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A cross-sectional study of weight misperception and health-related quality of life in Appalachian adolescents

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Abstract

Introduction—There is limited research on the relation between weight misperceptions and health-related quality of life (HRQoL) among U.S. adolescents.

Methods—Baseline data (n=1509) collected in 2012 from the *Team Up for Healthy Living* project were used. Measures included BMI percentiles calculated from measured height and weight; self-perception of weight status; and the 23-item PedsQL™ Inventory. Multiple linear regression was performed after adjustment for covariates to examine associations between weight misperception and HRQoL.

Results—Compared to accurate weight perception, weight underestimation was associated with higher total HRQoL ($\beta=2.41$), physical health ($\beta=2.77$), and emotional ($\beta=2.83$), social ($\beta=2.47$) and psychosocial functioning ($\beta=2.38$) (all $p<0.05$). Weight overestimation was associated with lower social functioning ($\beta=-13.13$, $p<0.05$). Stratified by gender, associations were observed only in males.

Discussion—Weight underestimation had greater association with HRQoL than weight overestimation; and varied by gender. Better understanding of these associations will assist in improving the health of adolescents in Southern Appalachia.

Keywords

weight perception; quality of life; adolescents; cross-sectional

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Conflicts of Interest

The authors declare no conflicts of interest.

Introduction

The prevalence of adolescent obesity has reached epidemic proportions in the U.S. and disparities persist across racial and socioeconomic categories (Martin et al., 2014; Ogden, Carroll, Kit, & Flegal, 2014). Health-related quality of life (HRQoL) is important for assessing the disease burden of obesity on an individual's perceived physical and mental health (CDC, 2014; Ul-Haq, Mackay, Fenwick, & Pell, 2013). From a theoretical standpoint, HRQoL is conceptualized as a multidimensional construct and underscores the complex and interacting relationship between disease, subjective well-being, and environment (Ferrans, Zerwic, Wilbur, & Larson, 2005; Nelson et al., 2014). This construct mirrors the definition of health adopted by the World Health Organization (1948): "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." Thus, assessments of health that encompass both a biomedical model of disease and subjective evaluations of health provide a more complete picture of the individual's health status (Nelson et al., 2014). The Centers for Disease and Control and Prevention (2014) recognizes the importance of assessing HRQoL across the age spectrum. Pediatricians also consider HRQoL as clinically important and meaningful for understanding subjective well-being and treatment outcomes in youth (Palermo et al., 2008; Varni, Seid, & Kurtin, 2001).

Ul-Haq and colleagues (2013) conducted a meta-analysis of the association between BMI and HRQoL in pediatric populations. Overweight/obese adolescents reported lower total, physical and psychosocial HRQoL when compared to normal weight adolescents (Ul-Haq et al., 2013). Empirical research has also demonstrated a link between perceptions of health, day-to-day functioning, and HRQoL (Nelson et al., 2014) even among healthy adolescent populations (Varni et al., 2001). There is paucity of research, however, on the perception of weight (eg, discordance between an individual's subjective weight and measured weight) and HRQoL among non-clinical samples of adolescents in the U.S. To our knowledge, only one study has examined these associations (Farhat, Iannotti, & Summersett-Ringgold, 2015). Results from this study provide evidence that overweight misperception may have a more robust association with HRQoL than does actual weight status, and therefore functions as an independent predictor of impaired HRQoL in adolescent girls (Farhat et al., 2015).

Studies among late adolescents and non-U.S. adolescents have yielded mixed results. A study conducted among normal weight U.S. college students found those who overestimated their weight status were 3.77 times more likely to report frequent mental distress when compared to those who accurately perceived their weight (Southerland et al., 2013). In a German study among 6669 11 to 17 year olds, HRQoL was higher among adolescents with accurate weight perception (normal weight group) and weight underestimation (overweight group who perceived themselves in a lower BMI category) compared to normal and overweight adolescents who felt "far too fat" (Kurth & Ellert, 2008). Normal weight adolescents who misperceived themselves as overweight/obese reported lower HRQoL scores for total, physical and emotional well-being, self-esteem, and family, friends, and school functioning. Associations were stronger for females than males (Kurth & Ellert, 2008).

Jansen and colleagues (2008) conducted research among 12-13 year old Dutch youth. Feeling overweight rather than actually being overweight resulted in poorer psychological well-being. Similar to these findings, Petracci and Cavrini (2013) assessed the role of body image in accounting for differences in HRQoL among 4338 13-year old adolescents in Italy. Adolescents who had a heavier body image than the ideal body image scored lower on all five dimensions of the EQ-5D questionnaire (eg, mobility, self-care, usual activities, pain or discomfort, and anxiety or depression).

