HEALTH-RELATED QUALITY OF LIFE IN OBESE AND OVERWEIGHT, TREATMENT-SEEKING YOUTH

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Objective: This study evaluated health related quality of life (HRQOL) in obese children using obesity-specific HRQOL measures and examined potential race and sex differences.

Participants: Two-hundred and four children aged 5.03 to 13.48 years (mean ± SD = 10.18 ± 1.95) and their parents participated.

Methods: All participants enrolled in a family-based weight loss intervention study. Their height and weight were measured before and after the intervention, and demographic information was collected. Participants also completed a weight related quality of life measure; children completed a self-report version, and parents completed a parent-proxy version.

Results: Higher child body mass index z-scores (BMIz) were related to poorer HRQOL per parent and child report. Males reported higher emotional functioning than females, and for race, African American parents reported higher physical functioning for their children than Caucasian parents. No difference in total HRQOL was found for race.

Conclusions: Childhood BMIz is inversely related to quality of life. Compared with male children, females have more impairment in quality of life. However, HRQOL did not differ by race. Also, although parent and child reports do overlap in certain areas, they also each provide unique information. Future researchers and clinicians would be wise to capture both child and parent perspectives regarding quality of life among obese children. (*Ethn Dis*. 2014;24[3]:321–327)

Key Words: Pediatric Obesity, Child Obesity, Health Related Quality of Life, HRQOL, Race Difference, Sex Difference

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INTRODUCTION

Obesity is a global issue, impacting individuals of many ethnicities, ages, and both sexes.[1] The increased incidence of childhood obesity presents a range of significant health concerns.[2] Obese children are more likely to become obese adults than non-obese children[3] and are at increased risk for long-term health complications, even if they attain normal weight status by adulthood.[4] Childhood obesity has also been linked to more immediate problems, such as greater impairment in psychological health[5–7] and greater difficulty in the development of peer relationships.[8]

Health-related quality of life (HRQOL) is a subjective multidimensional evaluation of well-being and health[9] and is defined as the physical, psychological, emotional, and social functioning of a person. In pediatric obesity, research has shown that higher body mass index (BMI) is related to impairment in HRQOL[10] and that HRQOL for obese children is similar to children with other chronic diseases.[11,12]

Disease specific HRQOL measures are better for determining the effectiveness or responsiveness of the patient to clinical intervention, as they are better able to focus on symptoms and aspects of functioning that are specific to the patient's disease or condition.[13] However, most research on HRQOL in childhood obesity has utilized generic QOL measures, enabling researchers to evaluate HRQOL across a broad range of pediatric diseases simultaneously but perhaps at the cost of disease specificity. Disease specific measures have been developed for children and adolescents with obesity, and these measures have exhibited greater sensitivity than generic HRQOL measures, as well as good convergent and discriminant validity.[14–16] Parallel child self-report and parent-proxy measures of weight related QOL measures (WRQOL) (ie, Sizing Me Up and Sizing Them Up) have been developed.[15,16]

Parent-proxy measures supplement child ratings by providing a vantage point that is different from the child's and can be used in place of child report due to illness and young age.[12] In pediatric obesity studies, parent-proxy versions of generic HRQOL measures have been inversely related to child BMI z-scores (BMIz) and weight classification,[17,18] showing impairment across multiple HRQOL domains.[17–20] However, there has been some debate about how indicative parent HRQOL ratings are of child functioning. Some studies have shown high agreement between parent and child reports,[17,18] whereas others have found that parent-proxy ratings are lower than child self-reports.[20–22] Due to potential disagreement between child and parent ratings, the unique perspectives that both children and adults provide, as well as the fact that adults initiate treatment,[23,24] WRQOL may best be understood through a combination of child and parent-proxy reports.[12,25]

Demographics and General Health-related Quality of Life

Obesity prevalence in children differs across ethnicities and sex[2], and is

increasing at a greater rate in Hispanic and African American children compared to Caucasian children.[26] Additionally, African American children are pre-disposed to greater cardiovascular risk factors than Caucasian children, further indicating health disparities.[27] Among obese and overweight children, some studies have found that compared to Caucasian peers, African American children reported greater levels of physical comfort and self-esteem and less social and emotional impairment on HRQOL measures.[14,17,28] In contrast, Wallander et al[8] found that Caucasians exhibited greater general HRQOL functioning than both African American and Hispanic children, regardless of BMI. However, some have found no ethnicity differences for HRQOL.[25,29,30] Previous research has also evaluated sex differences in HRQOL and has shown that that females exhibit greater impairment than males on several domains of functioning with both generic[20,31] and weight specific measures.[14] Other studies using similar or identical measures have found no sex differences.[15,32]

