

Disordered Eating and Health-Related Quality of Life in Overweight and Obese Children

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Objectives To examine disordered eating and associations with health-related quality of life (HRQOL) in rural overweight/obese (OW/OB) children. **Methods** Cross-sectional analyses were conducted with 272 rural OW/OB children aged 8–12 years ($M = 10.36$; $SD = 1.39$). Child anthropometrics, demographics, disordered eating attitudes, unhealthy weight control behaviors (UWCBs), and HRQOL were measured. Relationships between these variables were analyzed using bootstrapped multiple linear regressions. **Results** Clinically significant disordered eating attitudes were endorsed by 17% of the sample, and the majority endorsed UWCBs. Disordered eating attitudes and weight status were the most common predictors of HRQOL. Disordered eating attitudes and UWCBs were negatively related to emotional HRQOL but were unrelated to social, school, or physical HRQOL. **Conclusions** Disordered eating is a serious and relevant problem in OW/OB children living in rural areas and may be indicative of impairments in emotional functioning. Early intervention may reduce the risk for eating disorders and associated negative sequelae.

Key words children; eating and feeding disorders; obesity; quality of life.

Introduction

Almost one-third of children in the United States are overweight or obese (OW/OB) (Ogden, Carroll, Kit, & Flegal, 2012). While the health consequences of childhood obesity are considerable and persist into adulthood (Dietz, 1988; Must & Strauss, 1999), psychosocial consequences including low self-esteem, body image concerns, depression, and peer victimization (Erickson, Robinson, Haydel, & Killen, 2000; Pesa, Syre, & Jones, 2000; Storch et al., 2007; Strauss, 2000) are often more proximate. Disordered eating attitudes and unhealthy weight control behaviors (UWCBs; e.g., fasting and skipping meals) are a growing concern in OW/OB youth, given that the rates for engaging in at least one UWCB have been as high as 60% compared with 37% of healthy-weight adolescents (Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002). Disordered eating attitudes (e.g., body dissatisfaction and shape and weight concerns) are conceptually different than

disordered eating behaviors (e.g., self-induced vomiting, dieting, and skipping meals). While disordered eating attitudes and behaviors frequently co-occur, there is evidence that disordered eating attitudes are predictive of disordered eating behaviors (Neumark-Stainer, Paxton, Hannan, Haines, & Story, 2006), and therefore are an important factor to consider in younger children at risk for disordered eating behaviors, such as OW/OB youth.

To date, the majority of research in this area has focused on adolescents; however, evidence suggests that young children also report disordered eating attitudes and UWCBs (Junger, Janicke, & Sallinen, 2010). Over the past decade, there has been a steep increase in hospitalizations for disordered eating among youth <12 years of age (Agency for Healthcare Research and Quality, 2011). Other findings suggest that up to 40% of children aged 7–13 years have previously attempted to lose weight and 7% exhibit clinically significant disordered eating attitudes

and behaviors (Maloney, McGuire, Daniels, & Specker, 1989; Rolland, Farnill, & Griffiths, 1997). Prospective predictors of eating disorders such as weight concerns and body dissatisfaction have been reported in children as young as 5 years of age (Davison, Markey, & Birch, 2003). Consistent with adolescent research, OW/OB children are more likely to report disordered eating attitudes and UWCBs compared with healthy-weight peers (Rolland et al., 1997). However, there is much we have yet to learn about disordered eating and the physical and psychosocial correlates in OW/OB children, who may be particularly vulnerable to disordered eating (Ermis et al., 2004).

Research regarding the multidimensional impact of pediatric obesity on child functioning has repeatedly documented negative associations between weight status and health-related quality of life (HRQOL) (Janicke et al., 2007; Schwimmer, Burwinkle, & Vami, 2003; Zeller & Modi, 2006). HRQOL has been found to predict attrition from pediatric weight management interventions (Zeller et al., 2004). However, the relationship between disordered eating and HRQOL among OW/OB youth has rarely been explored. In a sample of adolescents (11–17 years) living in Germany, global HRQOL was significantly lower, and the rates of disordered eating assessed using a 5-item screener were nearly 2.5 times greater among OW/OB youth compared with healthy-weight peers (Herpertz-Dahlmann, Wille, Hölling, Vloet, & Ravens-Sieberer, 2008). Similarly, in a study of treatment-seeking adolescents with obesity (12–17 years), high-risk levels of shape and weight concerns were associated with lower physical, emotional, and social HRQOL (Doyle, le Grange, Goldschmidt, & Wilfley, 2007). As these studies were conducted with adolescents and assessed limited disordered eating attitudes and behaviors, more comprehensive investigation into these relationships in younger children is warranted.

