Commentary

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Journal of Childhood Obesity
ISSN 2572-5394

2016
Vol.1 No.4:22

DOI: 10.21767/2572-5394.10022

The Impact of Expressing Concern for a Child's Weight on the Parents Perception of Child Weight and the Parents Concern for Future Weight Problems

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Rec date: November 25, 2016; **Acc date:** December 06, 2016; **Pub date:** December 09, 2016

Citation: White DA, Rofey DL, Kriska AM, Venditti EM, Barone Gibbs B, et al. (2016) The Impact of Expressing Concern for A Child's Weight on The Parents Perception of Child Weight and The Parents Concern for Future Weight Problems. J Child Obes 1: 23.

Abstract

Objective: Parents of overweight and obese children often underestimate the severity of their child's weight problem, which may influence the parent's anticipated need for weight loss treatment and parent's concern for future weight problems in their child. The purpose of this study is to examine the influence of individuals who have expressed concern for their child's weight on: 1) parental perception of their child's weight; 2) parental concern for future weight problems in their child (C-FWP).

Methods: Forty-eight parent-child dyads completed questionnaires reporting individuals who have expressed concern for their child's weight, parental perception of their child's weight, and parental C-FWP. Child subjects were 6-12 years old and were overweight or obese (≥85th percentile for BMI).

Results: Parents were more likely to accurately perceive their child as overweight if concern was expressed by a primary care pediatrician (PCP) (p=0.0001), family member (p=0.013), grandparent (p=0.042), or spouse/other parent (p=0.013). There was no influence on parent perception of child weight if weight concern was expressed by a school nurse (p=0.302), teacher (p=0.165), or the child's coach (p=0.392). Expressed concern had no influence C-FWP.

Conclusion: PCP's, family members, grandparents, or spouse/other parents have a significant impact on parent perception of child weight. Accurate parent perception of child weight may help parents recognize the need for lifestyle modifications and to promote healthy weight in their child. PCP's should anchor parents to the child's weight status and express concern to the parent when a child is overweight or obese.

Keywords: Childhood obesity; Primary care provider; Parent; Perception

Introduction

Throughout the past 30 years, obesity in the United States has become a major public health concern. The most recent data finds 16.9% of youth aged 2-19 years are obese (BMI ≥95th percentile) [1]. When prevalence is examined by age, 8.4% of 2-5 year olds, 17.7% of 6-11 year olds, and 20.5% of 12-19 year olds are classified as obese [1]. Children who are overweight or obese are at an elevated risk for developing diabetes, hypertension, sleep apnea, arthritis, gallstones, some types of cancer, and continuing to obese as an adult [2-5]. Additionally, having a high, socially stigmatized condition (such as obesity) also places children who are overweight or obese at an increased risk for various psychosocial problems such as poor body image, decreased self-esteem, peer victimization, and social isolation [6-9].

Without parental support, children who are obese are unlikely to reach and maintain a healthy weight [10]. The parents themselves should be attentive to their child's weight in order to identify the need for behaviour modification. However, several studies have cited an alarming discrepancy between the child's physical appearance and the parental perception of their child's weight status [11-14]. A study by Jeffery and colleagues [15] explored parental awareness of overweight and obesity status for themselves and their children and found that approximately 86% of the parents who did not accurately perceive their child to be overweight were also unconcerned with their child's weight [15]. Additionally, Parry and colleagues [16] published a review on parental perceptions of overweight status in children and determined that more than half of parents cannot recognize when their child is overweight. Hernandez et al. [17] found that 54% of low income Hispanic mothers perceived their child who

was overweight or obese were 'about the right weight.' This misperception and/or lack of awareness would likely have a detrimental effect on the parents' ability to recognize the need for lifestyle modifications and to promote weight loss in their child [11].

