OPEN ACCESS Freely available online

ADVANCES IN PEDIATRIC RESEARCH

Relationship between parental perception and concern for child weight and influence on obesogenic parenting practices

Katheryn Swyden [1], Susan B. Sisson [1*], Karina Lora [1], Ashley Weedn [2], Amanda Sheffield Morris [3], Beth DeGrace [4], Kristen A Copeland [5]

1 University of Oklahoma Health Sciences Center, Department of Nutritional Sciences, College of Allied Health, Oklahoma City, OK, USA **2** University of Oklahoma Health Sciences Center, Department of Pediatrics, Oklahoma City, OK, USA **3** Oklahoma State University, Department of Human Development and Family Science, Tulsa, OK, USA **4** University of Oklahoma Health Sciences, Department of Rehabilitation Sciences, College of Allied Health, Oklahoma City, OK, USA **5** Cincinnati Children's Hospital Medical Center and Department of Pediatrics, Division of General and Community Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH, USA

Abstract

Background: Parents' perception of whether children are overweight can influence parenting practices. The purpose of this study was to examine parental perception of and concern for child weight in relation to parenting practices.

Methods: A cross-sectional study of parents (n=75) with pre-school age children. Parents completed the Child Feeding Questionnaire and Parenting Strategies for Obesogenic Behaviors Questionnaire. Perception (overweight vs. not overweight) and concern (concerned vs. not concerned) of child weight were examined in relation to individual strategies (Chi-square) and feeding practices (independent t-tests). Findings were confirmed in analyses adjusted for child race, sex, and weight status.

Results: Five percent of parents perceived their child as overweight; 61.3% of parents were concerned about their child becoming overweight; 36% of children were overweight. Parents who perceived their child as overweight agreed their child should always eat all of the food on his/her plate (75%, p=0.031). Concerned parents made sure their child did not eat too many sweets (89%, p=0.005), high fat foods (78%, p=0.001), or favorite foods (59%, p=0.009); kept some foods out of reach (76%, p=0.014); kept track of sweets eaten (87%, p=0.012) and television watched (83%, p=0.046). Parents with concern used restrictive feeding practices (3.6% vs. 2.9%, p=0.003) and had children with a higher BMI percentile (75.0 vs. 51.0, p=0.001). Adjustment for multiple analyses was more conservative ($p \leq 0.003$).

Conclusions: Parents' concern as to whether their child is overweight was associated with overall restrictive feeding practices and children with higher body mass. Individual strategies employed by parents with a perception of or concern for overweightness included restriction, monitoring, and pressure to eat.

Citation: Swyden K, Sisson SB, Lora K, Weedn A, Sheffield Morris A, DeGrace B, Copeland KA (2015) Relationship between parental perception and concern for child weight and influence on obesogenic parenting practices. Adv Pediatr Res 2:12. doi:10.12715/apr.2015.2.12

Received: February 9, 2015; Accepted: April 23, 2015; Published: May 13, 2015

Competing interests: The authors have declared that no competing interests exist.

Sources of funding: KS was supported by the College of Allied Health, Department of Nutritional Sciences at the University of Oklahoma Health Sciences Center. No sources of funding for additional authors.

* Email: susan-sisson@ouhsc.edu

Introduction

Although the US trend for increasing obesity among children aged 2–5 appears to be leveling off, childhood obesity remains a major national concern [1]. In Oklahoma in 2009, 14% of low-income pre-school children were classified as obese [2] (≥95th BMI%ile for age and sex), which is nearly 6% higher than the national average [1]. Many parents with obese pre-school age children underestimate their child's weight [3-10]. This may be a factor within the home environment that prevents parents from fostering healthy dietary and activity related behaviors [5, 6] and can have a direct impact on behaviors known to promote obesity, such as quality of dietary intake [7], amount of physical activity, and the quantity and quality of television watched.

