

Parental Influences on Child Weight: Perception, Willingness to Change, and Barriers

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Abstract

Background: Although parents are primary to development of obese genic behaviors, many parents do not perceive their child's obesity as problematic and are not ready to make changes to address their child's weight. The purpose of the study is to examine relationships between parental perception of child weight, parental readiness to change behaviors, and barriers to behavior change.

Methods: A sample of low-socioeconomic and minority parents of 6-12 year old children who are overweight or obese completed questionnaires on perception of their child's weight, stage of readiness to change behaviors for their child's weight (SOC), and barriers to changing child weight control behaviors. Parents were blinded to the purpose of the study. Child weight status was categorized 'overweight' (BMI \leq 85th-95th percentile) or 'obese' (BMI \geq 95th percentile).

Results: Of the 48 parent-child dyads, 77.1% of parents underestimated their child's weight status and 54.2% perceived their child as normal weight. Older ($p=0.045$) and married parents ($p=0.025$) were more likely to perceive their child as overweight. Accurate parental perception was significantly associated with advanced stage of change (SOC; $r=0.358$, $p=0.012$).

Conclusions: Parents of overweight or obese children underestimated their child's weight status. Parental perception of child weight was associated with the parent's SOC for their child's weight.

Keywords: Childhood; Obesity; Parents; Perception; Readiness to change

Introduction

Estimates show more than one-third of US children (34.2% of 6-11 year olds and 34.5% of 12-15 year olds) are overweight or obese [1]. Parental and familial support is an essential component of weight management for children and adolescents [2-5]. Although parents should be attentive to their child's weight, in order to identify the need for behavior modification, many parents are unaware of the severity of their child's weight and may not be motivated to make behavior changes to support weight loss [6]. Several recent studies have cited a disconnect between the child's physical appearance and the parental perception of their child's weight [6-10]. A review by Perry et al. determined that more than 50% of parents cannot recognize when their child is overweight [11].

Parent's readiness to change behavior, based on the Transtheoretical model of behavior change, has only recently been investigated as a predictor of childhood obesity treatment effectiveness. The transtheoretical model posits change as a process that unfolds over time, with progress through a series of six stages (precontemplation, contemplation, preparation, action maintenance, and relapse). The stages of change are the central organizing construct of the transtheoretical model, representing the temporal and readiness dimension [12]. Rhee et al. [13] studied parental perceptions and parental readiness to make lifestyle modifications for their children and found that 38% of parents were in the preparation/action stage of change (SOC), 17% were in the contemplation stage, and 44% were in the precontemplation stage. Parents who perceived their child's weight as a health problem were more likely to be in the preparation/action stage than parents who did not [13].

Although there have been many parent-focused investigations that

have analyzed the independent effects of parental perception of child weight, parent's readiness to change based on the transtheoretical model, and parent's perceived barriers to changing child/family behaviors on child weight management, few studies have attempted to examine the interrelationships of these behavioral constructs in a parent-focused weight management paradigm for children. We hypothesize that: parents who accurately perceive their child as overweight will report a greater readiness to change behavior; parents who accurately perceive their child as overweight will report greater presence of weight control barriers; and parents who report a greater readiness to change behavior will report less presence of weight control barriers (Figure 1).

Methods

Forty-eight male and female children between 6-12 years of age, overweight or obese (minimum of the 85th percentile for body mass index (BMI)), were recruited via flyers and community advertisements from the greater Pittsburgh Community. Each child was accompanied by one parent (the primary meal provider for the child, defined as the parent who is responsible for >50% of the meal decisions for the child). The children were healthy, without any significant psychological or physiological health complication that would hinder normal diet,

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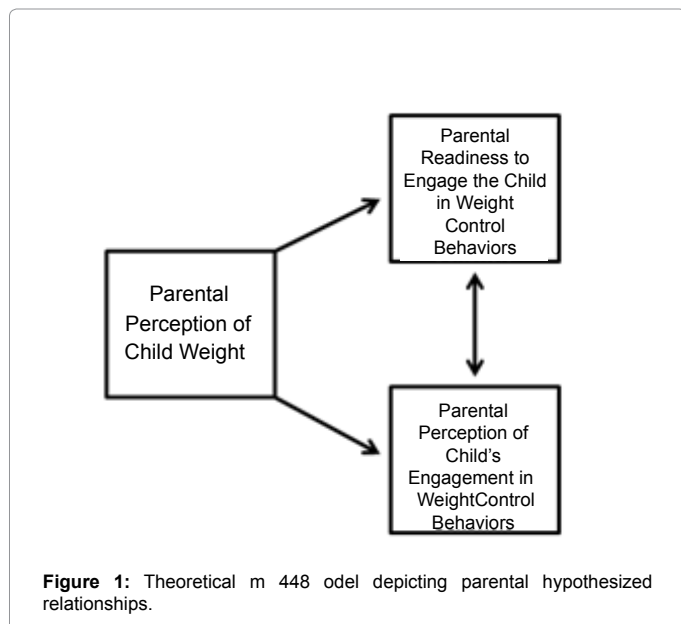


