant relationships found among age, gender, or ethnicity when examining the Indicators of Distress and the Indicators of Protection Against

Distress on the Draw-A-Person-in-the-Rain, thus not supporting those hypotheses. Because of the nonsignificant relationship of ethnicity, to compute the ANCOVA is statistically inappropriate, and this analysis was not done.

According to the independent t-tests, there were significant group differences between subjects with known and subjects with unknown ethnicity among the Indicators of Distress ($t=-2.727$, $p<0.05$, $n=186$) and the Indicators of Protection Against Distress ($t=3.264$, $p<0.05$, $n=186$). Subjects with unknown ethnicity reported fewer average Indicators of Distress ($M=1.689$) than did subjects with known ethnicity ($M=2.107$). Subjects with unknown ethnicity reported more Indicators of Protection Against Distress ($M=2.365$) than did subjects with known ethnicity ($M=1.867$).

The second hypothesis stated that there would be significant relationships between readiness for change and distress with age, gender, and ethnicity effects in a pediatric obesity population. In order to determine significant relationships between the two continuous variables of the separate Readiness for Change factors and the Indicators of Distress and the Indicators of Protection from Distress on the Draw-A-Person-in-the-Rain, bivariate correlations were used. ANCOVA was performed to determine age, gender, and ethnicity effects.

There were no significant relationships found between the separate Readiness for Change factors and Indicators of Distress and Protective Factors Against Distress on the Draw-A-Person-in-the-Rain, thus not supporting those hypotheses. Because of the lack of significant relationships, to compute the ANCOVA is statistically inappropriate, and this analysis was not performed.

The third hypothesis stated that there would be significant relationships between physical changes (change in BMI, change in systolic blood pressure percentile, and change in body fat percentage) over the course of treatment and distress with age, gender, and ethnicity effects in a pediatric obesity population. To evaluate the relationships between the continuous variables, bivariate correlations were performed.

There were no significant relationships found between the physical changes, Indicators of Distress, and Protective Factors Against Distress on the Draw-A-Person-in-the-Rain, thus not supporting those hypotheses. Because of the lack of significant relationships, to compute the ANCOVA is statistically inappropriate, and this analysis was not done.

Discussion

Pediatric overweight and obesity is a growing national epidemic with 15 percent of children ages 6-19 considered obese and at least 22 percent considered overweight. Children who are obese are likely to remain obese into adulthood, and are not spared adult-like diseases while still in childhood. There are also significant potential psychosocial concerns for this population. Further, while there is considerable research pointing to contributing factors of obesity, as well as specific medical or physical ramifications, there is a paucity of information on what contributes to a globally successful intervention. Considering that by the year 2050, nearly 50 million Americans may be obese, understanding the factors delineating success is a necessity.

This study evaluated three specific hypotheses in relationship to psychological distress in a pediatric obese sample. The first hypothesis proposed that there would be significant relationships between psychological distress and age, gender, and ethnicity in this pediatric obese sample. The second hypothesis proposed that there would be significant relationships between readiness for change and distress with age, gender, and ethnicity effects in a pediatric obesity population. The last hypothesis proposed that there would be significant relationships between physical changes over the course of treatment and distress with age, gender, and ethnicity effects in a pediatric obesity population.

The archival data sample collected from the Growing Fit Program at Loma Linda University Children's Hospital yielded 334 subjects for analysis. Overall, the sample was 53 percent female, predominately Hispanic, with an average age of 11.

The first hypothesis yielded insignificant results for most of the analyses with the exception of the significant inverse relationship between the Piers Harris Self-Concept

Scale Physical Appearance and Attributes T Score and age, and the significant inverse relationship between gender and self-reported depression as measured by the Children's Depression Inventory Total T Score.

The inverse relationship between self-reported physical appearance and attributes and age suggests that younger children tend to rate themselves more highly on physical appearance than do older children. A study by Stradmeijer, Bosch, Koops, & Seidell (2000) corroborates these results. They found that older overweight girls, ages 13-16, identified lower body esteem than did their younger counterparts, ages 10-12. Flannery-Schroeder and Chrisler's study (as cited in Ricciardelli and McCabe, 2001) also revealed age differences in body satisfaction. They indicated that 13 percent of boys and girls ages 6 and 7 report body dissatisfaction compared to 52 percent of boys and girls ages 10 and 11. These trends that imply younger children endorse more positive feelings about physical appearance and attributes than do older children can perhaps be understood from a developmental perspective. Younger children are not as likely to have been exposed to negative media and societal pressures, or negative peer influences, about their bodies, consequently feeling better about their physical appearance. Although Ricciardelli and McCabe (2001) state that the role of social comparison in the development of body image for prepubescent children has not been explicitly measured, research by Clark and Tiggemann (2007) illuminates the relationship of increased exposure to television and magazines, as well as taking part in conversations about appearance with peers, with body dissatisfaction and increased dieting behaviors in a sample of 8-13 year old females. This suggests that as children increase exposure to the media's physical appearance standards, even at an early age, body dissatisfaction increases and dieting behaviors are