The American Academy of Paediatrics expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent obesity [18] as well as the 2012 Institute of Medicine report on obesity prevention [19] strongly suggest that primary care paediatricians (PCP) should address body weight and body mass index (BMI) with parents. However, many PCP's are unaware of the obesity guidelines [20] and fail to discuss childhood obesity with the parents due to reported lack of training and skills to address obesity [21, 22], discomfort discussing a sensitive subject such as obesity [23], and low confidence in their effectiveness in addressing obesity [23-26]. National data from the Centers for Disease Control and Prevention (CDC) show that only 36.7% of children who are overweight and their parents have been told by a PCP that their child is overweight [27].

Although effective treatment of obesity in primary care clinics continues to be a challenge [28], some research suggests that a medical provider merely expressing concern for the child's weight may have a significant effect on the parental awareness of their child's weight status and readiness to make lifestyle modifications in the home [26,29-31]. The purpose of this study is to examine the influence of individuals who mentioned or expressed concern for a child's weight on: 1) parent perception of their child's weight; and 2) parental concern for future weight problems in their child.

Methods

Study design and sample

This was a cross-sectional study measuring the demographic and psychosocial influences on parental behaviours associated with childhood obesity. More detailed descriptions of the design and selection criteria for this investigation have been provided elsewhere [31]. Briefly, the subjects were 48 parent/child dyads recruited with flyers placed in community centers and schools, and internet postings from the Greater Pittsburgh community.

To avoid only enrolling parents who are interested in their child's weight status, the recruitment flyers did not mention that the study was investigating child weight or obesity and parents were not informed that children must be in the 85th percentile until after their data were collected. Interested parents would call the number listed on the flyer and were screened for eligibility.

Children were 6 to 12 years of age, overweight or obese and were accompanied by one parent at the study outcome visit. The children were healthy and without any significant psychological or physiological health complication that would affect normal diet, physical activity behaviours, or weight for the child's age.

All recruitment, informed consent and assent, and data collection procedures were approved by the University of Pittsburgh Institutional Review Board.

Child anthropometrics

Child height was measured without shoes using a calibrated stadiometer to the nearest 0.1cm. Child weight was measured using a calibrated Tanita TBF 300A Body Composition Analyzer (Tanita Corporation, Arlington Heights, Illinois) in the standard mode. Children were required to empty the contents of their pockets, remove shoes, and heavy external clothing items such as jackets. Height and weight were used to calculate BMI, which was placed into a percentile and z-score using the 2000 CDC growth charts for boys and girls aged 2 to 20 years [32]. For the purpose of this study, overweight was defined as BMI ≥85th to <95th percentile, while obesity was defined as ≥95th percentile.

Parental measures

Demographics

Parents answered descriptive questions about themselves (sex, age, ethnicity/race, marital status, education level, and their self-perceived parental weight status) and their family (household income, household members - i.e., other individuals who lived in their household beside themselves and their child who was participating in this study).

Parental concern and perception of child weight

As previously described [31], parental perception of their child's weight status was measured with a single item 5-point Likert scale question. 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.

An accurate 'overweight' response represented child BMI of ≥85th to <95th percentile, while an accurate 'very overweight' response represented child BMI of ≥95th percentile. Parent's concern for their child becoming overweight in the future was measured using a single item 4-point Likert scale question: "How concerned are you about your child becoming overweight in the future?" Response options were: 1) no weight concern, 2) little weight concerns, 3) some weight concerns, 4) many weight concerns.

Expressed concern by others for child weight

Parents identified individuals who have mentioned or expressed concern for their child's weight status in the past. The parents were asked, "Have any of the following people ever mentioned or expressed concern for your child's weight?" Parent had the option to select from the following choices marking any that applied: a) pediatric healthcare provider, b) teacher, c) grandparent, d) spouse/child's other parent, e) other parents, f) other family members, g) child's coach, h) school nurse/psychologist, i) other.

Data analysis

Parental descriptive characteristics were examined and displayed as frequency and percent of total sample. Child weight category was compared to parental perception of child weight using the raw percent of total agreement. Fisher's exact tests were applied to: 1) examine the relationship between those who have expressed concern for their child's weight and parent's perception of child weight; 2) examine the relationship between those who have expressed concern for their child's weight and parental concern for their child becoming overweight in the future. Statistical significance was defined as $p<0.05$. Data were analyzed using IBM SPSS version 21.0 Premium (Armonk, NY: IBM Corporation).