Figure 1: Theoretical model depicting parental hypothesized relationships.

physical activity, or weight status. Child subjects were screened to identify whether they were an appropriate weight status for inclusion in the study. Parents were not informed that children must be in the 85th percentile until after data collection to avoid confounding persuasion of parent perception of child weight. Study procedures were approved by the University of Pittsburgh Institutional Review Board and informed consent and assent was obtained from parent and child participants prior to data collection.

Child protocol

Height was measured with a calibrated stadiometer. Child subjects were instructed to remove their shoes, socks, and any unnecessary clothing or accessories and stand upright with the back of their heels against the wall for the measurement. Height was measured to the nearest 0.1cm.

Bodyweight was measured using a calibrated Tanita TBF 300A Body Composition Analyzer (Tanita Corporation, Arlington Heights, Illinois). Child subjects were instructed to step onto the scale and to stand upright and still with one foot on each of the metallic portions of the scale. Weight was recorded to the nearest 0.1kg.

Height (cm) and weight (kg) were used to calculate BMI, which was placed into a percentile score using the child's age and the 2000 CDC growth charts for boys and girls aged 2-20 years [14,15].

Parent protocol

The parent completed a series of questionnaires. Parental perception of their child's weight was measured using a 5-point Likert scale. Parents were asked "how would you describe your child's weight at the moment?" Response options were: 1) very underweight, 2) underweight, 3) normal weight, 4) overweight, 5) very overweight.

Parental readiness to change behavior was assessed using the algorithm previously reported by Rhee et al. [13] and originally developed by Kristal et al. [16]. As part of the readiness algorithm, parents were asked if they were thinking about making lifestyle changes to help their child lose weight, how likely parents were to make lifestyle changes in the next 6 months, and if they are currently making changes

to their child's diet and activity behavior more than 50% of the time. Questions regarding specific behavior changes (i.e. decreased fruit juice consumption, changing to low-fat or skim milk, increasing fruit and vegetable consumption, increased physical activity levels, and decreasing the amount of time spent watching TV or playing on the computer, etc.) were used to determine which parents were actively making changes [13]. Parents who were consistently making behavior changes, defined as >50% of the time, were categorized as being in the action SOC [13]. Parents in the preparation SOC are considered in the 'ready stage' [13].

Parental barriers to engaging their child in weight control behaviors were assessed with a series of questions where the parent responded to each item with one of the following: 1) barrier does not exist, 2) small barrier, 3) medium barrier, or 4) large barrier. Each barrier was individually scored, and scores were added together to make an overall 'barriers score.' The questions are grouped under three general areas (food choice, physical activity, psychosocial). Similar questionnaire methodology has been used in previous investigations of parental barriers regarding obesity prevention [17].

Parent/Family characteristics

Parents answered demographic questions including: parent's gender, parent's age, parent's self-described ethnicity/race, parent's marital status, household members, parental education level, household income, and parent's self-perceived weight status.

Parent self-reported physical activity was assessed using an abbreviated version of the Modifiable Activity Questionnaire (MAQ) for adults [18]. The MAQ asks subjects to report household, occupational, and recreational forms of physical activity. Data were used to estimate time spent in (hours per week) and total volume of physical activity (MET-hr/week) as previously described [18].

Data analysis

A power analysis determined a sample size of n=48 was required to detect an anticipated correlation of r=0.40 [19,20] for the primary aim with 85% power. Data were analyzed using SPSS version 21 Premium (Armonk, New York, USA). Statistical significance was defined as p<0.05. Measured BMI was categorized as overweight (85th to <95th percentile) or very overweight (>95th percentile) based on the CDC committee recommendations [14]. The parental perception was reduced to four categories: 1) very underweight and underweight were collapsed into "underweight," 2) normal weight remained as "normal weight," 3) overweight remained as "overweight," 4) very overweight remained as "very overweight." Additional analyses re-categorized weight status as "normal weight" and "overweight," which combined the overweight and very overweight categories. Measured BMI were compared to the parent's perceived weight category using the raw percent of total agreement.

