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I, Katlyn Garr, hereby submit this original work as part of the requirements for the degree of Master of Arts in Psychology.

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The Relationship Between Maternal Internalizing Symptoms and Pediatric Obesity

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The Relationship Between Maternal Internalizing Symptoms and Pediatric Obesity

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by

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Abstract

Due to the high prevalence of pediatric obesity and its associated physical (e.g., diabetes, asthma, hypertension) and mental health comorbidities (e.g., depression, low quality of life), it is important to explore all factors that may influence weight management in children and adolescents. The current study explored the relationship between maternal internalizing symptoms (i.e., depressive and anxiety symptoms) and child weight and weight change (i.e., measured via BMI percentile), quality of life (health-related and obesity-specific), and maternal recognition and concern of child health and weight. Participants were 112 youth (aged 2 to 18) with obesity enrolled in a weight management program and their biological mothers. ANCOVAs revealed a trend for children of mothers with clinical-level internalizing symptoms demonstrating a greater BMI percentile at baseline ($p = .07$, $d = .37$) and a significant negative association between maternal clinical-level internalizing symptoms and child health-related quality of life via child- and parent-report (total score child-report: $p < .001$, $d = .99$; total score parent-report: $p < .001$, $d = .80$) and child obesity-specific quality of live via parent-report (total score: $p < .001$, $d = .88$). Multilevel modeling did not support the hypothesized longitudinal association between maternal internalizing symptoms and child BMI percentile change. The association between maternal internalizing symptoms and recognition and concern of child health and weight was also not supported via ANCOVAs. The current study's findings demonstrate the necessity for caregiver mental health screening for prevention and treatment efforts in pediatric obesity. Identifying and treating caregiver mental health symptoms will likely improve child quality of life and weight management efforts and may be an avenue to lower pediatric obesity rates.

Keywords: obesity, parent mental health, quality of life, weight management

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The Relationship Between Maternal Internalizing Symptoms and Pediatric Obesity

Pediatric obesity is a nationwide epidemic with 1 in 5 children and adolescents (6-19 years) meeting criteria for obesity (a Body Mass Index [BMI] z-score $\geq$ 95th percentile for one's age and sex; Centers for Disease Control and Prevention, 2017). Pediatric obesity has been linked to an increased risk of health conditions and complications (e.g., diabetes, asthma, cardiovascular risk, hypertension; Sanders, Han, Baker, & Cobley, 2015) and poor psychosocial functioning (e.g., emotional problems, depression, anxiety, few friends, stress; Gundersen, Mahatmya, Garasky, & Lohman, 2011). Additionally, children with obesity are often unsuccessful with weight management attempts to reach a healthy weight, which is detrimental since pediatric obesity oftentimes continues into adulthood (De Miguel-Etayo, Bueno, Garagorri, & Moreno, 2013; Singh, Mulder, Twisk, van Mechelen, & Chinapaw, 2008). Therefore, identifying factors that help or hinder weight management among children with obesity is critical and necessary in order to develop interventions to promote better health and psychosocial outcomes in children and adolescents with obesity.

Research has identified many biological and health-related factors that can contribute to the development of obesity among children and adolescents (e.g., genetics, diet, physical activity; Deckelbaum & Williams, 2001). Identifying other contributing factors (e.g., parental mental health, the family environment, availability of healthy food) that influence the development of obesity and weight management among youth with obesity has also been a focus for researchers. A model by Hemmingsson (2014) proposes that there are other factors that influence the development of obesity and weight management besides diet and physical activity; this model places a strong emphasis on the influence of the family environment (i.e., income, education, employment, emotional distress, psychological problems) in pediatric obesity. Within

an ecological framework, family factors have been found to influence children's risk and development of obesity. For example, parenting practices (e.g., feeding practices, parenting styles; Berge, Wall, Loth, & Neumakr-sztainer, 2010; Gross, Mendelsohn, Fierman, Hauser, & Messito, 2014), maternal weight (Whitaker, Jarvis, Beeken, Boniface, & Wardle 2010), and family income (Wang, 2001) have been linked to pediatric obesity.

Maternal Depression and Child Obesity

Previous research has also suggested that maternal mental health may play an important role in pediatric obesity. For example, research has suggested that maternal depression has a negative effect on the amount of physical activity a child engages in (Dittrich et al., 2018; Yoo, Chung, & Lee, 2015), which is detrimental since it is necessary for children with obesity to engage in physical activity to help manage their weight (Nemet, 2015). However, research examining a direct link between maternal depression and child obesity has produced mixed findings. For example, one systematic review (Lampard, Franckle, & Davison, 2013) including children that were overweight and obese, aged 2-18, found that in half of the studies (n = 3) there was a positive association between maternal depressive symptoms and child BMI z-score or adiposity, while the other half (n = 3) did not find this association. Another systematic review (Benton, Skouteris, & Hayden, 2015) examining maternal psychopathology and obesity in preschool-aged children also found mixed results. Two (out of 6) cross-sectional studies found a positive association between moderate-to-severe depressive symptoms in mothers and overweight/obese weight status in preschoolers. However, stronger support was found among longitudinal studies, and 11 (out of 14) longitudinal studies found partial support for an association between maternal depression and overweight/obese risk in preschoolers. These mixed findings may be due to inappropriate weight classification (i.e., combining overweight

and obese children into one category). Additionally, much of the past research has not clearly distinguished between clinical and subclinical levels of depression, such as whether a mother meets diagnostic criteria for a clinical diagnosis of depression compared to a mother only exhibiting some symptoms of subclinical depression. Therefore, more research is necessary to investigate the link between maternal depression and pediatric obesity.

Maternal Anxiety and Child Obesity

Past research also suggests that maternal anxiety may be related to the risk, development, and protraction of pediatric obesity. For example, mothers displaying anxious symptomatology during pregnancy and at 6 and 12 months postnatally have been shown to engage in controlling (e.g., restrictive) feeding practices when the child is 1-year-old (Farrow & Blissett, 2005), a feeding practice that has been linked to later childhood obesogenic factors (e.g., overeating, high adiposity; Birch, Fisher &, Davison, 2003; Cardel et al., 2012). However, there have been limited findings regarding the link between maternal anxiety and child obesity. To our knowledge, only two studies have examined this relationship; a study conducted in Turkey found that maternal anxiety in youth with obesity was significantly higher than in control groups (Pekcanlar Akay, Ozturk, Nur Avcil, Kavurma, & Tufan, 2015), and another study conducted in Spain found that anxiety was significantly higher in mothers of children with obesity when compared to mothers of children with healthy weight (Blanco et al., 2017). However, prior studies examining the link between maternal anxiety and child obesity have all been cross-sectional and outside of the U.S. Therefore, a U.S., longitudinal design is necessary in order to understand the potential effects that maternal anxiety can have on pediatric obesity and weight management.

Maternal Mental Health and Child Weight Management Program Outcomes

Maternal internalizing symptoms (i.e., depressive and anxiety symptoms) may also be a barrier to treatment success in weight management programs to address pediatric obesity. Although this has been underexplored in current research, the significant role that parents play in the development of child weight and obesity makes maternal mental health necessary to examine in pediatric obesity interventions (Skouteris et al., 2011; Ventura & Birch, 2008). Further, prior research has identified that child weight management programs are more effective if the parent(s) are actively involved (Hingle, O'Connor, Dave, & Baranowski, 2010; Paineau et al., 2008). If a mother is experiencing depressive symptoms, preparing nutritious meals, attending the child's doctor appointments, and engaging in physical activity with the child could be difficult. This could result in a child with obesity trying to manage their weight solely on their own, and for any child, particularly a young child, this could be stressful, overwhelming, and almost impossible. Further, since young children are not equipped to make lifestyle changes, the responsibility for managing the child's weight falls on the parent. In fact, prior research with other illness populations has shown that mothers with internalizing symptomatology have a difficult time managing their child's illness or health condition (Bartlett et al., 2004; Perry, 2008; Wiebe et al., 2005). For example, mothers with high depressive symptoms report more difficulties managing their child's asthma (e.g., less self-efficacy to cope with their child's illness, greater emotional distress with their child's asthma interfering with daily activities, less confidence to control illness symptoms) than mothers with low depressive symptoms (Bartlett et al., 2004). In addition, children with diabetes that appraised their mothers as uninvolved in managing their illness problems had poorer treatment adherence and lower quality of life than children that appraised their mothers as collaborative (i.e., mother and child work together;

Wiebe et al., 2005). This specific area of focus could have significant clinical implications. If maternal depressive or anxious symptoms are hindering a child's weight or health, interventions could include mental health screening for parents, and if parents display clinical or impairing levels of internalizing symptoms, interventions could incorporate supports and intervention content to address these symptoms. This, in turn, could result in an increased effort to help their child manage their weight.

Maternal Recognition and Concern of Child Health and Weight

In addition to maternal mental health potentially influencing child weight management, internalizing symptomology could also impact a mother's recognition and concern for their child's health status and current weight. Prior research has repeatedly shown discrepancies between mothers' concerns and perceptions of their child's current weight and health and the actual weight status of their child, with mothers failing to recognize their child as overweight or obese (Almoosawi et al., 2016; Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000). A mother's inaccurate or skewed perception of their child's weight could be harmful for a child's long-term health, and result in poor treatment efforts. Depressive or anxiety symptoms may further hinder a mother's concern or ability to recognize that their child's weight is unhealthy and needs treatment. For example, depressed mothers have been shown to be inattentive, unresponsive, disengaged, and affectively flat to their children and their needs (Canadian Paediatric Society, 2004). Therefore, since mothers dealing with mental health problems face many parenting difficulties (Lovejoy, Graczyk, O'Hare, & Neuman, 2000), and mothers without mental health problems oftentimes inaccurately fail to perceive and recognize their child's current weight and health as detrimental (Campbell, Williams, Hampton. & Wake, 2006), there is reason to believe that internalizing symptomatology may further hinder a mother's ability to

recognize when their child's health is at risk. However, to our knowledge, no research has been conducted to investigate how maternal depressive or anxiety symptoms influence a mother's recognition and concern of their child's health and weight.