Parents who accurately perceive their child as being overweight or obese may take steps to improve their child's diet by restricting certain foods or snacks, not pressuring their child to eat more than the recommended serving, or monitoring their child's food intake [7, 11, 12]. However, restriction of certain foods, pressure to eat, and monitoring may be counterproductive means of child weight management within the home setting [10-14]. Studies have found disparate results regarding feeding practices and child weight, making it unclear as to whether these practices improve or encourage obesogenic behaviors [12].

Parents concerned about their child's weight may find ways to increase their child's physical activity [7]. However, overconsumption of unhealthy foods correlated with decreased physical activity and increased television viewing among overweight children may negate parental control efforts [9]. Although low television time among 2–3 year olds is a preventive factor for obesity and a protective factor as children continue to age [15], a recent study concluded that parental concern about television viewing did not translate into less screen time in the home [16]. This disparity demonstrates a gap that may exist between parental awareness of child weight and preventive parenting practices.

Because of the misperception of child weight among parents, parents of overweight children who do not perceive their child's weight accurately may be less likely to influence healthful food choices, promote physical activity, and decrease screen time [4]. Given the lack of clear understanding regarding parent concern and awareness of child weight and concurrent parenting behaviors, the purpose of this cross-sectional study was to determine the relationship between parental perception of and concern for child weight and influence on parenting practices, including dietary intake, physical activity, and television viewing within the home environment among pre-school age children.

Methods

Participants

Participants were recruited for this cross-sectional study by trained research staff from 16 licensed child-care centers in urban and rural areas across the state of Oklahoma. Participants included parents of typically developing children aged 3–5 years who attended these child-care centers. All participants voluntarily gave their informed consent, and the study was approved by the Institutional Review Board of the University of Oklahoma Health Sciences Center.

Parents completed questionnaires that addressed demographics (child age, sex, and race) and obesogenic parenting practices using the Child Feeding Questionnaire (CFQ) [17] and the Parenting Strategies for Obesogenic Behaviors Questionnaire (PEAS) [18]. Questionnaires were sent home with parents and completed during the same week that the child's height and weight were measured in the child-care centers by trained research staff.

Child Feeding Questionnaire

Parental beliefs, attitudes and practices related to child feeding were collected using the CFQ [17], which has an internal consistency ranging from 0.70–0.92 (Cronbach-alpha coefficients) [17]. Parental perception of and concern for child weight were also determined using the CFQ and were utilized as predictors in these analyses. Parental perception of child weight was assessed with the "perceived child weight" factor question: "What is your perceived weight of your child as a pre-schooler"? Response options included 'markedly underweight', 'underweight', 'normal', 'overweight', and 'markedly

overweight'. These were collapsed into two categories for analyses: 'not overweight' (comprising 'markedly underweight', 'underweight' and 'normal') and 'overweight' (comprising 'overweight' and 'markedly overweight'). Parental concern for child weight was assessed with the "concern about child weight" factor question: "How concerned are you about your child becoming overweight"? Response options included 'unconcerned', 'a little concerned', 'concerned', 'fairly concerned', and 'very concerned'. These were collapsed into two categories for analyses: 'not concerned' (i.e. 'unconcerned') and 'concerned' (comprising 'a little concerned', 'concerned', 'fairly concerned', and 'very concerned').

For brevity, the outcomes of interest in terms of individual parenting practices are included in Table 1. Response options including 'disagree', 'slightly disagree', 'neutral', 'slightly agree', and 'agree' were collapsed into two categories: 'agree' (comprising 'slightly agree' and 'agree') and 'disagree' (comprising 'slightly disagree', 'disagree', 'neutral'). Response options including 'never', 'rarely', 'sometimes', 'mostly' and 'always' were collapsed into two categories: 'never, rarely, sometimes' and 'mostly, always'. In addition to these individual parenting practice outcomes, three factors, also known as feeding practices (restriction, pressure to eat, and monitoring), were calculated based on instrument instructions [17].