Results

Subject characteristics

Parents were primarily female, 25 to 39 years old, single marital status, reported African-American race, and most had education beyond high school. The sample was predominantly lower-income with the largest percentage of the sample reporting less than $29,000 income per-year. Four parents did not report annual income. More than half of parents reported themselves as overweight. The majority of parents (64.6%) reported other children living in the home, 35.4% reported living with a partner, and only 22.9% of parents reported that only they and their one child lived in their home (Table 1).

Table 1: Descriptive characteristics of sample parents and family.

Descriptive variable	N	%
Gender		
Male	8	16.7
Female	40	83.3
Self-reported weight status		
Underweight-normal	18	37.5
Overweight	29	60.4
Not disclosed	1	2.1
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
Age (years)		
Less than 24	6	12.5
25 to 39	33	68.7
40 or older	9	18.8
Marital status		
Single	32	66.6
Married	12	25
Other	3	6.3
Not disclosed	1	2.1
People living in household		
Partner	17	35.4
Other children	31	64.6
Other family	4	8.4
No one else	11	22.9
Ethnicity		

White, non-Latino	5	10.4
African-American	35	72.9
Other	8	16.7
Highest education		
Did not complete high school	4	8.3
Completed high school	16	33.3
Some college - post graduate work	28	58.3

The child subjects were male (n=26, 54.2%) and female (n=22, 45.8%), 6 to 12 years old (mean age 9.3 ± 1.9), and were overweight (85th to <95th percentile, n=21, 43.8%), or obese (≥95th percentile, n=27, 56.3%). Mean child BMI was 23.5 ± 4.9, BMI percentile was 93.9 ± 5.1, and BMI z-score was 1.7 ± 0.5. The sample was relatively evenly distributed by child age: 12.5% of the sample was 6 years old; 12.5% of the sample was 7 years old; 8.3% of the sample was 8 years old; 14.6% of the sample was 9 years old; 20.8% of the sample was 10 years old; 14.6% of the sample was 11 years old; and 16.7% of the sample was 12 years old.

Parent perception

As described previously [31], only 11 of the 48 parent participants accurately placed their child into an overweight or obesity category based on child's BMI percentile category (22.9% of the sample); the clear majority (77.1%) reported an inaccurate perception of their child's weight status. When the data are re-coded to examine the percentage of parents who perceived their child to be overweight (by collapsing the overweight and very overweight perception categories) compared to normal weight status, 22 of the 48 parent participants (45.8% of the sample) accurately perceived that their child was not normal weight.

Expressed concern by others

The sample statistics describing those individuals who have expressed concern about the participating child's weight are displayed in Table 2. Briefly, about half of the parents reported that the child's PCP expressed concern for their child's weight. A quarter of the sample reported that the child's grandparent expressed concern. A similar number of parents reported that a school nurse/psychologist, spouse/other child's parent, and other family members expressed concern for child weight, while few parents reported that their child's coach, teacher, or other parents expressed any concern (Table 2).

When parent perception of child weight was analyzed against individuals who have expressed concern for child weight, parents who have been notified by a PCP (p=0.0001), family member (p=0.013), grandparent (p=0.042), or spouse/other parent (p=0.013) were more likely to perceive their child as overweight (Table 3). There was no relationship observed between parents having been notified by a school nurse, teacher, or the child's coach and the parent's perception of child weight. There was also no relationship between any measured individual who expressed concern for child weight and parent concern for future weight problems (Table 4).

Table 2: Influencing individuals and the total sample frequency of expressed concern.