initiated. The trend of younger children endorsing increased physical appearance satisfaction is also elucidated in Ricciardelli and McCabe (2001) who speculate that this could also be due to either difficulty in measurement because younger children may potentially have trouble understanding the evaluation tasks or constructs, or because of social and cultural norms not being fully internalized and integrated an early age. However, it does again appear that when young children increase exposure to social and cultural norms via the media, then body satisfaction is lowered (Clark & Tiggemann, 2007). It is also possible that younger children may not have the 'awareness' to realize that they are overweight, or if they do realize they are overweight, they may accept it more readily. However, Ricciardelli and McCabe (2001) do also indicate that there is a trend of emerging gender differences of body image concerns between the ages of 8 and 10. The authors' review of the existing research lends itself to the conclusion that body image develops differently for males and females in the 8-10 age range, and subsequently thereafter. Specifically, they indicate the divergent use of social comparisons by males and females in adolescence by suggesting that adolescent girls tend to make more social comparisons and view themselves more negatively in such comparisons, and adolescent boys tend to use fewer social comparisons, and when they do, they view themselves more favorably. Interestingly, even when given this theory, much research on body image has traditionally been conducted only on female participants, such as the aforementioned Stradmeijer, Bosch, Koops, & Seidell (2000) and Clark & Tiggemann (2007) studies, and many others included in the literature review by Wardle & Cooke (2005). This may promote overemphasizing and highlighting female-specific body dissatisfaction concerns,

while overlooking and possibly minimizing more male-centric information and understanding.

The second significant relationship in the first set of hypotheses was between the child's self-reported depression symptomology and gender. The relationship between the two variables demonstrated a higher incidence of self-reported depression symptomology in girls than in boys. There were no other significant relationships between gender and any of the other depression subscales. Existing research states that in the general population of children and adolescents, depression is one of the most prevalent psychiatric diagnoses, with the lifetime prevalence rate of major depression in adolescents ranging from 10 to 28 percent (Santos, Richards, & Bleckley, 2006). Further, a study of gender in pediatric depression indicates that during childhood, depression is equally distributed between males and females, with some tendency for males to have higher rates. However, by late adolescence, females are twice as likely to be diagnosed with depression than are males. Disordered eating symptoms, body dissatisfaction, and pressure to be thin have all been implicated for the higher rates of depression in adolescent girls (Santos, Richards, & Bleckley, 2006). Perhaps the slight relationship between gender and depression detected in this study is an interaction related to the average age of the sample, which is 11. The older females in this pediatric obesity sample appear to be mirroring the established adolescence depression prevalence rates, likely for similar reasons, such as disordered eating symptoms and pressure to be thin.

However, overall, the results from this hypothesis indicate little impact of age, gender, and ethnicity on psychological distress, as captured by the children's self-reports on the CDI, Piers Harris, and BASC, and on a projective measure. This outcome may be

related to the fact that many of the participants' scores fell in the average range, thus reducing variance. Additionally, the sample was rather demographically homogenous. The majority of the participants live in the urban area surrounding Loma Linda University and all were Medi-cal eligible. Perhaps the cultural and geographic uniformity negated potential age, gender, and ethnicity effects. It is possible that other demographic variables, such as socioeconomic status, which has demonstrative predictive power for this population (Strauss & Knight, 1999; Kumanyika, 2007) may produce more viable relationships with psychological distress in this population.

