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Child and Parent Readiness to Change in a Clinical Sample of Obese Youth

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CHILD AND PARENT READINESS TO CHANGE IN A CLINICAL SAMPLE OF OBESE
YOUTH

by

JEAN E. COBB

Under the Direction of Lindsey L. Cohen, Ph.D.

ABSTRACT

Parent and child readiness to change have been identified as emerging areas informing pediatric obesity interventions. The purpose of this study was to increase understanding of child and parent readiness to change in obese youth by examining how these constructs are related to demographic variables, as well as to psychosocial functioning, in a sample of obese youth presenting for weight- management treatment. A secondary aim was to examine consistency between parent and child readiness to change. Two hundred twenty-eight 7- to 17-year-old children and their parents participated during the child's initial assessment at a multidisciplinary weight-management clinic. Demographic variables included in analyses were child Body Mass Index, parent Body Mass Index, child age, child gender, child race, and family income. Children completed measures of quality of life, depression, social anxiety, internalizing and externalizing symptoms, and readiness to change. Parents completed assessments of children's quality of life, children's internalizing and externalizing symptoms, and parents' own readiness to change. The

child's Body Mass Index was significantly related to both parent and child readiness to change. There was also a significant positive relation between child readiness to change and the child's own report of social anxiety symptoms, as well as a curvilinear relation with internalizing symptoms, such as depression. In addition to the child's Body Mass Index, parent readiness to change was positively related to the child's age and was higher in African American parents than in European American parents. Race moderated the relation between parent readiness to change and health-related quality of life, internalizing symptoms, and externalizing problems. Parents and children were discordant in their ratings of readiness to change, with parents tending to report higher levels; the child's Body Mass Index moderated the relation between parent and child report of readiness to change. Clinical implications and future directions are discussed.

INDEX WORDS: Pediatric, Obesity, Readiness to change, Transtheoretical model, Stages of change, Psychosocial functioning, Health-related quality of life, Social anxiety, Depression, Internalizing behavior, Externalizing behavior

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YOUTH

by

JEAN E. COBB

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

in the College of Arts and Sciences

Georgia State University

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DEDICATION

I would like to dedicate this work to those who have struggled with the physical and psychological sequelae of pediatric obesity. I remain hopeful that we can one day find sensitive and effective interventions to help children and families make healthy lifestyle changes that will improve their quality of life; I also hope that society can reduce weight-related discrimination and stigma associated with obesity.

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Introduction

Pediatric Obesity Overview

Obesity is a national health crisis and the second leading cause of death in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004). Prevalence of pediatric obesity has almost tripled for 12- to 19-year-olds and more than tripled for 6- to 11-year-olds over the last three decades (Wang & Beydoun, 2007). Pediatric obesity is disproportionately represented in low socioeconomic status groups and ethnic minority groups, including African Americans, Latinos, and Native Americans (Barlow & The Expert Committee, 2007; Ogden, Carroll, & Flegal, 2008; Wang & Beydoun, 2007), with Mexican American boys and adolescent African American girls having the highest prevalence (Wang & Beydoun, 2007).

A standardized formula, using weight and height, is used to calculate Body Mass Index (BMI) for both adults and children, but the methods used to classify weight status vary. In adults, BMI ranges determine one's assigned weight classification of *healthy weight*, *overweight*, or *obese*. In contrast, youth (ages 2 to 20 years) are classified by BMI *percentile* ranges, which are calculated by charting their BMI on age- and gender-specific growth charts (Heinberg & Thompson, 2009). The most widely used references for age- and gender-specific BMI percentiles are the pediatric growth charts published by the Centers for Disease Control and Prevention (CDC) in 2000 (Appendix; Kuczmarski et al., 2000). The National Health and Nutrition Examination Survey reported that between 2003 and 2006 approximately one third of children were overweight, defined as having a BMI at or above the 85th percentile for age and sex. Additionally, 16.3 % of children were obese, defined as at or above the 95th percentile, and 11.3% were above the 97th percentile (Ogden et al., 2008).

The 85th and 95th percentiles are consistently used as cutoffs for defining obesity severity in youth; however, classification terminology, or labels assigned to these ranges, has fluctuated over time for children. For example, the CDC labels departed from the adult model, which uses the terms *overweight* and *obese*. Instead, the CDC chose not to use the term *obese*, classifying children between the 85th and 94th percentiles of BMI for age and sex as *at risk for overweight*, and used the term *overweight* to classify children at or above the 95th percentile (Kuczmarski & Flegal, 2000). In 2007, in an effort to reduce confusion between the adult and pediatric models, the American Medical Association (AMA) recommended new classification terms for pediatric overweight and obesity, suggesting that children between the 85th and 95th percentile be identified as *overweight* and children above the 95th percentile be classified as *obese* (American Medical Association, 2007). The modified classification is consistent with terminology used to classify adults (Barlow & The Expert Committee, 2007). Furthermore, Expert Committee recommendations published by the American Academy of Pediatrics proposed a new classification for children above the 99th BMI percentile, *severe obesity*, because of increasing prevalence and increased health risks associated with extreme obesity (Barlow & The Expert Committee, 2007).

The shift to using these terms has controversial clinical implications. For instance, some professionals are concerned that the term *obesity* has negative connotations, which might be stigmatizing. At the same time, the term *at risk for overweight* may not convey the severity of this medical condition, which might lead affected youth to perceive their weight status as unimportant and reduce motivation to change their behavior (Heinberg & Thompson, 2009). Recommendations published by the American Academy of Pediatrics concluded that the current AMA terms more accurately reflect the medical risks associated with high BMI and that stigma

associated with the terminology can be offset by a supportive, empathic, and nonjudgmental attitude from healthcare providers (Barlow & The Expert Committee, 2007).

Obesity has been linked to health problems that include Type II diabetes, asthma, sleep apnea, heart disease, high blood pressure, and cardiovascular disease; furthermore, children who are obese are at greater risk for adult morbidity and mortality (for reviews, see Heinberg & Thompson, 2009 and Jelalian & Hart, 2009). Despite increasing prevalence of pediatric obesity, affected children routinely encounter discrimination from peers and adults, including healthcare providers and teachers (Latner & Stunkard, 2003; Puhl & Latner, 2007). Although obese youth are not universally at risk for psychological problems, empirical findings suggest that clinical populations (obese youth presenting for weight-loss treatment) often have comorbid social, mood, or behavioral problems that warrant assessment and treatment from pediatric-obesity practitioners (Jelalian & Hart, 2009; Zimetkin, Zoon, Klein, & Munson, 2004; Zeller, Saelens, Roehrig, Kirk, & Daniels, 2004).

A variety of prevention and intervention approaches have evolved in an effort to regulate weight in youth, and parents play an important role in implementing and maintaining behavior changes. Preventative approaches include population-based efforts to prevent development or progression of obesity, such as school-based programs or policy initiatives (for a review, see Jelalian & Hart, 2009). Behavioral interventions, particularly those that are family based, have been the most extensively studied with the best short- and long-term results (for reviews, see Faith & Wrotniak, 2009 and Luttikhuis et al., 2009). In fact, a review article examined pediatric-obesity interventions according to Chambless criteria (Task Force on Promotion and Dissemination of Psychological Procedures, 1995) and concluded that comprehensive behavioral interventions for 8- to 12-year-old children without medical or psychological comorbidity meet

criteria for a *well established treatment* (Jelalian & Saelens, 1999). In adolescents, comprehensive behavioral interventions for pediatric obesity meet criteria to be defined as “promising interventions” (Jelalian & Saelens, 1999). Given the high prevalence of pediatric obesity, the severity of potential physical and psychological sequelae, and the number of different treatment approaches available, healthcare providers must understand the mechanisms that influence families to implement healthy lifestyle behavior changes in and out of treatment.

Transtheoretical Model and Stages of Change

The transtheoretical model provides a framework for understanding the process of intentional behavior change both within and outside the context of therapy (DiClemente & Prochaska, 1982; Prochaska, 1979; Prochaska & DiClemente, 1982, 1983). One of the cornerstone concepts in the transtheoretical model is the construct of *stages of change*, in which behavior change is viewed as a process, rather than as a singular event. In short, the transtheoretical model posits that individuals move through cyclical stages that progress from lack of awareness of or unwillingness to change a specific behavior, then to increased knowledge and belief in the need for change without much commitment to act, and finally to taking action and maintaining changes over time. In some ways, this concept could be thought of as a continuous construct but is more commonly described by stages. The distinct stages of the model are labeled precontemplation, contemplation, preparation, action, maintenance, and termination (see Table 1). Movement is not always linear; individuals might skip steps or move forward or relapse depending on other factors (Prochaska & DiClemente, 1982; Prochaska & Velicer, 1997). A stage theory model is useful to clinicians because people who are in the same stage face common barriers to behavior change, and these barriers are different from those faced by individuals at a different stage (Weinstein, Rothman, & Sutton, 1998). Thus, the model offers a

useful framework for understanding difficulties with motivation or adherence and may inform intervention to overcome barriers.

Stages of change theory was first applied in smoking cessation research. Since that time, it has been researched most extensively in populations with alcohol- and substance-use disorders, but also in other health behaviors, including safer sex practices, medication adherence, preventative medicine, eating behavior, exercise behavior, and weight-loss interventions (Prochaska, Johnson, & Lee, 2009). Research reviews have examined the application of stages of change theory to exercise behavior (Spencer, Adams, Malone, Roy, & Yost, 2006) and dietary behavior (Spencer, Wharton, Moyle, & Adams, 2007). The authors concluded that there is promising evidence for construct validity of stages of change with these specific health behaviors. However, the authors also acknowledged that more research is needed to develop valid and reliable tools to assess stages of change for eating and exercise behaviors, particularly in youth (Spencer et al., 2006; Spencer et al., 2007).

Readiness to Change

Motivation, referred to in the transtheoretical model as *readiness to change*, has an important relation to the stages of change. Readiness to change could be conceptualized as a more global term, influenced by perceived importance and perceived confidence, and expressed on a continuum ranging from not ready to change, to unsure about changing behavior, to ready to change behavior (Rollnick, Mason, & Butler, 1999). Readiness to change is a key determinant in sustaining individuals as they attempt to change problematic behavior, particularly pediatric obesity (Barlow & The Expert Committee, 2007); however, patients are not a homogenous group in regard to their commitment and readiness to change health behaviors.

Researchers and theorists have speculated about factors that contribute to variability in levels of readiness to change, and social cognitive theories, such as the transtheoretical model, have been tested (for review, see Armitage & Conner, 2000). Research has determined that readiness to change is influenced by both perceived personal importance of and confidence in the ability to change successfully (Rollnick et al., 1999). Readiness to change, however, is more than the sum of these two qualities; for example, someone with high confidence and a high level of perceived importance still might not see the behavior change as a top priority or be ready to make changes (Miller & Rollnick, 2002).

Role of Readiness to Change in Pediatric Obesity Interventions

Although the transtheoretical model is not an intervention in and of itself, it does have clinical implications. Specifically, the transtheoretical model posits that treatment outcomes will likely be impacted by a patient's level of readiness to change. As discussed previously, family-based, behavioral pediatric obesity interventions have been the most extensively studied with the best short- and long-term results (Faith & Wrotniak, 2009; Luttikhuis et al., 2009). These traditional obesity interventions are action oriented, requiring individuals to make dramatic behavior changes in order to lose weight. Two core components are recommended for pediatric obesity interventions in an effort to create a negative energy balance necessary for weight loss; those components are changes in dietary behavior and increased physical activity (Barlow & The Expert Committee, 2007).

Therefore, the transtheoretical model has important clinical implications for understanding effectiveness of the empirically supported approach of family-based behavioral interventions. The model suggests that high levels of readiness to change will likely predict positive treatment outcome and it suggests that without high levels of readiness to change,

patients are vulnerable to unsuccessful treatment outcomes. Therefore, the first important implication is that readiness to change can have a significant impact on which treatment approach a clinician recommends. Another implication is that parent readiness to change is also important because research has shown that family-based behavioral interventions have the most effective short- and long-term results (for reviews, see Faith & Wrotniak, 2009 and Luttikhuis et al., 2009).

Implications for treatment approach. Clinicians might respond in several ways to a patient with low readiness to change. If standard care is a behavioral, action-oriented intervention, they may not recommend participation at this time. They could either develop an intervention that engages the patient in a way that complements his/her stage of change or use a motivational intervention to facilitate movement toward higher levels of readiness to change.

An intervention tailored to address barriers shared by individuals with similar levels of readiness to change is known as a *stage-matched* intervention. The transtheoretical model argues that patients at the same level of readiness to change are struggling with similar barriers that interfere with making behavioral changes and are unique to their particular stage of change. Therefore, an intervention could be implemented at a group or individual level to address the common barriers unique to a particular level of readiness to change (Weinstein et al., 1998). For example, behavioral change interventions should result in optimal treatment outcome for individuals in the action stage, whereas therapies aimed at education or encouraging insight might produce better results for clients in the contemplation stage (Prochaska & DiClemente, 1982). More specifically, individuals in early stage of change for exercise are typically characterized by low motivation because they perceive low benefits from exercise or few negatives from lack of exercise; therefore, their intervention would focus on education about

exercise benefits to increase readiness to change (Blissmer & McAuley, 2002). In contrast, someone in the action stage would benefit from behavioral strategies to reinforce continued exercise behavior (Blissmer & McAuley, 2002).

Although the evidence is not conclusive, a review of the literature reported general support for increased effectiveness with exercise interventions that are tailored to the patient's stage of change compared to traditional action-oriented interventions (Spencer et al., 2006). Furthermore, one study found that when interventions are mismatched (contemplators purposely given action-oriented messages and materials), participants had poorer outcomes than those in a stage-matched intervention and in the control group (Blissmer & McAuley, 2002). Additionally, Spencer et al. (2007) reviewed research on the transtheoretical model constructs and dietary behavior, primarily with adult samples. They concluded that there is strong empirical support for the application of the transtheoretical model and readiness to change in assessing and treating dietary behavior and intake. In particular, the reviewers noted that stage-based dietary interventions were especially beneficial in increasing fruit and vegetable consumption and reducing dietary fat intake.

Although the pediatric literature in stage-matched interventions is sparse, findings support their use for treatment of pediatric obesity. Frenn, Malin, and Bansal (2003) used a quasi-experimental design to compare a stage-based tailored intervention to classroom education for increasing a low-fat diet and exercise in a population of 12- to 17-year-olds. Results indicated that the intervention aimed at the adolescents' stage of change resulted in improved diet and exercise behavior when compared to that of the control group. Another study of obese 8- to 12-year-old children showed that children in a stage-matched intervention had significant reductions

in BMI and a significant increase in vigorous physical activity compared to those of a typical-care control group (Crabtree, Moore, Jacks, Cerrito, & Topp, 2010).

A second way readiness to change can be considered in treatment approach is for the clinician to first implement a motivational intervention for individuals with low levels of readiness to change. In other words, treatment would focus on increasing readiness to change in order to help the patient enter the action stage before attempting behavioral pediatric-obesity interventions. In fact, The Expert Committee concluded that part of a clinician's task is to motivate families struggling with pediatric obesity, rather than to prescribe behavior changes to a family who is not ready to change (Barlow & The Expert Committee, 2007).

One readiness to change focused intervention, known as *motivational interviewing*, has garnered a great deal of research and clinical attention. Motivational interviewing has been considered an area of growth both in clinical practice and in research, particularly in pediatric primary-care settings (Ivers-Landis & Witherspoon, 2009). Consistent with The Expert Committee's recommendations, studies have begun to test motivational interventions in obese youth. For example, Resnicow, Taylor, Baskin, and McCarty (2005) conducted motivational interviewing interventions with overweight adolescent African American girls. Although reductions in BMI were not statistically significant, pediatric-obesity interventions with youth are often considered successful when there is BMI maintenance, as opposed to continued weight gain. In another study, motivational interviewing was used as an intervention in a primary-care setting for overweight children (Schwartz et al., 2007). Consistent with findings by Resnicow et al., there were slight nonstatistically significant reductions in BMI over 6 months, but participants did maintain BMI, which is considered a successful initial outcome in youth. More recently, a study applied motivational interviewing in a school-based obesity-prevention program

(Flattum, Friend, Neumark-Sztainer, & Story, 2009). The intervention utilized individual motivational interviewing sessions and reported they were helpful with participation and goal setting (Flattum et al., 2009).

Although only a few studies have applied motivational interventions in pediatric-obesity prevention and treatment, data suggest that this method is feasible, but efficacy of the intervention is still unclear (Flattum et al., 2009; Resnicow, Davis, & Rollnick, 2006; Rollnick, Miller, & Butler, 2007; Schwartz et al., 2007). A review of the studies that have applied motivational interviewing to the prevention and treatment of pediatric obesity concluded that the evidence base is beginning to emerge, but that research needs to examine further how effective it is for varying populations (Resnicow et al., 2006).

Implications for parent readiness to change. Another implication for the transtheoretical model on the practice of family-based behavioral interventions is that parents' levels of readiness to change may be just as important, if not more important, than the children's. Some researchers have even argued that the parents are the primary agent of change in children's obesity interventions (Golan, 2006). Surprisingly, only a few studies have examined parents' readiness to change, given the important role parents play in the progression and treatment of pediatric obesity (Dolan & Faith, 2007). A survey of practitioners cited lack of parental motivation and lack of parental involvement as the most common barriers to successful pediatric obesity intervention (Story et al., 2002). School nurses also have recognized the importance of assessing parents' readiness to change in childhood obesity assessment and treatment (Howard, 2007). A review by Ward-Begnoche et al. (2008) emphasized the influence of parents on treatment, particularly the modeling of diet and physical activity, as well as parenting style when

monitoring food intake, provision of and attitudes toward food choices at home, and parent perceptions of neighborhood safety when encouraging children to engage in physical activity.

Furthermore, an examination of general trends in the concordance between parent and child readiness to change could prove useful. This information could be helpful to clinicians in assessing not only readiness to change in the individuals, but also the dynamic interaction of family members participating in treatment. Examining the concordance between parent and child readiness to change can help clinicians better understand the family dynamics. There may even be factors, such as the child's age or weight, that moderate the relation between parent and child readiness to change.

The role of parents needs to be considered in a developmental context because the importance of parent involvement varies with the age of the child (Barlow & The Expert Committee, 2007; Jelalian & Hart, 2009). The Expert Committee recommended that assessment of parental readiness to change is essential for young children, and although parental support can be helpful for adolescents, adolescents' motivation is the most essential component of successful intervention at this age (Barlow & The Expert Committee, 2007). Further indicating the importance of developmental considerations, one study found that average-weight and overweight 10- to 14-year-olds reported higher levels of readiness to change their nutritional and physical activity if recommended by a physician than did 15- to 18-year-olds (Taveras et al., 2007). This finding may speak to the reduced influence of adults when children reach adolescence. Consistent with these findings, Uzark, Becker, Dielman, and Rocchini (1987) reported that parental health beliefs were not predictive of an early adolescent's weight-loss response to a behavioral intervention. They attributed this finding to the adolescent

developmental transition toward increasing independence, including the ability to self-control many of their eating and exercise behaviors (Uzark et al., 1987).