Influencing individual	Expressed concern	Did not express concern
Pediatrician		
N	22	26
Percent	45.8	54.2
School Nurse/psychologist		
N	11	37
Percent	22.9	77.1
Teacher		
N	5	43
Percent	10.4	89.6
Grandparent		
N	12	36

Percent	25	75
Spouse/child's other parent		
N	11	37
Percent	22.9	77.1
Other parents		
N	5	43
Percent	10.4	89.6
Other family members		
N	11	37
Percent	22.9	77.1
Child's coach		
N	6	42
Percent	12.5	87.5

Table 3: Individuals expressed concern and parental perception of child weight.

Influencing individual	Parents who perceived child to be overweight (n=22)		Parents who did not perceive child to be overweight (n=26)		Fisher's exact
	(n)	(%)	(n)	(%)	P value
School nurse					
Expressed concern	7	31.8	4	15.4	
Did not express concern	15	68.2	22	84.6	0.302
Pediatrician					
Expressed concern	17	77.3	5	19.2	
Did not express concern	5	22.7	21	80.8	*0.0001
Family member					
Expressed concern	13	40.9	2	7.7	
Did not express concern	9	59.1	24	92.3	*0.013
Grandparent					
Expressed concern	9	40.9	3	11.5	
Did not express concern	13	59.1	23	88.5	*0.042
Spouse/Child's other parent					
Expressed concern	9	40.9	2	7.7	
Did not express concern	13	59.1	24	92.3	*0.013
Child's coach					
Expressed concern	4	18.2	2	7.7	
Did not express concern	18	81.8	24	92.3	0.392
Teacher					
Expressed concern	4	18.2	1	3.8	
Did not express concern	18	81.8	25	96.2	0.165

Table 4: Individuals expressed concern and parental concern for future weight problems.

Influencing individual	Parents who have none or little concerns for future weight problems (n=19)		Parents who have some or many concerns for future weight problems (n=29)	Fisher's exact	
	(n)	(%)	(n)	(%)	P value
School nurse					
Expressed concern	3	15.8	8	27.6	
Did not express concern	16	84.2	21	72.4	0.488
Pediatrician					
Expressed concern	6	31.6	16	55.2	
Did not express concern	13	68.4	13	44.8	0.144
Family member					
Expressed concern	4	21.1	7	24.1	
Did not express concern	15	78.9	22	75.9	0.999
Grandparent					
Expressed concern	2	10.5	10	34.5	
Did not express concern	17	89.5	19	65.5	0.091
Spouse/Child's other parent					
Expressed concern	2	10.5	9	31	
Did not express concern	17	89.5	20	69	0.161
Child's coach					
Expressed concern	0	0	6	20.7	
Did not express concern	19	100	23	79.3	0.068
Teacher					
Expressed concern	3	15.8	2	6.9	
Did not express concern	16	84.2	27	93.1	0.372

Discussion

The primary findings of this investigation show that when the presence of childhood overweight or obesity is addressed by a PCP, family member, grandparent, or spouse/other parent, the parent is more likely to accurately perceive their school aged child as obese. This is one of the first studies to measure the impact of individuals who have expressed concern regarding a school aged child's weight status on the parent's perception of their child's weight and the parents concern for future obesity. Additionally, this unique sample consisting of mostly single African-American parents making less than $29,000 per year could provide important insight on a population with a high prevalence of overweight and obesity through childhood and adolescence. These results are consistent with the findings of Hernandez, Cheng, and Serwint who investigated parents' healthy weight perceptions and preferences regarding obesity counseling in a much younger sample of preschool aged children

[29]. The authors found that parents of preschool aged children reported the child's PCP as the most valued advisor on child weight, with misclassification of child body image being strongly associated with absence of PCP comment on child weight. After the child's PCP, the most valued and trusted advisors on the preschool aged child weight were the child's grandparents, spouse/other parent, and family members [29].