The second hypothesis, which predicted significant relationships between readiness for change and psychological distress (measured by a projective drawing task), with age, gender, and ethnicity did not yield significant results. This indicates that as a group, readiness for change in children starting the Growing Fit Program was not related to latent psychological distress. This finding could be due to several reasons. First and likely foremost, this may be due to measurement concerns related to use of this projective instrument, further adding to the debate of clinical utility noted in the current literature review. However, assuming the potential for appropriate clinical utility of the projective measure, the lack of relationship between these variables may be related to the child's subjective experience of distress and the lack of attribution of this distress to his or her weight issues. A child may be suffering from distress, but the distress may be perceived as unrelated to his or her weight, and as such, this distress may not be motivation for making healthy changes, such as exercise and proper eating habits. The child may be suffering from distress, but is indifferent or does not make this connection; thus does not utilize it as motivation for making healthy changes. In addition, it is also plausible that a

child is suffering from distress, such that the magnitude of the distress is oppressive or prohibitive towards any desire to change. This echoes the study by Beck, Stevens, Hamai, and Freier (2006) that revealed that a child's self-reported readiness to change is more significantly associated with a positive perception of him or herself—specifically his or her perception of his or her social, intellectual, and physical selves. Children who are too distressed and likely feel too poorly about themselves are likely not able to create or implement healthy change. Another possible explanation for the lack of significant findings may be that the child is not perceiving distress, is happy with his or her current weight and lifestyle, and consequently endorses no desire to change. Therefore, the aggregate of these potential reasons may be negating any singular relationship, and the many possible different relationships between distress and readiness for change are likely too dissimilar for one specific relationship to be highlighted.

The final hypothesis postulated that there were significant relationships between physical changes over the course of treatment and distress, as measured by the projective instrument, with age, gender, and ethnicity effects in a pediatric obesity population. However, no significant relationships were found. This is perhaps not surprising given the small sample size for this hypothesis and the fact that physical changes in children are hard to measure, because normal physical development may always be a confounding factor (Harrigan, Beck, Hamai, & Freier, 2006). Additionally, this hypothesis makes the assumption that as a group, the children in the program are making significant physical changes over the course of treatment. Clinical experience with this population indicates that while many of the children do make physical improvements, others do not, and improvement may be somewhat ambiguous and individual-specific, which may muddle

relationship evaluation. Another possible factor for the lack of relationship may again be the uncertain clinical utility of the projective measure of distress.

Limitations

The main limitation of this study was the missing data. Over 15 percent of the information on the participants' ethnicity was missing. In fact, independent t-tests performed on the variables of psychological distress from the CDI, Piers Harris, BASC, and the DAPIR indicated that there were some group differences between those subjects who had known ethnicity information and those who did not. While there is no overt explanation for this difference, the difference does exist, and must be addressed as a specific limitation for the study. Such a significant amount of missing information potentially also has an effect on the lack of discernable influence of ethnicity on the data. Unfortunately, ethnicity is not information that can be transformed or substituted when missing.

The second significant limitation is the paucity of available physical outcome data. The Growing Fit Program, like many obesity treatment programs, suffers from a high rate of attrition, which heavily reduces the available physical outcome data. Additionally, part of the medical data from the early years of the program was not easily available and often not possible to accurately decipher. Unfortunately, the participants with available physical outcome data did not also have available DAPIR data, which reduced the correlation matrix drastically. Therefore, the third hypothesis, which utilized physical outcome data, was not supported, and the analysis was left with little statistical power to appropriately determine significant relationships.

A third limitation is related to the available instruments used to evaluate these constructs and relationships. All instruments used have been created for the general population, and none are specific for the obese population in a treatment setting. As previously mentioned, the DAPIR may not be the best way to examine distress in this population. Further, it is possible that none of these measures are accurately tapping into the constructs as relevant for these children, and therefore have reduced clinical utility. New measures specifically geared towards the needs of the pediatric obesity population may more likely yield a better reality of their experience and treatment needs, and may potentially lead to more effective intervention.

Significant Contribution

A significant contribution of this study is the relationship between self-perceived physical appearance and attributes, or body image, and age. To date, there has been a paucity of information regarding body image in obese children, particularly with an age range from pre-adolescent to adolescent. Additionally, this study is one of the few to utilize males in the evaluation of body image and body esteem, and interestingly there was no gender difference. Therefore, this information can lend itself to more appropriate treatment options. Certainly the findings, and/or lack of significant findings, in this study continue to promote the need for further understanding of the nuances of psychological factors in pediatric obesity.

Future Directions

This study endorses the need for future research in this area specifically to continue to evaluate body image and body esteem in this population, particularly as it

relates to age. Another direction of research important to this area is to further evaluate the relationship between physical change and distress with a larger sample size. Other areas of importance not addressed in this study would be to incorporate variables, such as socioeconomic status, to determine their potential relationship with psychological factors in obesity. An important area of further research would be to continue to investigate the utility of the Readiness for Change measure and to evaluate the clinical utility of the Draw-A-Person-in-the-Rain measure. Certainly this area of research is necessary to better understand and prevent the pediatric obesity epidemic.

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