Predictors of interest in these analyses included parental perception of child weight and parental concern for child becoming overweight. Outcomes of interest in these analyses included individual parenting practices such as, "I make sure my child does not eat too many of his/her favorite foods", "I intentionally keep some foods out of reach", and "My child should always eat all of the food on her/his plate". Calculated feeding practices of restriction, pressure to eat and monitoring were also included as outcome variables.

Parenting Strategies for Obesogenic Behaviors Questionnaire

Nine items from the Parenting Strategies for Obesogenic Behaviors survey (PEAS) [18] were used as outcome parenting practices pertaining to diet, exercise, and television viewing.

Table 1. Individual obesogenic parenting practice questions from the Child Feeding Questionnaire and Parenting Strategies for Obesogenic Behaviors Questionnaire

Child Feeding Questionnaire [a]
17. I make sure my child does not eat too many sweets
18. I make sure my child does not eat too many high-fat foods
19. I make sure my child does not eat too many of his/her favorite foods
20. I intentionally keep some foods out of my child's reach
21. I offer sweets to my child as a reward for good behavior
22. I offer my child her/his favorite foods in exchange for good behavior
23. If I did not regulate my child's eating, she/he would too many junk foods
24. If I did not guide/regulate my child's eating, she/he would eat too much of her/his favorite foods
25. My child should always eat all of the food on her/his plate
26. I have to be careful to make sure my child eats enough
27. If my child says, "I'm not hungry", I try to get her/him to eat anyway
28. If I did not guide/regulate my child's eating, she/he would eat much less than she/he should
29. How much do you keep track of the sweets your child eats?
30. How much do you keep track of the snack foods your child eats?
31. How much do you keep track of the high fat foods your child eats?
Parenting Strategies for Obesogenic Behaviors [b]
2. My child should always eat all of the food on his/her plate
4. If my child says I'm not hungry, I try to get him/her to eat anyway
7. I limit the number of snacks my child eats
8. I limit the amount of time my child watches TV or videos during the week
9. I limit the amount of time my child watches TV or videos on the weekend
13. How much do you keep track of the sweet snacks your child eats?
14. How much do you keep track of the salty snack foods your child eats?
16. How much do you keep track of the amount of TV your child is watching?
17. How much do you keep track of the exercise your child is getting?

[a] Items 17–24 include the restriction factor; items 25–28 include the pressure to eat factor; items 29–31 include the monitoring factor

[b] Items 2–4 include the control factor; items 7–9 include the limit setting factor; items 13–14, 16–17 include the monitoring factor

The PEAS has internal consistency ranging from 0.81–0.82 (Cronbach-alpha coefficients) [18]. For brevity, all the outcome questions are listed in Table 1. Response options were collapsed into: 'agree' (comprising 'slightly agree' and 'agree') and 'disagree' (comprising 'slightly disagree', 'disagree' and 'neutral') and 'never, rarely, sometimes' and 'mostly, always'. Outcomes of interest in these analyses included individual parenting practices such as, "If my child says I'm not hungry, I try to get him/her to eat anyway", "How much do you keep track of the amount of TV your child is watching?" and " How much do you keep track of the exercise your child is getting?"

Body Mass Index Percentile (BMI%ile)

Each child was measured once for height (cm) and weight (kg) by trained research staff using standard protocols [19]. They were measured in the child care centers while wearing light clothing and without shoes. Height, weight, gender, and age in months were used to calculate body mass index percentile (BMI%ile) and weight classification ($\geq 95^{th}$ percentile=obese, 85^{th}–$<95^{th}$ percentile=overweight, 5^{th}–$<85^{th}$ percentile=normal weight) [20].