Weight-related Quality of Life

Weight-related quality of life measures, such as Sizing Me Up (SMU) and Sizing Them Up (STU), have been developed in the last five years and have been used in only a few studies, which have been primarily limited to Caucasian and African American participants.[16,28,33] Also, though some work has been done on WRQOL with an adolescent specific measure (ie, aged 11 to 19 years),[14] less work has been done with younger children (ie, aged <11 years). Therefore, our study was designed to overcome these limitations by: 1) including a large proportion of children under the age of 11, 2) including a large proportion of Hispanic children, and 3) expanding on the literature using an obesity specific HRQOL measure with parents and children of overweight/obese treatment seeking youth.

The first aim of our study was to evaluate the relationship between WRQOL and weight (ie, BMIz) among children enrolling in a pediatric obesity program. An inverse relationship was expected between BMIz and WRQOL scores. The second aim was to investigate demographic variables related to WRQOL. It was expected that that African American children would exhibit greater WRQOL than Caucasian and Hispanic children, and that females would exhibit greater impairment than males. Lastly, the third aim was to evaluate the level of agreement between child and parent total scores and WRQOL subscales. It was hypothesized that parent report would be related to child report but that differences would exist on some subscales.

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METHODS

Participants

Children and their families were recruited through university broadcast emails, community health fairs, community events, and were referred by physicians, clinics, and social workers. Families participated in one of two pediatric obesity treatment programs at two Midwestern regional medical centers. Interventions were either a 12- or 24-week family-based behavioral pediatric weight management program. Inclusion criteria for this analysis were that the participant be aged 5 to 13 years, have a baseline BMI ≥85th percentile for age and sex, speak English as a first or second language, and have at least one parent willing to participate. Children with intellectual disabilities and Autism Spectrum Disorder were excluded.

Procedure

At the beginning of each program, baseline demographic information, height, weight, and WRQOL were recorded. All materials were provided to children in English. Spanish-speaking parents were given the option of completing study materials in either English or Spanish. Parental consent and, if appropriate, child assent, was obtained by research personnel using approved consent forms and procedures. All consent and assent forms were approved by each participating institution's IRB.

Measures and Materials

Demographic Information

Parents completed a demographic form and provided information pertaining to their child's age, sex, and race/ethnicity.

Anthropometry

While wearing light clothing and no shoes, height was measured to the nearest .1 centimeters using a Holtain stadiometer (Holtain Ltd., Crymych, Dyfed, UK) and weight was measured to the nearest .1 kilograms using either a Temp-Stik Digitron 8000 (National Medical Corp., Temp-Stik corp) or Scaletronix 5002 digital scale. Due to different growth rates between sexes and across age,[34] height, weight, age, and sex were used to calculate BMIz based on norms provided by the Centers for Disease Control and Prevention.[35]

Sizing Me Up

Sizing Me Up is a 22-item obesity-specific self-report measure designed to evaluate WRQOL in children aged 5 to 13 years. Questions are worded so that children respond to questions in the context of their size (eg, teased by other kids because of your size) and are ordered on a 4-point

Table 1. Demographics, BMI Z-Scores, and HRQOL

	n	Mean	SD
Age	204	10.18	1.95
Ethnicity			
Caucasian, 25%	51		
African American, 27%	54		
Hispanic, 46%	94		
Other, 2%	5		
Sex			
Male, 47%	95		
Female, 53%	109		
BMI Z-Score			
Total sample	204	2.31	.36
Sizing Me Up			
Emotional Functioning	186	71.55	27.83
Physical Functioning	186	75.42	22.14
Teasing/marginalization	186	75.00	29.57
Positive Social Attributes	186	42.68	22.26
Social Avoidance	186	86.82	18.06
Total QOL	186	68.31	15.35
Sizing Them Up			
Emotional Functioning	107	61.59	21.73
Physical Functioning	107	69.10	19.48
Teasing/marginalization	107	68.02	23.07
Positive Social Attributes	107	61.76	19.45
Mealtime Challenges	107	61.37	28.19
School Functioning	107	93.46	16.79
Total QOL	107	65.61	16.26