Maternal Mental Health and Child Quality of Life

Maternal psychopathology may also influence quality of life among children with obesity. Children and adolescents with obesity have been shown to consistently experience poorer quality of life than their healthy-weight counterparts (Schwimmer, Burwinkle, & Varni, 2003; Zeller & Modi, 2006). Further, researchers have recently identified that maternal depression negatively affects child quality of life in healthy-weight children (Dittrich et al., 2018). Therefore, it may be possible that maternal depressive or anxiety symptoms worsen the quality of life of a child or adolescent with obesity. This potential relationship is plausible due to the fundamental role that mothers play in their children's lives (Cummings & Kouros, 2009). Further, parental mental health problems have been shown to greatly affect the wellbeing (e.g., mood disorders, interpersonal problems, difficulties in functioning) of their children (Beardslee, Versage, & Gladstone, 1998). Mothers have a significant impact on their children, and maternal mental health problems may further hinder their child's quality of life, beyond what obesity would alone. However, this is an area that has not been examined, but could offer critical information for health-related family interventions and improved psychological functioning for children with obesity.

Current Study

The current study examined cross-sectionally whether children of mothers with and without clinical-levels of internalizing symptoms (i.e., depressive and anxiety symptoms) differed on child weight, quality of life, and maternal recognition and concern of child health and

current weight within a pediatric obesity weight management context. Additionally, the study examined the longitudinal relationship between maternal internalizing symptoms and weight change during an obesity weight management program. This study builds on past research regarding maternal internalizing symptoms and child obesity by 1) using longitudinal data, 2) ensuring all children are in the same weight status classification (i.e., obese, with a BMI $\geq$ 95th percentile), and 3) examining mothers with clinical- level symptoms compared to mothers without clinical-level symptoms.

Primary Aim: To examine the relationship between maternal internalizing symptoms and child weight.

Particularly, we examined the cross-sectional relationship between the presence of clinical-level maternal depressive and anxiety symptoms and child BMI percentile (i.e., BMI percentage of the 95th percentile) among treatment-seeking youth aged 2-18 years with obesity. We hypothesized that children of mothers with clinical-level symptoms of depression and anxiety would have higher BMI percentiles at baseline than children of mothers without clinical-level symptoms of depression and anxiety (Hypothesis 1). Additionally, we explored the longitudinal relationship between maternal internalizing symptoms and change in child BMI percentile during participation in a pediatric weight management program. We examined how weight change in children from baseline (i.e., at the first clinic visit) to follow-up clinic visits related to maternal internalizing symptoms (measured at baseline). We predicted that children of mothers with clinical-level symptoms of depression and anxiety at baseline would show less reduction in BMI percentile than children of mothers that did not display clinical-level symptoms of depression and anxiety (Hypothesis 2).

Secondary Aims: To examine the relationship between maternal internalizing symptoms and child quality of life (health-related and obesity-specific) and maternal perceptions of child health and weight.

The cross-sectional relationship between maternal depressive and anxiety symptoms and child quality of life (health-related and obesity-specific) was explored. We hypothesized that children of mothers with clinical-level symptoms of depression and anxiety would have lower health-related (Hypothesis 3) and obesity-specific (Hypothesis 4) quality of life than children of mothers that did not display clinical-level symptoms of depression and anxiety. The relationship between maternal depressive and anxiety symptoms and maternal recognition of child health status and concern of child current weight was also examined. We hypothesized that mothers with clinical-level internalizing symptoms would have less recognition of their child's current health status (Hypothesis 5) and less concern about their child's current weight (Hypothesis 6) compared to mothers that did not display clinical-level symptoms of depression and anxiety.

Method

Participants

Participants were 112 children and adolescents 2-18 years old with obesity and their biological mothers. Participants were drawn from a larger study, the Biorepository of Environment, Activity and Nutrition to Prevent Obesity-related Disorders (BEANPOD) study, examining the origins of diabetes, cardiovascular, and metabolic risk factors in the context of obesity. The BEANPOD study enrolled youth (2-18 years old) referred to the Center for Better Health and Nutrition (CBHN) clinic, an obesity prevention program of the Heart Institute at Cincinnati Children's Hospital Medical Center (CCHMC) and their primary caregivers. Participants (i.e., children and primary caregivers) completed a one-time set of questionnaires

and provided access to their CBHN clinical records, which included anthropometrics measured longitudinally as part of clinical care. Inclusion criteria for the current secondary analysis were 1) child BMI z-score $\geq 95^{th}$ percentile (most patients enrolled in the BEANPOD study met this criterion, but this was not a requirement for enrollment), 2) the caregiver participating in the BEANPOD study was the child's biological mother, and 3) enrollment prior to March 2018 (i.e., when the data was pulled for this secondary data analysis). A subset of questionnaires was drawn from the BEANPOD study for the current study's aims and hypotheses.

Measures

Demographics

Child demographic information (e.g., age, sex, race) was obtained through the child's medical records. Child age was converted to months for use in analyses. Additionally, further demographic information not included in the child's medical record (e.g., biological parent information, socioeconomics) was obtained from the BEANPOD Parent Questionnaire (see Appendix A).

Child Anthropometric Measurements

Child anthropometric data (e.g., height, weight, BMI, BMI percentile, waist circumference, caloric intake, blood pressure) were collected through the CBHN medical records at varying frequencies for each child because it was collected as part of standard clinical care rather than standardized research assessments. BMI percentiles were used as the main weight variable for the current study; this approach allowed for a more feasible and valid way to track child weight status over time because percentiles account for age and sex, allowing for a more accurate comparison of child weight across age and sex than regular child BMI (Must & Anderson, 2006). Child BMI percentiles were analyzed by using the child's BMI percentage of

the 95th percentile (i.e., a child can be categorized as having 120% of the 95th percentile), which allows for a more accurate way to examine and monitor weight in children with severe obesity (Gulati, Kaplan, & Daniels, 2012). Since all children in the current study met the criteria for obesity (i.e., BMI z-score ≥ 95th percentile), this allowed for more variation, and a better depiction of child weight at baseline.

Maternal Mental Health

Mothers completed the *Kessler Psychological Distress Scale* (Kessler-10/K10; Kessler et al., 2002) at baseline. The K10 is a well-established, validated, 10-question measure that assesses symptoms of anxiety and depression. This measure was developed in order to assess clinical-level symptoms of depression and anxiety in the general population (Kessler et al., 2003). It is currently used worldwide and has been deemed as a valid tool for identifying individuals that fall within the clinically significant range for a mental illness (Kessler et al., 2002; National Comorbidity Survey, 2005). Mothers rated each question based on the frequency and severity of the symptom experienced during the past 30 days (e.g., "…how often did you feel…so nervous that nothing could calm you down/hopeless/tired out for no good reason?"; see Appendix B) on a 5-point Likert-type scale of 1 (none of the time) to 5 (all of the time). The K10 has demonstrated acceptable reliability (α = .93) and convergent validity (r = 0.65-0.75; Kessler et al., 2003). For the current sample, the K10 demonstrated good internal consistency (α = .90). The Kessler-10 is scored by summing the participant's 10 responses to receive a total score. Scores range from 10-50, with higher scores indicating more symptomatology. Cut-offs have been well-established and validated based on U.S. samples to indicate clinical-level symptomatology: scores < 20 indicate that the individual is likely to be well (i.e., no mental illness), scores 20-24 indicate that the individual likely has a mild mental disorder, scores 25-29 indicate that the individual likely has a

moderate mental disorder, and scores ≥ 30 indicate that the individual likely has a severe mental disorder (Andrews & Slade, 2001; Kessler et al., 2002).

For the current study, mothers were grouped into 2 categories based on their K10 score in order to examine clinical-level symptomatology vs. non-clinical level symptomatology: 1) scores under 20, indicating that the mother was likely to be well and did not have a mental illness (n = 75) and 2) scores 20 and over, which indicate that the mother was likely to have a mild to severe mental illness (n = 37).

Health-related Quality of Life

A pediatric quality of life measure (PedsQL; Varni, Seid, & Rode, 1999) was used to capture parent- and child- report of child quality of life. *The Pediatric Quality of Life Inventory (Version 4.0)* is a well-established, 23-item, self-report, validated, health-related quality of life questionnaire that includes six subscales (Physical Functioning, Emotional Functioning, Social Functioning, School Functioning, Psychosocial Health, Physical Health) and a Total quality of life score. For children under 4-years old, only mothers completed the PedsQL, and for children and adolescents (aged 5-18), the child completed the measure about themselves, while the mother completed a parent-proxy version of the PedsQL about their child. Participants were asked to report how much of a problem each item had been for themselves or their child in the past month (e.g., "It is hard for me to run," "I feel sad or blue," "I forget things"), with a 5-choice response scale ranging from "never a problem" to "almost always a problem." To score, items were reversed scored and linearly transformed to a 1-100 scale, so that higher scores indicated better quality of life. The PedsQL has demonstrated good reliability ($\alpha = 0.83$ for child and $\alpha = 0.86$ for parent) and validity (Varni et al., 1999).