Understanding the psychosocial risks of obesity among at-risk populations including youth living in rural communities may be especially important (Davis, Bennett, Befort, & Nollen, 2011). Risk factors such as higher rates of poverty, medical comorbidities, and barriers to medical care and mental health services (Lutfiyya et al., 2007; National Advisory Committee for Rural Health and Human Services, 2011) may increase rural youth's vulnerability to the negative consequences of obesity. Research examining HRQOL among rural populations is limited, and investigations of disordered eating attitudes and UWCBs among OW/OB children living in rural areas are nonexistent. Only two studies were found that examined the association between HRQOL and pediatric weight among this at-risk population, both of which reported that higher weight status in youth living in rural areas

was associated with lower HRQOL (Dalton, Schetzina, Pfortmiller, Slawson, & Frye, 2011; Ward et al., 2012).

To date, research on disordered eating attitudes and UWCBs has focused predominantly on adolescents in urban settings. Few studies have examined HRQOL in association with disordered eating attitudes and UWCBs. Exploring this relationship among rural OW/OB youth may help identify modifiable behaviors that may exacerbate negative physical and psychosocial consequences of obesity and impede weight management interventions. Building on previous literature, the primary aims of the current study were to (1) describe the prevalence of disordered eating attitudes and UWCBs in a sample of rural OW/OB children, and (2) investigate the associations between demographics, disordered eating attitudes, UWCBs, and HRQOL. It is hypothesized that the prevalence of disordered eating attitudes and UWCBs will be comparable with the rates reported in population-based studies of OW/OB adolescents. Additionally, it is expected that higher levels of engagement in disordered eating attitudes and UWCBs will be associated with lower HRQOL.

Method

Participants

Data for the current study were collected during baseline assessments for the Extension Family Lifestyle Intervention Project (E-FLIP for kids), a randomized controlled trial examining the effectiveness of behavioral family interventions for overweight and obese youth and their families in community-based rural settings (Janicke et al., 2011). Recruitment methods involved direct solicitation via direct mailings, distribution of brochures through local schools and physician offices, newspaper press releases, and community presentations. Participants were 272 OW/OB children and a parent or legal guardian living in a rural setting based on criteria for the Office of Management and Budget (Ricketts, Johnson-Webb, & Taylor, 1998). Children aged 8–12 years with a body mass index (BMI) of ≥ 85 th percentile according to established norms from the Centers for Disease Control and Prevention (CDC, 2000) at the start of treatment were eligible to participate in the study. Exclusion criteria included interfering dietary or exercise restrictions, medical condition or medications affecting weight or appetite, or participation in another weight management program. Research staff at participating Cooperative Extension Service offices collected informed consent and baseline data. The governing institutional review board approved the study.

Measures

Anthropometry

Child height and weight were measured by trained study staff using standardized equipment and procedures. Standardized BMI (BMIz) and BMI percentiles were derived from CDC norms adjusted for age and sex (CDC, 2000).

Demographics

Demographic information including parent and child age, sex, race, ethnicity, and family income was collected via parent-report questionnaire.

Health-Related Quality of Life

The child self-report Pediatric Quality of Life Inventory (PedsQL; Varni, Seid, & Rode, 1999) is a generic HRQOL questionnaire consisting of 23 items (e.g., I have low energy, I feel sad or blue, and Other kids tease me) rated on a 5-point Likert scale. This measure yields a global score and four subscale scores for physical, emotional, social, and school functioning. Scales are standardized with scores ranging from 0 to 100, with higher scores indicating better quality of life. The PedsQL has been shown to be both reliable and valid across healthy and chronically ill pediatric populations (Varni, Bulwinkle, Seid, & Skarr, 2003; Varni, Seid, & Kurtin, 2001). Cronbach's alpha for the global scale score was 0.87 in the current sample.