Factors Related to Readiness to Change in Pediatric Obesity

Given the importance of readiness to change and amount of current research focusing on increasing intervention effectiveness, it is also vital that researchers identify factors, such as demographic or psychosocial variables, predictive of readiness to change. In fact, DiClemente (1999) acknowledged that research has contributed to the understanding of motivation and treatment outcomes; however, future research should focus on predictors of readiness to change. Identifying variables related to readiness to change might highlight additional targets for intervention, inform efficient and effective treatment recommendations, and inform future research models.

Since DiClemente's call to action in 1999, some studies have begun to examine factors that predict variation in readiness to change, and the most substantial literature on these topics involves treatment of substance abuse (Battjes, Gordon, O'Grady, Kinlock, & Carswell, 2003; Breda & Heflinger, 2004; Broome, Joe, & Simpson, 2001; Melnick, De Leon, Hawke, Jainchill, & Kressel, 1997; Slesnick et al., 2009). Although substance-abuse treatment does not typically involve children, the growing literature on adolescent substance-abuse treatment and readiness to change can inform hypotheses about predictors of readiness to change in pediatric obesity treatment. Given the sparse literature on factors related to readiness to change in pediatric obesity, some potentially important variables will be explored in the context of a larger literature on adolescent readiness to change substance-abuse behaviors and also of the broader pediatric-obesity literature.

One finding from adolescent substance-abuse populations might inform several hypotheses about readiness to change in obese pediatric populations. Research suggests that the most robust predictor of adolescents' readiness to change is negative consequences of substance use, such as general, emotional, or legal problems caused by substance use (Battjes et al., 2003; Breda & Heflinger, 2004). The only negative consequence not associated with readiness to change is pressure to enter treatment, which could come from legal system, family, or school (Battjes et al., 2003; Broome et al., 2001). In pediatric obesity, negative consequences could be defined in many different ways (e.g., impaired health-related quality of life, negative peer interactions). Therefore, severity of negative consequences, along with other research findings, will be considered to inform hypotheses about demographic and psychosocial variables and their relation to child and parent readiness to change.

Demographic factors. Generally, for adolescents entering substance-abuse treatment, demographic variables, such as age, gender, and race, apparently are not related to readiness to change (Battjes et al., 2003; Breda & Heflinger, 2004; Slesnick et al., 2009). However, the overrepresentation of pediatric obesity in low socioeconomic status groups and racial minority groups supports a further investigation of these variables in this population.

Child age. One might assume that severity of negative consequences, from either pediatric obesity or adolescent substance use, is likely to increase with age, which suggests that both older children and parents of older children will have higher levels of readiness to change. In fact, one study found a statistically significant positive relation between age and readiness to change in a sample of adolescent substance users (Breda & Heflinger, 2004).

Pediatric-obesity researchers have yet to examine how the child's age is related to the child's readiness to change; however, there has been some investigation of the parents' readiness

to change and its relation to the child's age. For example, Rhee, DeLago, Arscott-Mills, and Mehta (2005) focused on parents of 2- to 12-year-olds because of the importance of parental involvement during that developmental period. They found that parents of older children, between the ages of 8 to 12 years, were significantly more likely to be in the preparation or action stage of change than were parents of younger children.

In summary, there is reason to believe that child age might have important connections to both child and parent readiness to change in obese youth and should be further examined. Unlike other demographic variables, which typically do not change (e.g., gender, race), the child's age is a fluid demographic variable; therefore, knowledge about the connection between this variable and readiness to change might inform the timing of treatment recommendations. If pediatric obesity trends parallel substance use research findings, one might expect a positive relation between age and child readiness to change. Furthermore, findings by Rhee et al. (2005) suggest that parents with older children will have higher levels of readiness to change.

Gender. Cultural messages that associate thinness with beauty are pervasive in American culture, and pressure is particularly strong for women to obtain and maintain an "ideal" body size. Cultural socialization is promoting an increasingly thinner ideal body size. This can contribute to body dissatisfaction, defined as a discrepancy between one's own mental representation of their size, known as body image, and one's ideal body size (Slade, 1994). The cultural messages of a thin ideal body size likely impacts not only parents, but also young children. In fact, weight-related stigma has been identified in children as young as 7 to 11 years old (Hill & Silver, 1995; Ricciardelli & McCabe, 2001; Shapiro, Newcomb, & Loeb, 1997; Tiggemann & Wilson-Barrett, 1998).

A review by Ricciardelli and McCabe (2001) concluded that girls aged 8 years and older have significantly more body-image concerns than do boys. Whether gender differences exist in children younger than 8 years is not clear; The lack of significant findings in younger children may be due to the use of assessment tools are not sufficiently sensitive for this age group. Another possible explanation is that very young children do not internalize cultural messages about thinness until the ages of 8 to 10 years, which is the broad conclusion among researchers (Gardner, Sorter, & Friedman, 1997; Ricciardelli & McCabe, 2001; Thelen, Powell, Lawrence, & Kuhnert, 1992).

Because body-image disturbance is a component of an eating-disorder diagnosis, such as anorexia nervosa or bulimia nervosa, researchers have focused mostly on body dissatisfaction as an underlying cause of eating disorders. There is, however, also some discussion about the role of body-image satisfaction in obesity treatment because being dissatisfied with one's body size might serve as motivation to lose weight. Although over-stigmatizing obese individuals is not helpful, Heinberg, Thompson, and Matzon (2001) suggest that a mild to moderate amount of dissatisfaction with weight might motivate healthy weight-loss behaviors. Although researchers have not investigated this phenomenon in obese youth, they may find that girls may have higher levels of readiness to change because girls have higher levels of body dissatisfaction than boys. In the context of American culture and socialization of thinness, parents are also likely to be influenced by these messages, which could lead parents of girls to have higher levels of readiness to change because they perceive the problem as significant. Clearly, gender is an important variable to examine in obese youth and could be related to readiness to change.

Race. Research indicates that cultural definitions and cultural social consequences of healthy weight vary. For example, Kimm et al. (1997) found that obesity was associated with lower self-esteem for both African American and European American 9- to 10-year-old girls, but social acceptance was negatively correlated with obesity only for European American girls. Another study found that obese Mexican children were no more likely to be rejected or isolated from peers than were their average-weight peers (Brewis, 2003). This finding suggests that social pressure to maintain a healthy weight may be lower in racial minority groups, such as African Americans, than in European Americans. Some research has suggested that subjective social norms can influence a person's intention to engage in health-related behavior change (Godin & Kok, 1996). Thus, those in racial minority groups that are more accepting of larger body sizes may feel less social pressure to maintain a healthy weight and less perceived importance for weight loss.

Child and parent Body Mass Index (BMI). One factor that might be related to readiness to change is BMI, which in pediatric obesity might represent the severity of the problem. A functionally comparable construct in substance-use populations is severity of drug use, defined in some research by such components as length of use, frequency of recent use, prior substance abuse treatment, or use of substances other than alcohol and marijuana (Battjes et al., 2003). Similar to findings with adults, one study found that adolescents' substance-use severity was positively associated with readiness to change as the adolescents entered treatment (Slesnick et al., 2009). Although another study found that severity of substance use did not predict adolescents' readiness to change, the authors suggested that as adolescents continue substance use over time, the frequency of negative consequences increases. This suggestion helps explain

why severity and readiness to change may not be consistently correlated in adolescents, but a significant relation is seen in adult populations (Battjes et al., 2003).

In obese youth, the research indicates that negative consequences are present in childhood, such as discrimination from peers and adults (Latner & Stunkard, 2003; Puhl & Latner, 2007) and impaired health-related quality of life (Janicke et al., 2007; Schwimmer, Burwinkle, & Varni, 2003; Zeller, Roehrig, Modi, Daniels, & Inge, 2006). It is possible that children who are severely obese (above the 99th percentile for BMI) have more negative consequences, which suggests that higher BMI might be associated with higher levels of child readiness to change. This possible connection is supported by evidence that higher BMI is associated with higher levels of youth readiness to change exercise behavior (Taveras et al., 2007). In obese youth, researchers should consider how severity might be related to parent readiness to change. Rhee et al. (2005) found that parents had a 4.54 greater chance of being in the preparation or action stage of change if their child's BMI was above the 95th percentile, as compared to parents of children with BMI between the 85th to 94th percentiles.

A characteristic unique to youth entering treatment for obesity is that there is a significant chance that the parent is also obese, which is important to consider when examining the parent's readiness to change. Results suggest that parents' history of obesity may negatively impact their self-efficacy in helping overweight children make behavior changes. Taveras, Mitchell, and Gortmarker (2009) conducted a study that focused on the self-efficacy component of readiness to change and confidence in making behavior changes in 446 parents of overweight (BMI above the 85th percentile) 2- to 12-year-olds. The researchers found that parents with a BMI less than 25 kg/m² reported higher levels of confidence to implement behavior changes, such as limiting

television, encouraging physical activity, and reducing sweetened-beverage and fast-food intake (Taveras, Mitchell, & Gortmaker, 2009).

Family income. Another important cultural variable in obese youth is the context of poverty and socioeconomic status, which can be roughly estimated by family income. In the context of poverty, child weight and eating behaviors may carry different meanings. To illustrate, low-income mothers of young children are more likely than higher income peers to endorse the belief that a heavy child is a healthy child (Baughcum, Burklow, Deeks, Powers, & Whitaker, 1998), that a child can outgrow overweight status, or that a child is not overweight unless he or she is inactive or has social problems in school (Jain et al., 2001). Thus, similar to expectations regarding race, one might expect that cultural definitions of healthy body size might influence readiness to change in children and parents of different socioeconomic status. More specifically, lower income families may perceive lower importance of weight loss in obese children.

Furthermore, economic barriers to changing eating and physical-activity behaviors might reduce one's confidence and sense of self-efficacy. For example, lower income families are challenged by the cost of healthy food options, subsidized school lunches with low nutritive value, expense of participating in organized sports, limited access to recreational facilities, and concerns about children's outside activity in unsafe neighborhoods (Ward-Begnoche & Thompson, 2008). The combination of lower perceived importance and significantly more barriers to behavior change may lead to lower levels of readiness to change in lower income families of obese youth.

Psychosocial factors.

Health-related quality of life. Obesity is associated with a young person's health-related quality of life, and impaired quality of life can be conceptualized as a global measure of negative consequences resulting from pediatric obesity. Health-related quality of life is a multidimensional construct that assesses the impact of health on a number of dimensions, including physical functioning, social functioning, psychological functioning, overall life satisfaction/well-being, and perceptions of health status (Naughton & Shumaker, 2003; Testa & Simonson, 1996). The construct is patient centered in that it captures the individual's perceptions about physical health status and psychosocial functioning, as well as level of enjoyment or social satisfaction (Eiser & Morse, 2001; Palermo et al., 2008). In a study of 5- to 18-year-olds with obesity, results indicated that youth had low health-related quality of life similar to that of children diagnosed with cancer and well below the health-related quality of life for children of a healthy weight (Schwimmer et al., 2003). This finding has been supported in other studies of pediatric clinical samples (children seeking obesity-related treatment or evaluation), in which health-related quality of life impairments were found globally and also across a number of specific domains (Janicke et al., 2007; Schwimmer et al., 2003; Zeller et al., 2006). Thus, health-related quality of life is a potentially important variable to consider when examining readiness to change in pediatric patients with obesity and in their parents. If this construct parallels severity of negative consequences in substance abuse, it suggests that more impairment in health-related quality of life will be related to higher levels of readiness to change in children and parents.

Internalizing behavior (depression and social anxiety). In the pediatric obesity literature, depression has been one of the most frequently studied psychological internalizing disorders. A review by Wardle and Cooke (2005), which incorporated findings from a review

completed 10 years earlier (Friedman & Brownell, 1995), concluded that there is negligible to modest evidence for a link between pediatric obesity and depression, but there has been criticism that studies have been inconsistent in their choice of measurement tools, their criteria for determining clinical significance (Jelalian & Hart, 2009), and their samples (e.g., clinical vs. community, high vs. low severity of obesity; (Ringham, Levine, & Marcus, 2009).

However, in clinical samples of obese youth and epidemiological studies, researchers have found the prevalence of depressive symptoms significantly exceeds population norms (Britz et al., 2000; Erermis et al., 2004; Jelalian & Hart, 2009; Vila et al., 2004; Zeller, Saelens, et al., 2004). One can assume that some children enter obesity treatment with clinically significant depressive symptoms that may interfere with their ability to fully participate in treatment. For example, symptoms of clinical depression can include loss of energy and diminished pleasure in activities, which could contribute to a more sedentary lifestyle. Additionally, clinical depression also can include changes in eating habits, such as emotional eating behavior or increased appetite, which could prove challenging for dietary adherence. Possibly because of the identified symptoms, or other factors, there is some indication that depressive symptoms are a predictor of poor adherence to weight management interventions, suggesting that psychological distress may interfere with treatment success (White et al., 2004; Zeller, Kirk, et al., 2004). Thus, it is important to examine if readiness to change and depression are related in obese youth seeking treatment.

Given the stigma associated with pediatric obesity, even in young children, considerable research has examined whether obese youth are at risk for impaired social functioning and other internalizing disorders, such as social anxiety. Social functioning in overweight youth has garnered considerable research attention, with a focus on peer relationships (Jelalian & Hart,

2009). Previous studies have also revealed significantly lower scores on the Child Behavior Checklist (CBCL; Achenbach, 1991a; Achenbach & Rescorla, 2001) Social Competency subscale, and these differences remain significant when corrected for age, sex, and socioeconomic status (Vila et al., 2004). Similarly, obesity severity has been found to predict higher scores on the CBCL Social Problems subscale in a sample of 5- to 10-year-old children, with very obese children in the *at-risk* range for social problems (Young-Hyman, Schlundt, Herman-Wenderoth, & Bozylinski, 2003). Studies that have not found significant levels of anxiety in overweight and obese youth often focus more on general anxiety, using instruments such as the Symptom Checklist Revised-90 (SCL-90; Derogatis, 1992), Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 1992), or State-Trait Anxiety Inventory for Children (STAIC; Spielberger, Edwards, Lushene, Montuori, & Platzek, 1973) instead of measuring social aspects of anxiety that obese youth are more likely to experience (Lamertz, Jacobi, Yassouridis, Arnold, & Henkel, 2002; Tanofsky-Kraff et al., 2004; Zeller, Saelens, et al., 2004). It appears that such an investigation of social anxiety in obese children has yet to be undertaken, and its relation with readiness to change in the families should be examined. Although depression research has been more common in pediatric obesity, anxiety disorders seem to be one of the most frequent disorders in obese youth, particularly separation and social anxiety, and they may interfere with motivation and treatment success (Vila et al., 2004), which suggests that higher levels of social anxiety could be associated with lower levels of readiness to change.

In the substance-abuse literature, the exact nature of the relation between general internalizing symptoms and readiness to change is not yet clearly understood. One could argue that a moderate level of psychological distress is associated with higher levels of readiness to change, but when internalizing symptoms reach a threshold of clinical significance,

psychological distress is associated with lower levels of readiness to change. For example, mild, subclinical symptoms of psychological distress (depressive, anxiety, and somatic symptoms) were positively related to motivation in a sample of adolescents entering substance abuse treatment (Battjes et al., 2003). Consistent with these findings, another study found that subclinical depressive symptoms predicted higher levels of readiness to change than did few to no depressive symptoms (Slesnick et al., 2009). However, when internalizing symptoms were elevated beyond the threshold of clinical significance, adolescent substance users had lower levels of readiness to change than those of participants with nonclinically elevated scores (Breda & Heflinger, 2004). Clearly, depression and other dysfunctions are important areas to consider when evaluating readiness to change, and the relation may be more complex than a linear correlation.

Externalizing behavior. In the adolescent-substance abuse treatment literature, some researchers have acknowledged the importance of externalizing behaviors (e.g., conduct disorder, deviant peer groups, and aggression) in understanding adolescents' readiness to change because partaking in these behaviors usually leads to consequences that might impact one's readiness to change. One study found no significant relation between readiness to change and aggressive behavior or conduct disorder symptoms in adolescents entering substance-abuse treatment; however, the authors acknowledged that measures might not have been sensitive to nuances of these behavior patterns (Battjes et al., 2003). Others have found a significant relation; for example, Broome et al. (2001) found that having a more deviant peer group, which likely means more negative consequences, was positively related to readiness to change. In contrast, another study found that illegal activity within the 90 days prior to entering treatment was negatively associated with readiness to change (Battjes et al., 2003), possibly because it resulted

in external pressure to enter treatment, a factor that is negatively associated with readiness to change. In short, engaging in externalizing behavior typically has consequences that might impact levels of readiness to change.

Although not as extensively studied as the relation between obese youth, depression, and social functioning, obese youth might also be at risk for externalizing difficulties, such as aggression or oppositional behavior. Furthermore, it is possible that although externalizing behavior may have negative consequences for substance-abusing youth, it could function as positive reinforcement in obese youth. In one study, Mustillo et al. (2003) found that chronically obese children were at higher risk than average-weight children for oppositional defiant disorder, but not conduct disorder; they defined chronically obese as those participants who had BMI at or above the 95th percentile at multiple assessment points over the course of an 8-year longitudinal study. Young-Hyman et al. (2003) found that BMI was positively correlated with parent ratings of child aggressive behavior on the CBCL; however, the scores were not in the clinically significant range. A study by Janssen, Craig, Boyce, and Pickett (2004) found that overweight 15- to 16-year-olds were more likely than average-weight children to be bully-perpetrators, which included both physical and relational bullying of peers; this finding was not apparent in children ages 11 through 14 years. They concluded that obese youth might be using their large physical stature to demonstrate social dominance over peers (Janssen et al., 2004). If large physical stature is reinforcing for obese youth, it could potentially interfere with their motivation to engage in weight loss intervention. Although the use of large physical stature to demonstrate social dominance has not been investigated closely, externalizing and aggressive behavior might prove valuable to examine in order to determine whether these factors related to readiness to change in the patients or their parents.

Summary, Purpose, Objectives, Specific Aims, and Hypotheses

Pediatric obesity is a serious public health concern, therefore, healthcare providers must understand factors that support or interfere with effective treatment. Readiness to change in both children and parents is a critical construct to consider in treatment; in fact, readiness to change has been identified as an important area for clinicians who are assessing and making treatment recommendations for obese youth (Barlow & The Expert Committee, 2007). The clinical practice and research of effectiveness of intervention approaches, such as motivational interviewing and stage-matched interventions, is growing rapidly, but it is also important to understand how relevant factors are related to readiness to change. Better understanding of how these factors are related might highlight additional targets for intervention, inform efficient and effective treatment recommendations, and guide future research models. Therefore, the purpose of this study was to increase understanding of both parent and child readiness to change in obese youth by examining associations between these constructs and both demographic variables and psychosocial functioning. The objectives, specific aims, and hypotheses of the study were as follows:

Objective #1. Examine factors related to child readiness to change.

Specific aim #1a and hypotheses. Examine associations between demographic factors (i.e., child age, child gender, child race, child BMI, parent BMI, and family income) and child readiness to change.

Age and child readiness to change. Based on findings that youth age was positively related to readiness to change in adolescents entering treatment for substance use (Breda & Heflinger, 2004), it was hypothesized that there would be a significant positive correlation between child age and child readiness to change.

Gender and child readiness to change. Given data that girls tend to have significantly more body-image concerns than do boys (Ricciardelli & McCabe, 2001), and the suggestion that a mild to moderate amount of dissatisfaction with weight might motivate healthy weight-loss behaviors (Heinberg et al., 2001), it was hypothesized that girls would report higher levels of readiness to change than those reported by boys.