Hayward, Millar, Petersen, Swinburn, and Lewis (2014) found a complex relationship between weight misperception and HRQoL that may vary by BMI classification. Weight underestimation resulted in lower global HRQoL and psychosocial functioning among normal-weight Australian males and females (mean age, 14.6 years) compared to those who accurately perceived their weight; lower physical functioning was also reported among normal-weight males who misperceived themselves as being underweight. In contrast, normal weight Australian adolescents who overestimated their weight status had lower global HRQoL and psychosocial functioning compared to those who felt “about right”; whereas, underweight adolescents who felt “about the right” weight reported higher global HRQoL when compared to those who accurately perceived their weight (Hayward et al., 2014). Among the overweight/obese group of adolescents a different pattern emerged. Adolescents whose perceived weight was concordant with their observed weight (overweight-overweight/obese) had lower HRQoL scores when compared to those who felt they were “about the right” weight (weight underestimation). Similar findings have been observed among Iranian adolescents (Heshmat et al., 2015).

Weight misperception is common among adolescents (Edwards, Pettingell, & Borowsky, 2010) and may contribute to high risk behaviors (Chung et al., 2013; Edwards et al., 2010; Martin et al., 2014) and the development of excess weight in later life (Sutin & Terraciano, 2015). Weight overestimation increases the odds of psychological distress (Ali, Fang, & Rizzo, 2010), weight preoccupation (Edwards et al., 2010), and disordered eating (Martin et al., 2014). A positive association between weight underestimation and depressed mood (Blashill & Wilhelm, 2014) has also been observed. Weight perception may also be more important than actual weight status for identifying adolescents at risk for psychological problems (Ali et al., 2010; Blashill & Wilhelm, 2014).

Epidemiologic trends indicate that weight overestimation (eg, subjective weight is greater than measured weight) is more common among adolescent females; whereas weight underestimation (eg, subjective weight is lower than measured weight) is more frequent among males (Chung, Perrin, & Skinner, 2013; Edwards et al., 2010; Martin et al., 2014; Park, 2011). Socioeconomic, geographic and racial/ethnic variations have also been observed. Adolescents from low-income households, rural communities, and those who are racial/ethnic minorities are more likely to underestimate their weight (Martin et al., 2014; Park, 2011).

The purpose of the current study is to examine potential associations between weight misperception and HRQoL among adolescents in Southern Appalachia. Childhood obesity ranks among the highest in this region (CDC, 2009). A recent study found that 46.6% of

adolescents in Southern Appalachia were overweight/obese (Wang et al, 2014). Higher rates of obesity in the region (NSCH, 2012) may skew how adolescents define a normal body weight for themselves and their peers (Maximova et al., 2008; Williams, Taylor, Wolf, Lawson, & Crespo, 2008). Changing weight norms may also result in individuals perceiving themselves as thinner (Schafer & Ferraro, 2011); which may have a positive effect on one's HRQoL. Furthermore, data from the 2011 National Survey of Children's Health suggest that adolescents in this region are less likely to report their health as 'excellent' or 'very good' when compared to their U.S. counterparts (NSCH, 2016). Weight misperception may be a factor that contributes to self-reports of health (Farhat et al., 2015). Therefore, assessing this relationship is important in this population.

Methods

Sample

Baseline data collected in 2012 were used from the *Team Up for Healthy Living* Project, a cluster-randomized trial targeting obesity prevention in Southern Appalachia among high school adolescents in grades 9 – 12 through an 8-week cross-peer obesity prevention program conducted in *Lifetime Wellness* classes (Slawson et al., 2015). Of the 1654 participants contacted, 1509 consented to participate in the study (91.2%). Data with information on measured height and weight as well as perceived weight status were used for the final analysis (n=1481). Research staff administered a battery of assessments to participants to assess health-related behaviors and personal characteristics. Parental consent and child assent were obtained prior to study enrollment. The study was approved by the Institutional Review Board at East Tennessee State University.

Measures

BMI percentile—Weight and height were collected during baseline assessment using calibrated scales and portable stadiometers by trained staff. BMI [weight (kg)/height (m)²] percentiles for age and sex were then calculated using measured height and weight based on a SAS program for the 2000 CDC growth charts (<http://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm>). Information regarding weight and height was not discussed with participants at any point during the assessments.