Disordered Eating Attitudes and Behaviors

The Children's Eating Attitudes Test (ChEAT) was used to assess disordered eating attitudes and behaviors via child self-report. The measure consists of 26 items (e.g., I think that food controls my life and I have been dieting) rated on a 6-point Likert scale (always, very often, often, sometimes, rarely, and never). Raw scores are summed to create a total score, with higher scores representing more disordered eating attitudes and behaviors. A total raw score ≥ 20 indicates clinically significant disordered eating (Garner, Olmsted, Bohr, & Garfinkel, 1982). The ChEAT has been shown to be both reliable and valid (Maloney, McGuire, & Daniels, 1988; Smolak & Levine, 1994). Cronbach's alpha for the current sample was 0.78.

Unhealthy Weight Control Behaviors

The Child Lifestyle Behavior Checklist is a child self-report questionnaire that assesses the number of specific healthy weight control behaviors and UWCBs used in the past year in a checklist (i.e., yes/no) format. This measure was adapted from a survey created by Neumark-Sztainer, Wall, Story, and Perry (2003) and added three items that were not included in the original survey: drank more water, drank less soda, and skipped breakfast. Only UWCBs (nine

items; e.g., skipped meals, made myself vomit, took diet pills) were of interest in the current study. Response items were summed to create a total UWCB score. Cronbach's alpha for the measure was 0.63.

Statistical Analyses

Statistical analyses were conducted using SPSS (21.0) for Windows (IBM Corp., 2012). Descriptive statistics are represented by means, standard deviations, and percentages. Covariates were identified using Spearman correlational analyses, Mann-Whitney *U* tests, and Kruskal-Wallis tests. Chi-square tests were used to analyze whether significant differences in disordered eating attitudes and UWCBs existed between groups based on sex and race/ethnicity. Bootstrapped multiple linear regressions were used to examine the relationships between HRQOL and child sex, age, BMIz, race/ethnicity, disordered eating attitudes, and UWCBs. Bootstrapping is a statistical method that generates a 95% confidence interval based on the construction of a set number of random samples (e.g., 5,000) generated by SPSS from the observed data set that are thought to be representative of the target population (Davison & Hinkley, 1997; Efron, 1979; Freedman, 1981). This method is advantageous when dealing with non-normal distributions. As the disordered eating attitudes and UWCBs were not normally distributed in this sample, nonparametric tests and bootstrapped multiple linear regressions were used.

Results

Preliminary Analyses

Participant demographics are displayed in Table I. Child age ranged from 8 to 12 years ($M = 10.36$; $SD = 1.39$). More than half of the sample identified as non-Hispanic Caucasian and female. The majority of children in this sample were obese or severely obese. Mean scores for disordered eating attitudes, UWCBs, and HRQOL scales are displayed in Table II. Frequencies of the four most commonly endorsed disordered eating attitudes (i.e., endorsed as "often" or "always") and all nine UWCBs are stratified by child sex and race/ethnicity in Table III. Girls endorsed more frequent concerns about being overweight than boys [$\chi^2(1) = 4.96$, $p = .03$], and non-Hispanic African Americans endorsed fasting at significantly higher rates than other race/ethnicity groups [$\chi^2(4) = 14.00$, $p = .01$]. No other significant group differences emerged. Correlational statistics for relationships between child age, BMIz, HRQOL, disordered eating attitudes, and UWCBs are presented in Table IV. Age was negatively correlated with disordered eating attitudes but did not share significant relationships with other variables. BMIz was

Table I. Demographic Characteristics of Participants (N = 272)

Characteristic	n (%)
Child BMI	
Overweight (85th–94th percentile)	25 (9.2)
Obese (95th–98th percentile)	133 (49.1)
Severely obese (\geq 99th percentile)	113 (41.7)
Child sex	
Female	147 (54.2)
Male	124 (45.8)
Child race/ethnicity	
Non-Hispanic Caucasian	172 (63.2)
Non-Hispanic African American	34 (12.5)
Hispanic	20 (7.4)
Other	25 (9.2)
Unknown	21 (7.7)
Family income	
Below \$19,999	51 (19.0)
\$20,000–\$39,999	81 (30.1)
\$40,000–\$59,999	60 (22.3)
\$60,000–\$79,999	37 (13.8)
Above \$80,000	40 (8.4)

Note. Total percentage for each variable may not equal 100% due to missing data.