Race and child readiness to change. Research suggests that African Americans are more accepting of larger body sizes than are European Americans (Kimm et al., 1997), which could affect the perceived importance of losing weight. Therefore, it was hypothesized that European American children would report higher levels of readiness to change than those reported by African American children.

Child BMI and child readiness to change. It was hypothesized that child BMI would be positively correlated with child readiness to change based on data suggesting that higher BMI is associated with youth readiness to change exercise behaviors (Taveras et al., 2007).

Parent BMI and child readiness to change. Given lack of data in this area, no hypotheses are posited for the exploratory analyses to examine the relation between parent BMI and child readiness to change.

Family income and child readiness to change. Evidence suggests that low socioeconomic status, which can be roughly estimated by family income, is associated with the belief that heavier children are healthier (Baughcum et al., 1998) or that obesity should be measured not by BMI but by level of inactivity or social problems at school (Jain et al., 2001). These findings suggest that lower income families may perceive weight loss as less important. This suggestion, in combination with economic barriers to healthy behavior changes in diet and physical activity (Ward-Begnoche & Thompson, 2008), led to the hypothesis that lower income

families would have lower levels of child readiness to change than those of higher income families.

Specific aim #1b and hypotheses. Examine relation of child readiness to change and the child's psychosocial functioning (i.e., health-related quality of life, social anxiety, depression, internalizing behavior, externalizing behavior) above and beyond significant demographic predictors.

Health-related quality of life and child readiness to change. Driven by data that suggest that health-related quality of life is impaired in obese children (Janicke et al., 2007; Schwimmer et al., 2003; Zeller et al., 2006), a construct that parallels severity of negative consequences in substance abuse, it was hypothesized that lower child health-related quality of life would be associated with higher levels of child readiness to change.

Internalizing behavior (depression and social anxiety) and child readiness to change. It was hypothesized that internalizing problems, including depression and social anxiety, would have a curvilinear (inverted u-shape) relation with child readiness to change. Specifically, high and low depression or social anxiety would be associated with low levels of readiness to change, and moderate symptoms would be associated with high levels of readiness to change. This hypothesis was based on findings in the substance-abuse literature suggesting possible evidence of a curvilinear relation between internal psychological distress (Battjes et al., 2003; Breda & Heflinger, 2004; Slesnick et al., 2009) and research suggesting that depression (White et al., 2004; Zeller et al., 2004) and social anxiety (Vila et al., 2004) may interfere with obesity-treatment motivation and success.

Externalizing behavior and child readiness to change. It was also expected that externalizing behavior would be negatively related to child readiness to change given data indicating that obese youth might use their large physical stature to demonstrate social dominance over peers (Janssen et al., 2004).

Objective #2. Examine factors related to parent readiness to change.

Specific aim #2a and hypotheses. Examine associations between demographic factors (i.e., child age, child gender, child race, child BMI z-score, parent BMI, and family income) and parent readiness to change.

Age and parent readiness to change. Consistent with previous research, it was hypothesized that parents' readiness to change would be positively correlated with their child's age (Rhee et al., 2005).

Gender and parent readiness to change. Given that cultural messages valuing thinness are commonly directed at women, it was hypothesized that parents of girls compared to parents of boys would perceive obesity as a greater problem and increase levels of readiness to change.

Race and parent readiness to change. Research suggests that African Americans are more accepting of larger body sizes than are European Americans (Kimm et al., 1997), and therefore this acceptance could affect the perceived importance of losing weight. Therefore, it was hypothesized that parents of European American children would report higher levels of readiness to change than those reported by parents of African American children.

Child BMI and parent readiness to change. Consistent with previous research, it was hypothesized that child BMI would be positively correlated with parent readiness to change (Rhee et al., 2005).

Parent BMI and parent readiness to change. It was expected that parent BMI would be negatively correlated with parent readiness to change because research has indicated that overweight parents report lower levels of confidence than those reported by average-weight parents in implementing dietary and exercise behavior changes with their children (Taveras et al., 2009).

Family income. Similar to cultural differences between racial groups, there is evidence that low socioeconomic status, which can be roughly estimated by family income, is associated with the belief that heavier children are healthier (Baughcum et al., 1998) or that obesity should be measured by level of inactivity or social problems at school (Jain et al., 2001). Moreover, there are economic barriers that low-income families may face that interfere with healthy lifestyle choices (Ward-Begnoche & Thompson, 2008). Thus, it was hypothesized that lower income families would have lower levels of parent readiness to change than those reported by higher income families.

Specific aim #2b and hypotheses. Examine relation between parents' readiness to change and parents' report of their child's psychosocial functioning (i.e., health-related quality of life, internalizing behavior, and externalizing behavior) above and beyond significant demographic variables.

Health-related quality of life. Driven by data that suggest impaired health-related quality of life in obese children (Janicke et al., 2007; Schwimmer et al., 2003; Zeller et al., 2006), a construct that parallels severity of negative consequences in substance abuse, it was hypothesized that parent report of lower child health-related quality of life would be associated with higher levels of parent readiness to change.

Internalizing behavior. Given the lack of prior research examining parent readiness to change and children's internalizing behavior, analyses examining child depression and social anxiety and parent readiness to change are exploratory in nature.

Externalizing behavior. Given the dearth of study of parent readiness to change and children's externalizing behavior, these analyses are exploratory in nature.

Objective #3. Examine general trends in the concordance between parent and child readiness to change.

Specific aim #3 and hypotheses. Examine consistency between parents' readiness to change and the child's readiness to change. The research to date has not examined the relation between parent and child readiness to change, thus exploratory analyses were planned to test for possible correlation between the two variables, and then for the possible moderating effects of demographic variables (i.e., age, gender, race, child BMI, parent BMI, family income), which were significant in analyses for specific aims #1a and #2a.

Objective #4. Conduct exploratory analyses to further examine child and parent readiness to change.

Specific aim #4 and hypotheses. Exploratory analyses were planned to examine individual items or subsets of items from the Parent or Child Readiness to Change questionnaire that may be driving significant findings from analyses for objectives #1 and #2. As these measures have not been previously investigated, no hypotheses were established.

Table 1

Stages of Change Model

Stage of change	Patient characteristics
Precontemplation	No intention to change in next 6 months Often avoidant of discussing or thinking about problem behavior May not perceive behavior as a problem May not feel capable of making change (low self-efficacy)
Contemplation	Not ready to change yet, but thinking about changing in next 6 months Usually ambivalent about perceived importance of making changes
Preparation	Getting ready to change in the next month Usually made some change in past year Usually have a plan for behavior change
Action	Made specific changes within the last 6 months Action must be clinically significant to reduce health risk
Maintenance	Working to maintain behavior change/prevent relapse Usually less tempted to relapse Usually more confident in ability to maintain behavior changes Estimated to last 6 months to 5 years
Termination	Zero temptation to engage in previous problematic behavior 100% confident can maintain behavior change in any circumstances (self-efficacy)

Note. Information from Prochaska & Velicer, 1997

Method

Data for this study come from a larger investigation of emotional and behavioral correlates of obese youth, which was conducted at University of Arkansas for Medical Sciences. The larger study was approved by the University of Arkansas for Medical Sciences Institutional Review Board, and the current study was approved by the Georgia State University Institutional Review Board.

Participants

Participants included 228 7- to 17-year-olds ($M = 11.58$, $SD = 2.85$) presenting at the Fitness Clinic at Arkansas Children's Hospital in Little Rock, Arkansas, and their parents. A statewide BMI assessment through the Arkansas public schools showed that prevalence of pediatric obesity in the state is above the national average. In Arkansas, 20.4% of children were categorized as obese, defined as at or above the 95th percentile, compared to 16% of children in a national survey (Arkansas Center for Health Improvement, 2009; Ogden et al., 2008). The Fitness Clinic is a multidisciplinary treatment facility for pediatric obesity that includes medical, psychological, and nutritional services. The clinic treats approximately 450 patients annually, almost all of whom have a BMI greater than the 95th percentile for their age and sex group. In addition to the participant characteristics, which are summarized in Table 2, parents were asked to report if their child had a comorbid medical condition. The most commonly reported medical problems were breathing conditions, such as asthma ($n = 52$, 22.8%). Pain conditions were endorsed by 12.7% of the sample ($n = 29$). Other medical problems reported by the sample included stomach conditions ($n = 17$, 7.5%), diabetes ($n = 6$, 2.6%), bone conditions ($n = 5$, 2.2%), brain conditions ($n = 2$, 0.9%), liver conditions ($n = 2$, 0.9%), and reproductive conditions ($n = 1$, 0.4%). An additional 9.2% ($n = 21$) of the sample endorsed other medical conditions

(e.g., attention deficit-hyperactivity disorder and allergies). Medical staff from the clinic indicated that parents might have underreported the prevalence of medical conditions; however, researchers were not authorized to retrieve clinical information from participants' medical charts, so the true prevalence of medical comorbidities is unknown.

All new patients, ages 6 to 17 years, presenting at the Fitness Clinic during the period of data collection were eligible for enrollment ($n = 380$). Exclusion criteria was if primary caregiver was absent, if child or parent had insufficient reading ability to complete the measures as assessed by difficulty completing standard clinic paperwork or difficulty reading the informed consent document, or if child or parent was not sufficiently proficient in English to complete the measures. The data were collected over an 18-month period from 2007 to 2008.

Of the 380 new patients available during data collection, 249 participated in the study. There were 131 patients who were ineligible for the following reasons: outside of 6- to 17-year old age range ($n = 35$, 26.7%), primary caregiver was not present ($n = 13$, 9.9%), parent had insufficient reading ability ($n = 8$, 6.1%), or parent was not proficient in English ($n = 12$, 9.2%). Additionally, 39 patients declined to participate (29.8%), and 24 patients were not included for other reasons (18.3%), such as the researcher did not have time to approach patient, patient was mislabeled as a new patient when actually he/she was a follow-up patient, or patient was seen for medical issue other than pediatric obesity. Some of the measures central to the current study were not validated for children under the age of 7; therefore, 16 participants were excluded from analyses because they were 6 years old. An additional 5 participants were excluded because their BMI did not exceed the 95th percentile. Therefore, the current sample included 228 participants.

Measures

Body Mass Index (BMI). BMI is defined as weight (kilograms)/height² (meters²).

However, given the physical development of children, considering BMI in the context of age- and sex-normed references, such as the BMI percentile or *z*-score was more clinically useful. The CDC Epi Info™ (Dean et al., 2008) computer program was used to calculate each participant's BMI percentile and *z*-score based on the CDC growth charts with age- and sex-specific norms (Kuczmarski et al., 2000). Generally, percentiles are useful in classifying pediatric obesity; however, children in this sample were bound to a range of 95 to 100; therefore, BMI *z*-scores were more sensitive for extreme BMI's because they documented a wider range of variability (Cole, Faith, Pietrobelli, & Heo, 2005). Although *z*-scores may not be the best measure of adiposity change, for example, in evaluating treatment effectiveness, they are preferred in cross-sectional research (Cole et al., 2005). BMI *z*-scores were used for data analyses focusing on obesity severity as a continuous variable.

Child Report.

Pediatric Quality of Life Inventory (PedsQL™; Varni, Seid, & Rode, 1999). The PedsQL™ Version 4.0 is a 23-item generic quality of life measure designed for children and adolescents between 2 and 18 years of age (Varni, Seid, Knight, Uzark, & Szer, 2002; Varni, Seid, & Kurtin, 2001; Varni et al., 1999). There are developmentally appropriate parent and child forms for ages 5 to 7, 8 to 12, and 13 to 18 years. Although the contents of the items are similar, the language for each version is developmentally appropriate for the specified age ranges. The current study used the PedsQL™ Child Report (ages 8 to 12 years) and the PedsQL™ Teen Report (ages 13 to 18 years). Parents and children responded to each item on a 5-point Likert scale (0 = *never a problem* to 4 = *almost always a problem*). The PedsQL™ assesses several

aspects related to quality of life, such as physical functioning, emotional functioning, social functioning, and academic functioning. Scores on the PedsQL™ are transformed to scores ranging from 0 to 100, with higher scores representing higher quality of life. In addition to having specific scaled scores, the items on the PedsQL™ are averaged to create a total scale score and two summary scores, the Physical Health summary score and the Psychosocial Health summary score. Good content, construct, convergent, and discriminant validity have been reported, along with excellent sensitivity/responsiveness to change (Varni, Seid, Knight, Burwinkle, et al., 2002; Varni, Seid, Knight, Uzark, et al., 2002; Varni et al., 2001; Varni et al., 1999). The PedsQL™ is considered a *well-established* instrument (Palermo et al., 2008). Internal consistency for the total score for this sample was adequate (Cronbach's alpha = .90). The total scale score was used in the current study.

Children's Depression Inventory (CDI; Kovacs, 1985, 1992). The CDI assesses symptoms of depression over the previous 2 weeks by self-report in children ages 7 to 17 years. Children rate their symptoms on each of the 27 items with a 3-point scale ranging from 0 (absence of symptom) to 2 (definitive symptom). The CDI yields a total depression score in addition to the following subscales: Negative Mood, Interpersonal Difficulties, Negative Self-Esteem, Ineffectiveness, and Anhedonia (Kovacs, 1985, 1992). This measure has strong validity and reliability and has been considered a well-established evidence-based assessment (Holmbeck et al., 2008). Internal consistency for the total score for this sample was adequate (Cronbach's alpha = .87). The current study used the CDI total depression *T*-score.

Social Anxiety Scale for Children-Revised (SASC-R; La Greca, 1998, 1999) and Social Anxiety Scale of Adolescents (SAS-A; La Greca, 1998, 1999). Both of these 22-item measures assess aspects of social anxiety in children and adolescents via self-report on a 5-point Likert scale. The SASC-R is normed for children ages 7 to 13 years, and the SAS-A is normed for 13- to 18-year-olds. The measure provides a total score and scores on the following three subscales: Fear of Negative Evaluation, Social Avoidance and Distress with New or Unfamiliar Peers, and Generalized Social Avoidance and Distress (La Greca, 1999, 1998). Both the SASC-R and SAS-A are considered well-established, developmentally appropriate, evidence-based assessment measures (Holmbeck et al., 2008; Morris, Hirshfeld-Becker, Henin, & Storch, 2004). Internal consistency for the total score for this sample was adequate (Cronbach's $\alpha = .92$). The social anxiety total score (*T*-score) was used in the analyses for the current study.

Youth Self-Report (YSR; Achenbach & Rescorla, 2001). The YSR provides a self-report assessment of youth behavioral and emotional functioning. The YSR was developed for children aged 11 to 18 years and has items similar to those in the CBCL, in addition to 14 validity items to assess responding in a socially desirable way. The YSR yields scores on the following scales: Activities and Social Competence; Total Competence; Internalizing; Externalizing; and Total Problems. Additionally, the YSR produces scores for eight syndromes (Aggressive Behavior, Anxious/Depressed, Attention Problems, Rule-Breaking Behavior, Social Problems, Somatic Complaints, Thought Problems, and Withdrawn/Depressed) and six Diagnostic and Statistical Manual of Mental Disorders (DSM) oriented scales (Affective Problems, Anxiety Problems, Somatic Problems, Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems, and Conduct Problems) (Achenbach, 1991b; Achenbach & Rescorla, 2001). The YSR has been

classified as a well-established evidence based assessment measure (Holmbeck et al., 2008). The current study used *T*-scores from the Internalizing and Externalizing scales.

Child Readiness to Change. Each child responded to six statements assessing various dimensions of readiness to change on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*very much*). The items were developed by Dr. Wendy Ward-Begnoche, the principal investigator of the larger study, based on the dimensions of readiness to change construct. The measure is theoretically consistent with transtheoretical model in that it assesses the child's perception of the problem and behavioral activation around behavior change. It should be noted that this measure was not constructed with the intention of identifying a participant's particular stage of change, but examines readiness to change as a continuous construct. The questions on this measure were: (a) "I think I am overweight," (b) "I am ready to change my weight," (c) "I am ready to change how and what I eat," (d) "I am ready to change how and what I do to be active," (e) "I feel I will be successful in making these changes," (f) "I am losing hope of losing weight." A Cronbach's alpha greater than .60 was considered adequate, with .60 to .69 considered minimal, .70 to .79 considered moderate, and above .80 considered exemplary (Robinson, Shaver, & Wrightsman, 1991). The last question was reverse scored and then the total score for the six questions was used, with higher scores representing a higher level of readiness to change. An exploratory factor analysis was also conducted to examine whether the measure contained conceptually and statistically unique factors.

Parent report.

Pediatric Quality of Life Inventory. (*PedsQL*TM; Varni et al., 1999). The caregivers completed the parent version of the *PedsQL*TM, which is identical to the child self-report version with question stem changes (e.g., "It is hard for my child to run," "My child has low energy").

Internal consistency for the total score for this sample was good (Cronbach's alpha = .93). For the current study, the total score was used as a generic measure of health-related quality of life.

Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). The CBCL (2001 version) is a broad parent-report assessment of behavioral and emotional functioning in 6- to 18-year-old children (Achenbach, 1991a; Achenbach & Rescorla, 2001). Parents rated their children's behavioral and emotional functioning over the previous 6 months on 118 items on a 3-point scale (*not true to very true or often true*). The CBCL yields scores on the following scales: Activities, Social, and School Competence; Total Competence; Internalizing; Externalizing; and Total Problems. Additionally it produces a *T*-score and percentile on the same eight syndromes and six DSM-oriented scales as does the YSR (Achenbach, 1991b; Achenbach & Rescorla, 2001). The CBCL is considered a well-established evidence-based assessment measure because of its strong reliability and validity and frequent use in research (Holmbeck et al., 2008). The current study used *T*-scores for the CBCL Internalizing and Externalizing scales.

Parent Readiness to Change. Each parent responded to seven questions assessing various dimensions of readiness to change on a 5-point Likert scale (*not much to very much*). The questions were developed by Dr. Wendy Ward-Begnoche, the principal investigator of the larger study, based on various dimensions of readiness to change (e.g., problem perception, commitment to behavioral change with regard to nutrition and physical activity, and self-efficacy). As with the questions assessing children's readiness to change, this measure was not constructed with the intention of identifying the participant's particular stage of change, but examined readiness to change as a continuous construct. The questions were as follows: (a) "I think my child is overweight," (b) "I think my child's weight is a problem," (c) "I am ready to change how and what my child eats," (d) "I am ready to change how and what my child does to

be active,” (e) “I feel my child is ready to make these changes happen,” (f) “I feel my child will be successful in making these changes,” and (g) “I feel I will be successful in making these changes.” A Cronbach’s alpha was used to assess the internal consistency of this self-report measure. A Cronbach’s alpha greater than .60 was considered adequate, with .60 to .69 considered minimal, .70 to .79 considered moderate, and above .80 considered exemplary (Robinson et al., 1991). The total score reflected the sum of the seven questions, with higher scores representing higher levels of parent readiness to change. An exploratory factor analysis was conducted to examine whether the measure might contain conceptually and statistically unique factors.

Procedures

New patients at the Fitness Clinic were approached for study participation by a research assistant after the patient had been escorted to a clinic exam room. Typically, an initial patient visit includes multiple appointments (e.g., medical, nutrition, psychological, and lab or fitness assessments). Children and caregivers spend roughly half of a day at the clinic, and participants completed the self-report measures during natural waiting periods between appointments. All data were reviewed by a researcher or fitness clinic staff member before participants left the clinic. Any children who endorsed suicidal ideation on the CDI ($n = 1$) discussed this issue during a diagnostic interview with a licensed psychologist, which was part of the standard intake procedure for new clients.