Likert scale ranging from none of the time (1) to all of the time (4). The measure comprises five core scales (Table 1) and a total quality of life score, combining all 5 subscales. Higher scores represent better WRQOL. This scale has demonstrated acceptable psychometric properties.[16]

Sizing Them Up

Sizing Them Up is a 22-item parent-proxy, obesity-specific measure that evaluates WRQOL in children aged 5 to 18 years. Both English and Spanish versions of the questionnaire were offered. Questions are worded so that parents respond to questions in the context of their child's weight or size and were ordered on a 4-point Likert scale ranging from none of the time (1) to all of the time (4). The measure consists of six core scales (Table 1) and a total quality of life score, combining all 7 subscales. The English-version of this scale has demonstrated acceptable psychometric properties.[15] However, several translation errors were later discovered for the Spanish version of STU. Eighty-seven Hispanic parents completed STU, and of those, 14 (16%) completed the English version. The decision was made to omit all Hispanic parent data as opposed to including those that completed the English version.

Statistical Analysis

Descriptive statistics were calculated for all variables. Pearson's correlation coefficients were calculated to evaluate the relationship between child BMIz and WRQOL measures and determine the necessity of including BMIz as a covariate in multivariate analyses. Additionally, multivariate analysis of covariance, controlling for BMIz, was conducted to investigate potential differences across SMU and STU subscales by sex and race. Results for sex comparisons were reported using Hotelling's T, and results for ethnicity were reported using Wilks' Lamda. Since total scores are not included in the multivariate analyses, and since missing subscale scores preclude individuals with missing data from multivariate analyses, post-hoc univariate analysis of covariance also were conducted to assess between group differences for sex and ethnicity. Benjamini-Hochberg corrections were applied to P for the F statistics, which is more powerful than Bonferroni correction in controlling multiple tests.[36] Additionally, child and parent reports were compared using both Pearson's correlation coefficients and inter class correlations. Since SMU and STU assess similar constructs, but ask different questions, Pearson's correlation coefficient was considered more relevant over intra class correlation.[16] As parents and children of the same families are related, paired t-tests were used to compare common subscales (ie, Emotional Functioning, Physical Functioning, Positive Social Attributes, School Functioning, and total HRQOL) between parents and children. Significant ($P<.05$) and moderate relationships ($.05<P<.08$) are reported in the results section. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 17.0.

RESULTS

Demographic Data

The average age of the sample ($n=204$) was 10.18 years ($\pm$ 1.95), and consisted of slightly more females (53%; $n=109$) than males. Demographic information is presented in Table 1. Due to inadequate sample sizes ($n=5$), participants reporting other ethnicity were excluded from ethnicity analyses.

Differences in BMI Z-Score across Demographics

The BMIz in males (mean $\pm$ SD = 2.31 $\pm$ .36) did not significantly differ from females (2.31 $\pm$ .35), $t(202)=.170$, $P=.865$. However, there were differences

Table 2. Correlations between HRQOL and BMI Z-Score

	n	*r*
Sizing Me Up		
Emotional Functioning	186	−.139
Physical Functioning	186	−.230[a]
Teasing/marginalization	186	−.294[b]
Positive Social Attributes	186	.032
Social Avoidance	186	−.208[a]
Sizing Them Up		
Emotional Functioning	107	−.153
Physical Functioning	107	−.250[a]
Teasing/marginalization	107	−.186
Positive Social Attributes	107	−.187
Mealtime Challenges	107	−.054
School Functioning	107	−.066

[a] $P<.01$.
[b] $P<.001$.

in BMIz between Caucasians (2.32 ± .29), African Americans (2.42 ± .36), and Hispanics (2.25 ± .38), $F(2,196)=3.651$, $P=.028$. Therefore, BMIz was controlled for in demographic comparisons (data not shown).

Relationship between WRQOL Subscales and BMI Z-Score

The average total WRQOL scores for SMU and STU, as well as individual subscale scores, are included in Table 1. Significant negative correlations were found between BMIz and the total WRQOL score for both SMU ($r=-.219$, $n=186$, $P=.003$) and STU ($r=-.220$, $n=107$, $P=.022$), suggesting that higher BMIz was related to poorer WRQOL. Significant negative correlations also were found between BMIz and three subscales on SMU (Physical Functioning, Teasing/marginalization, and Social Avoidance) and the Emotional Functioning subscale on STU. Thus, per both child and parent report, higher BMIz was related to poorer functioning. Correlations between BMIz and all of the subscales are presented in Table 2.