Analyses

Descriptive characteristics of participants were calculated as means ± SD and frequencies (%). Bivariate analyses were performed using the Chi-square test to examine the association between parental perception of child weight (overweight versus not overweight) and individual parenting practice outcomes from the CFQ and PEAS. Similar analyses were completed with parental concern for their child becoming overweight (concerned versus not concerned) and individual parenting practice outcomes from the CFQ and PEAS. To account for increased possibility of type 2 error with multiple analyses, binary logistic regression analyses were used to confirm the significant Chi-square findings while adjusting for potential confounders of sex, race and weight status. The Bonferroni correction was applied to adjust the significance levels to $p \leq 0.003$ for parenting practices from the CFQ (15 items) and $p \leq 0.005$ for parenting practices from the PEAS (nine items).

An independent *t*-test was used to determine the relationship between child BMI%ile and calculated feeding practices of restriction, pressure to eat and monitoring between parents who perceived their child as overweight versus not overweight. Another independent *t*-test similarly examined child BMI%ile and feeding practice differences between parents with concern for their child becoming overweight and those with no concern. Significant differences were confirmed using Analysis of Covariance while adjusting for sex, race and weight status. The statistics software program SPSS® 19.0 was used for all analyses.

Results

Approximately 45% (254/544) of eligible participants consented to participate. Of these, approximately 30% (75/254) of parents had fully completed the questionnaires, leaving a total of 75 parent–child pairs. Approximately half (53%) of the children were male, had a mean age of 3.7 ± 0.6 years, and 36% were overweight or obese. Over half (61.3%) of parents were concerned about their child's weight, 5% perceived their child to be overweight, and 4% both perceived their child to be overweight and were concerned. Complete descriptive characteristics of participants are shown in Table 2.

Parents who perceived their child as overweight versus those who did not agreed to making sure their child did not eat too many of their favorite foods (100%, $p=0.028$); they also agreed their child should always eat all of the food on his/her plate (75%, $p=0.031$) (Table 3). All findings remained significant after adjustment for child race, sex, and weight status, with the exception of one parenting practice that could not be analytically tested. There were no parents who did not perceive their child as overweight and made sure their child did not eat too many of their favorite foods. After conservative adjustment for multiple analyses ($p \leq 0.005$), none of the differences between parental perception of child weight and parenting practices remained statistically significant.

Table 2. Descriptive Characteristics of the sample

Variables *(n*=75)	(%)
Age, years mean (sd)[a]	3.7 (0.6)
Sex [a]	
Male	53.3
Female	46.7
Race	
American Indian	50.7
White	38.7
African American	1.3
Hispanic	5.3
Asian	2.7
Pacific Islander	1.3
Actual Weight Classification [b]	
Underweight	2.7
Normal Weight	61.3
Overweight/Obese	36.0
Parents with concern for child [c] becoming overweight	
Not Concerned	38.7
Concerned	61.3
Perception of child weight [c]	
Underweight/Normal Weight	94.7
Overweight	5.3

[a] Age, sex, race based on parental report

[b] Weight classification is based on measured height and height and calculated according to body mass index percentiles for age and sex with underweight <5th percentile, normal weight 5th-84th percentile, over weight 85th-94th percentile and obese ≥95th percentile

[c] Parental concern and parental perception based on parental report

Parents concerned about their child becoming overweight versus those not concerned agreed to making sure their child did not eat too many sweets (89%, p=0.005), too many high fat foods (78%, p=0.001), or too many favorite foods (59%, p=0.009), that they kept some foods out of reach (76%, p=0.014), and kept track of the amount of sweets the child ate (87%, p=0.012) and the amount of television the child watched (83%, p=0.046). All findings remained significant after adjustment for child race, sex, and weight status. After conservative adjustment for multiple analyses (p≤0.003), only the difference between parental concern about their child being overweight and making sure their child did not eat too many high fat foods remained statistically significant.

No relationship was found between parent's perception of their child being overweight and feeding practices or child BMI%ile. Parents who were concerned about their child being overweight had higher restrictive feeding practices than parents who were not concerned (3.6 vs 2.9, p=0.003, Table 4). Among concerned parents, their children's BMI%ile was higher (75.0 vs 51.0, p=0.001, Table 4). Relationships remained significant after adjustment for child race, sex, and weight status.