Weight misperception—Weight misperception was assessed by one question: How do you describe your weight? Participants completed this question prior to the anthropomorphic measurements. Response options were collapsed to the adjacent response resulting in 3 categories: underweight (i.e., “very underweight” and “slightly underweight”), normal weight (i.e., “about the right weight”), and overweight/obese (i.e., “slightly overweight” and “very overweight”). We then calculated weight misperception by comparing the 3 weight status perception categories with actual weight status categories. Participants were classified into 3 groups: (1) accurate weight perception (perceived corresponds with actual), (2) weight underestimation (perceived < actual), and (3) weight overestimation (perceived > actual). These classifications of weight misperception have been used in prior research (Hayward, Millar, Petersen, Swinburn, & Lewis, 2014; Martin et al., 2014).

HRQoL—The 23-item Pediatric Quality of Life Inventory 4.0 (PedsQL™) teen report for ages 13-18 was used to assess HRQoL. The PedsQL™ is comprised of four subscales (eg, physical, emotional, social, and school functioning) which are used to calculate a total HRQoL score and two summary scores (eg, physical health summary score and psychosocial health summary score). Varni et al. (2001) recommends using the total score as the primary measurement of HRQoL and the two summary scores for secondary analysis. Physical health assesses an individual's ability to perform daily tasks such as walking, exercising, bathing, and chores; whereas, psychosocial health encompasses those psychological and emotional resources for coping as well as social participation and peer relationships. Prior research suggests that the measure has good psychometric properties (Varni et al., 2001); in the current study, Cronbach's alphas ranged from 0.68 to 0.90. All items used a 5-point Likert-type scale, from "never" to "almost always." Higher PedsQL scores reflect better HRQoL.

Covariates—Demographic characteristics such as age, gender, and race/ethnicity were also collected. Due to small sample sizes for minority groups, race/ethnicity was categorized as White and Nonwhite.

Statistical Analysis

Misperception characteristics were examined according to demographics of adolescents where Chi-square test, Fisher's exact test, or one-way analysis of variance was used. To examine associations between weight misperception and HRQoL, we first examined the unadjusted association between them. Then, we performed multiple linear regression analyses adjusted for demographics (i.e., age, gender, and race/ethnicity) and further adjusted for BMI, respectively. We examined potential interactions between weight perception and gender and BMI in relation to HRQoL. We found a significant interaction between weight perception and gender ($p < 0.0001$) but not weight perception and BMI. In addition, because differences in weight misperceptions have been observed in adolescent males and females, we conducted analyses stratified by gender. Statistical significance was set at $p < 0.05$, two tailed. All analyses were performed using SAS, version 9.2 (SAS Inc., Cary, NC).

Results

Descriptive statistics

The demographic characteristics of the study sample are presented in Table 1. The study sample included 1,509 high school students (744 females [49.3%] and 765 males [50.7%]; age: $M = 14.9$ years, $SD = 0.7$). Students were predominately White Caucasian Non-Hispanic (93.4%) with 52.5% in the normal weight range and 46.4% in the overweight/obese range. Approximately half (54.3%) perceived themselves in a normal or healthy weight range; whereas one third (34.3%) perceived themselves as overweight/obese.

Overall, weight underestimation was more common than weight overestimation: 28.4% versus 3.9%, respectively. Compared with female adolescents, male adolescents had a higher

prevalence of weight underestimation (20.5% vs. 36.0%) but a lower prevalence of weight overestimation (6.3% vs. 1.5%). Differences in BMI were also observed. (Table 2).

Univariate Analysis

Univariate analyses showed that compared to accurate perception, weight underestimation was positively associated with total HRQoL score ($\beta=3.47$, $p=0.0001$), physical health summary score ($\beta=4.24$, $p<0.0001$), psychosocial health summary score ($\beta=3.33$, $p<0.0004$), and emotional ($\beta=4.89$, $p<0.0001$) and social functioning ($\beta=2.84$, $p=0.0068$); whereas, weight overestimation had an inverse association with total HRQoL score ($\beta=-3.46$, $p=0.0001$) and emotional functioning ($\beta=-6.48$, $p=0.0254$) (Table not shown).