Understanding the factors that influence a parent's perception of their child's weight, including expressed concern by others, and the parent's approach to weight related issues is of primary importance in the treatment of obesity. Before a child who is overweight or obese can be enrolled in an obesity treatment program, the child must be identified as having a weight problem. Unfortunately, the lack of association between the presence of childhood obesity and the parents' perception of a child's weight status is not a novel finding. Factors for poor awareness might include reluctance or ambivalence about acknowledging a weight problem, or desensitization to excess weight because being overweight has become normative [15]. Previous investigations have found that parents who misperceive their child's weight status were more likely to be mothers, have lower education, minority ethnic backgrounds, and lower household income [11,16,17,33,34]. These results suggest that multiple family burdens may have a significant impact on parental perceptions of child weight, and parental readiness to acknowledge a problem with their child's health. However, parents who accurately perceived their child as overweight or obese, even without any additional weight management counselling, were more likely to be in the preparation or action stages of the trans-theoretical model of behaviour change [26,30,31].

Rhee and colleagues [30] investigated demographic factors associated with parental perception of child weight and parents' readiness to make weight-reducing lifestyle changes for their children who are overweight or at-risk-for-overweight. They found that when the child's PCP made a comment about their weight, the parent was 10.8 times more likely to report readiness to make changes in the home [30]. Furthermore, 56% of parents who believed their child's weight was a health problem reported that their child's PCP commented on their child's weight status. Only 8% of parents who did not think their child's weight was a health problem reported that their child's PCP made a comment about their child's weight [30]. Researchers believe that increasing a parent's awareness of their child's weight should be a primary purpose of intervention for a parent in the pre-contemplation stage of the trans-theoretical model of behaviour change, and awareness of the severity of the weight problem could help facilitate movement through the other stages of change [30,31,35]. Although neither this study or Rhee's study can show a causal relationship between PCP concern and parent perception/readiness to change, health care providers may have a strong influence on the parent's beliefs regarding the health risks associated with overweight or obesity.

Surprisingly, expressed concern by the school nurse had no influence on parent perception of child weight. It is common for a school nurse to measure children's height and weight at the beginning of each school year. If a child is found to be overweight or obese, many school nurses notify the parent by sending a letter home with the child describing their placement on a BMI growth chart [35]. Since many parents do not favour 'official' methods of identifying overweight (i.e., BMI and/or percentiles), showed limited understanding of how overweight is defined for children, limited comprehension of the measures, and felt that they were irrelevant for their child [36,37], the letters from school nurses identifying weight status may not be effective. An evaluation of school based BMI and body composition screenings in California showed that only 12% of the letter formats contained an explanation of the measures used to determine the child's weight status [38] further limiting the parent's comprehension of the weight status conclusions. Lastly, parents have reported distrust with notification from school nurses citing that it is not the school's role to discuss weight status with parents and discussions of weight status should come from the child's PCP, not a school nurse [38].

The parents understanding of official weight status measures (i.e., BMI, BMI Z-scores, BMI percentiles) can be a significant barrier to modifying a parent's perception of their child's weight [17]. Data from qualitative studies show that parents have a limited understanding of how childhood overweight is actually defined and their comprehension of the measures typically used by clinicians and scientists [36]. Parents, therefore, reported using a range of alternative approaches to objective measures when determining overweight in children, which relied on media driven extreme and exceptional cases as a reference point [36]. These appear to skew parents' perception of what overweight is, and may promote misclassification of their own children. Therefore, providing parents with accurate clinical reference points may increase the accuracy of the parent's perception in their own child. Once a parent perceives their child to be overweight, they may be more likely to express concern about their child's weight, and possibly act to initiate weight control behaviours [15,30,31].

Not only do PCPs play a primary role in addressing obesity, but they also have the ability to educate the parents on the official methods for defining obesity, discuss obesity implications, and answer any clarifying questions. Unfortunately, many PCPs often fail to maintain updated BMI growth charts and address weight status in their overweight and obese pediatric patients [18,27]. Personal interaction, as would happen at a PCP visit or discussion with a family member, could help influence a parent's perception of their child's weight. The PCP's ability to understand whether a parent is ready for this discussion can be key to creating a nonthreatening and productive interaction between parents and clinicians. In addition, understanding which factors are associated with parental behavior change may help PCPs feel more confident when trying to motivate parents [21,30]. However, many PCPs report that they do not have adequate training, feel comfortable discussing weight status and weight management with parents and children [21-25]. Recently, Hernandez and colleagues, studying weight perception in low-income immigrant Hispanic mothers, concluded that healthcare providers, need to broaden their healthcare screenings, especially regarding child weight in populations with a high prevalence of obesity [17]. As the prevalence of childhood obesity continues at epidemic levels, PCPs should have a focus

on weight management and attempt to personally address child weight status with parents.