Discussion

This study aimed to better understand the relationship between parental perception of and concern for child weight on parenting and feeding practices, including dietary intake, physical activity, and television viewing within the home environment in pre-school age children. The findings from this study showed that even though greater than one third of the sampled children were overweight or obese, and over half of parents were concerned about their child becoming overweight, a very small percentage of parents actually perceived their child to be overweight. Parents who perceived their child as overweight engaged in restrictive and pressure to eat feeding practices by making sure the child did not eat too many of their favorite foods, and by agreeing that their child should eat all of the food on his/her plate. Parents who were concerned about their child becoming overweight had children with a higher BMI%ile and engaged in restrictive and monitoring feeding practices by restricting high fat foods, sweets, favorite foods, keeping some foods out of reach, and keeping track of the sweets the child ate and the amount of television the child watched.

Previous research suggests that parents who are concerned about their pre-school child's weight are more likely to play an active role in promoting healthy eating, and often use feeding practices of restriction, monitoring, and pressure to eat [6, 7, 10, 12].

Table 3. Parental concern and parental perception and association with individual obesogenic parenting practices (*n*=75)

Individual parenting practices		**Concern (%)**			**Perception (%)**		
	Total	Concern	Not Concerned	*p* value	Not Overweight	Overweight	*p* value
Child Feeding Questionnaire							
17. I make sure my child does not eat too many sweets.							
Slightly disagree, disagree, neutral	21.3	10.9	37.9	0.005*	22.5	0.00	0.284
Slightly agree, agree	78.7	89.1	62.1	∞	77.5	100.0	
18. I make sure my child does not eat too many high-fat foods.							
Slightly disagree, disagree, neutral	36.0	21.7	58.6	0.001*	35.2	50.0	0.549
Slightly agree, agree	64.0	78.3	41.4		64.8	50.0	
19. I make sure my child does not eat too many of his/her favorite foods.							
Slightly disagree, disagree, neutral	53.3	41.3	72.4	0.009*	56.3	0.00	0.028*
Slightly agree, agree	46.7	58.7	27.6	∞	43.7	100.0	∞Ŧ
20. I intentionally keep some foods out of my child's reach.							
Slightly disagree, disagree, neutral	34.7	23.9	51.7	0.014*	32.4	75.0	0.081
Slightly agree, agree	65.3	76.1	48.3	∞	67.6	25.0	
25. My child should always eat all of the food on his/her plate.							
Slightly disagree, disagree, neutral	72.0	65.2	82.8	0.099	74.6	25.0	0.031*
Slightly agree, agree	28.0	34.8	17.2		25.4	75.0	∞
29. How much do you keep track of the sweets your child eats?							
Never, rarely, sometimes	22.7	13.0	37.9	0.012*	22.5	25.0	0.909
Most of the time, always	77.3	87.0	62.1	∞	77.5	75.0	
Parenting Strategies for Obesogenic Behaviors Questionnaire							
16. How much do you keep track of the amount of TV your child is watching?							
Never, rarely, sometimes	25.3	17.4	37.9	0.046*	25.4	25.0	0.987
Most of the time, always	74.7	82.6	62.1	∞	74.6	75.0	

*Indicates significance at *p* value <0.05, as determined by Chi-square

Ŧ Logistic regression adjusted analyses could not be completed due to zero cases of parents who perceived their child as overweight and made sure their child does not eat too much of their favorite foods

∞ Bonferroni correction. Correction for multiple analyses: α =0.003 (concern) and 0.005 (perception). Not significant when adjustment applied

Table 4. Difference in feeding practice factors[a] by parental concern and parental perception of child weight (*n*=75)