Table II. Mean Ratings and Standard Deviations of Disordered Eating Attitudes, UWCBs, and HRQOL

Construct	M	SD	Minimum–maximum
Disordered eating attitudes—ChEAT total score	11.74	8.87	0–53.00
UWCBs	1.49	1.37	0–6.00
HRQOL global	76.08	13.81	30.43–100.00
HRQOL physical	79.27	14.78	34.38–100.00
HRQOL psychosocial	74.42	15.48	21.67–100.00
HRQOL social	75.79	20.11	10.00–100.00
HRQOL emotional	72.15	21.46	5.00–100.00
HRQOL school	75.46	17.42	10.00–100.00

positively related to UWCBs and negatively related to physical and social HRQOL, but did not have a significant relationship with disordered eating attitudes or other HRQOL domains. Child sex and race/ethnicity were not significantly related to disordered eating attitudes [$z = 1.08$, $p = .28$; $\chi^2(4) = 6.14$, $p = .19$], UWCBs [$z = -.64$, $p = .52$; $\chi^2(4) = 5.86$, $p = .21$], or HRQOL [$z = -.94$, $p = .35$; $\chi^2(4) = 5.34$, $p = .25$].

Relationships Between Demographics, Disordered Eating Attitudes, UWCBs, and HRQOL

Bootstrapped multiple linear regressions were conducted to identify whether child sex, age, BMIz, race/ethnicity,

disordered eating attitudes, and UWCBs were related to global HRQOL and HRQOL subscales. Results of these analyses are described below, and findings are displayed in Tables V and VI. Although disordered eating attitudes and UWCBs were significantly correlated ($r = .29$, $p < .001$), they are believed to measure different yet overlapping concepts (i.e., attitudes vs. behaviors). While the ChEAT measures disordered eating attitudes, items regarding disordered eating behaviors are also included. As such, disordered eating attitudes and UWCBs were both entered into the regressions, as they were hypothesized to measure unique and significant portions of the variance in the models.

In the first model predicting global HRQOL ($R^2 = .09$), the main effects of BMIz and disordered eating attitudes were significant ($p = .026$ and $.028$), whereas child sex, age, race/ethnicity, and UWCBs were not significantly related to global HRQOL. Disordered eating attitudes and UWCBs were both significant predictors of emotional functioning ($p = .001$ and $.018$, respectively) in the second model ($R^2 = 11.4$). However, child sex, age, BMIz, and race/ethnicity were not significantly related to emotional functioning. Social functioning was the outcome of interest in the third model ($R^2 = .075$). There was a significant main effect of BMIz ($p = .006$), although all other variables including disordered eating ($p = .064$) and UWCBs ($p = .061$) were not significantly related to social functioning. Similarly, BMIz was the only significant predictor ($p = .003$) in the model predicting physical functioning ($R^2 = .065$). The model predicting school functioning did not contain any predictors that reached significance ($R^2 = .016$).

Discussion

The current study adds to existing literature by examining disordered eating attitudes and UWCBs in the context of physical and psychosocial correlates of HRQOL among OW/OB rural children, an underserved population disproportionately affected by health disparities. The data suggest that disordered eating is a relevant and serious problem in these children that is related to impairments in HRQOL, specifically in the domain of emotional functioning.