Limitations

This investigation had several limitations. This sample was recruited through flyers placed throughout a specific community in Pittsburgh's urban core. These demographics may not represent the majority of Americans. The sample was small and relatively homogeneous (mostly low-income, African American families) which may also limit the generalizability of the results. Also, the study sample size was determined for the primary aims of another study [31] and did not meet 85% power for the anticipated relationship based on Hernandez, Cheng, and Serwint [29]. An inadequate sample size may limit the size or significance of the associations between individuals who have expressed concern for child weight and the parents' perceptions of child weight and parental concern for future weight problems and may not represent a population of parents. Although we conclude that the PCP addressing weight status will affect the parent's perception of the child's weight, we are unable to determine if this translates to the parents taking action.

Future Directions

Future investigations should determine the most practical and effective methods for PCPs to anchor parents to their child's weight status during a standard clinical visit. Follow-up studies should track parents and children after a PCP addressed overweight or obesity to determine if the parents take action to change the child's weight status. This information could help clinicians: 1) understand characteristics of parents who will make changes after being anchored to their child's weight status (without any additional weight management counselling) and the effectiveness of those parent-initiated changes; 2) identify characteristics of parents who may need additional assistance.

When school nurses and other child care providers expressed concern for child weight, the parents did not perceive their child's weight any more accurately. School based weight status notification has the potential to reach large populations of parents who have children who are at risk for overweight, overweight, or obese. Future research should attempt to understand what parents' believe the school and school nurses' role should be in the assessment of weight status, parents' preferred method for weight status notification from the school, and notification systems that help parents understand the clinical methods used to determine weight status.

Conclusion

Prevalence of childhood obesity has increased to epidemic proportions over the past 30 years. Obesity in childhood has significant effects on metabolic and psychological health.

Parents should be attentive to their child's weight in order to identify the need for behavior modification. However, many parents are unaware and often under estimate their child's weight status.

This study found that when childhood obesity is addressed by a PCP, family member, grandparent, or spouse/other parent, the parent is more likely to accurately perceive their child as obese. However, when school nurses and other child care providers expressed concern for child weight, the parent's perception did not change. Also, when individuals expressed concern for a child's weight, parents did not have an increased concern for their child to have weight problems in the future. The results of this study reinforce the PCP's vital role in addressing obesity. The child's PCP has the ability to educate the parents on the official methods for defining obesity, discuss obesity implications, and answer any clarifying questions. Research suggests that the child's PCP merely expressing concern for the child's weight may have significant effects on the parental awareness and readiness to make lifestyle modifications in the home [26,29-31], and these current findings suggest that others (family members, grandparents, spouse/other parents) may influence this as well. These findings may have implications for how to best direct intervention approaches aimed at attaining healthy weight in children.

Acknowledgements

This study was funded by the Phi Kappa Psi Foundation Founders Fellowship Award. The authors thank Tricia Burrello for her assistance in data collection. All authors have contributed to and approved the final manuscript.

Conflict of Interest Statement

David A. White, Dana L. Rofey, Andrea M. Kriska, Elizabeth M. Venditti, and Jere D. Gallagher report no financial interests or potential conflicts of interest. Dr. Jakicic received an honorarium for serving on the Scientific Advisory Board for Weight Watchers International, was the Principal Investigator on a grant awarded to the University of Pittsburgh by Jawbone, Inc., a co-investigator on a grant award to the University of Pittsburgh by Human Scale, a co-investigator on a grant awarded to the University of Pittsburgh by Weight Watchers International, and a co-investigator on a grant awarded to the University of Pittsburgh by Ethicon/Covidien. Bethany Barone Gibbs is a co-investigator on a grant award to the University of Pittsburgh by Human Scale. This study was funded by the Phi Kappa Psi Foundation Founders Fellowship Award. The funding source had no role in the data collection, analysis, interpretation, writing, or decision to submit the manuscript for publication.