	Not Concerned	Concerned	*P* value	Perceive as 'Not Overweight'	Perceive as 'Overweight'	*P* value
Restriction	2.9 ± 0.9	3.5 ± 0.7	0.003*	3.3 ± 0.9	3.8 ± 0.2	0.252
Monitoring	3.9 ± 1.0	4.3 ± 0.8	0.182	4.1 ± 0.9	4.2 ± 0.9	0.175
Pressure to Eat	2.6 ± 1.1	2.9 ± 0.9	0.122	2.8 ± 0.9	3.4 ± 1.3	0.843
BMI Percentile	51.0 ± 29.6	74.8 ± 25.0	0.001*	64.6 ± 29.2	83.0 ± 25.8	0.249

* Indicates significance at *p*-value <0.05, using independent *t*-test

[a] Factor score development from Individual CFQ factor items:
Restriction=(CFQ_Q17 + CFQ_Q18 + CFQ_Q19 + CFQ_Q20 + CFQ_Q21 + CFQ_Q22 + CFQ_Q23 + CFQ_Q24/8)
Pressure=(CFQ_Q25 + CFQ_Q26 + CFQ_Q27 + CFQ_28/4)
Monitor=(CFQ_29 + CFQ_30 + CFQ_31/3)

While this may be intuitive, it has been suggested that restriction, monitoring, and pressure to eat may negatively affect children's eating by disinhibiting natural hunger cues, which may cause the child to consume more restricted foods [7, 12, 13] and may not be the best means of weight management among children [7, 12, 13, 21]. However, not all research is in congruence since one study reported that restricting less healthful foods resulted in the improved intake of healthful foods [22]. Another study suggested that restrictive feeding practices might occur due to parents being concerned about child weight, while not being the actual cause of child weight gain [10]. Conversely, the feeding practice of monitoring has been used as a means of weight control among children and has been found to have a positive effect on children's eating patterns [12]. Monitoring of food intake may help a child learn that all foods can be enjoyed within reasonable limits, thereby promoting healthy eating [12].

An unexpected finding of the current study is that a higher percentage of parents with concern (83%) versus those who perceived their child as overweight (75%) kept track of the amount of television their child watched. Previous studies have reported that excessive television viewing may be associated with decreased activity and increased weight among 2–3 year olds [15]. Many children in the United States exceed the recommended <2-hours/day television viewing (22-24). However, even if parents are aware of their child viewing excessive amounts of television, lack of concern may impede the motivation to limit viewing time [16].

Developing healthful practices in the pre-school years can be a protective factor against obesity as children continue to age [7, 25, 26]. Although parents are more likely to increase their child's involvement in activity if they are concerned about their child's weight [7], parenting practices may be independent of concern and perception since perception and concern of obesity may not be motivators for change within the home. Dietary intake, physical activity, and television watching also play an important role. More research is needed to examine these influences and develop strategies to implement changes.

Strengths and limitations

One of the strengths of this study was that the diverse sample included traditionally underrepresented populations such as American Indians who have a high prevalence of childhood obesity [27, 28]. A recent study examined the parental concern of kindergarten child's weight status among American Indians on a reservation in South Dakota [27], and reported that parents underestimated their child's weight [27]. In fact, 29% of the sampled children were overweight, 33% of the parents under classified their child's weight, and only 6% of parents correctly classified their children as being obese [27]. Only 21% of the parents who correctly identified their child as overweight were concerned about it [27]. It

has been postulated that due to the previous history of under-nutrition among American Indian children, there is a cultural tendency to prevent under-nutrition through a greater acceptance of being overweight [27, 28]. In addition, because of the history of food insecurity, American Indian parents are less likely to restrict foods but rather encourage eating, which leads to higher energy intake [28]. Overweight American Indian children are often seen as strong, loved, and protected [27]. Cultural influences must be taken into account when addressing child weight with parents [27, 28]. Regardless of racial or ethnic background, parental understanding of child weight status is important with regards to prevention of overweight among children [27].