Multivariate Analysis

We first examined the associations between weight perception and HRQoL, and then adjusted for demographics, and finally further adjusted for BMI. The findings appeared similar. After adjusting for covariates, the positive association between weight underestimation and HRQoL domains weakened but remained significant. Adolescents who underestimated their weight status had significantly higher total HRQoL scores, physical health summary scores, psychosocial health summary scores, and emotional and social functioning. Stratified by gender, these associations were observed only in males. Associations between weight overestimation and HRQoL were not observed, with the exception of the inverse association between overestimation and social functioning among males (Table 3). No significant associations were detected for weight under- and overestimation on school functioning. Although not the focus of the study, advancing age, nonwhite status, and higher BMI appeared to be associated with lower HRQoL; findings varied when stratified by gender.

Discussion

To our knowledge this is the first study to examine the relationship between weight misperception and HRQoL among a non-clinical sample of U.S. adolescent males and females. We found that approximately 32.2% of adolescents misperceived their weight; a finding consistent with prior studies (Edwards et al., 2010). Weight underestimation emerged as an important predictor in the regression analysis. Adolescents who underestimated their weight status reported significantly higher total HRQoL scores, physical health summary scores, and psychosocial health summary scores when compared to those who accurately perceived their weight status. When stratified by gender, these findings were only present among adolescent males. We found minimal evidence to support the relationship between weight overestimation and HRQoL in our study sample with the exception of the inverse association between overestimation and lower social functioning among males.

Although these findings stand in contrast to the research of Farhat et al (2015), direct comparisons are difficult due to differences in BMI measurement (eg, measured height and weight versus self-reported height and weight) and study sample (eg, males and females, grades 9-12 versus females only, grades 5-10). When compared to measured height and

weight, self-reported height and weight can result in less occurrence of weight underestimation and a higher occurrence of weight overestimation. Further, females are more likely to overestimate their weight status using self-reports than are males (Dalton et al., 2014). Differences in the accuracy of self-reported height and weight have also been observed across age groups; self-reports are less accurate among younger versus older adolescents (Beck et al., 2012). These factors may explain, in part, the apparent differences in study outcomes.

To better place our findings in context, we must consider changing weight norms. Peer norms and social networks have been shown to influence and reinforce beliefs about eating habits and the ideal body weight among adolescents (Fletcher, Bonell, & Sorhaindo, 2011). Adolescents in Southern Appalachia are exposed to high rates of obesity in their communities and schools (Wang et al., 2014; NSCH, 2012). For example, 46.4% of the study sample was overweight/obese. This may result in greater acceptance of higher than normal body weights (Maximova et al., 2008; Williams et al., 2008) among peers, in social networks, and with regards to one's own body weight (Schafer & Ferraro, 2011). Peer clustering of overweight/obesity has also been documented in youth (Fletcher et al., 2011). These factors could have a protective effect on body image, an important predictor of HRQoL (Haraldstad, Christophersen, Eide, Natvig, & Helseth, 2011). Thus, one might expect to see a positive relationship between weight underestimation and HRQoL and a weakening of the association between weight overestimation and HRQoL.

Our study did find that adolescent males who overestimated their weight status reported lower social functioning (eg, strength and quality of peer relationships). Surprisingly, weight overestimators had a lower BMI than weight underestimators and those who accurately perceived their weight status. Given the limitations of our sample size, we were unable to conduct separate analyses and examine weight misperception across distinct BMI categories (eg, weight overestimation and underweight BMI; weight overestimation and normal weight BMI; accurate weight perception and overweight/obese BMI). Risk factors unaccounted for in the analysis could explain the observed relationship between weight overestimation and impaired social functioning among males. That is, psychopathology, was not controlled for in the analysis and could have resulted in residual confounding. Given the low BMI in this group, it is plausible to assume that some of these adolescents may present with psychopathology which has been linked to weight overestimation in adolescents (Ali, et al., 2010).

Ogden, Carroll, Kit, and Flegal (2012) found that obesity prevalence increased among males aged 2 to 19 years but not among females based on 1999-2000 and 2009-2010 NHANES data. This is an important trend given the fact that males in our study were almost twice as likely as females to underestimate their weight status, a factor associated with poor weight-related habits. Adolescent males who underestimate their weight status may be less concerned about their health, potentially limiting engagement in health promoting behaviors such as maintaining a healthy diet and engaging in physical activity (Martin et al., 2014). Males in this age group who accurately perceive their weight are 4 times more likely to engage in weight loss or maintenance when compared to males who misperceive their weight (Edwards et al., 2010).