References

1. Ogden CL, Carroll MD, Kit BK, Flegal KM (2014) Prevalence of childhood and adult obesity in the United States, 2011-2012. JAMA 311: 806-814.
2. Ravussin E, Swinburn BA (1992) Pathophysiology of obesity. Lancet 340: 404-408.
3. Simmonds M, Llewellyn A, Owen C, Woolacott N (2016) Predicting adult obesity from childhood obesity: a systematic review and metaanalysis. Obes Rev 17: 95-107.

4. Thompson D, Edeksberg J, Kinsey KL, Oster G (1998) Estimated economic costs of obesity in U.S. business. Am J Health Promot 13: 120-127.

5. Vivier P, Tompkins C (2008) Health consequences of obesity in children and adolescence. In: Jelaian E, Steele RG, editors. Handbook of Childhood and Adolescent Obesity. New York, NY: Springer Science.

6. Gray WN, Janicke DM, Ingerski LM, Silverstein JH (2008) The impact of peer victimization, parent distress and child depression on barrier formation and physical activity in overweight youth. J Dev Behav Pediatr 29: 26-33.

7. Schwimmer J, Burwinkle T, Varni J (2003) Health-related quality of life of severly obese children and adolescents. JAMA 289: 1813-1819.

8. Strauss RS, Pollack HA (2003) Social marginalization of overweight children. Arch Pediatr Adolesc Med 157: 746-752.

9. Zamertkin A, Zoon C, Klein H (2004) Psychiatric aspects of child and adolescent obesity: a review of the past 10 years. J Am Acad Child Adolesc Psychiatry 43: 134-150.

10. Epstein LH, Valoski A, Wing RR, McCurley J (1990) Ten-year follow-up of behavioral, family-based treatment for obese children. JAMA 264: 2519-2523.

11. Doolen J, Alpert PT, Miller SK (2009) Parental disconnect between perceived and actual weight status of children: A meta-synthesis of the current research. J Am Acad Nurse Pract 21: 160-166.

12. Fisher JO, Birch LL (2001) Early experience with food and eating: Implications for the development of eating disorders. In: Thompson K, Smolak L, editors. Body Image, Eating Disorders, and Obesity in Youth. Washington D.C.: American Psychological Association.

13. Hodges EA (2003) A primer on early childhood aboesity and parental influence. Pediatr Nurs 29: 13-16.

14. Killion L, Hughes SO, Wendt JC, Pease D, Nicklas TA, et al. (2006) Minority mothers' perceptions of children's body size. Int J Pediatr Obes 1: 96-102.

15. Jeffery AN, Voss BS, Metcalf AS, Wilkin TJ (2005) Parents' awareness of overweight in themselves and their children: cross sectional study within a cohort (EarlyBird 21). BMJ 330: 23-24.

16. Parry LL, Netuveli G, Parry J, Saxena S (2008) A systematic review of parental perception of overweight status in children. J Ambul Care Manage 31: 253-268.

17. Hernandez DC, Reesor L, Machuca I, Chishty M, Alonso Y, et al. (2016) LowIncome Immigrant Hispanic Mothers' Concerns and Perceptions of Their Young Child's Weight. Public Health Nurs 33: 412-420.

18. Barlow SE, Bobra SR, Elliott MB, Brownson RC, HaireJoshu D, et al. (2007) Recognition of childhood overweight during health supervision visits: Does BMI help pediatricians? Obesity 15: 225-232.