Obesity-specific Quality of Life

Child quality of life was measured through both mother- and child- report. Child-report quality of life was obtained only for the subset of children aged 5-13 years using a validated obesity-specific health quality of life measure that assesses the impact of obesity on child functioning over the past month (*Sizing Me Up* [SMU]; Zeller & Modi, 2009; see Appendix C). All items use phrasing to guide responses to focus on the child's size (e.g., "...because of my size/weight/shape"). The SMU consists of 22 items (e.g., "felt mad because of your size," "felt left out because of your size") and a four-choice response scale (i.e., "none of the time," "a little," "a lot," "all the time"). The measure consists of five subscales (Emotional Functioning, Physical Functioning, Teasing, Positive Attributes, Social Avoidance) and a Total score, which are calculated by summing and standardizing items loading on those scales. Scores range from 0-100, with higher scores indicating better quality of life. The SMU has demonstrated good reliability ($\alpha = 0.68 – 0.85$) and validity (Zeller & Modi, 2009), and for the current sample the SMU demonstrated excellent internal consistency ($\alpha = .99$).

Parent-report of child quality of life was assessed using the *Sizing Them Up* measure (STU; Modi & Zeller, 2008; see Appendix C), a parent-proxy designed in parallel with the SMU measure. For children aged 5-13, mothers answered 22-items to assess how they thought their child felt in the past month (e.g., "felt worried because of their size," "were teased by peers because of their size"); for children aged 14 and older, mothers completed an additional six questions that were developmentally appropriate (e.g., "talked about difficulties dating due to their size," "worried about their future because of their weight/size"). Responses were also reported on a four-choice response scale (i.e., "never," "sometimes," "often," "always"). The STU is composed of six subscales (i.e., Emotional Functioning, Physical Functioning, Teasing/Marginalization, Positive Social Attributes, Mealtime Challenges, and School

Functioning) and a Total score. For the subscales, corresponding items were summed and standardized; for the Total score, all items were summed and standardized. Scores range from 0-100, with higher scores indicating better quality of life. The STU has demonstrated adequate reliability ($\alpha = 0.59 – 0.91$) and validity (Modi & Zeller, 2008), and for the current sample adequate internal consistency was established ($\alpha = .86$).

Maternal Recognition and Concern of Child Health and Weight

Maternal recognition and concern regarding their child's current overall health status and current weight was assessed through the BEANPOD Parent Questionnaire (see Appendix A). One question measured parental recognition of child health status: "In general, would you say your child's health is…"; answers were based on a 5-point Likert-type scale ranging from "excellent" to "poor." Another question assessed parental concern of their child's current weight: "How concerned are you about your child's current weight?" with answers based on 4-point Likert-type scale ranging from "not at all" to "very."

Procedure

The BEANPOD study was approved by the CCHMC Institutional Review Board. Before, the child's initial clinic visit, BEANPOD study personnel prospectively identified newly-referred patients to the CBHN clinic that met study inclusion criteria. An introduction letter and packet were then sent to eligible identified patients to introduce the BEANPOD study. The mailed packet consisted of general study information, why they were being asked to participate in the study, and what to expect at their CBHN clinic visit if they chose to participate. The mailed packet also contained consent and assent forms as well as questionnaires for both the child and parent to complete (when age appropriate). In addition, a phone call was made to remind patients of their upcoming appointment at the CBHN clinic and to complete the questionnaires and bring

them to the clinic if they wanted to participate in the BEANPOD study. However, in some cases, when scheduling did not provide enough time to provide the introduction letter and questionnaires via mail before the patient's clinic visit, study coordinators approached eligible participants at the CBHN clinic to introduce the study.

Weight management treatment. The weight management intervention was a comprehensive, family-based, multidisciplinary program addressing health concerns of youth with overweight and obesity. At the first CBHN clinic appointment, the child and family met with a medical provider, dietician, and exercise physiologist to examine the causes of weight gain, health-related problems, and to develop an individualized exercise and healthy eating plan as part of standard clinical care. At the family's request, they could also meet with a psychologist to discuss any mental health concerns and increase health behavior change efforts (e.g., setting goals, motivation). Social workers were also available for support and to connect families with resources. Follow-up clinic visits were scheduled based on family need and availability every 2-3 months.

BEANPOD study. Research coordinators met once with participants at their initial CBHN clinic appointment. A parent or legal guardian had to be present in order for the child or adolescent to be enrolled in the BEANPOD study. For all participants, a full consent process (i.e., written consent and assent when age appropriate) was conducted by a study coordinator once the patient and parent arrived at the clinic. Children and adolescents 11-years and older gave written assent, while children under 11-years were present for the consent process, but did not engage in it (i.e., did not provide a signature). The questionnaires were not collected until after the full consent process was completed. Additionally, participants consented for researchers

to access their CCHMC clinical records to track longitudinal anthropometric information. Each participant received $10 at the visit for completing the study forms.

Data Analyses

All analyses were conducted in SPSS Version 25 and/or RStudio Version 1.0.153. Before analyses, the data were cleaned (e.g., checked for errors, reformatted), appropriate assumptions were checked (e.g., skewness, kurtosis), and the presence of any potential outliers was examined. One outlier was identified among the longitudinal child BMI percentile data and, therefore, removed for corresponding study analyses (i.e., Hypothesis 2). All applicable study variables (child baseline BMI percentile, child quality of life, maternal recognition and concern) fell within the normal ranges for skewness and kurtosis (between -2.00 and 2.00; Tabachnick & Fidell, 2013). In addition, the assumption of linearity, or that there is a linear relationship between variables, and the assumption of homoscedasticity (i.e., homogeneity), or that there is constant variance among the data, was checked by several plotting methods (i.e., normality probability plots, scatterplots, residual vs. predicted plots, simple box plots). The assumptions of linearity and homoscedasticity were met for all study variables (i.e., maternal internalizing symptoms, baseline child BMI percentile, child quality of life, maternal recognition and concern). Analyses are interpreted as significant if $p < .05$.

Dropout rates. Given study attrition could impact the results of our longitudinal analyses, we sought to identify predictors of treatment dropout. Categorical variables (i.e., yes and no) were created to determine if any study variables were related to how many visits the child attended (e.g., does the child have BMI data after 1 month, 2 months, 3 months). Chi-square tests revealed no significant associations between the maternal internalizing groups (mothers with

clinical-level symptoms and mothers without clinical-level-symptoms) and if the child had BMI data at any time points (i.e., visits after 10 months were not examined due to small sample size). Further, maternal sociodemographic factors (i.e., race, ethnicity, employment status, education level, marital status, currently in school) and child sociodemographic factors (i.e., age, race, sex, insurance) were not related to whether the child had BMI data at any time points. A significant association between how many hours mom worked and if the child had BMI data after 1 month was found, $F(1, 109) = 4.33$, $p = .04$; no significant associations were detected for hours mom worked and if the child had BMI data for any other time points. Based on these findings, we believe that the data is still representative of youth enrolled in a pediatric weight management program.

Covariates. Child demographic factors (i.e., age, sex, race, insurance) and mother demographic factors (i.e., race, ethnicity, employment status, education level, marital status, currently in school, number of hours worked) were explored as potential covariates through a series of correlations, chi-square tests, and one-way ANOVAs. Child baseline BMI percentile, maternal internalizing groups, maternal recognition of child health status, and maternal concern of child weight were not associated with child demographic factors or mother demographic factors. Whether mom is currently in school was significantly related to child-report of health-related quality of life (Total score), and therefore controlled for in study analyses for Hypothesis 3. Child age and mother marital status were associated with child-report of obesity-specific quality of life (Total score) and child race and insurance were associated with parent-report of child obesity-specific quality of life (Total score) and, therefore treated as covariates in study analyses for Hypothesis 4. See Table 1 for significant covariate statistics.

Primary Aim

Hypothesis 1 (i.e., children of mothers that display clinical-level symptoms of depressive and anxious symptoms would have higher baseline BMI percentiles than children of mothers that did not display clinical-level symptoms) was tested using an Analysis of Covariance (ANCOVA). This approach allowed us to test if our dichotomous predictor (i.e., mothers with and without clinical-level symptoms) had an effect on child BMI percentile (i.e., percentage of the 95th percentile) at the beginning of a weight management program for pediatric obesity. Cohen's *d*, which presents the difference between two means in standard deviation units, was calculated to examine effect sizes by subtracting the adjusted means from one another and dividing the absolute value by the square root of the mean squared error. Cohen's *d* was calculated for all analyses conducted via ANCOVAs.

Hypothesis 2 (i.e., children of mothers with clinical-level depressive and anxious symptoms as assessed by the K10 would show less reduction in BMI percentile during weight management treatment than children of mothers without clinical-level symptoms) was tested using a linear mixed model for longitudinal data (multilevel modeling/MLM) to measure trajectories of change in child BMI percentile over time. Participants had to have at least 2 BMI percentile measurements to be included in the MLM (n = 52; maternal clinical-level symptom group: n = 18; maternal non-clinical-level symptom group: n = 34). A MLM approach was chosen due to the variation in timing and frequency of child anthropometric measurements across children (i.e., varying number of weight measurements for each child). MLM provides greater flexibility in situations where there may be missing data, varying occasions of measurement, and more complex error structures (Heck, Thomas, & Tabata, 2013). MLM uses the multiple BMI percentile measurements of each child to estimate an intercept and linear slope that summarizes the child's BMI percentile change (i.e., growth trajectories; model 1). Then, it

treats those intercepts and slopes as outcome variables to analyze if the predictor (i.e., maternal internalizing symptom groups) accounts for change in the model (model 2). A quadratic time variable was also computed to test for the rate of growth (i.e., how did change in child BMI percentile differ over time; "change in the rate of change;" Tabata, Heck, & Thomas, 2010).

Model 1 (i.e., base model) was conducted to explore the association between time and child BMI percentile, where child BMI percentile was entered as the dependent variable and the time and quadratic time variables were entered as covariates. Model 1 was computed using an unstructured covariance structure, which put no constraints on the data, allowing the best possible model fit to be estimated. Restricted Maximum Likelihood (REML) was used, which allowed for the means and variances to be estimated, rather than Ordinary Least Squares (OLS), which determines unknown parameters in linear regression (Tabata et al., 2010). Convergence could not be established past 9.99 months; therefore, any child BMI data collected after 9.99 months were excluded.