Consistent with our hypothesis, the young OW/OB children in this rural sample endorsed rates of disordered eating attitudes and UWCBs traditionally reported by older adolescent youth. Almost one in five youth in the current sample endorsed a clinically significant level of disordered eating attitudes, which is higher than the rates found previously in school-based studies including children of

Table III. Frequencies of Disordered Eating Attitudes (Often/Always) and UWCBs Endorsed in the Past Year, Stratified by Race/Ethnicity and Sex

Construct and/or item	Total % (N = 272)	Males (n = 124)	Females (n = 147)	NH Caucasian (n = 172)	NH African American (n = 34)	Hispanic (n = 20)	Other (n = 25)	Unknown (n = 21)
Disordered eating attitudes								
Think a lot about being thinner	64.2	58.9	69.2	64.5	66.7	60.0	72.0	52.4
Think about burning calories when exercising	51.3	51.6	51.4	52.9	60.6	35.0	48.0	42.9
Aware of calorie content in foods	32.8	29.0	36.3	30.2	45.5	30.0	32.0	38.1
Scared about being overweight	31.7	25.0	37.7	32.0	45.5	15.0	32.0	23.8
Clinically significant total scores	17.2	14.8	19.2	17.0	21.2	5.0	20.0	20.0
UWCBs								
Ate very little food	36.4	37.9	35.4	37.2	38.2	25.0	44.0	28.6
Skipped meals	35.3	39.5	32.0	37.2	29.4	25.0	44.0	28.6
Skipped breakfast	33.5	33.9	33.3	32.6	38.2	30.0	40.0	28.6
Fasted	15.4	15.3	15.6	13.4	35.3	10.0	4.0	19.0
Used a food substitute	15.4	16.9	14.3	14.0	26.5	20.0	12.0	9.5
Made myself vomit	4.8	4.8	4.8	4.7	11.8	5.0	0	0
Used a laxative	4.4	3.2	5.4	3.5	11.8	5.0	4.0	0
Used diet pills	2.9	4.0	2.0	2.3	8.8	0	4.0	0
Smoked more cigarettes	0.4	0.8	0	0.6	0	0	0	0
Any UWCB (≥ 1)	68.8	69.4	68.7	70.3	73.5	55.0	72.0	57.1

Note. Total sample for child sex was 271 due to missing data from one participant; valid percentages are presented for all groups.

Table does not include all disordered eating attitudes assessed; bold values indicate a significant χ^2 test result.

NH = non-Hispanic.

Table IV. Spearman Correlation Coefficients for Variables of Interest

Variable	1	2	3	4	5	6	7	8	9
1. Age	–								
2. BMIz	.01	–							
3. HRQOL global	.12	–.11	–						
4. HRQOL physical	.09	–.13*	.80**	–					
5. HRQOL emotional	.11	–.02	.77**	.52**	–				
6. HRQOL social	.08	–.14*	.81**	.55**	.54**	–			
7. HRQOL school	.06	–.05	.62**	.36**	.26**	.46**	–		
8. Disordered eating attitudes	–.17**	.08	–.18**	–.07	–.24**	–.13*	–.03	–	
9. UWCBs	–.02	.13*	–.19**	–.09	–.20**	–.16**	–.09	.29**	–

Note. * $p \leq .05$; ** $p \leq .01$.

Table V. Multiple Linear Regression Analysis Summary for Child Sex, Age, BMIz, Race/Ethnicity, Disordered Eating Attitudes, and UWCBs Predicting HRQOL Global, Emotional, and Social Functioning

Variable	HRQOL global		HRQOL emotional		HRQOL social	
	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI
Intercept	82.32 (7.77)***	67.25, 98.08	73.64 (12.87)***	47.56, 98.91	89.27 (11.54)***	67.22, 112.79
Sex	–1.42 (1.64)	–4.51, 1.86	–2.92 (2.57)	–7.89, 2.11	0.29 (2.28)	–4.19, 4.79
Age	1.05 (0.62)*	–.21, 2.25	1.50 (0.95)	–0.41, 3.39	0.86 (0.85)	–0.83, 2.47
BMIz	–4.50 (2.03)*	–8.47, –0.49	–1.02 (3.42)	–7.62, 5.63	–8.14 (3.33)**	–14.44, –1.54
Race/ethnicity	–.17 (0.59)	–1.35, 0.98	–0.25 (0.97)	–2.14, 1.63	0.35 (0.86)	–1.27, 2.02
Disordered eating attitudes	–0.24 (0.11)*	–0.45, –0.03	–0.52 (0.17)***	–0.84, –0.18	–0.26 (0.14)	–0.54, 0.01
UWCBs	–1.25 (0.67)	–2.55, 0.09	–2.47 (1.01)*	–4.44, –0.46	–1.72 (0.92)	–3.57, 0.05