Social network-based interventions (de la Haye, Robins, Mohr, & Wilson, 2010; Fletcher et al., 2011) targeting adolescent males would be an important component of obesity prevention programming since one in three males in the current study underestimated their weight, and since misperception is more common among adolescent males than females (Chung et al., 2013; Edwards et al., 2010; Park, 2011). However, caution should be used when educating adolescents about their weight status, particularly among those weight underestimators and those whose perceptions are concordant with their under- or overweight status, as it may lead to impaired HRQoL (Hayward et al., 2014). To date, few studies on body image and weight perception have focused on males. The findings from the present study further highlight the need for more systematic approaches to research that consider the influence of cultural and social norms on body image and weight perceptions among males and females alike (Hayward et al., 2014; Kurth & Ellert, 2008).

This study has several limitations. The use of cross-sectional data does not permit the detection of causality. Second, the small sample size of weight overestimators may lack power to detect statistically significant results. Third, findings regarding the influence of race/ethnicity should be interpreted with caution given the homogeneity of the study sample. Finally, although demographic characteristics were included for multivariate analysis, some other important factors, eg, chronic conditions (CDC, 2009), psychopathology (Ali et al., 2010) and health literacy levels (Davis, Armstrong, Dignan, Norling, & Redmond, 2006) were not included in our model, potentially leading to residual confounding. Larger studies conducted among more ethnically diverse samples are needed to confirm results.

The extant literature suggests a complex relationship exists between weight misperception and the physical, psychological, and social dimensions of health. Associations may vary by BMI classification. Few studies have assessed these relationships longitudinally. Although we tried to capture current scientific knowledge regarding the association between weight misperception and HRQoL, comparisons across studies are difficult. Differences in study outcomes may be attributed to variability in measures used to assess weight misperception, study population assessed, and methods used. Developing a common method for selecting the different combinations of weight perception and BMI categories is warranted and would permit better comparison across studies.

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Significance

What is already known on this subject?

There is limited research on the relationship between weight misperception and health-related quality of life (HRQoL) among adolescents. The few studies that exist were conducted among obese adolescents or non-U.S. samples. These studies have yielded mixed results.

What this study adds?

This study uses a non-clinical sample of U.S. adolescents to assess associations between weight misperception and HRQoL. In contrast to prior research, our study found minimal support for the relationship between weight overestimation and HRQoL. Rather, we found a significant, positive association between weight underestimation and dimensions of HRQoL. Stratified by gender, these associations were observed only in adolescent males.

Table 1

Sample characteristics at baseline, Team Up for Healthy Living, 2012 (n=1509)

<i>Characteristics^a</i>	Overall	Males	Females
Age in years [Mean (SD)]	14.9 (0.7)	14.9 (0.8)	14.8 (0.7)
Gender [n (%)]			
Female	744 (49.3)	NA	744 (100)
Male	765 (50.7)	765 (100)	NA
Race/Ethnicity [n (%)]			
White Caucasian non-Hispanic	1364 (93.4)	692 (92.9)	672 (93.9)
American Indian or Alaska Native	14 (1.0)	8 (1.1)	6 (0.8)
Asian	4 (0.3)	3 (0.4)	1 (0.1)
Black or African American	11 (0.8)	6 (0.8)	5 (0.7)
Hispanic or Latino	39 (2.7)	20 (2.7)	19 (2.7)
Native Hawaiian or Other Pacific Islander	1 (0.1)	0 (0)	1 (0.1)
Other	28 (1.9)	16 (2.2)	12 (1.7)
Perceived Weight Status			
Underweight	169 (11.4)	106 (14.1)	63 (8.6)
Healthy Weight	808 (54.3)	419 (55.6)	389 (53.0)
Overweight/Obese	511 (34.3)	229 (30.4)	282 (38.4)
BMI [Mean (SD)]	25.0 (6.1)	25.3 (6.3)	24.8 (6.0)
Actual weight status			
Underweight	17 (1.1)	11 (1.5)	6 (0.8)
Healthy Weight	782 (52.5)	363 (48.1)	419 (56.9)
Overweight/Obese	692 (46.4)	381 (50.5)	311 (42.3)

Note. Percentages in each column were adjusted to total approximately 100%. Perceived weight status included collapsing or fitting “very underweight” and “slightly underweight” into Underweight, “about the right weight” into Healthy Weight, and “slightly overweight” and “very overweight” into Overweight/Obese categories. Actual Weight Status categories were assigned via age- and gender-specific BMI percentile scores based on the CDC 2000 Growth Charts.