Further, the current study extends knowledge about the importance of parental understanding of child's weight and how that relates to obesogenic parenting practices in an ethnically diverse sample of children living in a state with high obesity prevalence. Although several studies have examined the topics of perception and concern of child weight among pre-school age children, this study adds to the literature by independently examining both parental perception and concern of child weight in a high-risk population, including American Indians.

Limitations of this study include the cross-sectional design, which prevents causality from being determined. Generalizability is also limited due to the small sample of child-care centers from a single state, as well as the low responses rate from parents. Additionally, demographic information, including marital status and which parent (mother or father) completed the questionnaires was not available and may have impacted the ability to determine the influence of family structure and parent care. Feeding practices and behaviors were determined through parental self-report rather than direct observation. Further studies may consider a longitudinal or experimental design using direct observation with a more diverse population. Future studies may also want to explore other attributes, such as stress and employment status, which might influence feeding practices aside from perception and concern.

Conclusions

Based on the current findings, more than half of parents with overweight children were concerned about their child becoming overweight, yet few parents perceived their child as being overweight; even fewer were both concerned and perceived overweight or obese status accurately. Parents with concern had children with a higher BMI%ile, used restrictive and monitoring feeding practices, and kept track of the amount of television watched. Parents who perceived their child as being overweight used feeding practices of restriction and pressure to eat.

A healthful home environment is one protective factor against the development of child overweightness and often coincides with healthy eating and fewer hours of television viewing [26]. Parents of pre-school age children may not see being overweight as a risk factor because of the stressed importance of appropriate growth at that age [3]. Parental misperception of child weight is common; not understanding child weight can be an obstacle in the prevention of child obesity [3, 5, 6, 8, 9]. Enhancing parental awareness of child weight and feeding practices may increase preventative action within the home to improve food choices, increase physical activity, and decrease television viewing. Further studies are warranted to explore ways in which to improve parental attitudes and behaviors as an approach to prevent pre-school age children from becoming or staying overweight.

References

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. JAMA. 2014;311[8]:806–14.
2. Weedn AE, Ang SC, Zeman CL, Darden PM. Obesity prevalence in low-income preschool children in Oklahoma. Clin Pediatr (Phila). 2012;51[10]:917–22.
3. Carnell S, Edwards C, Croker H, Boniface D, Wardle J. Parental perceptions of overweight in 3–5 y olds. Int J Obes (Lond). 2005;29[4]:353–5.
4. Eckstein KC, Mikhail LM, Ariza AJ, Thomson JS, Millard SC, Binns HJ, et al. Parents' perceptions of their child's weight and health. Pediatrics. 2006;117[3]:681–90.
5. Mathieu ME, Drapeau V, Tremblay A. Parental misperception of their child's body weight status

impedes the assessment of the child's lifestyle behaviors. Int J Pediatr. 2010;2010.