Spearman rho, non-parametric, rank-order correlations were used to determine: associations between parental perception of child weight and parental SOC; associations between parental perception of child weight and the each subject's barriers score; and associations between SOC and parent's barriers score.

Additional analyses explored descriptive characteristics of parents who: perceived their children as normal or overweight; identified with precontemplation/contemplation or preparation/action SOC; and reported higher or lower barriers score. Fisher's exact tests were used to analyze descriptive characteristics between parents who: do and do not perceive that their child is overweight (at any category); and are and are

not 'ready' to change behavior for their child's weight. A Kruskal-Wallis analysis was used to examine differences in barrier score by parent descriptive characteristic. Results for each descriptive characteristic were displayed as mean ± standard deviation.

Results

Telephone screenings were conducted on 116 individuals, where 53 were deemed eligible, and 67 were deemed ineligible based on the screening criteria. Of the ineligible participants, 51 parents reported their child's height and weight below the 85th percentile for age, 2 reported their child having a physiological condition that hindered normal diet and physical activity, 1 reported their child was above the age limitations for the study, and 13 failed to report their child's height and weight. Of the 53 eligible participants, 5 were excluded based on the child's height and weight at the time of data collection, with the remaining 48 parent/child dyads participating in the study.

Parents were primarily female, 30-39 years old, African-American, single marital status, and predominantly lower-income. The largest percentage of parents reported living with a partner and high school as the highest level of education. The majority of parents self-described their weight as average or a little overweight and more than half of the parents reported other children living in the home (Table 1). Parents reported 26.36 ± 28.51 MET-hours/wk of physical activity, 5.45 ± 5.60 hr/day of physical activity, and 4.02 ± 3.01 hr/day of leisure screen time physical activity.

Children were both male (n=26, 54.2%) and female (n=22, 45.8%) and had an average BMI percentile of 93.91 ± 5.08 and BMI z-score of 1.76 ± 0.523. The sample was relatively evenly distributed by child age (9.29 ± 1.99 years) and weight status (overweight: n=21, 43.8%; obese: n=27, 56.3%).

Only 11 of the 48 parent participants perceived their child's weight accurately (22.9% of the sample); 77.1% were inaccurate. Data were re-coded to analyze parents who perceived their child to be either overweight or obese vs. normal weight. The raw values showed that 22 of the 48 parent participants accurately perceived that their child was overweight or obese (45.8% of the sample); 54.2% inaccurate (Table 2).

A positive relationship was found between parent perception of child weight and parental SOC (r=0.358, p=0.012). There was no relationship found between parental perception of child weight and the parent's barriers score (r=0.117, p=0.430). Additionally, there was no relationship between the parent's barriers score and the parent's SOC (r=0.032, p=0.829).

When parents were grouped by those who perceived their child to be either overweight or obese (n=22) vs. normal weight (n=26). Parental age and marital status appear to influence perception of the child's weight status (age: p=0.039; marital status p=0.017). The parent's gender, ethnicity, self-described weight, education level, household income, physical activity, or hr/day screen time had no relationship with parental perception of child weight. Results are displayed in Table 3.

Parental education was significantly related to barriers score (X²=5.997, p=0.05). Parents in the precontemplation/contemplation SOC (n=25), and parents in the preparation/action SOC (n=23) did not differ in gender, age, ethnicity, self-described weight, marital status, education level, household income, physical activity, or hr/day screen time. There were no other differences in barrier score by parent's gender, age, ethnicity, self-described weight, marital status, household income, physical activity, or hr/day screen time.

