

REGULAR ARTICLE

# How do parents of 4- to 5-year-old children perceive the weight of their children?

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**Abstract**

**Introduction:** A heavier weight in adults is becoming the norm rather than an abnormal weight. Whether the same trend is happening in children is unknown.

**Objective:** To assess the perception of the weight of 4- to 5-year-old children and the recognition of overweight by both parents.

**Design:** Population-based survey.

**Participants:** A questionnaire was sent to parents of 1 155 4- to 5-year-old children.

**Results:** In total, 439 questionnaires (35%) were returned. Of all, 90% of the children had a normal weight, 9.3% were overweight and 4.1% were obese. For all weight classes, the parents depicted the child as lighter on both the verbal and visual scale. Of all, 75% of mothers of overweight children stated that the child had a normal weight. In obese children, 50% of the mothers believed that the child had a normal weight.

**Conclusion:** Children with a weight in the normal range were considered by their parents as a little too light or too light. Overweight was considered as normal weight, and obesity as normal or a little too heavy. The perception of a normal weight in children at 4–5 years is distorted.

**INTRODUCTION**

Factors in early life such as the type of infant feeding and the rate of weight gain in the first years of life influence the risk of a child to become obese and thereby the risk to become overweight or obese in later life (1–3). Obesity prevention that starts early in life is an important approach to reduce the dramatic upwards trend in obesity prevalence. Young children are dependent on their parents for controlling their food and activity pattern. Parents therefore are crucial in the prevention and early treatment of childhood overweight. Recognition of overweight is a critical first step for participation in prevention and treatment programmes and public health messages will not reach parents of overweight children if they fail to identify the child as being overweight.

Studies have shown that parents frequently do not recognize overweight in their children (4–7). These studies all focussed on the perception of the weight of the overweight child. Very limited information is available on how parents of children without overweight perceive the weight of their children. One study showed that parents of normal weight children perceive them as being too light (5).

No clear explanation exists of why parents do not recognize overweight in their child. Whether this is related to a changed perception of a normal weight for a child is unknown. If a child with a normal weight is considered as having a low weight, then it is understandable that overweight will be regarded as a normal weight.

We evaluated the parents' perception of weight in a random sample of healthy 4- to 5-year-old children in The Netherlands, a country with a relatively low incidence of overweight children (8).

**METHODS**

**Population**

Between September and November 2006, questionnaires were handed out to parents of all 4- to 5-year-old children attending 35 schools in the city and province of Groningen, The Netherlands. All children in The Netherlands attend school starting at the age of 4 years. Half of the schools were in the city of Groningen and half in the more rural area around the city. Schools were selected at random from a list of schools in the area. Each child was provided with two copies of a questionnaire, a maternal and a paternal version, with a postage-paid return envelope. Two reminder letters were handed out, one and four months after the dispersion of the original questionnaires.

**Questionnaire**

The self-administered questionnaire was presented as a general child health questionnaire, to not focus especially on overweight in children.

The first section gathered information on the relationship between the child and the respondent (mother, father or other), child's age and gender, height and weight of both the

child and the parent and the total number of siblings in the family.

In the second section, we addressed food and activity. Parents' appraisal of their child's weight was assessed with the question 'What do you think of your child's current weight?' with a five-option answer; too heavy, a little too heavy, normal, a little too light and too light. This is referred to as 'verbal scale'. We also asked parents to score the child's body shape on a visual scale by selecting the sketch (from seven choices) that most resembled their child's body shape [used with permission from H.J. Binns (5)]. This is referred to as 'visual scale'. In this section, questions were also included to assess parental level of concern about their child's current or future weight, parental opinion regarding the influence on their child's food choices, the importance of parents as role models for exercise and questions on the child's physical activity pattern. Five Likert-scale response choices were provided for these questions; strongly agree, agree, neutral, disagree and strongly disagree. We also asked parents how they perceived their own weight and whether they believed they were overweight.