Convergence could not be established for model 2 (i.e., association between maternal internalizing symptom groups and child BMI percentile change). Before moving to an alternate analytic strategy, several steps were attempted to establish convergence: changing the covariance structure (i.e., diagonal, autoregressive), computing the MLM in a different program (i.e., RStudio), using categorical time points (e.g., 1-1.99 months, 2-2.99 months) rather than the observed continuous time variable, using a continuous maternal internalizing symptoms variable (i.e., Total score of the K10), and separating maternal internalizing symptoms into 3 groups rather than 2. However, convergence could still not be established. Literature suggests that it is common for random slopes to cause estimation problems, resulting in the model being unable to converge (UCLA, 2019). Therefore, the slopes for each child's growth trajectory were extracted

and a linear regression was conducted to examine the relationship between child BMI percentile slopes (i.e., growth trajectories) and maternal internalizing symptoms group (clinical vs. non-clinical), while controlling for child baseline BMI percentile.

Secondary Aims

Hypothesis 3 (i.e., children of mothers that display clinical-level symptoms of depressive and anxious symptoms would have lower health-related quality of life than children of mothers that did not display clinical-level symptoms) was also tested using an Analysis of Covariance (ANCOVA). This allowed us to test if our dichotomous predictor (i.e., whether mothers had or did not have clinical-level symptoms) was associated with health-related quality of life (PedsQL). If the mother was currently in school was identified as a covariate, and therefore, controlled for when the ANCOVAs were conducted. In addition, adjusted means (i.e., accounts for additional variance from the covariates) were examined and presented for mothers with clinical-level symptoms and mothers without clinical-level symptoms. Similarly, Hypothesis 4 (i.e., children of mothers that display clinical-level symptoms of depressive and anxious symptoms would have lower obesity-specific quality of life than children of mothers that did not display clinical-level symptoms) was tested using an ANCOVA, allowing us to test if our dichotomous predictor (i.e., whether mothers had or did not have clinical-level symptoms) was associated with child obesity-specific quality of life (i.e., SMU for children aged 5-13; STU for children aged 5 and above). Child age, child race, insurance, and maternal marital status were controlled for when the ANCOVAs were conducted. Adjusted means were also examined and presented for mothers with clinical-level symptoms and mothers without clinical-level symptoms.

Hypothesis 5 (i.e., mothers with clinical-level internalizing symptoms would have less recognition about their child's current health status than mothers without clinical-level internalizing symptoms) was tested using an ANCOVA; this allowed us to test if our dichotomous predictor (i.e., whether mothers had or did not have clinical-level symptom) was associated with maternal recognition of their child's health status.

Lastly, Hypothesis 6 (i.e., mothers with clinical-level internalizing symptoms would have less concern about their child's current weight than mothers without clinical-level internalizing symptoms) was also tested using an ANCOVA, allowing us to test if our dichotomous predictor (i.e., whether mothers had or did not have clinical-level symptoms) was associated with the levels of concern mothers endorsed about their child's current weight.

Results

Participants

The majority of children were female (67.9%), White (46.4%), and had public health insurance (65.2%). Child age ranged from 2 to 18 years (M = 10.99, SD = 4.10). Child baseline BMI ranged from 18.48 to 58.19 (M = 32.93, SD = 7.82) with BMI percentile (i.e., BMI percentage of the 95th percentile) ranging from 96.40 to 218.85 (M = 137.85, SD = 23.68). Mom age ranged from 21 to 54 years (M = 37.64, SD = 7.21). Majority of mothers were White (53.6%), never married (41.1%), had some college or an associate degree (42.0%), and worked full-time (38.4%). Tables 2 and 3 provide detailed descriptive data on child and mother demographic factors, respectively.

Results for Primary Aim

A trend effect was demonstrated for children of mothers with clinical-level internalizing symptoms and children of mothers without clinical-level internalizing symptoms in regard to

baseline BMI percentiles (F (1,110) = 3.43, p = .07, d = .37; Hypothesis 1); Mean for children of mothers with clinical-level symptoms = 143.69, SE = 3.85, Mean for children of mothers without clinical-level symptoms = 134.98, SE = 2.71).

Multilevel modeling revealed that there was a significant fixed main effect for the intercept, β = 138.82, SE = 3.44, t = .40.41, p < .001, meaning that children differed on their BMI percentiles at their first clinic visit. The main effect of time and quadratic time were non-significant, β = .09, SE = .33, t = .27, p = .79 and β = -.02, SE = .04, t = -.55, p = .59, respectively, meaning BMI percentiles did not demonstrate a linear or quadratic growth rate. Covariance parameters for model 1 (i.e., growth trajectories) demonstrated that residuals associated with child BMI percentiles were significant, β = 10.86, SE = 1.90, z = 5.70, p < .001, indicating independence and a normal distribution (a necessary assumption for MLM). Significant variability between individuals was also found in the random intercept (β = 604.27, SE = 121.07, z = 4.99, p < .001) and BMI change trajectories for time (i.e., slopes), β = .70, SE = .29, z = 2.36, p = .02), suggesting that there was unique variability between children to be explained by other factors. The covariance between child baseline BMI percentiles and growth trajectories was non-significant, β = 1.96, SE = 4.23, z = .46, p = .64, meaning baseline BMI was not related to change over time during the treatment. A linear regression revealed that whether mothers had clinical-level or non-clinical-level internalizing symptoms did not account for the unique variability found in child BMI percentile change slopes, β = .14, SE = .17, t = .87, p = .39 (Hypothesis 2). See Figure 1 for child BMI percentile trajectories.

Results for Secondary Aims

Health-related Quality of Life (PedsQL) child-report; Hypothesis 3

Children of mothers with clinical-level internalizing symptoms displayed poorer child-reported health-related quality of life via Total score (Adjusted Mean = 59.43, SE = 2.84) than children of mothers without clinical-level internalizing symptoms when controlling for if the mother was currently in school (Adjusted Mean = 75.03, SE = 2.01), F (1,90) = 20.02, $p < .001$, $d = .99$. All child-report PedsQL subscales were also significantly related to whether the mom had clinical-level internalizing symptoms or did not have clinical-level internalizing symptoms while controlling for whether the mother was in school: Physical Functioning, F (1,90) = 9.34, $p = .003$; Emotional Functioning, F (1,90) = 14.58, $p < .001$; Social Functioning, F (1,90) = 16.68, $p < .001$; School Functioning, F (1,90) = 7.02, $p = .01$; Psychosocial Health, F (1,90) = 22.45, $p < .001$; Physical Health, F (1,90) = 9.34, $p = .003$. Adjusted means and effect sizes for subscales can be seen in Table 4.

Health-related Quality of Life (PedsQL) parent-report; Hypothesis 3

Children of mothers with clinical-level internalizing symptoms displayed poorer parent-report health-related quality of life via Total score (Adjusted Mean = 55.98, SE = 3.02) than children of mothers without clinical-level internalizing symptoms when controlling for whether the mother was in school (Adjusted Mean = 70.41, SE = 2.15), F (1,104) = 15.14, $p < .001$, $d = .80$. Additionally, all mother-report PedsQL subscales were significantly related to if the mother had clinical-level internalizing symptoms or did not have clinical-level internalizing symptoms when controlling for whether the mother was in school: Physical Functioning, F (1,108) = 6.25, $p = .01$; Emotional Functioning, F (1,108) = 23.78, $p < .001$; Social Functioning, F (1,107) = 7.19, $p = .008$; School Functioning, F (1,105) = 10.18, $p = .002$; Psychosocial Health, F (1,104) = 18.73, $p < .001$; Physical Health, F (1,108) = 6.25, $p = .01$. Adjusted means and effect sizes for subscales can be seen in Table 4.

Obesity-specific Quality of Life (SMU) child-report (subset of children 5-13 years only); Hypothesis 4

Whether mothers had clinical-level internalizing symptoms or did not have clinical-level internalizing symptoms demonstrated a trend in regard to child-report of obesity-specific quality of life via Total score when controlling for child age, race, insurance, and mother marital status, F (1,81) = 3.86, p = .05, d = .45. Adjusted means revealed that children of mothers with clinical-level internalizing symptoms self-reported poorer obesity-specific quality of life (Adjusted Mean = 62.53, SE = 2.56) than children of mothers without clinical-level internalizing symptoms (Adjusted Mean = 68.74, SE = 1.79). The Social Avoidance subscale also demonstrated a trend when controlling for child age, race, insurance, and mother marital status, F (1,80) = 4.08, p = .05. All other child-report subscales were not significantly associated with whether mothers had clinical-level internalizing symptoms or non-clinical-level internalizing symptoms when controlling for child age, race, insurance, and mother marital status: Emotional Functioning, F (1,81) = 1.90, p = .17; Teasing, F (1,80) = 1.17, p = .28; Positive Attributes, F (1,81) = .02, p = .90; Physical Functioning, F (1,81) = 3.1, p = .08. Adjusted means and effect sizes for subscales can be seen in Table 5.