Descriptive Variable	N	Percent of sample	
Gender	Female	40	83.3
	Male	8	16.7
Age (years)	Less than 24	6	12.5
	25 to 39	33	68.7
	40 or older	9	18.8
Ethnicity	White, non-Latino	5	10.4
	African-American	35	72.9
	Other	8	16.7
Self-Described Weight	Underweight-Average	18	37.5
	Overweight	29	60.4
	Not disclosed	1	2.1
Marital Status	Single	32	66.6
	Married	12	25
	Other	3	6.3
	Not disclosed	1	2.1
Highest Education	Did not complete HS	4	8.4
	Completed HS	16	33.3
	Some college / post graduate work	27	56.3
Total Household Income	Less than \$29,000	29	60.4
	\$30,000-79,000	8	16.7
	\$80,000 and above	7	14.6
	No response	4	8.3
People Living in Household	Partner	17	35.4
	Other Children	31	64.6
	Other Family Members	4	8.4
	No One Else	11	22.9
	Other	0	0

Table 1: Demographic characteristics of the parents

Discussion

The primary aims of this investigation examined parental perception of child weight, parental readiness to change for their child's weight, and parents' perceived barriers to engage their child in weight control behaviors. When measured across all five weight status categories, 77.1% of parents in this sample perceived their child was leaner than objectively measured. When these data were split into two categories of

Parent Perception of Child Weight		Objectively Measured Child Weight		
		Overweight (85th-95th percentile)	Very Overweight (>95th percentile)	Overweight or Very Overweight (>85th percentile)
Normal Weight	N	15	11	26
	Percent of total sample	31.30%	22.90%	54.20%
Overweight	N	6*	11	-----
	Percent of total sample	12.5%*	22.90%	-----
Very Overweight	N	0	5*	-----
	Percent of total sample	0%	10.40%	-----
Overweight or Very Overweight	N	-----	-----	22*
	Percent of total sample	-----	-----	45.8%*

*Accurate parental perception of child weight.

Table 2: Parent perception of child weight compared to measured weight status.

Descriptive Variable		Perceived child as overweight n (%)	Did not perceived child as overweight n (%)	Fisher's Exact P value
Gender	Female	22 (90.9)	20 (76.9)	0.195
	Male	2 (9.1)	6 (23.1)	
Age (years)	Less than 24	4 (13.6)	2 (7.7)	*0.045
	25 to 39	11 (50.0)	22 (84.6)	
	40 or older	7 (31.8)	2 (7.7)	
Ethnicity	White, non-Latino	4 (18.2)	1 (3.8)	0.236
	African-American	14 (63.6)	21 (80.8)	
	Other	4 (18.2)	4 (15.4)	
Self-Described Weight	Underweight/Average	9 (40.9)	9 (34.6)	0.763
	Overweight	12 (54.5)	17 (65.4)	
Marital Status	Not disclosed	1 (4.6)	0 (0)	*0.025
	Single	10 (45.4)	22 (84.6)	
	Married	9 (40.9)	3 (11.5)	
	Other	2 (9.1)	1 (3.8)	
	Not disclosed	1 (4.6)	0 (0)	
Highest Education	Did not complete HS	1 (4.5)	3 (11.5)	0.214
	Completed HS	5 (22.7)	11 (42.3)	
	Some college / post graduate work	16 (68.2)	12 (46.2)	
Total Household Income	Less than \$29,000	12 (54.5)	17 (65.4)	0.316
	\$30,000-79,000	3 (13.6)	5 (19.2)	
	\$80,000 and above	5 (22.7)	2 (7.7)	
	No response	2 (9.1)	2 (7.7)	
Physical Activity-hrs/wk	Low (< 5.5)	13 (59.1)	17 (65.4)	0.654
	High (> 5.5)	9 (40.9)	7 (34.6)	
Physical Activity-MET-hrs/wk	Low (< 27)	15 (68.2)	15 (57.7)	0.454
	High (>27)	7 (31.8)	11 (42.3)	
Leisure Screen Time	Low (< 3 hrs/day)	12 (54.5)	13 (50.0)	0.256
	High (> 3 hrs/day)	10 (45.5)	10 (38.5)	
	No response	0 (0.0)	3 (11.5)	

*p<0.05; HS: High School; hrs/wk: Hours per Week

Table 3: Parental characteristics associated with perception of child weight.

parents who perceived their child as overweight or obese or parents who perceived their child as normal weight; the results showed that 54.2% of the sample misrepresented their child's weight status. This is consistent with previous studies by Parry and Baughcum who determined 50% and 79% of parents, respectively, did not perceive their child's weight accurately [11,21]. Rudolph et al. reported that parents with overweight children, only 69.4% perceived their child to be overweight, and 28.6% as very overweight, where as 83% of the sample was actually obese [20].