Differences in WRQOL by Race/Ethnicity

After controlling for BMIz, there was no overall multivariate difference between ethnic groups on SMU subscales (Wilks' Lamda=.956, F[10,346]=.785, P=.643), nor on STU subscales, Wilks' Lamda=.934, F(6,94)=1.116, $P=.359$. However, univariate analysis found differences in Physical Functioning on STU, $F(1,101)=6.112$, $P=.015$, such that African American parents rated their children as having lower functioning than did parents of Caucasian children (data not shown).

Differences in WRQOL by Sex

After controlling for BMIz, there was an overall difference between males and females on SMU, Hotelling's T=.067, F(5,179)=2.395, $P=.039$. Males reported higher Emotional Functioning (77.55 ± 24.61) than females (66.27 ± 29.49), F(1,185)=8.177, $P=.005$). There was not a difference between males and females on STU subscales, Hotelling's T=.070, $F(6, 99)=1.162$, $P=.333$. Results for all subscale comparisons are located in Table 3.

Comparisons between Child Self-Report and Parent-Proxy WRQOL

Between common scales across the two measures, significant and medium Pearson's correlation coefficients were found for Emotional Functioning ($r=.309$, $n=103$, $P=.002$), Physical Functioning ($r=.328$, $n=103$, $P=.001$), Teasing/marginalization ($r=.573$, $n=103$, $P<.001$), and total WRQOL ($r=.477$, $n=103$, $P<.001$). Although child and parent reports were significantly related, they also were significantly different such that parents reported higher scores on the Positive Social Attributes scale, $t(102)=-7.148$, $P<.001$ and children marginally lower scores on Emotional Functioning, $t(102)=1.777$, $P<.079$ (data not shown).

DISCUSSION

Our study examined the relationship between obesity-specific quality of life, demographics, and BMIz in a diverse sample of obese children. Also, child self-report and parent-proxy obesity specific WRQOL were compared.

The Relationship between WRQOL and BMIz

Similar to previous work,[5,31] our study found that as BMIz increased, overall WRQOL decreased, as well as in several areas of functioning. First, greater BMIz was related to more peer teasing. Obese children often have social difficulties, are teased and victimized more by peers,[37,38] are negatively regarded,[6] and are excluded from social activities by their peers.[39] Obese children are also more likely than non-obese children to be perpetrators of bullying[40] which may contribute to further social

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Table 3. HRQOL differences by sex

	Male		Female		
	n	Mean (SD)	*n*	Mean (SD)	*F*
Sizing Me Up					
Emotional Functioning	87	77.55 (24.61)	99	66.27 (29.49)	8.177[a]
Physical Functioning	87	78.33 (21.70)	99	72.86 (22.32)	3.174
Teasing/marginalization	87	78.35 (29.10)	99	72.05 (29.82)	2.490
Positive Social Attributes	87	39.95 (21.55)	99	45.08 (22.70)	2.493
Social Avoidance	87	89.25 (15.10)	99	84.68 (20.14)	3.272
Total QOL	87	70.20 (15.05)	99	66.65 (15.49)	2.754
Sizing Them Up					
Emotional Functioning	41	63.88 (21.82)	66	60.17 (21.72)	.626
Physical Functioning	41	66.34 (19.72)	66	70.81 (19.28)	1.721
Teasing/marginalization	41	69.11 (25.16)	66	67.34 (21.85)	.090
Positive Social Attributes	41	59.55 (20.83)	66	63.13 (18.56)	1.056
Mealtime Challenges	41	57.32 (28.88)	66	63.89 (27.67)	1.434
School Functioning	41	92.68 (15.83)	66	93.94 (17.45)	.164
Total QOL	41	65.04 (16.89)	66	66.00 (15.97)	.158

[a] Significant at $P<.05$ after using the Benjamini-Hochberg correction.

exclusion by peers.[41] Secondly, in the current study parents indicated lower levels of emotional functioning as BMIz increased, similar to previous work concluding that obese children have higher levels of anxiety and depression and lower levels of self-esteem compared to non-obese children.[5] These difficulties may be attributed to feelings of loneliness, dissatisfaction with appearance,[5] worrying about what others think of them,[42] and feelings of sadness.[43] Lastly, physical functioning was associated with increased BMIz, per parent and child reports. It may be difficult for obese children to participate in physical activities due to a lack of ability,[38] experienced discomfort while participating in physical activity, a lack of energy, or feeling self-conscious,[44] which may lead to avoidance of physical activities.[19]