6. Mitchell R, Wake M, Canterford L, Williams J. Does maternal concern about children's weight affect children's body size perception at the age of 6.5? A community-based study. Int J Obes (Lond). 2008;32[6]:1001–7.
7. Moore LC, Harris CV, Bradlyn AS. Exploring the relationship between parental concern and the management of childhood obesity. Matern Child Health J. 2012;16[4]:902–8.
8. Rietmeijer-Mentink M, Paulis WD, van Middelkoop M, Bindels PJ, van der Wouden JC. Difference between parental perception and actual weight status of children: a systematic review. Matern Child Nutr. 2013;9[1]:3–22.
9. Sarrafzadegan N, Rabiei K, Nouri F, Mohammadifard N, Moattar F, Roohafza H, et al. Parental perceptions of weight status of their children. ARYA Atheroscler. 2013;9[1]:61–9.
10. Webber L, Hill C, Cooke L, Carnell S, Wardle J. Associations between child weight and maternal feeding styles are mediated by maternal perceptions and concerns. Eur J Clin Nutr. 2010;64[3]:259–65.
11. May AL, Donohue M, Scanlon KS, Sherry B, Dalenius K, Faulkner P, et al. Child-feeding strategies are associated with maternal concern about children becoming overweight, but not children's weight status. J Am Diet Assoc. 2007;107[7]:1167–75.
12. Rodgers RF, Paxton SJ, Massey R, Campbell KJ, Wertheim EH, Skouteris H, et al. Maternal feeding practices predict weight gain and obesogenic eating behaviors in young children: a prospective study. Int J Behav Nutr Phys Act. 2013;10:24.
13. Jansen E, Mulkens S, Emond Y, Jansen A. From the Garden of Eden to the land of plenty. Restriction of fruit and sweets intake leads to increased fruit and sweets consumption in children. Appetite. 2008;51[3]:570–5.
14. Ventura AK, Birch LL. Does parenting affect children's eating and weight status? Int J Behav Nutr Phys Act. 2008;5:15.
15. Jago R, Baranowski T, Baranowski JC, Thompson D, Greaves KA. BMI from 3–6 y of age is predicted by TV viewing and physical activity, not diet. Int J Obes (Lond). 2005;29[6]:557–64.
16. Pearson N, Salmon J, Crawford D, Campbell K, Timperio A. Are parental concerns for child TV viewing associated with child TV viewing and the home sedentary environment? Int J Behav Nutr Phys Act. 2011;8:102.
17. Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. Appetite. 2001;36[3]:201–10.
18. Larios SE, Ayala GX, Arredondo EM, Baquero B, Elder JP. Development and validation of a scale to measure Latino parenting strategies related to children's obesigenic behaviors. The parenting strategies for eating and activity scale (PEAS). Appetite. 2009;52[1]:166–72.
19. Nieman DC. Exercise testing and prescription: a health-related approach. Mountain View, CA: Mayfield Publishing Company; 1999.
20. Kuczmarski RJ, Flegal KM. Criteria for definition of overweight in transition: background and recommendations for the United States. Am J Clin Nutr. 2000;72[5]:1074–81.
21. Jago R, Davison KK, Thompson JL, Page AS, Brockman R, Fox KR. Parental sedentary restriction, maternal parenting style, and television viewing among 10- to 11-year-olds. Pediatrics. 2011;128[3]:e572–8.
22. Spurrier NJ, Magarey AA, Golley R, Curnow F, Sawyer MG. Relationships between the home environment and physical activity and dietary patterns of preschool children: a cross-sectional study. Int J Behav Nutr Phys Act. 2008;5:31.
23. Smith BJ, Grunseit A, Hardy LL, King L, Wolfenden L, Milat A. Parental influences on child physical activity and screen viewing time: a population based study. BMC Public Health. 2010;10:593.
24. Vandewater EA, Rideout VJ, Wartella EA, Huang X, Lee JH, Shim MS. Digital childhood: electronic media and technology use among infants, toddlers, and preschoolers. Pediatrics. 2007;119[5]:e1006–15.
25. Colley RC, Garriguet D, Adamo KB, Carson V, Janssen I, Timmons BW, et al. Physical activity and sedentary behavior during the early years in Canada: a cross-sectional study. Int J Behav Nutr Phys Act. 2013;10:54.
26. Masse LC, Blanck HM, Valente M, Atienza AA, Agurs-Collins T, Weber D, et al. Association between self-reported household practices and body mass index of US children and adolescents, 2005. Prev Chronic Dis. 2012;9:E174.
27. Arcan C, Hannan PJ, Himes JH, Holy Rock B, Smyth M, Story M, et al. American Indian parents' assessment of and concern about their kindergarten child's weight status, South Dakota, 2005–2006. Prev Chronic Dis. 2012;9:E56.
28. Fulkerson JA, Hannan P, Rock BH, Smyth M, Himes JH, Story M. Food responsiveness, parental food control and anthropometric outcomes among young American Indian children: cross-sectional and prospective findings. Ethn Dis. 2013;23[2]:136–42.