Obesity-specific Quality of Life (STU) parent-report; Hypothesis 4

Children of mothers with clinical-level internalizing symptoms displayed poorer obesity-specific quality of life via parent-report Total score (Adjusted Mean = 57.07, SE = 3.34) than children of mothers without clinical-level internalizing symptoms when controlling for child age, race, insurance, and mother marital status (Adjusted Mean = 73.46, SE = 2.36), F (1,89) = 15.69, p < .001, d = .88. The following subscales were significantly related to whether mothers had clinical-level internalizing symptoms or non-clinical-level internalizing symptoms while controlling for child age, race, insurance, and mother marital status: Emotional Functioning, F

(1,89) = 10.72, p = .002; Physical Functioning, F (1,89) = 14.06, p < .001; Teasing/Marginalization, F (1,89) = 13.49, p < .001; Mealtime Challenges, F (1,89) = 4.92, p = .03; School Functioning F (1,88) = 8.19, p = .005. The Positive Social Attributes subscale was not significant, F (1,89) = 2.58, p = .11. Additionally, mothers of children ages 14 and above completed the Adolescent scale, which was also significantly related to whether mothers had clinical-level internalizing symptoms or non-clinical-level internalizing symptoms when controlling for child age, race, insurance, and mother marital status, F (1,34) = 7.12, p = .01. Adjusted means and effect sizes for subscales can be seen in Table 5.

Maternal recognition and concern of child health and weight; Hypothesis 5 & 6

Whether mothers had clinical-level internalizing symptoms or non-clinical-level internalizing symptoms was not significantly associated with maternal recognition of child's current health status, F (1,109) = 2.30, p = .13, d = .30; Mean for mothers with clinical-level symptoms = 2.92, SE = .15, Mean for mothers without clinical-level symptoms = 3.20, SE = .11). Similarly, whether mothers had clinical-level internalizing symptoms or non-clinical-level internalizing symptoms was not significantly associated with maternal concern of child's current weight, F (1,109) = .92, p = .34, d = .20; Mean for mothers with clinical-level symptoms = 2.56, SE = .13, Mean for mothers without clinical-level symptoms = 2.40, SE = .09).

Discussion

Pediatric obesity is a nationwide epidemic associated with long-term physical and psychological adversities (e.g., Gunderson et al., 2011; Sanders et al., 2015). A significant challenge for children with obesity is weight management and psychosocial well-being. The current study identified that maternal clinical-level symptoms of anxiety and depression may play an important role for the development and maintenance of pediatric obesity and negatively

affects child quality of life. This is the first study to explore whether maternal clinical-level internalizing symptoms relate to these outcomes, and these findings have important implications for the management of maternal mental health symptoms in pediatric obesity clinic settings.

Although children of mothers with clinical-level internalizing symptoms did not significantly differ from children of mothers without clinical-level internalizing symptoms in regard to BMI percentiles, a trend was demonstrated for children of mothers with clinical-levels internalizing symptoms having greater BMI percentile at baseline (143.69 vs. 134.98). However, the clinical meaningfulness of the BMI percentile difference between the two groups is uncertain since research has yet to explore cut-off points in BMI percentages above the 95th percentile associated with differential health outcomes. It may be that clinical-level internalizing symptoms, such as depression, could hinder a mother's ability for managing their child's weight and promoting healthy weight-related behaviors (e.g., exercise, healthy eating habits, screen time management). This is consistent with past research findings that maternal depression is linked to child obesity-risk factors (e.g., increased screen-time, lower levels of physical activity; Hoyos Cillero & Jago, 2010; Fernald et al., 2008). A mother with clinical-level symptoms, such as anxiety, may also engage in restrictive or controlling feeding practices, a well-known risk factor for child obesity (Cardel et al., 2012). Further, there is a well-established link between parental and child mental health symptoms (i.e., if a parent demonstrates depression, the child is at an increased risk for depression; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997). This is important since symptoms of child and adolescent depression have been linked to the development and maintenance of obesity (Goodman & Whitaker, 2002), as well as poor adherence for weight management treatment (Zeller et al., 2004). Children who have a caregiver with mental health symptoms may be at greater risk for obesity due to both the direct effect of

maternal mental health on child obesity and to the indirect effect mediated through increased child mental health symptoms. Therefore, screening for caregiver mental health symptoms at the beginning of child weight management treatment is critical for promoting optimal child weight management. Further, if primary care physicians or pediatricians can screen for caregiver anxiety and depression, this may prevent or reduce weight gain in children before obesity develops.

Despite the trend for children of mothers with clinical-level internalizing symptoms to experience greater BMI percentiles at baseline, maternal internalizing symptoms did not relate to change in BMI percentile over the course of treatment. In fact, our sample as a whole did not experience change in BMI percentile over time in the weight management program. Unfortunately, this is not surprising since obesity is often difficult to treat (Skelton, Goff, Ip, & Beech, 2011). It may be that there are more significant contributing factors (e.g., access to healthy foods, safe neighborhoods, SES) to successful weight management treatment in children with obesity than maternal anxiety or depressive symptoms. Further, the current study's sample was likely comprised of mothers functioning adequately enough to enroll their child in weight management treatment, as mothers with severe internalizing symptoms would likely have a difficult time completing all tasks necessary for treatment enrollment (e.g., finding a clinic, completing necessary paperwork, transportation, taking time off work). Having a caregiver with significant mental health problems may hinder treatment initiation, as well as involvement and motivation efforts in their child's weight management treatment, as this association has been found in other pediatric populations (e.g., asthma, ADHD; Bartlett et al., 2004; Gau, Shen, Chou, Tang, Chiu, & Gau, 2006).

Children with mothers with clinical-level internalizing symptoms also displayed poorer health-related and obesity-specific quality of life. Strong support was found for maternal-report

of child quality of life and partial support for children's own report of their quality of life. Medium to large effect sizes were found suggesting that maternal mental health is a critical predictor of quality of life among youth with obesity. When considering the well-established link between child obesity and poor quality of life (Schwimmer et al., 2003; Zeller & Modi, 2006) and the recent finding that maternal depression negatively affects quality of life in children with healthy weight (Dittrich et al., 2018), this finding was anticipated. This indicates that children with obesity who also have mothers with clinical-level internalizing symptoms are at an increased risk for poor quality of life. Of note, both child- and parent- report for health-related quality of life, indicated that physical functioning was the highest (i.e., best) domain of quality of life, when compared to emotional, social, and school functioning. Similarly, emotional functioning was lower than physical functioning on both child- and parent-report for obesity-specific quality of life. This demonstrates the psychosocial toll that obesity and parental mental health symptoms can have on a child, above and beyond the physical problems linked to obesity.

While both parent- and child-report of health-related quality of life related to maternal internalizing symptoms, the relationship between obesity-related qualify of life and internalizing symptoms was only consistently found for parent-report of child quality of life, as child-report of obesity-specific quality of life only demonstrated a trend. It may be that children with obesity lack insight regarding the impact of their weight/size on their daily functioning. It may also be that the obesity-specific quality of life measure's focus solely on weight- and size-related factors missed other contributing factors (e.g. being teased based on intelligence or popularity, general feelings of sadness) for quality of life. Additionally, it may be that mothers with internalizing clinical-level symptoms are overreporting their child's difficulties or are projecting their negative emotional symptoms onto their children. However, the current study's findings suggest that the

former justification (i.e., lack of insight among children, less sensitivity among the SMU) is more likely. These findings demonstrate the importance of assessing for and targeting maternal mental health symptoms in pediatric chronic health conditions to improve children's psychological well-being.

Inconsistent with prior research (Warschburger & Kroller, 2009), we did not find an association between maternal clinical-level internalizing symptoms and maternal recognition of child health status or concern of child weight. This may be the product of our sample being a treatment-seeking sample; mothers enrolling their children in weight management treatment are the mothers that are aware that their child's weight and health are problematic. It may be that mothers with severe levels of anxiety and depression are not the mothers seeking treatment for their children, which highlights the importance of including caregiver mental health screening at regular standard-of-care clinic appointments (e.g., mother's primary care appointments, children's well-check appointments). This would allow for early detection of mental health problems in caregivers, as well as lessening the impact of these symptoms on children (e.g., mental health problems, poor quality of life, obesity risk).

An important potential interpretation of the current study's findings is that it may not be that mothers with internalizing symptoms have a difficult time recognizing their child's health and weight as problematic and needing treatment, but rather these mothers are more so struggling to adequately execute or promote healthy weight management behaviors (e.g., healthy eating habits, exercise, attending follow-up visits) among their children. This is consistent with the theoretical underpinnings of the importance of family and parental factors in pediatric obesity (Hemmingsson, 2014); considering caregiver mental health in pediatric obesity would likely improve weight-related factors such as child quality of life. This highlights the important role

that psychologists play in pediatric weight management settings, as they often work with the entire family to promote health behavior change (i.e., family-based interventions; Kitzmann & Beech, 2011). Further, this may indirectly alleviate maternal internalizing symptoms (i.e., behavioral activation). Psychologists, as well as social workers, should be trained on how to appropriately approach parental mental health concerns in pediatric settings. Team members should also be prepared to provide mental health resources to families when necessary (e.g., recommendations, referrals, brief psychoeducation). Incorporating a quick mental-health screener, such as the *Patient Health Questionnaire* (PHQ-9; Kroenke, Spitzer, & Williams, 2001) or the *Generalized Anxiety Disorder Scale* (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006), at standard-of-care clinic appointments could be an efficient and effective way to identify clinical-level internalizing symptoms among caregivers. The implications of the current study could offer major improvements for obesity prevention efforts and quality of life in children with obesity.