Results

A posthoc power analysis using computer software, G*Power (Version 3), indicated that the sample size in the current study ($N = 228$) was adequate to detect an effect size of $f^2 = .10$ with .95 power and an alpha of .05 using multiple regression analysis with eight predictors (Faul, Erdfelder, Lang, & Buchner, 2007). By convention, f^2 effect sizes of .02, .15, and .35 are considered small, medium, and large, respectively (Cohen, 1988).

Preliminary Analyses

Preliminary analyses involved several steps. First, data were examined for missing data and outliers. Owing to time limitations in the clinical setting, unwillingness to complete some questions, or inadvertently not answering a few questions, some participants did not complete all items on the questionnaires and therefore did not have complete data. The number of completed questionnaires for the main study variables is reported in Table 3. Listwise deletion was used in analyses to handle missing data, and other compensatory actions, such as imputation, were not taken. The most significant disadvantage of listwise deletion is removal of some available data, which reduces power in hypothesis testing; however, listwise deletion reduces the likelihood of Type I error (Allison, 2009). Given the exploratory nature of the current study, reducing the likelihood of type I error seemed particularly important and warranted a more conservative and conventional approach to missing data. Outliers were identified using a process recommended by Field (2005). In a standard distribution, fewer than 5% are expected to exceed a z -score ± 1.96 , fewer than 1% are expected to exceed ± 2.58 , and even fewer are expected to exceed ± 3.29 . Analyses, which identified the percentage of z -scores exceeding these numbers, did not reveal significant deviations from the expected percentages. Next, descriptive statistics were examined (e.g., means, standard deviations, frequencies) to characterize the sample (see Table 2) and study

variables (see Table 3). A correlation matrix (see Table 4) was examined to look at relations between all continuous study variables and *t*-tests and ANOVAs (see Table 5) were run to compare group differences on study variables by gender and race.

The next step of preliminary analyses was to determine the extent to which all of the continuous variables included in the study conformed to the assumptions of normality. Skewness and kurtosis statistics are reported for all study variables in Tables 2 and 3. Values of skewness and kurtosis are expected to be zero in a normal distribution. Field (2005) recommends converting the skewness and kurtosis scores to *z*-scores to determine if the distribution violates assumptions of normality. However, large samples, of 200 or more, typically have small standard errors; therefore, Field recommended a visual analysis of the shape of the distribution, as well as consideration of how far the skewness and/or kurtosis statistic is from zero. Using these guidelines, the Parent readiness to change violated the assumptions of normality (see Table 3), so this variable was transformed according to the recommendations of Tabachnick and Fidell (2007). The variable was reflected, and then a square-root transformation was applied, which significantly reduced skewness and kurtosis for Parent Readiness to Change total score. The skewness was reduced from -1.17 to 0.14, and kurtosis was reduced from 2.41 to 0.42. Therefore, in primary analyses, the transformed variable was used in analyses of parent readiness to change.

The next set of preliminary analyses focused on the measures of Child and Parent Readiness to Change. The pattern of responses to each item on the questionnaires is shown in Figures 1 and 2, and interitem correlations are reported in Tables 6 and 7. Children's responses were notable in that many children did not report being overweight, even though the sample consisted of children with BMIs above the 95th percentile, all of whom were presenting for

weight management treatment. In fact, fewer than half of the sample reported being *very* (23.7%) or *quite a bit* (25.9%) overweight, with the remaining 50.0% reporting being *not at all* to *somewhat* overweight (see Figure 1). Although half of the sample did not regard themselves as more than *somewhat* overweight, the majority of children reported that they were ready to change their weight, with 79.4% answering *quite a bit* or *very much*. Similar to the responses in the child report, many parents (38.7%) who said their child is *not at all* to *somewhat* overweight, despite having a BMI above the 95th percentile. Moreover, a substantial number of parents (44.2%) felt their child's weight was *not at all* to *somewhat* of a problem (see Figure 2). However, their expressed commitment to changing their child's eating and activity habits, as well as their sense of hopefulness and self-efficacy, was generally very high.

The two questionnaires were also examined for internal consistency. The Cronbach's alpha for the six initial items on the measure of Child Readiness to Change was .48, which was below the minimally adequate cutoff of .60 (Robinson et al., 1991). Further item analyses revealed that removing item #6 "I am losing hope of losing weight," would increase Cronbach's alpha to an adequate level of .68. Consequently, all statistics regarding child readiness to change represent the total score of items 1 through 5. The Cronbach's alpha for the seven items on the measure of Parent Readiness to Change was .69. Because this value was adequate, the total score of all seven items was used to represent parent readiness to change.

Once internal consistency was assessed, an exploratory factor analysis examined whether the Parent or Child Readiness to Change measures contained conceptually and statistically unique factors. A principal component analysis with varimax rotation extracted one factor on the Child Readiness to Change questionnaire that accounted for 45.7% of the variance, the Kaiser-Meyer-Olkin (KMO) measure was adequate at .70 (Kaiser, 1974), and the eigenvalue for the one

factor was 2.28. A scree plot analysis (Figure 3) was consistent with the conclusion that there was one factor.

A principal component analysis with varimax rotation extracted two factors on the Parent Readiness to Change questionnaire that accounted for 67.8% of the variance. Although KMO was adequate at .67 (Kaiser, 1974), a scree plot analysis (Figure 4) indicated a potential third factor. Analysis was repeated extracting three factors (see Table 8), which accounted for 79.2% of the variance. Although the third factor's eigenvalue was less than 1, it did account for a substantial portion of the variance (11.4%), and the two specific questions that created the third factor did not load significantly on the other factors. Most importantly, the three-factor model fits conceptually with the theoretical underpinnings of the readiness to change construct, including confidence in making changes, perceived importance of the problem, and commitment to act. Confidence (Factor 1) consisted of the following three items, related to the parent's level of hopefulness and sense of self-efficacy: "I feel my child is ready to make these changes happen," "I feel my child will be successful in making these changes," and "I feel I will be successful in making these changes." Perceived Importance (Factor 2) consisted of the following two items: "I think my child is overweight" and "I think my child's weight is a problem." Commitment to Act (Factor 3) consisted of the two items that assess the parents' level of commitment to making immediate behavioral changes in their child's eating and level of activity. Descriptive statistics for the three factors are shown in Table 3.

Assumptions of normality were also tested for the three factor scores according to the guidelines of Tabachnick and Fidell (2007). The Commitment to Act (Factor 3) violated assumptions of normality; a reflection and square root transformation did not significantly improve normality of the distribution. Therefore, the factor score was analyzed unaltered in

exploratory analysis. In order to reduce the number of analyses and avoid Type I error, primary analyses for the current study focused on the total score for parent readiness to change, but in exploratory analyses, each of the three parent readiness to change factors was examined as a dependent variable.

Primary Analyses

Specific aim #1a. The first objective of the current study was to examine factors related to child readiness to change. An omnibus regression was used to examine the first aim of the study, evaluating associations between demographic factors (i.e., child age, child gender, child race, family income, child BMI *z*-score, and parent BMI) and child readiness to change. The sample primarily consisted of European American and African American participants and only 26 participants (11.4%) identified as another race. Because no other racial groups were adequately represented in the sample, racial comparisons focused on European American, African American, and other participants. Therefore, the child's race was analyzed with three levels by creating two dummy coded variables to differentiate these three groups; the first variable compared European Americans and African Americans and the second dummy code compared European American to other racial groups.

The omnibus regression revealed that demographic factors were significantly related to child readiness to change, $F(7,183) = 2.23, p < .05, R^2 = .08, \text{Adjusted } R^2 = .04$. As shown in Table 9, child BMI drove this significant finding, such that children who were more severely obese reported higher levels of readiness to change. Child BMI accounted for 2.9% of the unique variance for the child readiness to change ($\beta = .18, p = .02$) and was the only significant demographic variable. Child age, gender, race, family income, and parent BMI were not significantly related to child readiness to change.

Specific aim #1b. Another omnibus regression examined whether the child's own report of psychosocial functioning (i.e., health-related quality of life, social anxiety, depression, internalizing behavior, externalizing behavior) was related to child's readiness to change, above and beyond significant demographic predictors. To reduce multicollinearity, all psychosocial variables were mean-centered. In order to control for significant demographic variables, the child's BMI z -score was entered in the first step of a hierarchical regression. Next, the child's report of health-related quality of life (PedsQL™), social anxiety (SASC-R/SAS-A), depression (CDI), internalizing problems (YSR Internalizing), and externalizing problems (YSR Externalizing) were simultaneously entered in the second step. A third step was used to test the hypothesis that child report of internalizing problems, including social anxiety and depression, would have a curvilinear (inverted u-shape) relation with readiness to change. Therefore, the third step simultaneously entered squared interaction terms of these three variables. As shown in Table 10, there was a significant main effect for social anxiety in step 2; in other words, there was a positive linear relation between the child's report of his/her own social anxiety symptoms and the child's readiness to change ($\beta = .33, p = .02$). There was also significant evidence of a curvilinear relation between the child's report of depression ($\beta = .41, p = .01$) and internalizing symptoms ($\beta = -.26, p = .04$) with the child's readiness to change. Figures 5 and 6 show the linear and quadratic trends for each of these variables. As can be seen in Figure 5, if the child reports mild to moderate symptoms of depression, the positive relation to readiness to change accelerates more rapidly; however, the rate of acceleration slows at higher levels of readiness to change. As shown in Figure 6, the relation is similar for the child's report of general internalizing symptoms (YSR); however, there is more rapid deceleration in readiness to change at higher levels of internalizing symptoms.

Specific aim #2a. The second objective of the current study was to explore factors related to parent readiness to change. An omnibus regression was used to evaluate associations between demographic factors (i.e., child age, child gender, child race, family income, child BMI z -score, and parent BMI) and parent readiness to change. As discussed previously, the child's race was analyzed with three levels by creating two dummy coded variables; the first variable compared European Americans and African Americans and the second dummy code compared European Americans to other racial groups.

An omnibus regression was performed using the transformed parent readiness to change score as the dependent variable and child age, child gender, child race, family income, child BMI z -score, and parent BMI as predictors. This analysis was significant $F(7,183) = 7.39, p < .01, R^2 = .22, \text{Adjusted } R^2 = .19$. As shown in Table 9, this significant result was driven by three specific variables: child's BMI z -score (13.7% of the unique variance), child's race (4.5% of the unique variance), and child's age (1.8% of the unique variance). To compensate for the reflected transformation, the signs of standardized coefficients have been reversed for interpretation of parent readiness to change. These results indicated that parents of children with higher BMI ($\beta = .39, p < .01$), of African American children ($\beta = .24, p < .01$), and of older children ($\beta = .14, p = .03$) reported higher levels of readiness to change. Child gender, family income, and parent BMI were not significantly related to parent readiness to change.

Specific aim #2b. To achieve the next aim, a hierarchical regression examined whether the parents' report of their child's psychosocial functioning (i.e., health-related quality of life and internalizing and externalizing behavior) was related to the parents' readiness to change above and beyond significant demographic variables (see Table 11). Again, to reduce multicollinearity all psychosocial variables were mean-centered and the transformed parent readiness to change

variable was used in analyses. The first step controlled for the following significant demographic variables related to parent readiness to change: age, race, and child BMI z -score. The second step simultaneously entered the parents' report of the child's health-related quality of life (PedsQL™), internalizing problems (CBCL Internalizing), and externalizing problems (CBCL Externalizing). The second step of the regression was not significant, and none of the individual predictors were statistically significant. However, despite efforts to reduce multicollinearity by centering variables, the tolerance for psychosocial variables was poor, ranging from .41 to .51, which indicated that the multicollinearity may be suppressing significant results.

Specific aim #3. The third aim of the current study was to examine consistency between child and parent readiness to change and potential moderation effects of significant demographic variables. The total scores for parent and child readiness to change were positively correlated ($r = .31, p < .01$). In order to examine the concordance between parent and child readiness to change, an average was computed by dividing the total score by the number of items. The Child Readiness to Change measure consisted of five items and Parent Readiness to Change consisted of seven items, which participants answered on a 5-point Likert scale. On average, parents rated their own readiness to change ($M = 4.17, SD = 5.46$) higher than the child's report of readiness to change ($M = 3.95, SD = 0.77$). However, a large percentage of the children (44.3%) had higher readiness to change than that of the parents. To examine the significance of parent and child discordance, a one-sample t -test compared the absolute value of the difference between average child and parent readiness to change scores ($M = .65, SD = .51$). The absolute value of the difference between average ratings was significantly different, $t(218) = 18.89, p < .01$, with parents reporting higher levels of readiness to change in more than half (55.8%) of the sample.

In previous analyses (aims #1a and #2a), the child's BMI z -score was significantly related to both parent and child readiness to change. Because this variable appeared relevant to both parents and children, a hierarchical regression examined the moderating effect of child BMI on the relation between child and parent readiness to change. To reduce multicollinearity, child BMI z -score and parent readiness to change were centered and analyses used the transformed parent readiness to change variable to predict child readiness to change. The first step of the regression simultaneously entered these two predictor variables, and the second step entered the BMI z -score \times Parent Readiness to Change interaction term. The second step of the regression was significant, $F(3, 215) = 11.07, p < .01; R^2 \text{ Change} = .03, p < .01$. The interaction of child BMI z -score and parent readiness to change significantly predicted child readiness to change ($\beta = -.17, p = .02$) and accounted for 3.0% of the unique variance. Posthoc probing of this significant interaction was conducted, as recommended by Aiken and West (1991) and Holmbeck (2002). First, high (1 SD above the mean) and low (1 SD below the mean) BMI z -score moderation variables were computed and then two interaction terms, Parent Readiness to Change \times High BMI z -score and Parent Readiness to Change \times Low BMI z -score, were created. Two separate posthoc regressions were then conducted to determine whether the slopes were significant for both high and low groups, and the signs of standardized coefficients were reversed in order to interpret the reflected transformation of parent readiness to change. These posthoc analyses revealed that there was significant positive relation between child and parent readiness to change for children with higher BMI z -scores ($\beta = .42, p < .01$); however, there was no significant relation between child and parent readiness to change scores for children with lower BMI z -scores ($\beta = .08, p = .35$). In addition, these analyses provided the regression equations to plot

high (1 *SD* above the mean) and low (1 *SD* below the mean) parent readiness to change scores (see Figure 7).

Specific aim #4. In order to explore subsets of items from the Parent Readiness to Change measure, analyses from specific aim #2a (relation between demographic variables and readiness to change) and specific aim #2b (relation between psychosocial variables and readiness to change) were repeated using the three factors identified on the Parent Readiness to Change measure (see Tables 12 and 13).

Parental Confidence (Factor 1) consisted of the following three items related to the parent's level of hopefulness and sense of self-efficacy: "I feel my child is ready to make these changes happen," "I feel my child will be successful in making these changes," and "I feel I will be successful in making these changes." An omnibus regression was used to examine demographic factors (child age, race, gender, child BMI *z*-score, parent BMI, and family income). This analysis revealed that the total score for Confidence (Factor 1) was significantly related to race, with parents of African American children rating higher levels of confidence than parents of European American children ($\beta = .38, p < .01$), and accounted for 11.7% of unique variance in the Factor 1 of parent readiness to change. Other demographic variables were not significantly related (see Table 12). Another hierarchical regression controlled for significant demographic variables (e.g., race) and in the second step examined the relation between the parental Confidence (Factor 1) and psychosocial variables of health-related quality of life, internalizing, and externalizing (see Table 13). There was a small significant effect for externalizing symptoms that accounted for 3.7% of the unique variance; parents who reported higher levels of externalizing symptoms in their children reported lower levels of confidence (β

= -.27, $p = .01$). Internalizing symptoms and health-related quality of life were not significantly related to parental confidence.

The second factor, Perceived Importance, consisted of the following two items: “I think my child is overweight” and “I think my child’s weight is a problem.” As reported in Table 12, an omnibus regression examining the relation between demographic factors (child age, race, gender, child BMI z -score, parent BMI, and family income) and parent level of Perceived Importance (Factor 2) was significantly related to child BMI z -score ($\beta = .48, p < .01$), age ($\beta = .28, p < .01$), gender ($\beta = -.16, p = .01$), and approached significance for family income ($\beta = .13, p = .05$). Parents reported higher levels of perceived importance to change behavior if they had children who had higher BMI, were older, and were female. There was also a trend towards higher levels of readiness to change in families with higher income. The most significant variable was child BMI z -score, which accounted for 21.1% of the unique variance on the factor of perceived importance. The child’s age accounted for 7.7%, child gender accounted for 2.5%, and family income accounted for 1.4% of the unique variance. Another hierarchical regression controlled for significant demographic variables (e.g., age, race, gender, BMI z -score), and family income was included because it approached significance. The second step examined the relation between the Perceived Importance (Factor 2) and psychosocial variables of health-related quality of life, internalizing, and externalizing (see Table 13). There was a significant effect of health-related quality of life, which accounted for 3.8% of the unique variance; parents who reported lower quality of life in their children reported higher levels of perceived importance ($\beta = -.29, p < .01$). Internalizing and externalizing symptoms were not significantly related to perceived importance.

The third factor, Commitment to Act, consisted of the two items that assess the parent's level of commitment to make immediate behavioral changes in their child's eating and level of activity. As shown in Table 12, an omnibus regression examining the relation between demographic variables (e.g., child age, race, gender, child BMI z -score, parent BMI, and family income) with parent commitment to act was significantly related to child BMI z -score ($\beta = .21, p = .01$) and race ($\beta = .20, p = .01$). Parents of African American children and parents of children with higher BMI reported higher levels of commitment. Child BMI z -score which accounted for 3.3% of the unique variance, and the child's race accounted for 3.3% of the unique variance in Commitment to Act (Factor 3). Another hierarchical regression controlled for significant demographic variables, race and child BMI z -score, and in the second step examined the relation between Commitment to Act (Factor 3) and psychosocial variables of health-related quality of life, internalizing, and externalizing (see Table 13). None of the psychosocial variables were significantly related to commitment.

The next set of exploratory analyses examined race as a moderator of the relation between parent readiness to change and psychosocial variables. Specific aim #2b initially proposed to control for any significant demographic variables; however, culturally competent research should examine the nature of the differences between these two cultural groups, and thus, moderation was included in exploratory analyses. Because these exploratory analyses were unplanned, a post-hoc power analysis was utilized. Computer software, G*Power (Version 3), indicated that the sample size in the current study ($N = 228$) was adequate to detect a moderate effect size of $f^2 = .12$ with .95 power and an alpha of .05 using multiple regression analysis with 13 predictors (Faul et al., 2007).

To explore race as a potential moderator, a hierarchical regression (see Table 14) used the transformed score for Parent Readiness to Change as the dependent variable and controlled for other significant demographic variables related to parent readiness to change. Child BMI *z*-score and age were identified as significant demographic variables in analyses for specific aims #1a and #2a, so these were entered in the first step. The second step included the two dummy-coded race variables and mean-centered scores for internalizing, externalizing, and health-related quality of life. The third step included six interaction terms, which included all possible combinations of mean-centered psychosocial variables and two race variables. Results revealed that there was a significant moderation of the European American versus African American race variable with all three psychosocial variables (see Table 14).