19. Committee on Accelerating Progress in Obesity Prevention; Food and Nutrition Board; Institute of Medicine, Glickman D, Parker L, Sim LJ, Del Velle Cook H, et al. (2012) Accelerating progress in obesity prevention: solving the weight of the nation. National Academies Press Washington, DC.

20. Rhodes ET, Ebbeling CB, Meyers AF, Bayerl CT, Ooi WL, et al. (2007) Pediatric obesity management: variation by specialty and awareness of guidelines. CLIN PEDIATR 46: 491-504.

21. Story MT, Neumark-Stzainer DR, Sherwood NE, Holt K, Sofka D, et al. (2002) Management of child and adolescent obesity: attitudes, barriers, skills, and training needs among health care professionals. Pediatrics 110: S210-214.

22. Vine M, Hargreaves MB, Briefel RR, Orfield C (2013) Expanding the role of primary care in the prevention and treatment of childhood obesity: a review of clinic-and community-based recommendations and interventions. Journal of Obesity.

23. Holt N, Schetzina KE, Dalton WT, Tudiver F, Fulton-Robinson H, et al. (2011) Primary care practice addressing child overweight and obesity: a survey of primary care physicians at four clinics in southern appalacia. South Med J 104: 14-19.

24. Hinchman J, Beno L, Dennison D, Trowbridge F (2005) Evaluation of a training to improve management of pediatric overweight. J Contin Educ Health Prof 25: 259-267.

25. Klein JD, Sesselberg TS, Johnson MS, O'Connor KG, Cook S, et al. (2010) Adoption of body mass index guidelines for screening and counseling in pediatric practice. Pediatrics 125: 265-272.

26. Lundahl A, Kidwell KM, Nelson TD (2014) Parental underestimates of child weight: a meta-analysis. Pediatrics 133: e689-703.

27. Centers for Disease Control and Prevention (2005) Children and teens told by doctors that they were overweight--United States, 1999-2002. Morbidity and Mortality Weekly Report 54: 848.

28. Sothern MS, Caprio S, Daniels SR, Gordon ST, Ludwig DS, et al. (2010) New ways to overcome old barriers: Engaging pediatricians and primary care physicians in obesity prevention and intervention. Childhood Obesity (Formerly Obesity and Weight Management) 6: 240-246.

29. Hernandez RG, Cheng TL, Serwint JR (2010) Parents' healthy weight perceptions and preferences regarding obeisty counseling in preschoolers: peditricians matter. Clin Pediatr 20: 1-9.

30. Rhee KE, DeLago CW, Arscott-Mills T, Mehta SD, Davis RK, et al. (2005) Factors associated with parental readiness to make changes for overweight children. Pediatrics 116: 94-101.

31. White D, Rofey D, Kriska A, Venditti E, Gibbs B, et al. (2016) Parental Influences on Child Weight: Perception, Willingness to Change, and Barriers. J Obes Weight Loss Ther 6: 1-6.

32. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, Flegal KM, Guo SS, et al. (2000) CDC growth charts: United States. Advance Data 314: 1-27.

33. Myers S, Vargas Z (2000) Parental perceptions of the preschool obese child. Pediatr Nurs 26: 23-30.

34. Parkinson KN, Drewett RF, Jones AR, Dale A, Pearce MS, et al. (2011) When do mothers think their child is overweight? International J Obes 35: 510-516.

35. Howard KR (2007) Childhood Overweight: Parental Perceptions and Readiness for Change. J Sch Nurs 23: 73-79.

36. Jones AR, Parkinson KN, Drewett RF, Hyland RM, Pearce MS, et al. (2011) Parental perceptions of weight status in children: the Gateshead Millennium Study. Int J Obes 35: 953-962.

37. Moyer LJ, Carbone ET, Anliker JA, Goff SL (2014) The Massachusetts BMI letter: a qualitative study of responses from parents of obese childrenPatient Educ Couns 94: 210-217.

38. Madsen KA, Linchey J (2012) SchoolBased BMI and Body Composition Screening and Parent Notification in California: Methods and Messages. J Sch Health 82: 294-300.