Note. CI = confidence interval for B; CIs that do not contain 0 are deemed to be significant; significant coefficient values are in bold.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Table VI. Multiple Linear Regression Analysis Summary for Child Sex, Age, BMIz, Race/Ethnicity, Disordered Eating Attitudes, and UWCBs Predicting HRQOL Physical and School Functioning

Variable	HRQOL physical		HRQOL school	
	B (SE)	95% CI	B (SE)	95% CI
Intercept	89.05 (8.82)***	71.71, 106.29	73.26 (11.66)***	50.64, 95.76
Sex	-2.80 (1.80)	-6.25, 0.81	0.58 (2.04)	-3.36, 4.68
Age	1.10 (0.66)	-0.21, 2.38	0.71 (0.80)	-0.87, 2.28
BMIz	-6.58 (2.29)**	-11.05, -2.03	-1.02 (3.14)	-7.17, 5.33
Race/ethnicity	-0.12 (0.62)	-1.33, 1.11	-0.72 (0.72)	-2.14, 0.75
Disordered eating attitudes	-0.15 (0.12)	-0.38, 0.10	-0.09 (0.15)	-0.39, 0.20
UWCBs	-0.43 (0.67)	-1.77, 0.88	-0.88 (0.82)	-2.48, 0.67

Note. CI = confidence interval for B; CIs that do not contain 0 are deemed to be significant; significant coefficient values are in bold.

** $p \leq .01$; *** $p \leq .001$.

healthy weight and overweight status (17% in the current sample vs. 10.5 and 6.9% in previous studies) (Maloney et al., 1989; McVey, Tweed, & Blackmore, 2004). Approximately 69% of the current sample of OW/OB children reported engaging in at least one UWCB, which is slightly higher than ~60% of OW/OB adolescents in a population-based study who reported engagement in UWCBs (Neumark-Sztainer et al., 2002). Children in the current study reported slightly lower HRQOL compared with a similar study examining HRQOL in OW/OB rural children (approximate PedsQL global HRQOL mean score of 76 vs. 80) (Ward et al., 2012). Together these data suggest that disordered eating is a problem for young OW/OB children, particularly those living in rural areas, and may be indicative of greater impairments in HRQOL.

Current findings also extend previous research with adolescents documenting an association between disordered eating attitudes and behaviors and HRQOL impairments (Doyle et al., 2007; Herpertz-Dahlmann et al., 2008) to a younger population. Findings of the current study suggest that disordered eating attitudes and UWCBs capture distinct aspects of disordered eating among preadolescent children. Disordered eating attitudes and UWCBs both accounted for a unique and significant portion of the variance in emotional HRQOL. While children's maladaptive eating attitudes were observed to influence perceptions of overall well-being and emotional functioning, UWCBs were specifically associated with perceived emotional well-being. Emotional HRQOL may have been particularly salient in this sample, as UWCBs have been significantly related to emotional distress in OW/OB children and may be used to modulate negative emotions (Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008), particularly in younger children who have difficulty using healthier coping strategies. As the current sample reported using a low average number of UWCBs, they

may be experiencing significant internal (i.e., emotional) correlates of these behaviors but may not be experiencing the level of frequency or severity of use to impact external domains such as social and physical functioning.

In line with previous research (Dalton et al., 2011; Schwimmer et al., 2003; Zeller & Modi, 2006), BMIz was a strong negative predictor of global, physical, and social HRQOL. However, emotional HRQOL was not significantly related to BMIz, which may be due to the nature of the sample. As the majority of children in the sample were obese, it is possible that the relationship between BMIz and emotional HRQOL was not strong enough to reach significance with the limited variability in weight status. Furthermore, as this was a group of preadolescent children, emotional functioning may not be as strongly influenced by weight status as the more external domains of physical and social functioning. Overall, these data suggest that disordered eating attitudes and UWCBs may be potential targets for improving HRQOL in OW/OB rural children, which may lead to better treatment outcomes and retention rates (Zeller et al., 2004).