Posthoc probing of the significant interaction involved recoding race by creating two new dummy variables: African Americans versus European Americans and African Americans versus Other (African Americans were coded as 0 and comparison group was coded as 1). Repeating the regression with these race variables provided the slopes for both African Americans and European Americans, so that regression equations could be developed to plot graphs representing high (1 *SD* above the mean) and low (1 *SD* below the mean) psychosocial variables (health-related quality of life, internalizing, externalizing) and the relation to parent readiness to change. The relation between parent readiness to change and health-related quality of life was significant for European Americans only ($\beta = .61, p < .01$; see Figure 8). European American parents reported lower levels of readiness to change when their children had better health-related quality of life; for parents of African American children, there was no relation between the two variables. The relationship between parent readiness to change and internalizing symptoms was significant for African Americans only ($\beta = .38, p = .03$; see Figure 9). African American

parents' report of readiness to change was positively related to the amount of internalizing symptoms they reported in their child. There was no relation between the child's internalizing symptoms and European American parents' readiness to change. The relation between parent readiness to change and externalizing symptoms was significant for African American parents only ($\beta = -.57, p < .01$; see Figure 10). African American parents who reported more externalizing symptoms in their children had lower levels of readiness to change; there was no significant relation between externalizing symptoms and parent readiness to change in parents of European American children.

Table 2

Descriptive Statistics for Participant Characteristics

Variable	<i>n</i>	Range	<i>M</i> (<i>SD</i>)	<i>n</i> (%)	Skewness	Kurtosis
Child Age (years)	228	7-17	11.58 (2.85)		0.14	-1.01
Child Gender	228					
Female				144 (63.2)		
Male				84 (36.8)		
Child Race	227					
European American				111 (48.7)		
African American				90 (39.5)		
Hispanic				5 (2.2)		
Asian-American				3 (1.3)		
Other				18 (7.9)		
Child BMI	228	20.81-70.40	34.83 (8.47)			
Child BMI <i>z</i> -score	228	1.65-3.21	2.50 (.30)		-0.10	-0.05
Child BMI Percentile	228	95-99	99.12 (.73)			
Child BMI Classification	228					
Obese				65 (28.5)		
Severely Obese				163 (71.5)		
Parent Age	213	25-69	38.69 (7.69)			
Parent BMI	204	17-62	33.80 (7.70)		0.50	0.73
Parent Relationship to Child	225					
Biological Mother				192 (84.2)		
Biological Father				14 (6.1)		
Other Caregiver				19 (8.3)		
Household Income	216				0.00	-0.87
\$0-\$15,000				37 (16.2)		
\$15,000-\$25,000				37 (16.2)		
\$25,000-\$50,000				74 (32.5)		
\$50,000-\$75,000				40 (17.5)		
\$75,000 and above				28 (12.3)		

Note. BMI = Body Mass Index. Variation in *sample size* is result of variation in number of

participants who responded to question. Standardized skewness and kurtosis are reported only

for variables used in statistical analyses.

Table 3

Psychometric Properties of Study Variables

Variable	<i>n</i>	Range	<i>M</i> (<i>SD</i>)	Skewness	Kurtosis
Child Report					
Health-Related Quality of Life (PedsQL™)	202	16-100	70.68 (17.06)	-0.47	-0.11
Social Anxiety (SASC-R /SAS-A)	222	15-88	43.50 (16.30)	0.53	-0.52
Depression (CDI)	223	34-84	49.16 (10.36)	1.02	0.46
Internalizing Problems (YSR)	107	28-84	55.41 (11.79)	0.05	-0.19
Externalizing Problems (YSR)	107	29-86	53.99 (10.90)	0.17	0.68
Child Readiness to Change	224	9-25	19.76 (3.87)	0.00	-0.87
Parent Report					
Health-Related Quality of Life (PedsQL™)	205	26-100	65.36 (18.84)	0.26	-0.93
Internalizing Problems (CBCL)	185	33-80	58.53 (12.03)	-0.35	-0.75
Externalizing Problems (CBCL)	185	33-81	53.98 (10.32)	-0.11	-0.42
Parent Readiness to Change	223	12-35	29.19 (3.82)	-1.17	2.41
Factor 1 - Confidence	225	7-15	12.64 (2.19)	-0.64	-0.31
Factor 2 – Perceived Importance	224	2-10	7.39 (2.06)	-0.43	-0.60
Factor 3 – Commitment to Act	226	3-10	9.15 (1.40)	-1.89	3.57

Note. Variation in *sample size* is result of variation in number of participants who completed the measure.

Table 4

Correlation Matrix of Study Variables

Variable	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Child age	.05	-.03	-.01	-.04	-.09	.03	.07	.14	.11	-.23**	.22**	.14	.18**
4. Child BMI z-score	—	.27	-.14*	-.21**	.22**	.14*	.07	.14	.22**	-.24**	.06	.01	.36**
5. Parent BMI		—	-.19**	-.11	.06	.13	.15	.21*	.10	-.06	.01	.10	.11
6. Family Income			—	.05	-.10	-.15*	-.17	-.13	-.15*	.05	-.13	-.15*	.00
7. PedsQL™ (Child Report)				—	-.65**	-.55**	-.63**	-.51**	-.27**	.53**	-.49**	-.41**	-.21**
8. Social Anxiety (SASC-R /SAS-A)					—	.46**	.53**	.29**	.27**	-.32**	.28**	.25**	.13
9. Depression (CDI)						—	.62**	.50**	.14*	-.35**	.29**	.28**	.09
10. Internalizing (YSR)							—	.62**	.09	-.33**	.41**	.30**	.11
11. Externalizing (YSR)								—	.05	-.46**	.44**	.63**	.08
12. Child Readiness to Change									—	-.21**	.14	.09	.31**
13. PedsQL™ (Parent Report)										—	-.69**	-.58**	-.25**
14. Internalizing (CBCL)											—	.68**	.15*
15. Externalizing (CBCL)												—	.05
16. Parent Readiness to Change													—

Note. * $p < .05$ and ** $p < .01$.

Table 5

Study Variables by Gender and Race

Variable	Gender			Race			ANOVA
	Male	Female	<i>t</i> -test	European American	African American	Other	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Child age	12.08 (2.87)	11.29 (2.81)	<i>t</i> (226) = -2.04*	11.43 (3.02)	11.74 (2.73)	11.77 (2.53)	<i>F</i> (2, 224) = 0.35
Child BMI <i>z</i> -score	2.53 (0.32)	2.49 (0.28)	<i>t</i> (226) = -1.04	2.50 (0.30)	2.53 (0.30)	2.42 (0.26)	<i>F</i> (2, 224) = 1.32
Parent BMI	33.05 (7.51)	34.23 (7.79)	<i>t</i> (202) = 1.06	31.63 (7.08)	37.04 (7.78)	32.49 (6.49)	<i>F</i> (2, 201) = 12.59**
Family Income	2.91 (1.29)	2.94 (1.23)	<i>t</i> (214) = 0.18	3.23 (1.26)	2.65 (1.18)	2.62 (1.17)	<i>F</i> (2, 212) = 6.23**
PedsQL™ (Child Report)	71.71 (16.70)	70.08 (17.30)	<i>t</i> (200) = -0.66	67.64 (17.85)	73.59 (15.78)	72.01 (17.27)	<i>F</i> (2, 198) = 2.81
Social Anxiety (SASC-R/SAS-A)	40.91 (16.93)	44.92 (15.82)	<i>t</i> (220) = 1.76	46.41 (16.69)	39.37 (14.82)	45.62 (17.41)	<i>F</i> (2, 218) = 4.91**
Depression (CDI)	47.42 (9.05)	50.15 (10.94)	<i>t</i> (221) = 1.90	49.42 (10.09)	47.77 (9.43)	52.68 (13.83)	<i>F</i> (2, 219) = 2.29
Internalizing (YSR)	55.12 (11.38)	55.61 (12.15)	<i>t</i> (105) = 0.21	55.98 (12.98)	53.45 (10.70)	59.21 (9.76)	<i>F</i> (2, 104) = 1.38
Externalizing (YSR)	53.49 (11.82)	54.33 (10.31)	<i>t</i> (105) = 0.39	55.22 (12.01)	52.10 (9.08)	55.21 (11.60)	<i>F</i> (2, 104) = 1.05
Child Readiness to Change	19.38 (3.94)	19.98 (3.83)	<i>t</i> (222) = 1.12	19.40 (3.68)	20.01 (3.85)	20.23 (4.67)	<i>F</i> (2, 220) = 0.85
PedsQL™ (Parent Report)	64.32 (18.31)	65.97 (19.18)	<i>t</i> (203) = 0.60	63.83 (18.04)	66.66 (18.82)	65.76 (21.68)	<i>F</i> (2, 201) = 0.52
Internalizing (CBCL)	59.44 (11.47)	58.03 (12.35)	<i>t</i> (183) = -0.77	59.31 (12.02)	57.92 (11.68)	57.30 (13.86)	<i>F</i> (2, 181) = 0.39
Externalizing (CBCL)	54.23 (10.95)	53.85 (10.00)	<i>t</i> (183) = -0.24	53.84 (10.92)	54.00 (9.16)	54.40 (12.00)	<i>F</i> (2, 181) = 0.03
Parent Readiness to Change	28.74 (4.34)	29.44 (3.49)	<i>t</i> (221) = 1.32	28.54 (4.09)	30.10 (3.58)	28.92 (2.80)	<i>F</i> (2, 219) = 4.26*

Note. * $p < .05$ and ** $p < .01$. Household income was treated as a continuous variable and coded as 1 = \$0 - \$15,000;

2 = \$15,000 - \$25,000; 3 = \$25,000 - \$50,000; 4 = \$50,000 - \$75,000; 5 = \$75,000 - \$100,000.

Table 6

Interitem Correlation Matrix for Child Readiness to Change

Item	#1	#2	#3	#4	#5
#1 I think I am overweight	-				
#2 I am ready to change my weight	.26	-			
#3 I am ready to change how and what I eat	.24	.46	-		
#4 I am ready to change how and what I do to be active	.28	.23	.36	-	
#5 I feel I will be successful in making these changes	.05	.47	.45	.30	-
#6 I am losing hope of losing weight	-.30	-.10	-.10	-.10	-.01

Note. Item #6 was reverse scored.

Table 7

Interitem Correlation Matrix for Parent Readiness to Change

Item	#1	#2	#3	#4	#5	#6
#1 My child is overweight	-					
#2 My child's weight is a problem	.80	-				
#3 I'm ready to change my child's eating	.32	.34	-			
#4 I'm ready to change my child's activity	.31	.35	.50	-		
#5 My child is ready to make changes	-.01	-.05	.30	.15	-	
#6 My child will be successful in making changes	-.09	-.10	.29	.12	.64	-
#7 I will be successful in making changes	-.01	-.01	.37	.21	.45	.68

Table 8

Factor Loadings for Exploratory Factor Analysis with Varimax Rotation of Parent Readiness to Change

Item	1. Confidence	2. Perceived Importance	3. Commitment To act
My child is overweight	-.03	.94	.15
My child's weight is a problem	-.06	.92	.22
I'm ready to change my child's eating	.32	.25	.73
I'm ready to change my child's activity	.04	.16	.90
My child is ready to make changes	.82	.01	.06
My child will be successful in making changes	.91	-.08	.07
I will be successful in making changes	.79	-.03	.24

Note. Factor loadings > .40 are in boldface. Eigenvalues: Factor 1 = 2.63, Factor 2 = 2.12, Factor

3 = .80. Variance accounted for: Factor 1 = 37.5%, Factor 2 = 30.2%, Factor 3 = 11.4%

Table 9

Relation of Demographic Variables with Child and Parent Readiness to Change

Variable	Child Readiness to Change	Parent Readiness to Change
	β	β
Age	.12	.14*
Gender	-.07	-.08
Race		
European American vs. African American	.02	.24**
European American vs. Other	.06	.04
Family Income	-.10	.03
Child BMI z-score	.18*	.39**
Parent BMI	.06	-.06

Note. * $p < .05$ and ** $p < .01$. For gender 0 = female, 1 = male; for race, two dummy-coded

variables were created with European American serving as reference group (European American

= 0, comparison group = 1). Parent Readiness to Change score was altered with reflection and

square-root transformation. β signs were reversed for interpretation of reflecting Parent

Readiness to Change during transformation.

Table 10

Regression of Psychosocial Variables on Child Readiness to Change

Variable	β	R^2	R^2 Change	F Change
Step 1		.02	.23	2.83
Child BMI z-score	.33			
Step 2		.10	.07	1.58
Health-Related Quality of Life (PedsQL™)	.10			
Social Anxiety (SASC-R /SAS-A)	.33*			
Depression (CDI)	.03			
Internalizing Problems (YSR)	.05			
Externalizing Problems (YSR)	.03			
Step 3		.20	.10	2.80*
Social Anxiety ² (SASC-R /SAS-A)	-.11			
Depression ² (CDI)	.41*			
Internalizing Problems ² (YSR)	-.26*			

Note. * $p < .05$

Table 11

Regression of Psychosocial Variables on Parent Readiness to Change

Variable	β	R^2	R^2 Change	F Change
Step 1		.15	.15	7.23**
Age	.06			
Race				
European American vs. African American	.12			
European American vs. Other	.02			
Child BMI z-score	.36**			
Step 2		.19	.04	2.53
Health-Related Quality of Life (PedsQL™)	-.21			
Internalizing Problems (CBCL)	.08			
Externalizing Problems (CBCL)	-.19			

Note. ** $p < .01$. For race, two dummy coded variables were created with European American

serving as reference group (European American = 0, comparison group = 1). Parent Readiness to

Change score was altered with reflection and square root transformation. β signs were reversed

for interpretation of reflecting Parent Readiness to Change during transformation.

Table 12

Relation of Demographic Variables with Parent Readiness to Change Factors

Variable	Confidence (Factor 1)	Perceived Importance (Factor 2)	Commitment to Act (Factor 3)
	β	β	β
Age	-.04	.28**	.07
Gender	.05	-.16**	-.08
Race			
European American vs. African American	.38**	-.08	.20*
European American vs. Other	.12	-.07	.12
Family Income	-.08	.13†	.12
Child BMI z-score	.05	.48**	.21**
Parent BMI	-.01	-.04	-.07

Note. † $p = .05$ * $p < .05$ and ** $p < .01$. For gender 0 = female, 1 = male; for race, two dummy-

coded variables were created with European American serving as reference group (European

American = 0, comparison group = 1).

Table 13

Regression of Psychosocial Variables on Parent Readiness to Change Factors

Variable	β	R^2	R^2 Change	F Change
<i>Confidence (Factor 1)</i>				
Step 1		.09	.09	7.89**
Race				
European American vs. African American	.31**			
European American vs. Other	.07			
Step 2		.13	.07	4.40**
Health-Related Quality of Life (PedsQL™)	-.09			
Internalizing Problems (CBCL)	-.05			
Externalizing Problems (CBCL)	-.27**			
<i>Perceived Importance (Factor 2)</i>				
Step 1		.31	.31	17.51**
Age	.21**			
Gender	-.16*			
Family Income	.19**			
Child BMI z-score	.49**			
Step 2		.46	.14	12.89**
Health-Related Quality of Life (PedsQL™)	-.29**			
Internalizing Problems (CBCL)	.16			
Externalizing Problems (CBCL)	-.05			
<i>Commitment to Act (Factor 3)</i>				
Step 1		.04	.04	2.39
Race				
European American vs. African American	.05			
European American vs. Other	.10			
Child BMI z-score	.17*			
Step 2		.06	.01	0.76
Health-Related Quality of Life (PedsQL™)	-.13			
Internalizing Problems (CBCL)	.02			
Externalizing Problems (CBCL)	-.04			

Note. * $p < .05$ ** $p < .01$. For gender 0 = female, 1 = male; for race, two dummy-coded variables were created with European American serving as reference group (European American = 0, comparison group = 1).

Table 14

Regression Analysis of Moderation Effect of Race on Parent Readiness to Change and Psychosocial Variables

Variable	β	R^2	R^2 Change	F Change
Step 1		.14	.14	13.14**
Age	.06			
Child BMI z-score	.36**			
Step 2		.19	.05	1.94
Race				
European American vs. African American	.15*			
European American vs. Other	.03			
Health-Related Quality of Life (PedsQL™)	-.21			
Internalizing Problems (CBCL)	.08			
Externalizing Problems (CBCL)	-.19			
Step 3		.31	.12	4.24**
Race (EA v. AA) x	.46**			
Health-Related Quality of Life (PedsQL™)				
Race (EA v. AA) x	.31*			
Internalizing Problems (CBCL)				
Race (EA v. AA)	-.26*			
x Externalizing Problems (CBCL)				
Race (EA v. Other) x	.23			
Health-Related Quality of Life (PedsQL™)				
Race (EA v. Other) x	-.03			
Internalizing Problems (CBCL)				
Race (EA v. Other)	.07			
x Externalizing Problems (CBCL)				

Note. * $p < .05$ ** $p < .01$. For race, two dummy-coded variables were created, with European American serving as reference group (European American = 0, comparison group = 1). Parent Readiness to Change score was altered with reflection and square-root transformation. β signs were reversed for interpretation of reflecting Parent Readiness to Change during transformation.

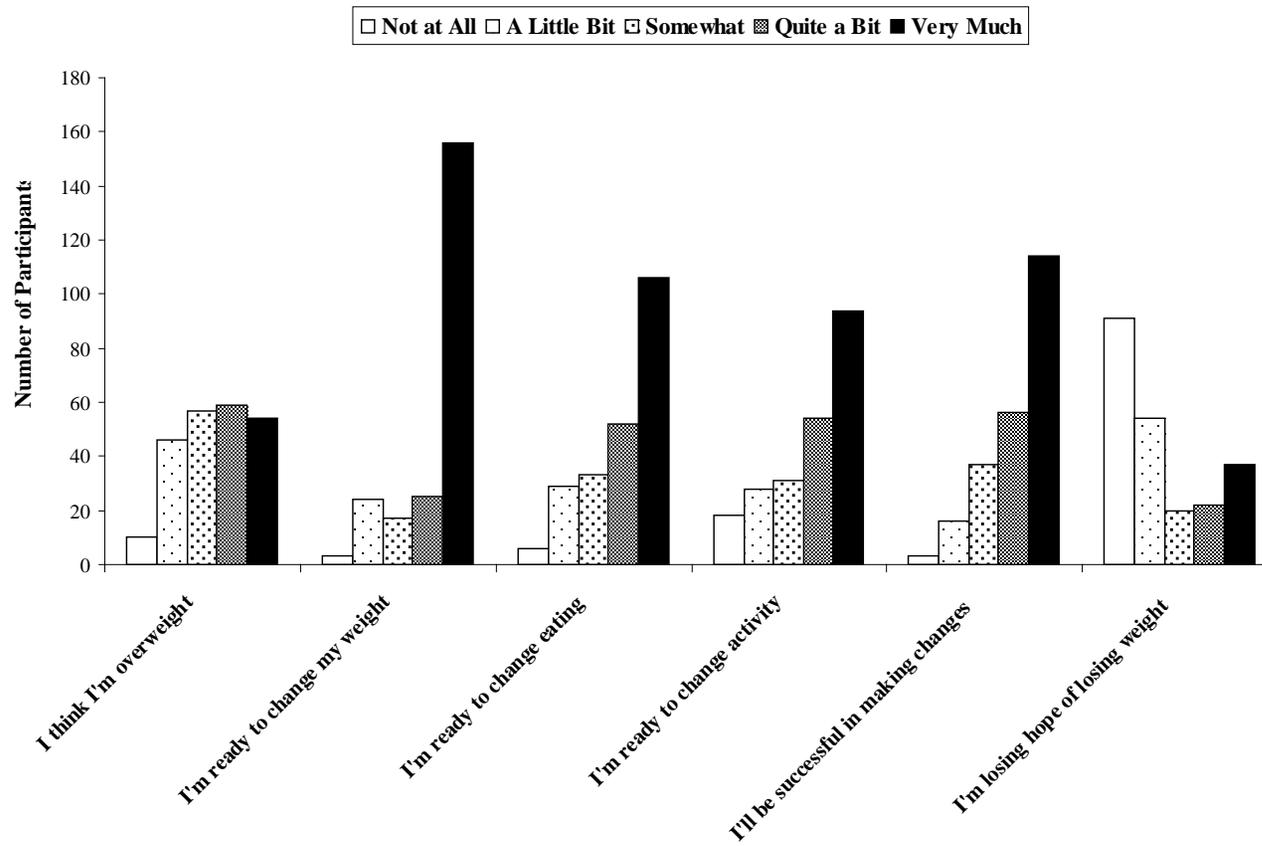


Figure 1. Distribution of participant responses for items on Child Readiness to Change measure.