The Relationship between WRQOL, Race/Ethnicity, and Sex

Our study also evaluated differences in WRQOL across race and sex. No differences were found by race per child or parent report, which given the mixed results of previous literature is not too surprising.[8,14,17,25,28–30] Since all families were referred or self-referred to a pediatric obesity treatment program, all children may be experiencing similar levels of impairment. Of note in our study is that while previous research compared Caucasian to African American children,[15,17] fewer studies evaluated HRQOL in Hispanic children. Those studies, which were completed either only assessed Mexican Americans or had large differences in recruited group sizes, limiting the ability of those studies to make comparisons across ethnic groups.[45] However, similar to our study, Wallander et al[8] included a more balanced sample of African Americans (40%), Hispanics (34%), and Caucasians (26%), and found no HRQOL differences by race. However, Wallander used a generic child QOL measure (ie, PedsQL) as opposed to a disease-specific measure. Based on the results of our study it can be concluded that even when utilizing an obesity-specific HRQOL measure, significant differences are not experienced across racial groups.

Our study also found that female children reported lower emotional functioning than male children.[14,28] Previous research has found that females have reported lower self-esteem than males regardless of weight status.[46] This may be due to higher emotional awareness[47] or ability to articulate their emotional experiences.[48]

Parent vs Child WRQOL Ratings

Overall, our study found that parent and child ratings were similar. However, several of the subscales were significantly different. Our results showed that parents reported greater levels of emotional impairment and greater difficulty with weight-based teasing than their children reported, though this relationship is smaller than those found in previous studies.[18–20] These differences could exist for a variety of reasons. First, parents tend to report more problems on internal domains than external domains[20] and may have difficulty rating something that they cannot directly observe (eg, emotional functioning, teasing). Second, the child may be reporting fewer problems because of a desire to please the researcher and appear to be functioning well.[49] Third, it has been suggested that child quality of life ratings are based on current state; whereas, parent ratings reflect an overall comparison of their child's quality of life to other children.[24] Lastly, since the

participants in this study were enrolled in a pediatric obesity intervention program, parents may have been biased toward lower HRQOL ratings and reported more problems.[23,25]

CONCLUSIONS AND IMPLICATIONS

Overall, our study found that: 1) obese children exhibit impairment in a range of daily WRQOL domains; 2) some aspects of functioning differ by sex, but no differences were observed by ethnicity even with our large proportion of Hispanic children; and 3) parent and child reports of WRQOL are highly related, yet still unique. This suggests that while WRQOL needs to be considered and evaluated in the treatment of obese children, all groups experience similar levels of impairment.

There were several strengths to this study. First, our sample of participants was very ethnically diverse compared to previous studies of HRQOL among children who were obese or overweight. Our study included a more diverse population than previous studies,[15,17,32] including a large sample of Hispanic children, allowing for greater generalization. Another strength is its use of a weight-specific HRQOL (WRQOL) measure. Lastly, our study gathered child and parent reported WRQOL, allowing for the direct comparison of the unique perspectives of the two types of respondents.

However, the study was not without limitations. Firstly, participants were not randomly selected, but were enrolled in clinical pediatric obesity treatment programs, which has been seen in previous research with obese children.[14,16,28] Secondly, although a strength of the study was its recruitment of a high number of Hispanics, problems with the original Spanish version of STU precluded Spanish-speaking parents from the study. Thirdly, our study did not include measures of socioeconomic status, income, or education level. Though no ethnicity differences were found, if they had been found it would have been difficult to determine if the variability in HRQOL was influenced more by these variables than by ethnicity independently. Despite these limitations, our study contributes to the current HRQOL literature by using weight-specific measures, including a large number of Hispanic children, as well as focusing on parent-child dyads.

Future research is needed to understand why obese female children experience greater difficulties with emotional functioning than obese male children. Also, differences in WRQOL across ethnicity are in need of further study; specifically, there is a need for a Spanish version of a parent-proxy weight-related HRQOL measure. Finally, more research is needed to determine how HRQOL in general affects child health, especially among children who enroll in a pediatric obesity treatment program and how participation in a pediatric obesity treatment program changes WRQOL both in terms of immediate and long-term outcomes.

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