Within the current sample, disordered eating attitudes and UWCBs were differentially associated with child demographics and weight severity. Consistent with previous research (Neumark-Sztainer et al., 2002), greater engagement in UWCBs was associated with higher BMIz among the OW/OB children in the current study. It is important to note that previous studies have revealed the bidirectionality of this relationship. As obesity becomes more visible with increases in BMIz, it may exacerbate vulnerability to social stigmatization and body dissatisfaction (Storch et al., 2007) and intensify weight loss efforts (Strauss, 1999), while it has also been found that UWCBs can predict future weight gain (Neumark-Sztainer et al., 2006). Thus, simultaneous efforts targeting obesity and disordered eating should be considered.

Diverging from previous research suggesting that older children tend to endorse higher rates of disordered eating attitudes and UWCBs than younger children (Neumark-Sztainer et al., 2002), results of the current study suggest that younger age was associated with more disordered eating attitudes. It may be important to first note the restricted age range of the current sample, which only includes young children and limits the conclusions drawn from the data regarding comparisons between younger and older children. However, within this age range, younger children may be less impacted by social desirability bias and more likely to truthfully report their engagement in disordered eating attitudes and behaviors, although younger children may also be more susceptible to misreporting due to difficulties understanding items or concepts.

In the current sample, child sex was not associated with disordered eating attitudes or UWCBs. This remains an area that needs further clarification, as there have been mixed findings on whether sex influences disordered eating attitudes and behaviors in elementary school-aged children (Shapiro, Newcomb, & Loeb, 1997; Thelen, Powell, Lawrence, & Kuhnert, 1992), despite consistently higher rates of disordered eating in adolescent and adult females than males (Croll, Neumark-Sztainer, Story, & Ireland, 2002; Presnell, Bearman, & Stice, 2004). Children in the current sample were OW/OB, with 42% severely obese (BMI \geq 99th percentile), which may increase awareness of weight status (Rhee, Delago, Arscott-Mills, Mehta, & Davis, 2005) and risk for weight-related psychological distress (Eremis et al., 2004) across all children, irrespective of sex. The relationship between race/ethnicity and disordered eating in children also remains unclear with no significant findings in the current study and mixed findings in the literature (Croll et al., 2002; Ricciardelli, McCabe, Williams, & Thompson, 2007).

Interpretation of findings should be considered in the context of limitations. Disordered eating attitudes and UWCBs only accounted for a modest portion of variance in HRQOL. Reliance on single informant report from pre-adolescent children may have influenced the accuracy of responses about disordered eating attitudes and UWCBs. The measure of UWCBs was a modified measure with less than optimal internal consistency and assessed quantity of UWCBs used but not frequency or severity. Although targeting at-risk rural children provides valuable information about underserved OW/OB children, generalizability to other populations such as treatment-seeking or urban populations is limited. Additionally, the cross-sectional design of the current study prohibits inferences about causation and directionality.

Despite limitations, the current study makes an important contribution to the existing literature, as it is one of the few studies to examine disordered eating attitudes and UWCBs in preadolescent children and, to our knowledge, is the first to examine this relationship in OW/OB rural children. Current findings suggest that these youth are at significant risk for weight-related psychosocial impairments. Thus, while adolescence and young adulthood may be periods of increased vulnerability to clinical eating disorders and behaviors (Killen et al., 1996; Neumark-Sztainer et al., 2002), risks may begin in childhood, during which early detection and intervention are critical. Longitudinal studies can help clarify the temporal relationship of disordered eating attitudes, UWCBs, and functional impairments in youth.

Clinically, the elevated rates of disordered eating attitudes and UWCBs in the current sample highlight the need for psychosocial assessments in regular medical care, especially in rural communities. Children at risk for such outcomes may benefit from prevention programs that address children's weight-related psychosocial distress and other correlates and predictors that contribute to the development of these problems. Furthermore, pediatric weight-related interventions should continue to move toward a comprehensive and integrated approach that focuses on healthy lifestyle practices that address the broad spectrum of weight-related problems.

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