Limitations

Although the current study demonstrated several strengths (e.g., longitudinal design, exploration of clinical-level and non-clinical-level internalizing symptoms, diverse sample) and adds valuable insights into the pediatric obesity literature, there are limitations to consider when interpreting the study's findings. First, maternal internalizing symptoms were assessed with a nonspecific psychological distress screener (i.e., K10) at one time point. Additionally, the Kessler-10 combines symptoms of depression and anxiety to yield a total distress score. This is problematic since anxiety and depression are two unique internalizing processes. For example, a mother with severe anxiety may be overly concerned or worried about their child's weight leading to increased treatment efforts, while a mother with severe depression may be too fatigued

or unmotivated to engage in proper treatment for their child's weight. Future research should use a separate, comprehensive measures for depression and anxiety symptoms. Another related limitation was the unequal number of mothers in both groups (clinical vs. non-clinical-level internalizing symptoms), which could have led to biased results. Ensuring that sample sizes are similar will be important for future research, as well as including a wide-range of internalizing symptom severity among the sample. Additionally, the large variation in frequency and timing of child weight measurement made it difficult to capture the longitudinal relationship between time and child BMI percentile, which may have contributed to the lack of covariance estimation for model 2 in MLM. Having set standard clinic visits would improve the current study's methodological design. The lack of support for maternal internalizing symptoms affecting a mother's ability to recognize their child's weight and health as problematic may be because only two items were used to capture the construct of maternal recognition and concern. Future research should implement a full measure to assess maternal levels of recognition and concern of their child's obesity. It should also be noted that the hypotheses pertaining to the longitudinal relationship between maternal internalizing symptoms and child BMI percentile change, maternal concern of child weight, and maternal recognition of child health may not have been supported because mothers with severe clinical-level symptoms of anxiety and depression were not the mothers participating in the research study/enrolled in weight management treatment. Assisted in preliminary

Summary

The current study adds valuable information for researchers and clinicians working within a pediatric obesity context and aids in preliminary steps of understanding how maternal internalizing symptoms relate to child obesity-related factors (i.e., weight, weight management,

quality of life, maternal recognition and concern). We identified that maternal clinical-level symptoms of anxiety and depression are related to poor quality of life among children with obesity and may serve as a risk factor for child obesity. This demonstrates the critical role that caregivers play in a child's life, physically and emotionally. Neglecting caregiver mental health in pediatric weight management treatment leaves out an important part of a child's life that is influencing their overall well-being. Pediatric obesity weight management programs should screen caregivers for mental health symptoms to potentially improve child quality of life. Additionally, in order to maximize the physical and psychological well-being of children with obesity, primary care physicians and pediatricians should also screen for mental health symptoms among caregivers.

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Appendix A

BEANPOD Parent Questionnaire that assessed demographic information and maternal recognition and concern of child health (#A.5.) and weight (#A.6.).

BEANPOD
Parent Questionnaire (Parts A-D)

ID: ☐☐☐☐☐

STAFF USE ONLY ABOVE THIS LINE

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

A. Your Child's Health

This study is looking at different things that may lead to health problems in overweight children. These things may be in the environment (for example, the foods that someone eats) or genetic (for example, due to genes in your DNA).

Some questions ask about the child's **biological** relatives. **Biological** relatives have genes and DNA in common because they are related in some way (e.g., the mother that gave birth to the child would be biologically related but a step-mother or step-father would not be).

For other questions, we are interested in the environment and it may not matter whether family members are biologically related (for example, family eating habits). We have tried to be clear when questions are about the biological relatives. Please ask if you have any questions.

A.1. Who is completeing this form? (Mark only one box.)
- ☐ Biological mother
- ☐ Biological father
- ☐ Other, please specify: ☐☐☐☐☐

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

A.6. How concerned are you about your child's current weight? (Mark only one box.)

☐ Not at all
☐ A little -->
☐ Moderately -->
☐ Very -->

A.6.1 How old was your child when you first became concerned?

| | | years old

A.7. How concerned do you think your child is about their current weight? (Mark only one box.)

☐ Not at all
☐ A little
☐ Moderately
☐ Very

A.8 What type of medical insurance does <u>your child</u> have? Mark all boxes that apply.

☐ Private health insurance (e.g., AARP, Aetna, Blue Cross Blue Shield, Humana, etc.)
☐ TRICARE
☐ Medicaid
☐ Other public health insurance (e.g., SCHIP, Caresource, Amerigroup, etc.)
☐ Not insured / self-pay
☐ Other, specify:

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

A.8. Have you ever been told by a doctor that your child has (Mark only one box for each.)

	No	Yes
a. Developmental delay	☐	☐
b. Mobility or joint pain	☐	☐
c. Diabetes	☐	☐
d. High blood pressure	☐	☐
e. High cholesterol	☐	☐
f. Addison's disease	☐	☐
g. Asthma	☐	☐
h. Allergies	☐	☐
i. Celiac disease	☐	☐
j. Hyperthyroidism (high thyroid)	☐	☐
k. Hypothyroidism (low thyroid)	☐	☐
l. Current or past use of steroid medication	☐	☐
m. Problems with his/her kidneys	☐	☐
n. Problems with his/her liver	☐	☐
o. Problems with his/her heart	☐	☐
p. Other serious medical illness that required surgery	☐	☐
q. Any other condition not listed above If yes, please specify below:	☐	☐

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

B. Your Family

B.1 Please provide the following information about the child's **biological** parents. Mark "Unknown" to those items you are unsure about.

	Biological Mother	Biological Father
a. Date of birth *(mm/dd/yyyy)*	☐☐ / ☐☐ / ☐☐☐☐ (month / day / year) ☐ Unknown	☐☐ / ☐☐ / ☐☐☐☐ (month / day / year) ☐ Unknown
b. What is this person's present marital status? (Mark only one box per person.)	☐ Married to biological father ☐ Married, but not to biological father ☐ Widowed ☐ Divorced ☐ Separated but not divorced ☐ Never married ☐ Unknown	☐ Married to biological mother ☐ Married, but not to biological mother ☐ Widowed ☐ Divorced ☐ Separated but not divorced ☐ Never married ☐ Unknown
c. What is this person's height?	☐☐ ft and ☐☐ inches ☐ Unknown	☐☐ ft and ☐☐ inches ☐ Unknown
d. What is this person's weight?	☐☐☐ lbs ☐ Unknown	☐☐☐ lbs ☐ Unknown
e. In which country was this person born? (Mark only one box per person.)	☐ United States ☐ Unknown ☐ Other, specify: ☐☐☐☐☐☐☐☐☐☐ If born in country other than the U.S., please specify the year when the person first arrived to live in the U.S. for 1 year or more ☐☐☐☐ year ☐ Unknown	☐ United States ☐ Unknown ☐ Other, specify: ☐☐☐☐☐☐☐☐☐☐ If born in country other than the U.S., please specify the year when the person first arrived to live in the U.S. for 1 year or more ☐☐☐☐ year ☐ Unknown

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

B.1 Please provide the following information about the child's **biological** parents. Mark "Unknown" to those items you are unsure about. CONTINUED.

	Biological Mother	**Biological Father**
f. What is this person's ethnicity?	☐ Hispanic / Latino ☐ Non-Hispanic / Non-Latino ☐ Unknown	☐ Hispanic / Latino ☐ Non-Hispanic / Non-Latino ☐ Unknown
g. Specify this person's race. (Mark all boxes that apply.)	☐ African-American/Black ☐ Caucasian/White ☐ Hawaiian/Pacific Islander ☐ Asian ☐ American Indian or Alaskan Native ☐ Unknown ☐ Other, specify:	☐ African-American/Black ☐ Caucasian/White ☐ Hawaiian/Pacific Islander ☐ Asian ☐ American Indian or Alaskan Native ☐ Unknown ☐ Other, specify:
h. What is the highest level of education this person has completed? (Mark only one box per person.)	☐ Less than high school ☐ Some high school, but no diploma or GED ☐ High school diploma or received GED ☐ Some college, no degree ☐ Graduated from a 2-year college, business or vocational school, or Associates degreee ☐ Graduated from a college university and obtained a Bachelor's degree (BA, BS) ☐ Some graduate school courses ☐ Master's degree ☐ Professional degree: Ph.D., Psy.D., Ed.D., M.D., DDS, LLB, LLD, JD, etc. ☐ Unknown	☐ Less than high school ☐ Some high school, but no diploma or GED ☐ High school diploma or received GED ☐ Some college, no degree ☐ Graduated from a 2-year college, business or vocational school, or Associates degreee ☐ Graduated from a college university and obtained a Bachelor's degree (BA, BS) ☐ Some graduate school courses ☐ Master's degree ☐ Professional degree: Ph.D., Psy.D., Ed.D., M.D., DDS, LLB, LLD, JD, etc. ☐ Unknown
i. Is this person currently in school?	☐ No ☐ Yes ☐ Unknown	☐ No ☐ Yes ☐ Unknown

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

B.1 Please provide the following information about the child's **biological** parents. Mark "Unknown" to those items you are unsure about. CONTINUED.

	Biological Mother	**Biological Father**
j. What is this person's current employment status? (Mark only one box per person.)	☐ Full-time paid employment ☐ Part-time paid employment ☐ Unemployed and seeking employment ☐ Not employed and not seeking employment (e.g., retired, full time parent, disabled, etc.) ☐ Student only ☐ Unknown ☐ Other, specify:	☐ Full-time paid employment ☐ Part-time paid employment ☐ Unemployed and seeking employment ☐ Not employed and not seeking employment (e.g., retired, full time parent, disabled, etc.) ☐ Student only ☐ Unknown ☐ Other, specify:
k. If this person has paid employment, about how many hours per week do they usually work?	☐☐☐ hours per week ☐ Unknown	☐☐☐ hours per week ☐ Unknown
l. What is this person's occupation? Or previous occupation if unemployed.	Specify occupation: ☐ Unknown	Specify occupation: ☐ Unknown
m. What kind of health insurance does this person have? (Mark all boxes that apply.)	☐ Private health insurance (e.g., AARP, Aetna, Blue Cross Blue Shield, Humana, etc.) ☐ TRICARE ☐ Medicare ☐ Medicaid ☐ Not insured / self-pay ☐ Unknown ☐ Other, specify:	☐ Private health insurance (e.g., AARP, Aetna, Blue Cross Blue Shield, Humana, etc.) ☐ TRICARE ☐ Medicare ☐ Medicaid ☐ Not insured / self-pay ☐ Unknown ☐ Other, specify:

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

B.1 Please provide the following information about the child's **biological** parents. Mark "Unknown" to those items you are unsure about. CONTINUED.