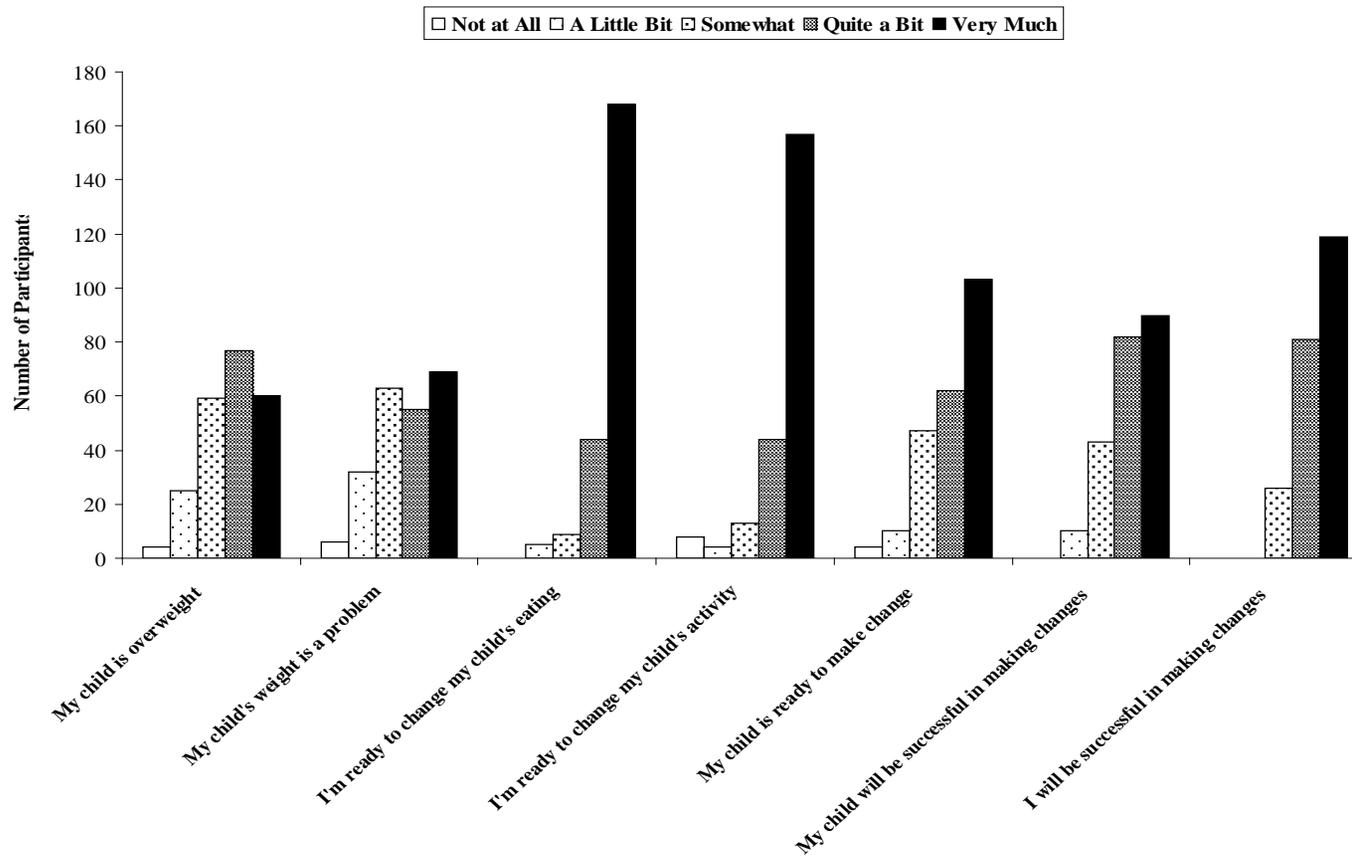


Figure 2. Distribution of participant responses for items on Parent Readiness to Change measure.

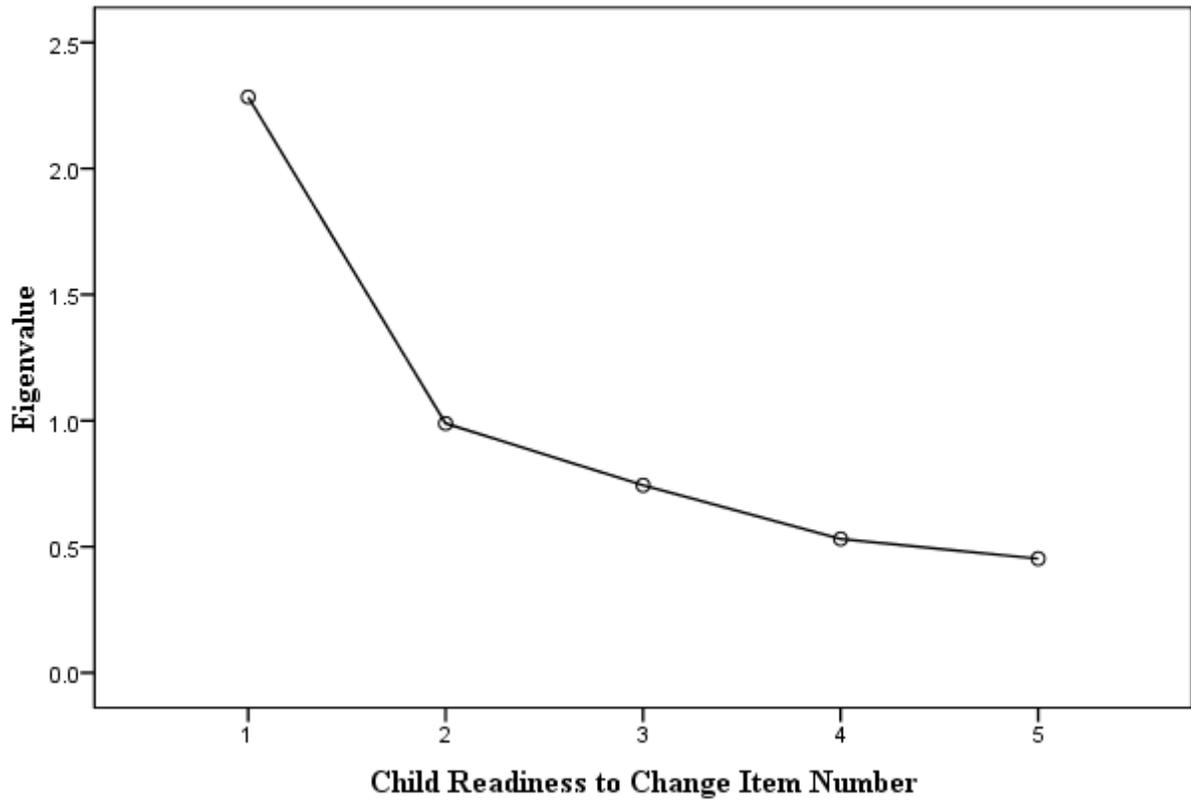


Figure 3. Scree plot for principal component analysis with varimax rotation of Child Readiness to Change items.

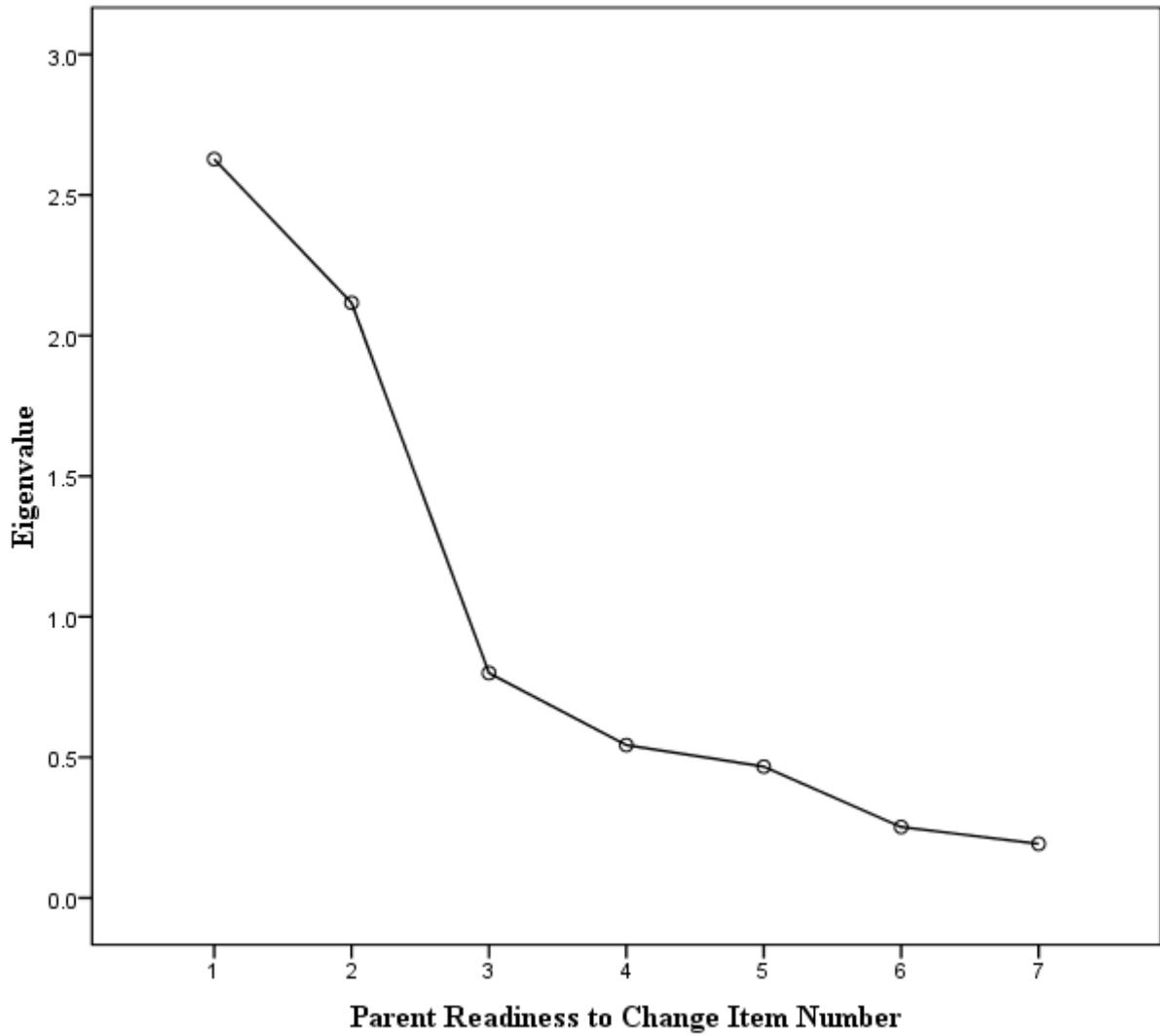


Figure 4. Scree plot for principal component analysis with varimax rotation of Parent Readiness to Change items.

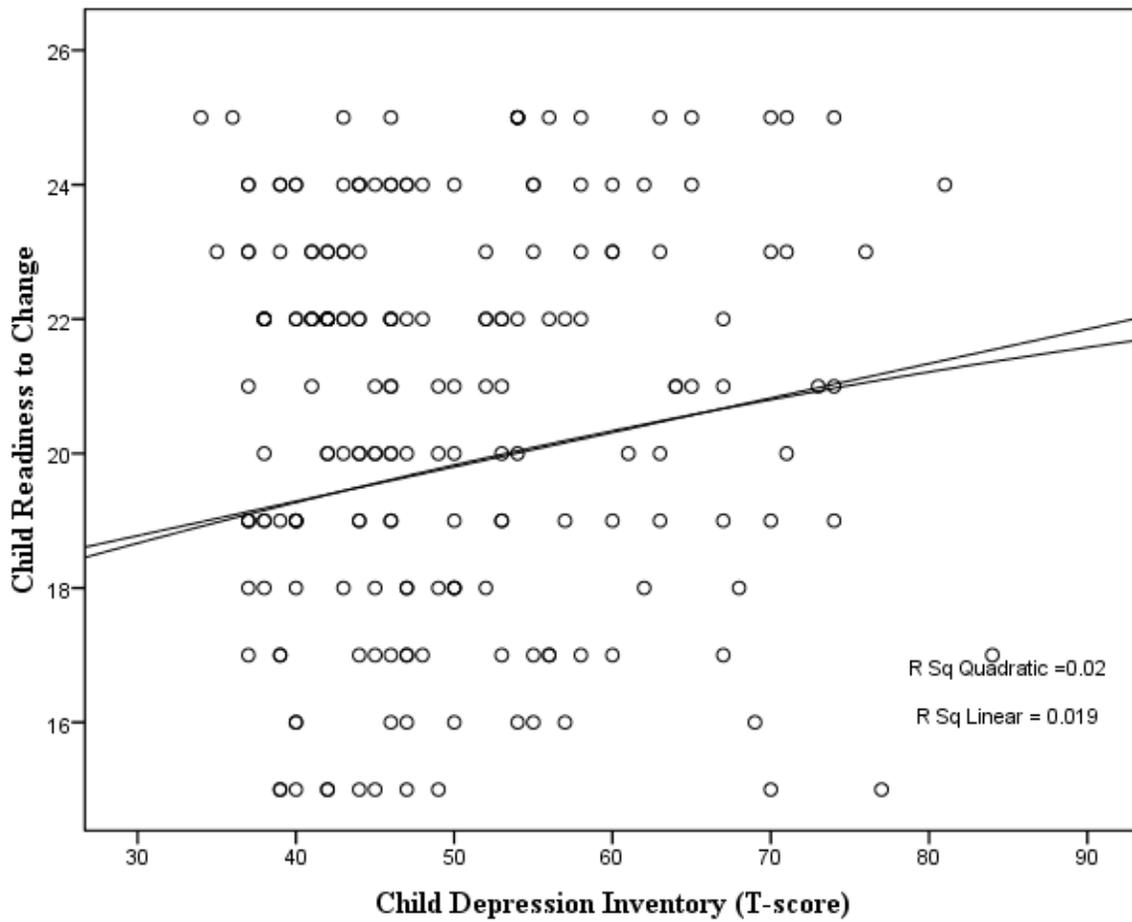


Figure 5. Scatterplot of relation between child's self-report of depression and child readiness to change. Lines are plotted for quadratic and linear estimations.

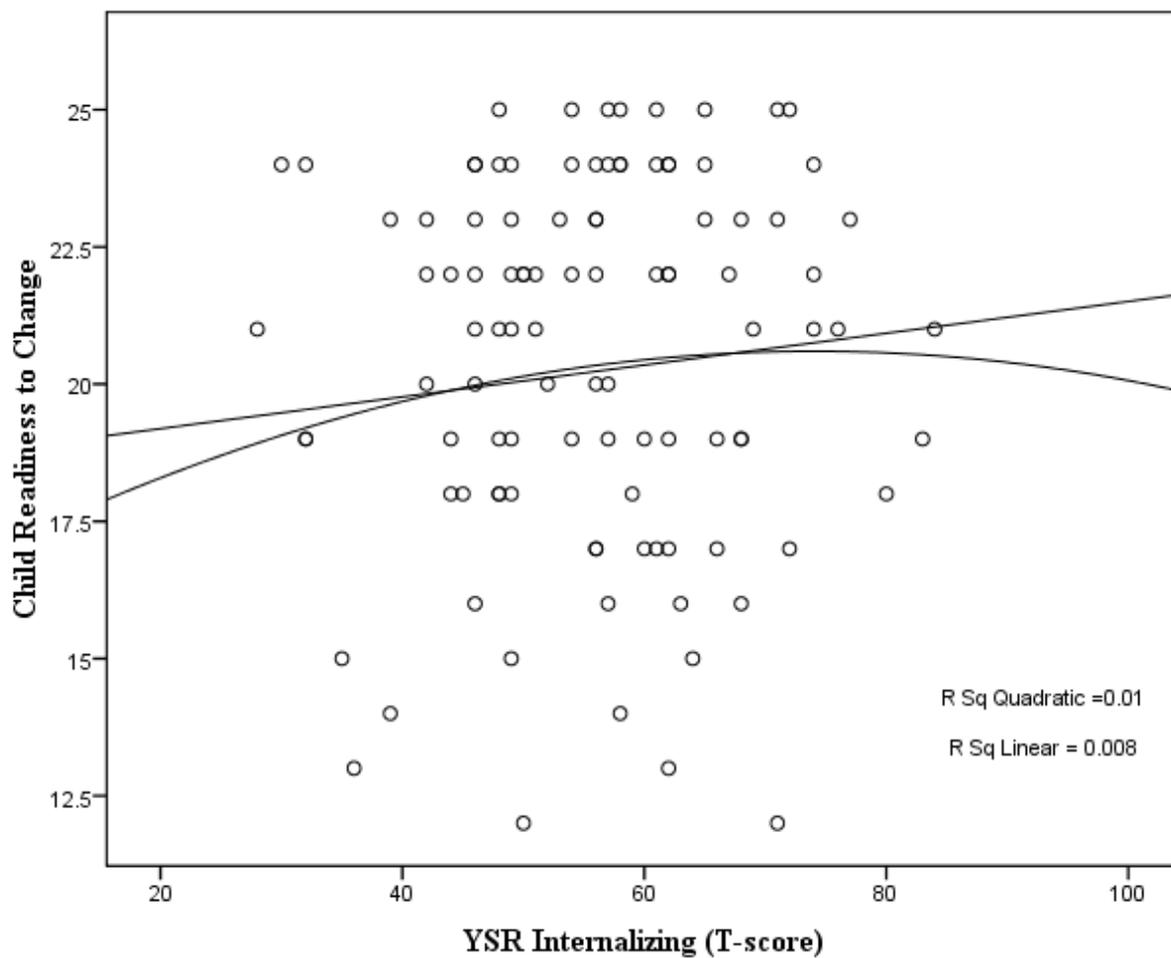


Figure 6. Scatterplot of relation between child's self-report of internalizing symptoms and child readiness to change. Lines are plotted for quadratic and linear estimations.