Several factors may explain the childhood obesity perception disconnect. Qualitative studies found that parents had limited understanding of how childhood overweight and obesity is defined, reporting difficulty comprehending the measures that are typically used (e.g. BMI, BMI percentile, BMI z-score) [22]. Therefore, parents reported using alternative approaches to determine if their child is overweight including: the use of extreme cases of obesity (seen in the media) and peers as a reference point and reliance on feedback from

family members [22]. Furthermore, some evidence in adults show that a diagnosis of a chronic disease has an effect on obesity recognition, weight management and weight loss [23]. It is possible that diagnosis of chronic disease in the parent or a close family member could have an effect on obesity recognition in children as well. An advantage of this investigation was the unique sample of low socio-economic and minority participants who have a documented higher prevalence of obesity in childhood and adulthood [24]. A high percentage of the parents were the mothers (83.3%), African-American (72.9%), having a high school education or less (41.7%), and having a household income of <\$20,000 (52.1%). As a weight status comparison, the child's peers may be more overweight themselves [25] and further skew the parent's perception of what is normal.

As hypothesized, parental perception of child weight was positively associated with parental SOC. These results are in agreement with Rhee et al. who found parents (of overweight children) who accurately perceived their child to be overweight were 16 times more likely to be in the preparation and action SOC than parents who misperceived their child's weight [13]. Howard et al., investigating parental perceptions and SOC, proposed that parents in the precontemplation stage were: 1) unaware that their child is overweight; 2) unaware of the health risks associated with overweight; and 3) and unaware of their contribution to their child's health behaviors [26]. Howard proposes that increasing parental awareness of child weight should be a primary purpose of intervention for a parent in the precontemplation SOC, and awareness of the severity of the weight problem may help facilitate movement through the SOC [26].

Parental SOC was not associated with perceived barriers to weight control behaviors. Jakubowski et al. reported, at the completion of a weight management program, parents were in the action SOC for some weight control behaviors, but not others [27]. The authors proposed that some behavior modifications (such as increasing fruit and vegetable intake) are easier because it involves a specific behavior, while more broad behaviors (such as increasing portion control) may be difficult [27,28]. Future studies should analyze SOC and barriers by grouping similar barrier themes (such as: organized physical activity participation, portion size, food quality, etc) rather than a composite score of all weight control barriers.

Parent age and marital status was found to be a significant predictor of parental perception of child weight. Older parents are more likely to perceive their child as overweight than younger parents. Although some studies reported older parents express more control over snacking in the home [29], overall, studies which investigated the influence of parental age on child weight status have not yielded conclusive results. Married parents are more likely to perceive their child as overweight than single parents. Although parent marital status is not often reported in perception studies, marital status has been found to be a significant predictor of obesity prevalence in families [30]. Misperception by single parents may be explained by additional stress [31], single mothers in particular have less income [32], education, occupational prestige [33], and more frequently suffer from major depressive episodes [34] that could affect the level of priority a parent places on child weight.

We found no significant differences in parents who are in the precontemplation/contemplation or preparation/action SOC. However, parental education was significantly related to parental perceived barriers to weight control behaviors. Parents with more advanced education had a lower barriers score than parents with less advanced education. Mauro et al. [35] reported education as a significant factor associated with perception of obesity as a chronic disease. Parents with

advanced education, who may have more experience with behavior change, may have a greater comprehension of the difficulties associated with weight management. Otherwise, there were no other differences in parents who perceived high versus low barriers. The most common barriers reported in previous investigations involve financial and time cost of preparing healthy foods and participating physical activity, and child resistance to change [17,36-38]. Typically, single parents and households with lower income report more difficulty overcoming these barriers than families with two parents in the home and higher household income [36].

Limitations

With the exception of child weight and height, all data were collected through parental questionnaire. Questionnaires have inherent limitations such as subjects' misunderstanding of questions posed, questionnaire fatigue, variability in health literacy, and recall bias. The parent's weight was not objectively measured in this study and the reliance on parental self-reported weight status is recognized as a limitation of this study. Lastly, physical activity was measured with self-report. Self-reported physical activity measurements have some inherent limitations such as misreporting and overestimation of physical activity.

Conclusion

Few studies have attempted to examine the interrelationships of these parent constructs and their impact on child weight control behaviors. There is an alarming discrepancy between child weight and the parent's perception of the child's weight. Without accurate parent perception, the parent may not be preparing or acting to address weight status, and the child may not receive the treatment necessary to maintain healthy weight. Future studies are needed to further investigate these relationships in parents of overweight and obese children to establish and implement effective treatment programs that will address childhood obesity.

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