	Biological Mother	**Biological Father**
n. Does this person currently smoke?	☐ No ☐ Yes ☐ Unknown	☐ No ☐ Yes ☐ Unknown
o. Has this person ever smoked regularly (that is, at least once a day)?	☐ No ☐ Yes ☐ Unknown	☐ No ☐ Yes ☐ Unknown

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

C. Your Family's Health

The following section asks about the child's **biological mother** and her parents (the child's biological maternal grandparents). Please answer these questions accordingly.

C.1 Has anyone on the **biological mother's** side of this child's family had any of the problems listed below? (Fill in one bubble for each person on each row. 'Unk' = Unknown)

Biological MOTHER'S side of the family									
Health Condition	Child's biological mother			Child's biological maternal grandmother			Child's biological maternal grandfather		
a. High blood pressure	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
b. Heart attack	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
c. Diabetes*	☐ No	☐ Yes*	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
d. Stroke	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
e. Lap band or other surgery to reduce weight	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
f. Early (before puberty) severe obesity	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
g. High cholesterol or triglycerides	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk
h. Polycystic ovary syndrome (PCOS)	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	N/A		
i. Thyroid problems	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk	☐ No	☐ Yes	☐ Unk

*If child's mother has diabetes, please answer item C.2. If No or Unknown, go to C.3.

C.2 If you marked that the child's mother had diabetes, please specify which type of diabetes she has.

☐ Type 1 diabetes

☐ Type 2 diabetes

☐ Gestational diabetes only

☐ Unknown

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

The following section asks about the child's **biological father** and his parents (the child's biological paternal grandparents). Please answer these questions accordingly.

C.3 Has anyone on the **biological father's** side of this child's family had any of the problems listed below? (Fill in one bubble for each person on each row. 'Unk' = Unknown)

Biological FATHER'S side of the family			
Health Condition	Child's biological father	Child's biological paternal grandmother	Child's biological paternal grandfather
a. High blood pressure	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
b. Heart attack	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
c. Diabetes*	☐ No ☐ Yes* ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
d. Stroke	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
e. Lap band or other surgery to reduce weight	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
f. Early (before puberty) severe obesity	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
g. High cholesterol or triglycerides	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk
h. Polycystic ovary syndrome (PCOS)	N/A	☐ No ☐ Yes ☐ Unk	N/A
i. Thyroid problems	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk	☐ No ☐ Yes ☐ Unk

*If child's father has diabetes, please answer item C.4. If No or Unknown, go to next section.

C.4 If you marked that the child's father had diabetes, please specify which type of diabetes he has.

☐ Type 1 diabetes

☐ Type 2 diabetes

☐ Unknown

Appendix B

Kessler Psychological Distress Scale (Kessler-10/K10) that assessed maternal internalizing symptoms.

BEANPOD
Kessler 10

ID: B

STAFF USE ONLY ABOVE THIS LINE

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

Date questionnaire completed: ☐☐ / ☐☐ / ☐☐☐☐ *(mm/dd/yyyy)*

Instructions:
The following questions ask about how you have been feeling during the **past 30 days**. For each question, please mark the box that best describes how often you had this feeling.

During that month, how often did you feel...	**None of the time**	**A little of the time**	**Some of the time**	**Most of the time**	**All of the time**
1. ... tired out for no good reason?	☐	☐	☐	☐	☐
2. ... nervous?	☐	☐	☐	☐	☐
3. ... so nervous that nothing could calm you down?	☐	☐	☐	☐	☐
4. ... hopeless?	☐	☐	☐	☐	☐
5. ... restless or fidgety?	☐	☐	☐	☐	☐
6. ... so restless that you could not sit still?	☐	☐	☐	☐	☐
7. ... depressed?	☐	☐	☐	☐	☐
8. ... so depressed that nothing could cheer you up?	☐	☐	☐	☐	☐
9. ... that everything was an effort?	☐	☐	☐	☐	☐
10. ... worthless?	☐	☐	☐	☐	☐

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Appendix C

Sizing Me Up and *Sizing Them Up* (parent-proxy) measures that assessed child obesity-specific quality of life.

BEANPOD

Sizing Me Up: School-aged child version (5-13 years)

ID: B

STAFF USE ONLY ABOVE THIS LINE

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

Date questionnaire completed: ☐☐ / ☐☐ / ☐☐☐☐ *(mm/dd/yyyy)*

Interviewer (record "none" if self administered): ☐

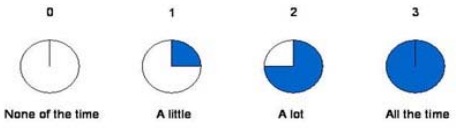
INSTRUCTIONS: This questionnaire is formatted to be used by an interviewer and should only be administered to a child in interview format. Directions that are to be read ALOUD by the interviewer will be in *italics*. Children 11-13 years of age may complete the measure on their own after the practice items.

Interviewer: *Now you are going to answer some questions, but first I want to go over the different answer choices with you.* (Take out Answer Choice Card). *If I asked you to pick **All** of the circle, which would you pick? If I asked you to pick **A lot** of the circle, which would you pick? If I asked you to pick **A little** of the circle, which would you pick? If I asked you to pick **None** of the circle, which would you pick?* Make sure child understands these concepts.

Interviewer: *We are going to be asking you some questions about some of the things that you think and feel. There are no right or wrong answers. For each question I ask you, you are going to look at this card* (give child Answer Choice Card) *and choose an answer. If you are not sure about your answer, just pick the one that you think is best for you.*

Let's try a practice one:
EXAMPLE: ***A library has books.***
Is that "none of the time," "a little," "a lot," or "all the time"?

Let's try another one.
EXAMPLE: ***Dogs can fly.***
Is that "none of the time," "a little," "a lot," or "all the time"?



DRAFT ONLY - DO NOT USE

BEANPOD
Sizing Me Up: School-aged child version (5-13 years)

ID: B

STAFF USE ONLY ABOVE THIS LINE

Please mark the box that corresponds with the child's answers. Mark response boxes like this: ☒

During the past month, tell us how much you:

	None of the time	A little	A lot	All the time
1. Were teased by other kids because of your size	☐	☐	☐	☐
2. Felt sad because of your size	☐	☐	☐	☐
3. Were told you are healthy or growing well	☐	☐	☐	☐
4. Felt mad because of your size	☐	☐	☐	☐
5. Felt left out because of your size (e.g. no one talks or sits with you)	☐	☐	☐	☐
6. Found it hard to swing, climb, skip, bounce a ball, or jump rope because of your size	☐	☐	☐	☐
7. Like yourself because of your size	☐	☐	☐	☐
8. Stood up for or helped other kids because of your size	☐	☐	☐	☐
9. Felt frustrated because of your size	☐	☐	☐	☐
10. Felt worried because of your size	☐	☐	☐	☐
11. Chose not to go to school because of your size	☐	☐	☐	☐
12. Had problems fitting into your desk at school because of your size	☐	☐	☐	☐
13. Felt happy because of your size	☐	☐	☐	☐
14. Were picked first for recess or gym because of your size	☐	☐	☐	☐
15. Were teased by other kids when physically active (e.g. move your body) because of your size	☐	☐	☐	☐
16. Felt you have a good sense of humor	☐	☐	☐	☐
17. Did not want to go to the swimming pool or park because of your size	☐	☐	☐	☐
18. Felt uncomfortable sleeping at a friend's house because of your size	☐	☐	☐	☐
19. Got upset at mealtimes (e.g. cried, fussed, argued)	☐	☐	☐	☐
20. Found it hard to keep up with other kids because your size	☐	☐	☐	☐
21. Got out of breath and had to slow down because of your size	☐	☐	☐	☐
22. Chose not to participate in gym or recess at school because of your size	☐	☐	☐	☐

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BEANPOD
Sizing Them Up: Parent Version (Children 5-18 years)

ID: B

STAFF USE ONLY ABOVE THIS LINE

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

Date questionnaire completed: ☐☐ / ☐☐ / ☐☐☐☐ *(mm/dd/yyyy)*

Understanding the impact of your child's health and treatment (e.g. exercise, diet) on their dayto-day activities can help healthcare professionals provide better treatment recommendations for you and your child. For this reason, we have developed a weight-specific quality of life measure for parents of children with obesity.

INSTRUCTIONS: The following questions are regarding your child's quality of life and your perceptions of how their weight/shape/size impacts their day to day activities. *Please answer all the questions.* There are no right or wrong answers. If you are unsure how to answer a particular question, please choose the response that seems to best fit your child's situation.

Has your child been on vacation, out of school, or had any major changes (e.g. moving, starting a new school) during the past month?

☐ NO ☐ YES, If yes, please explain: _____

Please indicate how your child has been feeling within the past MONTH regarding their weight/shape/size by checking the box that best fits your child.