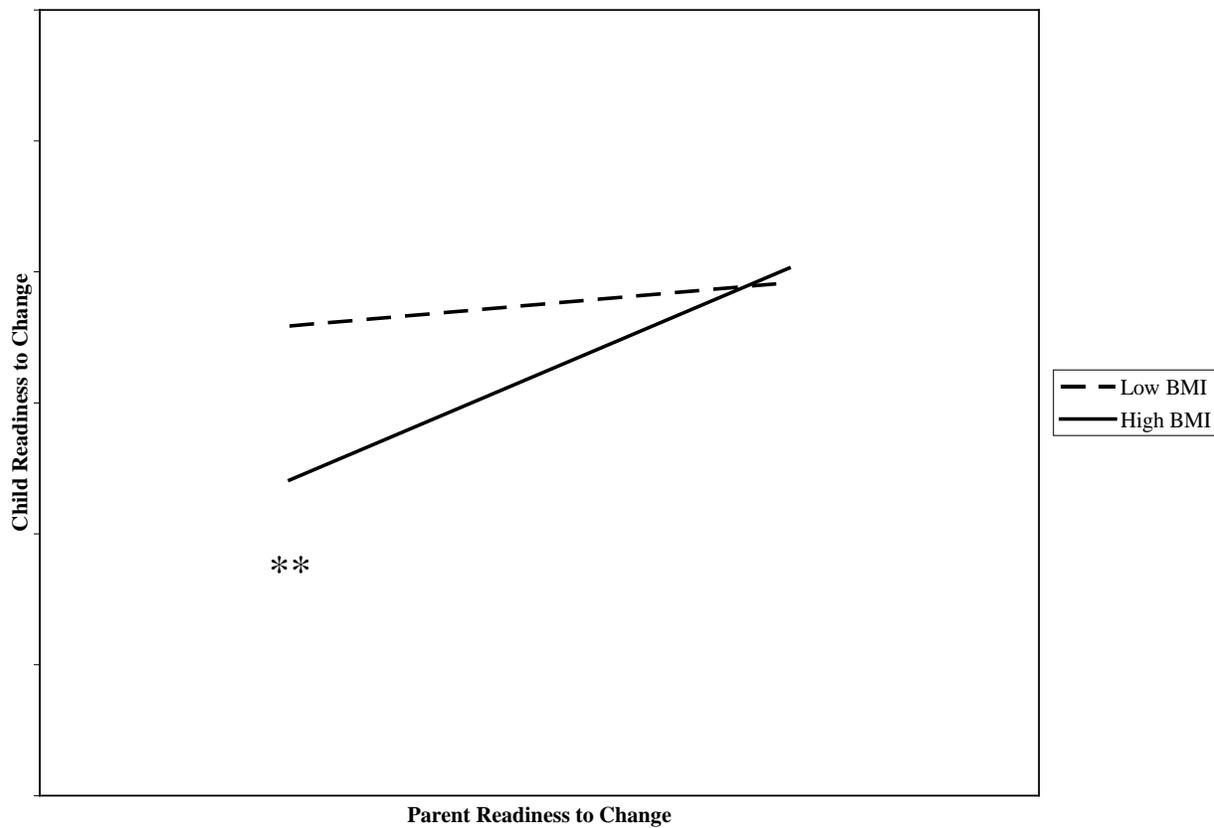


Figure 7. Graph of moderation effect of child BMI z -score on the relation between Child and Parent Readiness to Change. $**p < .01$

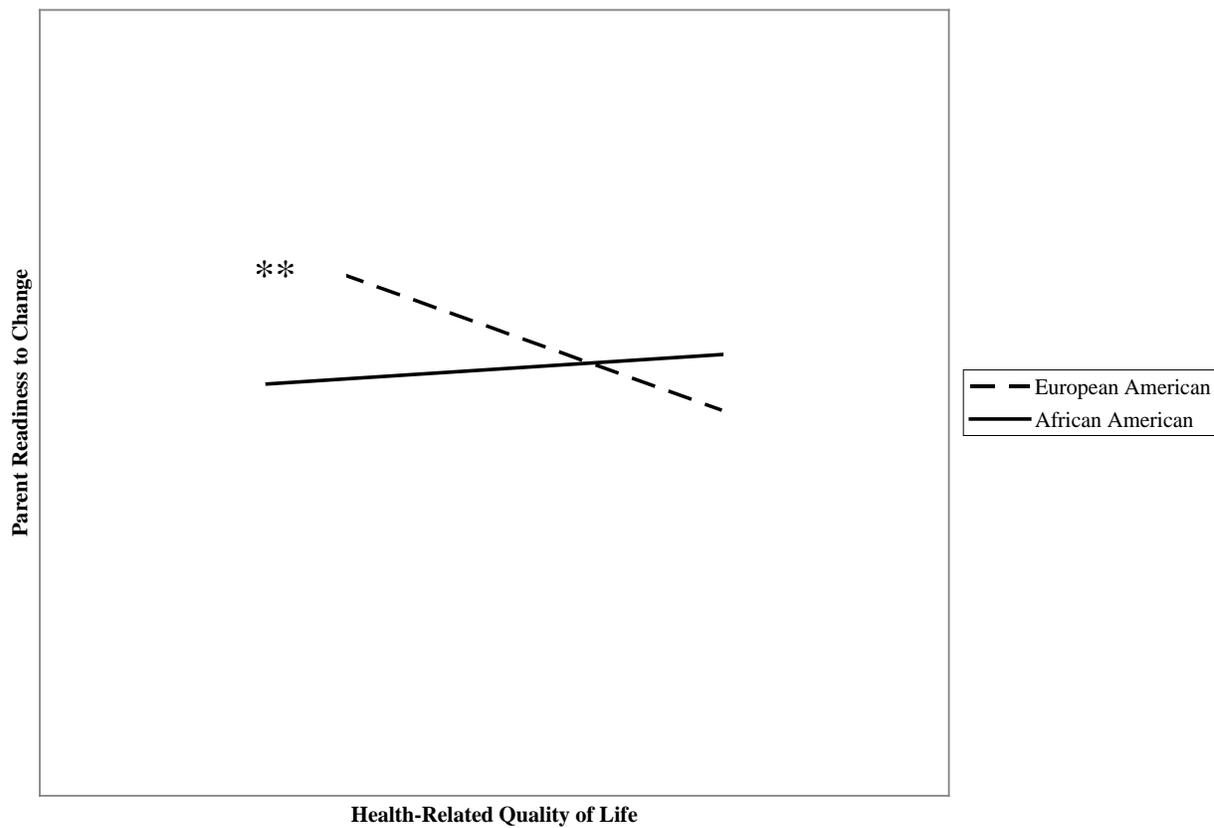


Figure 8. Graph of moderational effect of race on relationship between Parent Readiness to Change and health-related quality of life (PedsQL™). ** $p < .01$

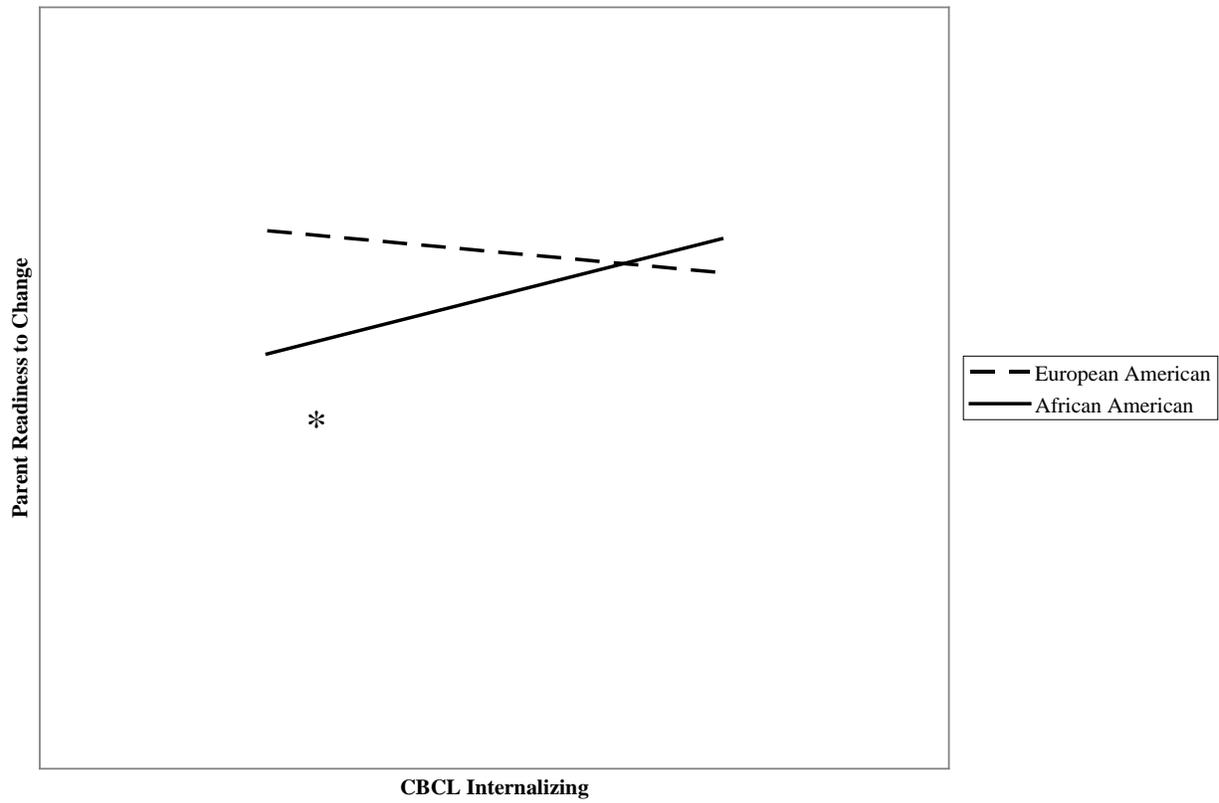


Figure 9. Graph of moderational effect of race on relationship between Parent Readiness to Change and internalizing symptoms (CBCL). $*p < .05$

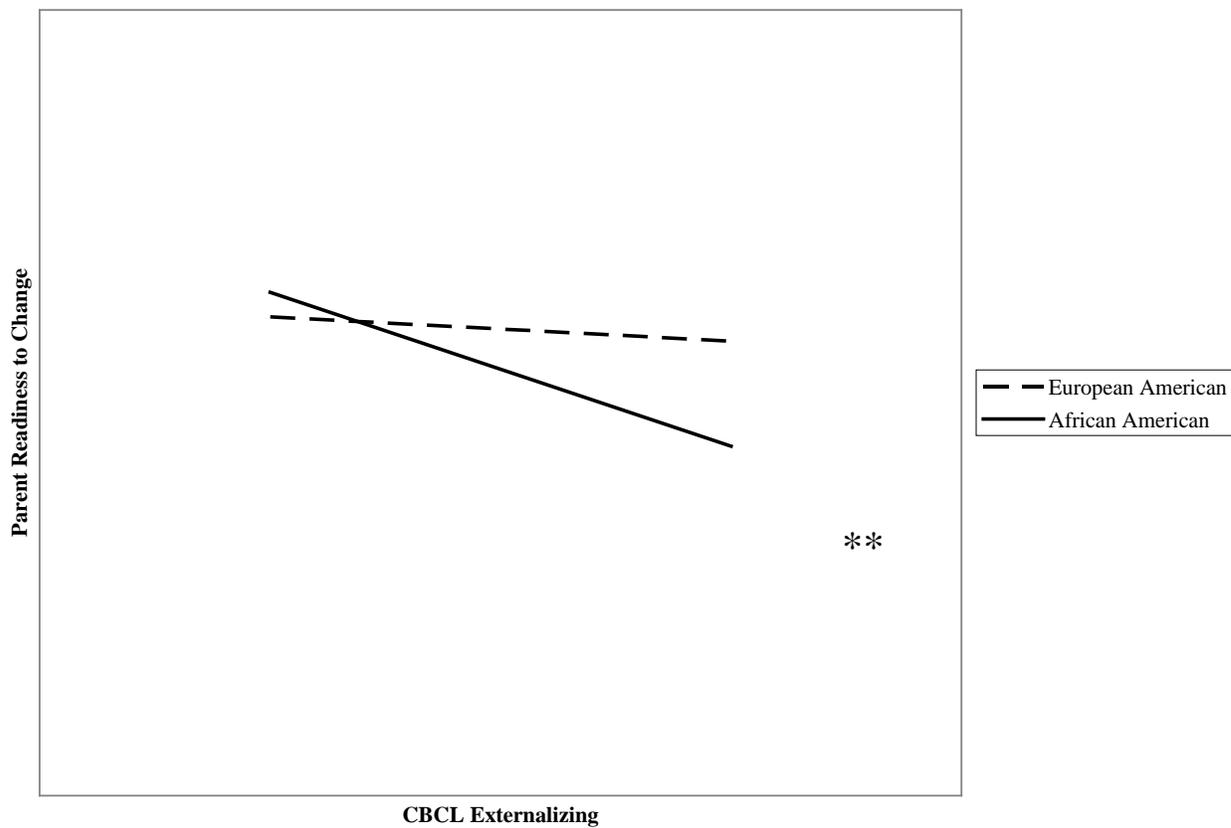


Figure 10. Graph of moderational effect of race on relation between Parent Readiness to Change and externalizing symptoms (CBCL). $**p < .01$

Discussion

Pediatric obesity is a serious public health concern, and rates of obesity in youth have been increasing rapidly during the last 3 decades (Wang & Beydoun, 2007). Therefore, healthcare providers must understand factors that support or interfere with effective treatment. Behavioral interventions, particularly those that are family based, have been the most extensively studied with the best short- and long-term results (for reviews, see Faith & Wrotniak, 2009 and Luttikhuis et al., 2009) and meet criteria as *well established treatments* (Jelalian & Saelens, 1999). Because behavioral interventions are action oriented, the transtheoretical model suggests that high levels of readiness to change will likely predict positive treatment outcome; it also suggests that without high levels of readiness to change, patients are vulnerable to unsuccessful treatment outcomes. Furthermore, because family-based interventions have the most empirical support, health care providers must consider the pediatric patients' and the parents' levels of readiness to change and general trends in the concordance between parent and child readiness to change. This information could be helpful to clinicians in assessing not only readiness to change in the individuals but also the dynamic interaction of family members participating in treatment.

Clinicians and researchers have begun to design interventions that are sensitive to a patient's level of readiness to change. For example, stage-matched interventions are tailored to address the common barriers that patients face at a particular level of readiness to change; although the research is sparse, there is some evidence to support the use of stage-matched interventions in pediatric weight management (Crabtree et al., 2010; Frenn et al., 2003). Another approach is the use of motivational interventions, such as motivational interviewing, which are designed to increase the individual's level of readiness to change. Although only a few studies have applied motivational interventions to pediatric obesity, data suggest that this method is

feasible, but efficacy of the intervention is still inconclusive (Flattum et al., 2009; Resnicow et al., 2006; Rollnick et al., 2007; Schwartz et al., 2007). Moreover, a review of the studies that have applied motivational interviewing to the prevention and treatment of pediatric obesity concluded that although the evidence base is beginning to emerge, research needs to examine further how effective it is for varying populations (Resnicow et al., 2006).

The clinical practice and research of approaches such as motivational interviewing and stage-matched interventions is growing rapidly, but relevant factors related to readiness to change are also important to understand. In fact, DiClemente (1999) acknowledged that research has contributed to the understanding of motivation and treatment outcomes; however, future research should focus on predictors of readiness to change. Better understanding of how other factors are related might highlight additional targets for intervention, inform efficient and effective treatment recommendations, and guide future research models.

This study examined factors related to parent and child readiness to change in obese youth presenting at a multidisciplinary clinic for weight management treatment. The primary aims were to increase understanding of parent and child readiness to change by examining associations between these constructs and both demographic variables and psychosocial functioning. Another aim of the current study was to examine consistency between parents' readiness to change and their child's readiness to change, as well as potential moderators of the relation between these variables.

Factors Related to Child Readiness to Change

The first objective of the study was to examine demographic and psychosocial variables related to child readiness to change. Consistent with previous research, results indicated that child readiness to change was significantly higher in children with a higher BMI (Taveras et al.,

2007). The child's BMI arguably represents the severity of the problem and might be functionally compared to severity of drug use in substance use populations. Research exploring readiness to change in adolescent substance abuse has suggested that severity of substance use over time increases the frequency of negative consequences, which is one of the most robust predictors of readiness to change (Battjes et al., 2003; Breda & Heflinger, 2004). In obese youth, research indicates that they experience negative consequences as a result of their weight, such as discrimination from peers and adults (Latner & Stunkard, 2003; Puhl & Latner, 2007) and impaired health-related quality of life (Janicke et al., 2007; Schwimmer et al., 2003; Zeller et al., 2006). Thus, higher BMI, or a more severe problem, might be leading to a greater range of problems, and also higher readiness to change.

This idea is further supported by statistical evidence of a positive linear relation between child readiness to change and self-reporting of social anxiety symptoms when controlling for the child's BMI. It had been hypothesized that social anxiety would have a curvilinear relation with child readiness to change because it was conceptualized as internal psychological distress that might interfere with treatment motivation and success (Vila et al., 2004). However, analyses indicated that there was only a significant linear relation. Given that peer relationships are particularly important for school-aged children and adolescents, perhaps social anxiety should be conceptualized as a salient and distressing negative consequence of obesity that is associated with higher levels of readiness to change. The measure of social anxiety used in the current study (*SASC-R* & *SAS-A*; La Greca, 1998, 1999) assessed different aspects of social functioning beyond internal psychological distress, such as fear of negative evaluation that may tap into the child's experience of stigma and teasing, more than internal distress associated with more broadly defined anxiety. This contradicts the suggestion that high levels of social anxiety might

interfere with treatment motivation (Vila et al., 2004), indicating that social anxiety may motivate children to change their behavior; however, it is unclear how significant social anxiety might impact adherence or treatment outcomes. Because the current study's design is cross-sectional, conclusions cannot be drawn about the direction of the relation between social anxiety and pediatric obesity. Furthermore, there may be another variable that mediates the relation between social anxiety and readiness to change found in the current sample.

As hypothesized, child internalizing symptoms and depression had a significant curvilinear relation with child readiness to change. These results are consistent with findings in the adolescent substance abuse literature and thereby suggest that the relation between internal psychological distress and readiness to change may be more complex than a linear correlation (Battjes et al., 2003; Breda & Heflinger, 2004; Slesnick et al., 2009). Results indicated that moderate internalizing symptoms predicted high levels of readiness to change, and low and high levels of internalizing symptoms were associated with low readiness to change. Thus, clinicians might target interventions designed to increase motivation at those children with low and high internalizing symptoms; children with moderate internalizing distress might be more ready to embrace pediatric-obesity treatment.

Depression was also significant for a curvilinear relation with child readiness to change, but the shape of the estimated curve was different from the shape of the curve for internalizing symptoms. With depression, there is seemingly a generally positive linear relation that decelerates and stabilizes at high levels of depression. Despite suggestions that depression (White et al., 2004; Zeller, Kirk, et al., 2004) may interfere with treatment motivation, results of the current study indicate that the presence of depressive symptoms is related to readiness to change, but the relation is the same at moderate and severe levels of depression. Clinicians may

wonder if a depressed, obese youth should first receive treatment for depressive symptoms before entering a weight management program. Results from the current study might inform clinicians, in that depression seems to be associated with higher levels of readiness to change, and there is no evidence that depressive symptoms when first entering treatment are negatively related to readiness to change; in fact, they are related to higher levels of readiness to change. However, because these data are cross-sectional conclusions cannot be drawn about how depression and readiness to change might impact one another over the course of treatment or how they might impact adherence and treatment outcome.