Table 2

Misperception characteristics according to adolescents' demographics

	Weight Underestimation	Accurate Perception	Weight Overestimation	P-value ^a
	n (%) or mean (SD)	n (%) or mean (SD)	n (%) or mean (SD)	
Race/ethnicity ^b				0.255
White	375 (27.9)	917 (68.1)	54 (4.0)	
Nonwhite	27 (35.5)	48 (63.2)	1 (1.3)	
Gender				<0.0001
Male	270 (36.0)	469 (62.5)	11 (1.5)	
Female	150 (20.5)	535 (73.2)	46 (6.3)	
Age, years	14.3 (0.70)	14.4 (0.8)	14.6 (0.9)	0.006
BMI percentile	74.3 (28.6)	75.9 (24.1)	69.9 (18.7)	0.159
BMI	24.3 (4.9)	25.5 (6.7)	22.0 (1.8)	<0.0001

Abbreviation: SD, standard deviation.

^aP-value was obtained from Fisher's exact test, Chi-square test, or ANOVA.

^bMissing data: 64 participants did not report race/ethnicity.

Multiple linear regression analysis of association between weight perception status and health-related quality of life in Appalachian adolescents according to different functioning scales

Table 3

	Total, β (SE) ^a			Physical, β (SE)			Psychosocial, β (SE) ^b		
	Overall	Males	Females	Overall	Males	Females	Overall	Males	Females
Weight perception									
Accurate (ref)									
Underestimation	2.41(0.90)**	3.15(1.22)**	1.26	2.77(0.94)**	3.93(1.26)**	0.98(1.43)	2.38(0.96)*	2.92(1.28)*	1.42
Overestimation	-2.33(2.11)	-7.03(5.64)	-1.54	-3.07(2.19)	-10.86(5.60)	-1.71(2.34)	-2.33(2.22)	-8.99(5.42)	-0.74
Age, years	-1.30(0.53)*	-0.54(0.75)	-2.13**	-0.58	-0.006(0.77)	-1.21(0.77)	-1.36(0.56)*	-0.33(0.79)	-2.48**
Gender									
Female (ref)									
Males	4.51(0.81)***	--	--	6.29(0.85)***	--	--	3.39(0.87)***	--	--
Whites									
White (ref)									
Nonwhite	-3.27(1.82)	-4.50(2.40)	-1.45	-1.60(1.89)	-2.26(2.51)	-0.71(2.87)	-3.93(1.90)*	-	-0.76
BMI	-0.25(0.06)***	-0.24(0.09)**	-0.26**	-0.33(0.07)***	-0.35(0.10)***	-0.31(0.09)**	-0.17(0.07)*	-0.14(0.10)	-0.20*
School, β (SE)									
Social, β (SE)									
Emotional, β (SE)									
Overall									
Weight perception									
Accurate (ref)									
Underestimation	2.83(1.25)*	3.77(1.63)*	1.42(1.95)	2.47(1.08)*	3.18(1.45)*	1.20(1.62)	1.68(1.13)	1.68(1.52)	1.51(1.72)
Overestimation	-2.84(2.93)	-4.34(7.76)	-2.67(3.20)	-3.10(2.49)	-13.13(6.15)*	-0.81(2.64)	-0.29(2.62)	-5.85(6.44)	1.25(2.81)
Age, years	-1.79(0.73)*	-0.98(1.01)	-2.69(1.06)*	-0.63(0.63)	0.94(0.90)	-2.35(0.88)**	-1.65(0.66)*	-0.90(0.95)	-2.45(0.93)**
Gender									
Female (ref)									

	Total, β (SE) ^a			Physical, β (SE)			Psychosocial, β (SE) ^b		
	Overall	Males	Females	Overall	Males	Females	Overall	Males	Females
Males	9.10(1.13) ***	--	--	-0.04(0.97)	--	--	1.33(1.02)	--	--
Whites									
White (ref)									
Nonwhite	-2.28(2.51)	-4.57(3.26)	1.19(3.93)	-5.66(2.15) **	-6.48(2.93) *	-4.08(3.20)	-3.25(2.25)	-	1.04(3.39)
BMI	-0.19(0.09) *	-0.13(0.13)	-0.26(0.13) *	-0.23(0.08) **	-0.20(0.11)	-0.27(0.11) *	-0.08(0.08)	6.17(3.03) *	-0.07(0.11)

Abbreviation: SE, standard error.

Note: Results in bold indicate statistically significant.

* p<0.05,

** p<0.01,

*** p<0.001

^aTotal HRQoL Summary Score = Sum of the items over the number of items answered in the Physical, Emotional, Social and School Scales.

^bPsychosocial Health Summary Score = Sum of the items over the number of items answered in the Emotional, Social, and School Scales.