During the past month, indicate how often your child:

	Never	Sometimes	Often	Always
1. Had difficulty participating in physical activities (e.g. sports) because of their weight/shape/size	☐	☐	☐	☐
2. Was teased by peers because of their weight/shape/size	☐	☐	☐	☐
3. Chose not to go to school because of their weight/shape/size	☐	☐	☐	☐
4. Felt sad because of their weight/shape/size	☐	☐	☐	☐
5. Had to make changes to surroundings (e.g. furniture, school desks) because of their weight/shape/size	☐	☐	☐	☐
6. Argued about when, what and how much to eat	☐	☐	☐	☐
7. Chose not to participate in gym/recess/physical education at school because of their weight/shape/size	☐	☐	☐	☐
8. Felt frustrated because of their weight/shape/size	☐	☐	☐	☐
9. Avoided dressing or undressing in front of others because of their weight/shape/size	☐	☐	☐	☐
10. Kept their body clean and fresh	☐	☐	☐	☐
11. Felt worried because of their weight/shape/size	☐	☐	☐	☐

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BEANPOD
Sizing Them Up: Parent Version (Children 5-18 years)

ID: B

STAFF USE ONLY ABOVE THIS LINE

Please PRINT NEATLY and complete this form in INK. Mark response boxes like this:☒

During the past month, indicate how often your child:

	Never	Sometimes	Often	Always
12. Felt left out because of their weight/shape/size (e.g. no one talks or sits with them)	☐	☐	☐	☐
13. Felt mad because of their weight/shape/size	☐	☐	☐	☐
14. Was teased by others when physically active because of their weight/shape/size	☐	☐	☐	☐
15. Seen as having a good sense of humor	☐	☐	☐	☐
16. Felt concerned about their weight/shape/size	☐	☐	☐	☐
17. Perceived as healthy by others	☐	☐	☐	☐
18. Became upset at mealtimes (e.g. cried, fussed, argued)	☐	☐	☐	☐
19. Had difficulty keeping up with other children because of their weight/shape/size	☐	☐	☐	☐
20. Felt successful in daily activities	☐	☐	☐	☐
21. Became out of breath and had to slow down because of their weight/shape/size	☐	☐	☐	☐
22. Had low self-esteem because of their weight/shape/size	☐	☐	☐	☐

For parents of children **14 years and older:**

During the past month, indicate how often your child:

	Never	Sometimes	Often	Always
23. Talked about difficulties dating due to their weight/shape/size	☐	☐	☐	☐
24. Preferred to spend time alone because of their weight/shape/size	☐	☐	☐	☐
25. Participated in hobbies/clubs (e.g. church group, school club, 4-H, scouts)	☐	☐	☐	☐
26. Found it difficult to find a job/volunteer activity because of their weight/shape/size	☐	☐	☐	☐
27. Worried about the future because of their weight/shape/size	☐	☐	☐	☐
28. Attended extracurricular school activities (e.g. dances, sporting events, clubs, concerts)	☐	☐	☐	☐

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Tables

Table 1

Significant maternal and child sociodemographic covariates

ANOVAs	*F*
	Is mother currently in school
Child- report health-related quality of life total score	7.26**
	Mother marital status
Child-report obesity-specific quality of life total score	4.11*
	Child race
Parent-report obesity-specific quality of life total score	5.85**
	Child insurance
Parent-report obesity-specific quality of life total score	10.14**

Correlations	*r*
	Child age
Child-report obesity-specific quality of life total score	-.30*

Note. * = $p < .05$; ** = $p < .01$

Table 2
Child descriptive statistics

Variable	*M*	*SD*
Age	10.99	4.10
BMI	32.93	7.82
BMI Percentile	137.85	23.68

Variable		*n (%)*
Sex		
	Boy	36 (32.1%)
	Girl	76 (67.9%)
Race		
	White	52 (46.4%)
	Black	48 (42.9%)
	Other	12 (10.7%)
Insurance		
	Private	32 (28.6%)
	Public	73 (65.2%)
	Other/Not-insured	6 (5.4%)
	Missing	1 (.09%)

Table 3
Biological mother descriptive statistics

Variable	*n (%)*
Race	
Black	46 (41.1%)
White	60 (53.6%)
Other	5 (4.5%)
Missing	1 (0.9%)
Ethnicity	
Hispanic	5 (4.5%)
Non-Hispanic	96 (85.7%)
Missing	11 (9.8%)
Marital Status	
Married	37 (33.0%)
Divorced/Separated	26 (23.2%)
Never married	46 (41.1%)
Missing	3 (2.7%)
Education	
Less than high school	16 (14.3%)
High school diploma/GED	25 (22.3%)
Some college/associate degree	47 (42.0%)
College degree	9 (8.0%)
Master's/Professional degree	13 (11.6%)
Missing	2 (1.8%)
Employment Status	
Full-time	43 (38.4%)
Part-time	13 (11.6%)
Unemployed	47 (42.0%)
Missing	9 (8.0%)
Currently in school	
Yes	24 (21.4%)
No	87 (77.7%)
Missing	1 (0.9%)

Table 4

Adjusted means and effect sizes for child health-related quality of life subscales (PedsQL) by mothers with clinical-level symptoms compared to mothers without clinical-level symptoms

	Adjusted Mean; Standard Error		
	Clinical	Non-clinical	Cohen's *d*
Child report			
Physical Functioning	64.13; 3.43	76.96; 2.42	.66
Emotional Functioning	57.49; 3.74	75.99; 2.64	.84
Social Functioning	58.05; 4.00	78.05; 2.82	.92
School Functioning	55.25; 4.22	68.95; 2.98	.59
Psychosocial Health	56.93; 2.94	74.00; 2.08	1.05
Physical Health	64.13; 3.43	76.96; 2.42	.66
Parent report			
Physical Functioning	57.86; 3.80	69.43; 2.64	.53
Emotional Functioning	53.87; 3.56	75.01; 2.47	.98
Social Functioning	55.65; 4.18	69.33; 2.92	.55
School Functioning	56.02; 3.86	71.10; 2.73	.64
Psychosocial Health	55.02; 3.12	71.54; 2.21	.88
Physical Health	57.86; 3.80	69.43; 2.64	.53

Table 5

Adjusted means and effect sizes for child obesity-specific quality of life subscales (SMU & STU) by mothers with clinical-level symptoms compared to mothers without clinical-level symptoms

	Adjusted Mean; Standard Error		
	Clinical	Non-clinical	Cohen's *d*
Child report			
Emotional Functioning	61.02; 4.70	69.01; 3.30	.32
Physical Functioning	67.45; 3.83	75.81; 2.69	.41
Teasing	71.59; 5.09	78.37; 3.51	.25
Positive Attributes	42.10; 3.45	42.65; 2.42	.02
Social Avoidance	80.83; 3.14	88.62; 2.16	.47
Parent report			
Emotional Functioning	50.35; 4.77	69.70; 3.37	.72
Physical Functioning	60.72; 3.65	77.68; 2.58	.83
Teasing	57.92; 4.80	79.75; 3.39	.82
Positive Attributes	54.76; 3.78	62.26; 2.67	.38
Mealtime Challenges	65.54; 4.47	77.82; 3.16	.48
School Functioning	82.66; 3.89	96.36; 2.70	.64
Adolescent scale	60.29; 5.18	78.56; 4.18	.87

Figures

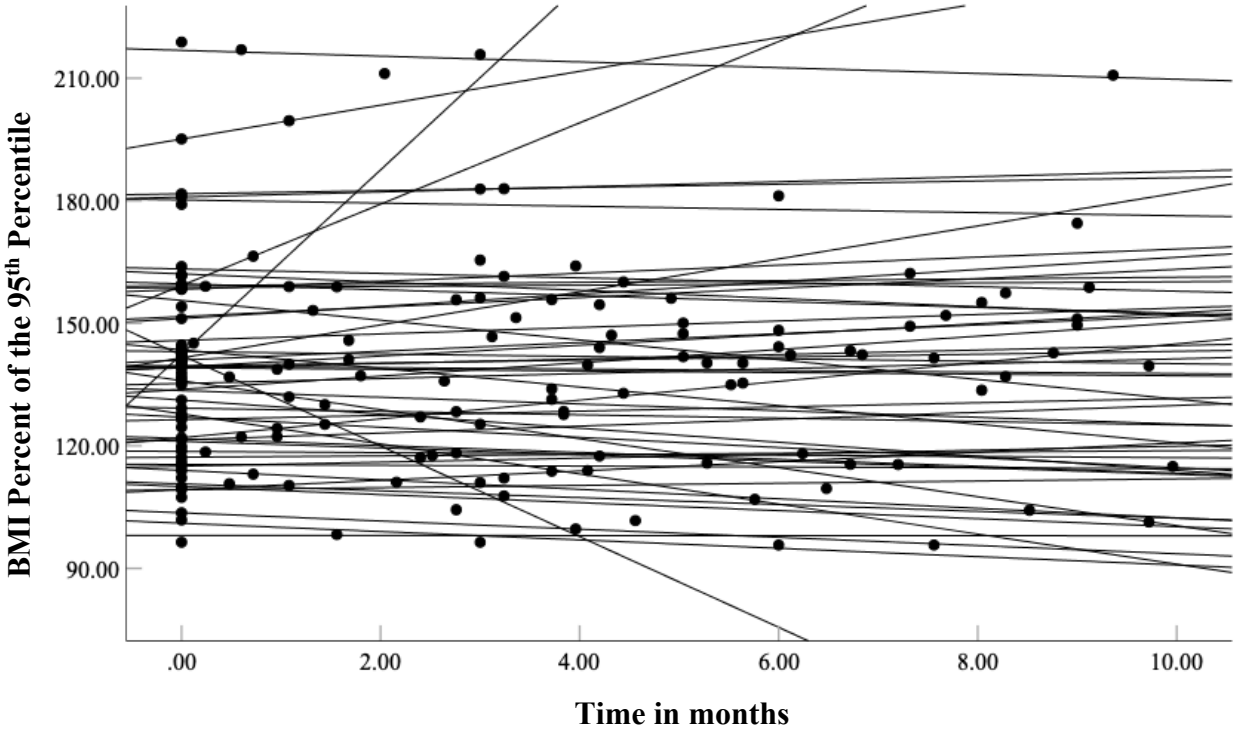

Figure 1. Individual child BMI percentile slopes over the course of weight management treatment.