The hypotheses that child readiness to change would be related to other demographic variables (e.g., age, race, gender, parent BMI, family income) were not supported. Although it had been hypothesized that older children would have more negative consequences as a result of their obesity and thus have higher levels of readiness to change, the results were not significant. It may be that the child's BMI is more acutely related to severity of negative consequences than is the child's age and therefore absorbed the majority of the variance. This finding is similar to findings with adolescent substance-abuse treatment, in which the relation between the adolescent's age and readiness to change their substance-use behavior was mediated by the severity of negative consequences (Breda & Heflinger, 2004). It was hypothesized that cultural differences in race, class, or gender concerning acceptance of larger body sizes or body satisfaction might affect the child's perceived importance of losing weight. It is possible that children have not yet internalized cultural messages of socialization, which could impact their level of readiness to change. Another possibility could be that these variables are significant, but child BMI, which was the most relevant variable in analyses with the current sample, absorbed the variance. Furthermore, the examination of parent BMI and its relation to child readiness to

change was exploratory in nature, but was not significantly related. If demographics variables, such as gender and race, are in fact not strong predictors of child readiness to change, this would suggest that treatment targeting readiness to change might be informed by other factors (e.g., internalizing symptoms, BMI) rather than demographics.

Contrary to hypotheses, child readiness to change was not significantly related to health-related quality of life or externalizing symptoms. It was suspected that health-related quality of life paralleled the construct of severity of negative consequences; thus, it was hypothesized that poor health-related quality of life would be associated with higher levels of readiness to change. The PedsQL™ assessed several aspects related to quality of life, such as physical functioning, emotional functioning, social functioning, and academic functioning. The significant finding that social anxiety was related to child readiness to change indicated that social functioning might be the most salient consequence for children. This indication may explain why a composite score that also included physical, emotional and academic functioning was not significantly related to child readiness to change. Current findings do not support the notion that obese youth may be using their large physical stature to demonstrate social dominance over peers and that this social capital is reinforcing (Janssen et al., 2004). It may be that large physical stature does not provide reinforcing experience of social power, at least in samples with BMIs above the 95th percentile. It may also be that the assessment of externalizing symptoms was too broad and a more sensitive measure of bullying behavior would be more appropriate.

Factors Related to Parent Readiness to Change

The second objective of the current study was to understand how demographic and psychosocial factors were related to parent readiness to change. Parent readiness to change was

also examined more closely in exploratory analyses of the following three significant factors identified on this measure: perceived importance, confidence, and commitment to act.

Similar to that of children in the current study and previous research (Rhee et al., 2005), the most robust demographic predictor of parent readiness to change was the child's BMI, such that parents of more obese children reported higher levels of readiness to change. Results from exploratory analyses of the parent readiness to change factors suggested that this finding was driven by higher perceived importance and higher commitment to act rather than reported level of confidence in parents children with higher BMIs. Parents and children are both seemingly motivated by the severity of the child's obesity.

Also consistent with previous results (Rhee et al., 2005), parents of older children generally reported higher levels of readiness to change. Exploratory analyses suggested that this finding was driven by higher levels of perceived importance in parents of older children. The parents' reported level of confidence and commitment to act were not significantly related to the child's age. This finding indicates that parents may receive some external cues that increase their concern about their child's weight as children get older, such as recognizing increased medical risks. If researchers can identify what prompts parents of older children to feel more strongly that it is important for their child to lose weight, clinicians may be able to use this concern as an intervention to increase levels of readiness to change in parents of younger children.

It was hypothesized that cultural messages regarding body-size acceptance would affect the perceived importance of weight loss, causing African American parents to report lower levels of readiness to change. However, the results were significantly different from those predicted. In the current sample, African American parents reported higher levels of readiness to change than those reported by European American parents. Exploratory analyses helped shed light on the

reasons behind this unexpected finding. There were no statistically significant differences between African American and European American parents on the perceived importance factor. Instead, African American parents endorsed higher levels of confidence and commitment to act than those endorsed by European American parents. It may be that subjective norms do not influence readiness to change as much as do other variables, such as one's sense of self-efficacy. Another possible explanation is that African Americans may be more aware of obesity-related health consequences because of the disproportionate prevalence rates of obesity in ethnic minority communities. On the other hand, mainstream media that promote thinness could increasingly influence cultural standards of beauty, and as a result, cultural differences in acceptance of larger body sizes may be fading. Because of the cross-sectional nature of the current study, it is not clear why African American parents might report higher levels of confidence and commitment to act than those reported by European American parents, but these important racial differences should be explored in future research.

Contrary to predictions, the child's gender, the parent's BMI, and the family's income were not significantly related to overall parent readiness to change. Although there are theoretical reasons to believe these variables might be important, variance was likely absorbed by the most salient variables of child BMI, race, and age. This was supported by exploratory analyses, which revealed that gender and family income either were significantly related or approached significance in relation to particular readiness to change factors, but not total score for parent readiness to change. Consistent with reasoning behind the hypothesis that girls would have higher levels of readiness to change because of higher levels of perceived importance, girls did report significantly higher levels of perceived importance than those reported by boys. The other two factors, confidence and commitment to act, were not significantly related to gender.

Family income approached significance in its relation to one factor; families reporting higher levels of income had a trend towards reporting higher levels of perceived importance. This trend suggests that cultural messages emphasizing thinness for women and possibly cultural differences in social classes in the acceptance of larger body size might impact perceived importance. However, these variables are not the most important demographically when compared to child BMI, race, and age. Given that these data are cross-sectional, it is not possible to attribute a casual direction for these findings, but should be considered as an area of examination for future research. In clinical assessment and intervention, it may be more important to focus on how components of readiness to change are influenced by the child's BMI, age, and race.

When controlling for significant demographic variables (child BMI, race, and age), the parents' report of their child's psychosocial functioning was not significantly related to the parent readiness to change. These analyses were exploratory in nature because there has been so little research examining parent readiness to change in any pediatric population. It is possible that multicollinearity may have suppressed significant results; tolerance was low for these variables despite efforts to reduce multicollinearity by centering the variables. On the other hand, children's psychosocial functioning might not impact parents' readiness to change. If so, treatments targeting parents' motivation might look to other variables (e.g., child BMI) to help inform intervention.

In order to guide culturally competent research in the future, exploratory analyses examined a possible moderating effect of race on the relation between parents' readiness to change and their child's psychosocial functioning. Although these differences were not predicted, results indicated that when controlling for the child's age and BMI, race significantly

moderated the relation between parent readiness to change and the three psychosocial variables of health-related quality of life, internalizing symptoms, and externalizing symptoms. Although the cross-sectional nature of the current study does not provide information about casual relationships, results indicated that for European American parents, higher readiness to change was associated with impaired health-related quality of life. For African American parents, higher readiness to change was associated with greater internalizing symptoms and fewer externalizing symptoms.

It is possible that the cultural context influences the parent's perceived importance of weight loss. For example, research has shown disproportionately higher prevalence of pediatric obesity in ethnic minority groups (Barlow & The Expert Committee, 2007; Ogden et al., 2008; Wang & Beydoun, 2007), and this difference in prevalence could provide a social context in which impaired quality of life is of less concern to ethnic minority parents because it is regarded as normative. This possibility is supported by research that examined health-related quality of life in a rural sample with high prevalence of obese youth and found that in a culture in which where obesity is normative, obese and non-obese participants did not report significant differences in overall health-related quality of life (Ward-Begnoche et al., 2010). However, European American parents might be more concerned about their child's weight when they notice impairments in health-related quality of life.

On the other hand, African American parents' level of readiness to change may be more influenced by their child's emotional functioning and behavior than would that of European American parents. Past research has suggested that obese youth might be using their large physical stature to demonstrate social dominance over peers (Janssen et al., 2004). Parents of a historically marginalized and oppressed group may find it reinforcing to have a child who

exhibits externalizing behavior and uses his/her size for social power. Measures in the current study did not adequately assess bullying behavior or experiences of racial discrimination; therefore, it would be premature to make such strong conclusions. Nonetheless, it is important for clinicians to understand that parents may differ broadly in which childhood behaviors are associated with higher or lower levels of readiness to change because these differences can inform an approach to motivational interventions or treatment recommendations. Furthermore, cultural context may play an important role in parents' readiness to change and because of within group variability, it may be an important topic of discussion when clinicians assess parent readiness to change.

Concordance Between Child and Parent Readiness to Change

The third objective was to examine general trends in the concordance between parent and child readiness to change. In the current sample, parents and children tended to be discordant in their ratings of readiness to change, and although parents usually rated their readiness to change higher than that of the child, there were also a significant number of children who rated their readiness to change higher than that of the parents. Thus, clinicians might have to take different approaches to motivate the pediatric patient or the parents. Results also suggested that parents and children are more likely to have positively correlated ratings when the child's BMI was extremely high. This finding could have an important implication for treatment of obesity and assessment of patient readiness to change. Families with severely obese youth will face some of the most significant obstacles to weight loss and are at higher risk for medical comorbidities. Parents and children are seem more likely to agree in cases of very severe obesity, with shared levels of low or high readiness to change. For youth with lower BMI relative to the rest of the sample, child readiness to change did not seem to change as a factor of the parents' level of

readiness to change. In short, given data indicating that treatment should target the whole family (for reviews, see Faith & Wrotniak, 2009 and Luttikhuis et al., 2009), the clinicians should separately assess and target the child and parent readiness to change.

Assessment of Readiness to Change in Obese Youth and Their Parents

The distribution of parent readiness to change scores was negatively skewed, meaning that the sample reported high levels of parent readiness to change. The current study consisted of a clinical sample, and parents ultimately decide whether the child will participate in the multidisciplinary weight-management clinic. Thus, one might expect to see high levels of parent readiness to change, and this trend may be significantly different from findings in community samples. There were similar trends in item responses on the parent and child readiness to change measures. Fewer than half of the obese youth in the sample perceived themselves as overweight, but a large portion of them reported being ready to change their weight. Similarly, a large portion of parents reported that their child was *not at all* or *somewhat* overweight and many did not regard their child's weight as a problem, but their expressed commitment to behavior change and sense of hopefulness and self-efficacy were generally high. This trend suggests that many of the children and parents may be close to the preparation or action stage of change, which is interesting given that many of them report that they do not regard the child's weight as problematic. The transtheoretical model suggests that perceiving the behavior as problematic is related to low levels of readiness to change (Prochaska & Velicer, 1997) and that perceiving the behavior as problematic is considered essential to achieving higher levels of readiness to change. With rapidly increasing rates of pediatric obesity during the last 3 decades, families may perceive obesity as more normative and therefore do not perceive pediatric obesity as problematic.

The current study used non-standardized measures to assess readiness to change; therefore, analyses examined internal consistency of these measures and also tested for statistically significant factors that emerged from these measures. When examined for internal consistency, the Cronbach's alpha for the six initial items measuring child readiness to change was low, but removal of one item, "I am losing hope of losing weight," improved the internal consistency to an adequate level according to criteria described. Notably, this item, which was intended to assess the patient's level of optimism and sense of self-efficacy, reduced internal consistency, but a similar question assessing optimism and self-efficacy, "I feel I will be successful in making these changes," improved reliability. Closer examination of these items, in the context of the transtheoretical model, revealed an important distinction between feeling one will be successful at changing their behavior as opposed to feeling hopeful about the final outcome of weight loss. The transtheoretical model emphasizes confidence in changing specific behaviors; thus, a question assessing hopefulness related to weight loss might not be an appropriate assessment of readiness to change.

In contrast with the measure of parent readiness to change, no significant factors emerged within the Child Readiness to Change questionnaire. This discrepancy may have emerged for several reasons. First, child readiness to change may require more sensitively designed questions to tap into these underlying constructs. Although child readiness to change may be as complex as parent readiness to change, the current study used fewer items to measure readiness to change in youth. On the other hand, child readiness to change may not consist of the same distinct components outlined by the transtheoretical model and might, therefore, be better represented by an overall readiness to change score.

A factor analysis of the Parent Readiness to Change questionnaire revealed three significant factors that fit conceptually with the theoretical underpinnings of the readiness to change construct: Perceived Importance (Factor 1), Commitment to Act (Factor 2), and Confidence (Factor 3). The factor analysis suggested that readiness to change is a complex, multidimensional construct, and the questionnaire used in the study was seemingly sensitive enough to detect critical constructs related to readiness to change. Clinically, assessment of such components as confidence in making changes, perceived importance of the problem, and commitment to act might inform the design of a stage-matched intervention or the key areas to target in a motivational intervention. For example, a parent who reports high level of perceived importance but low confidence might benefit from a tailored intervention to help the parent feel more confident in helping his/her child make healthy lifestyle changes.

Limitations and Future Directions

Although readiness to change has been identified as an important area for clinicians assessing and making treatment recommendations for obese youth (Barlow & The Expert Committee, 2007), there is a paucity of research examining stage-matched and motivational interventions, and even fewer studies examining how relevant factors are related to readiness to change. The current study serves as a cross-sectional, exploratory examination of demographic and psychosocial variables related to parent and child readiness to change in a clinical sample, but there are many avenues of empirical investigation to consider in the future.

Despite the significant contributions of this study, caveats should be considered when interpreting results. First, there is no current standard for assessing readiness to change in obese youth and their parents; therefore, the measures used to assess the construct of focus were not standardized and have not been used in any other studies. One way to help facilitate productive

research concerning readiness to change in obese youth is the development of a standardized and validated measure of readiness to change for this population. Readiness to change is a complex construct, and research to help the field gain a more comprehensive understanding of its meaning in obese youth is an important undertaking. One of the first steps will be testing the validity of the stages of change construct in obese youth, (e.g., do youth in the same stage of change face similar barriers to behavior change that are unique to those faced by youth at different stages?). Furthermore, future research needs to investigate the validity and reliability of readiness to change assessment tools in this population. The measures developed for the current study can provide a starting point for the development of a measure that can assess the different components of readiness to change in a format that is easily utilized in clinical settings.

In addition to examining the validity and reliability of assessing readiness to change, future research should focus on predictors of readiness to change, as suggested by DiClemente (1999). Identifying variables related to readiness to change might highlight additional targets for intervention, inform efficient and effective treatment recommendations, and inform future research models. Identification of other potentially related predictors might include those suggested by the theory of planned behavior, such as subjective norms, attitudes toward the behavior, and perceived behavioral control (Ajzen, 1988).

Second, the generalizability of the findings from this study is limited. The current study included a clinical sample of youth presenting for treatment at a weight management clinic. This alone implies that they are more likely to be beyond the precontemplation stage of change and more committed to changing health behaviors than would obese youth from a community sample. Therefore, future investigations must confirm and expand findings from the current study and assess generalizability to the population of obese youth, including community samples.

Third, the current findings indicate that race is an important variable when assessing factors related to parent readiness to change. Future studies should consider including a more diverse sample in order to make meaningful comparisons among racial groups beyond European American and African American comparisons.

Lastly, the current study was cross-sectional in nature and considered only factors related to readiness to change as patients entered treatment. There is no information about how readiness to change might fluctuate over the course of treatment or how baseline levels of readiness to change are related to weight management treatment outcomes. Moreover, the cross-sectional design does not allow for conclusions about casual direction in understanding predictors of readiness to change.

Ultimately, the most important questions about readiness to change involve the impact on treatment outcome. A critical future direction for pediatric obesity research is an examination of moderators and mediators of treatment success. The current study highlighted the importance of examining child BMI, age, race, and internalizing problems, such as social anxiety and depression. Future longitudinal studies that assess the impact of readiness to change, interventions designed to increase levels of readiness to change, and factors related to readiness to change will help clinicians develop interventions that produce the most positive physical and emotional outcomes for obese youth.

Conclusions

A trend is rapidly emerging for clinicians to assess obese youth for readiness to change and allow that assessment to inform efficient and effective treatment recommendations. Despite recommendations by The Expert Committee to motivate families instead of prescribing changes they are not ready to make (Barlow & The Expert Committee, 2007), little research is available

to guide clinical practice. As a result, clinicians are left with questions about how to accurately assess readiness to change, how to use assessment to inform treatment, and how to proceed with patients presenting with low levels of readiness to change.

This study examined the relation between demographic and psychosocial variables with child and parent readiness to change in obese youth, and outcomes may provide some preliminary guidance for clinicians. Certainly there is within-group heterogeneity, but some demographic variables may help identify patients with higher levels of readiness to change. Both children with higher BMI and their parents report higher levels of readiness to change. Moreover, agreement between parent and child readiness to change was higher for these children. This finding suggests that while families with severely obese youth may face the most significant number of obstacles, they may also be more motivated than other families. Additionally, parents of older children are more likely to report higher levels of readiness to change. This evidence might lead clinicians to consider postponing an intervention for a family with young children if the parent reports low levels of readiness to change, not only because the parents' level of readiness to change may increase as the child gets older but also because parents play a more significant role in weight-loss interventions for young children.

Also, clinicians should challenge their own potential biases about which patients may have higher readiness to change. For example, clinicians might assume that parents who are obese themselves are not motivated to help their children lose weight; however, the current study suggests that readiness to change is not related to the parent's BMI. Another potential bias is that ethnic minority parents may be less ready to change because of cultural acceptance of larger body sizes; however, the evidence was exactly the opposite in the current sample, with African

American parents reporting higher levels of readiness to change than those reported by European American parents.

Clinicians may often wonder about the treatment implications of a child's psychosocial functioning. For example, is a very depressed child contraindicated for a behavioral obesity intervention? This clinical question is complicated, and the evidence from the current study demonstrating the relation between these variables is also complicated. There is evidence that that child readiness to change is positively related to his/her self-reported symptoms of social anxiety. Thus, children with social anxiety symptoms might be more motivated to participate in an obesity intervention than would children without such symptoms. Social functioning is developmentally important to children, and helping a child identify a discrepancy between his/her goals and social functioning may be a consideration for motivational interventions with obese youth. Furthermore, children with some symptoms of depression seemingly have higher readiness to change, and the same trend is also true in children with higher levels of depression. Although the current study, which was cross-sectional, did not assess the impact of depression on treatment adherence or outcomes, there is no evidence that depressed youth are less motivated to change their behavior than are children who are not depressed. In fact, they may be more motivated than their nondepressed peers. The contradiction to these findings was with general internalizing symptoms; readiness to change was highest for children who reported moderate internalizing symptoms. This finding is consistent with the idea that some level of psychological distress (i.e., social anxiety and depression) is associated with higher levels of readiness to change, but also is contradictory because high levels of general internalizing symptoms were related to lower levels of readiness to change. The impact of the child's psychosocial functioning on readiness to change is unclear, but the findings suggested that there are differences between

African American and European American parents because race moderated the relation between parent readiness to change and child psychosocial functioning.

Results from this study are limited by the cross-sectional design, but they begin to shed light on understanding demographic and psychosocial variables related to child and parent readiness to change in obese youth, as well as highlight a number of future endeavors in the study of the effective and efficient treatment of pediatric obesity.

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Appendix

Centers for Disease Control and Prevention (CDC) Growth Charts, 2000