The third section was related to assistance by the health-care workers. In this section, we asked parents whether they wished to receive information or assistance regarding food, activity or the weight as well as the amount of time or money they would consider spending. In the last section, information on demographics was gathered.

The study was approved by the local Medical Ethical Committee, and all parents gave informed consent.

### Analysis

Data from children having a medical condition influencing growth were excluded from analysis. If data such as age and gender were missing in the questionnaire of one parent, they were copied from the other parent's questionnaire. If these data were different between both parents, the data provided by the mother were used. Parental perceptions and concerns were related to height and weight as reported by that parent; disagreement between both parents on child height and weight was not adjusted for.

Height and weight were reported by the parents and not measured by the investigators.

International Obesity Task Force cut-off values for paediatric overweight and obesity were used to generate weight status categories (9). Maternal and paternal BMI were categorized as non-overweight ( $<25 \text{ kg/m}^2$ ), overweight ( $\geq 25$  to  $<30 \text{ kg/m}^2$ ) and obese ( $\geq 30 \text{ kg/m}^2$ ).

For further analysis of the visual weight perception, we correlated the seven sketches with seven BMI percentile groups, i.e.  $<p5$ ,  $p5$ – $p15$ ,  $p15$ – $p25$ ,  $p25$ – $p75$ ,  $p75$ – $p85$ ,  $p85$ – $p95$  and  $>p95$ .

Data were analysed using SPSS for Windows 14.0 (Chicago, IL, USA).

### RESULTS

In total, 1155 questionnaires were sent out; 439 were returned (38%), 435 by mothers (37%) and 380 by fathers

(33%). Two children were excluded from the analysis because of conditions that are known to influence child growth (acute lymphatic leukaemia and mucopolysaccharidosis type I). Data on age, height and weight were available from at least one parent for 397 (94%), from the maternal questionnaire for 386 (92%) and from the paternal questionnaire for 339 (89%) children. In line with recent national population data (8), the prevalence of overweight (including obesity) was 9.3% ( $n = 36$ ). The prevalence of obesity alone was 4.1% ( $n = 16$ ). Mothers of overweight and obese children were significantly heavier, and overweight children more often had an obese mother. Fathers of obese children were significantly heavier and more often obese than fathers of normal weight children. The fathers of obese children reported significantly less obesity-related illnesses, such as obesity itself, diabetes and cardiovascular disease, in their family history (normal children 65%, overweight 65% and obese 29%,  $p < 0.01$ ). Characteristics of the children and their parents are summarized in Table 1.

### Verbal scale

On the verbal scale, 299 (86%) mothers and 256 (84%) fathers perceived the weight of their child to be normal or below normal. In overweight children, 75% of mothers and 77% of fathers stated that their child was of normal weight. About a quarter of these parents thought their child was a little too heavy, but none of the parents believed their overweight child was too heavy. In obese children, 50% of mothers and 39% of fathers believed their child had a normal weight, 39% of the mothers and 54% of the fathers thought their child was a little too heavy, whereas only one mother and one father stated that their child was too heavy.

In contrast, 83% of the overweight mothers perceived themselves to be a little too heavy or too heavy. These figures were higher for obese mothers; 98% of them claimed to be a little too heavy or too heavy. Similarly, 78% overweight fathers perceived themselves as a little too heavy or too heavy and 96% of obese fathers stated that they were a little too heavy or too heavy.

### Visual scale

The rating of the children in all weight categories followed a Gaussian curve. However, in all categories, there was a clear difference between the visual scale as indicated by the parents, and the visual scale was calculated from weight and height. Of the normal weight children, 97% were indicated by both their mother and their father with a lighter sketch than calculated.

All overweight children were rated with a lighter sketch than the median sketch by their mothers and fathers, except one overweight child who was rated with the median sketch. None of the overweight children was indicated with a heavier sketch than calculated from the weight and height. Of the 16 obese children, 10 were indicated with a lighter sketch than the median by both parents; five with the median sketch by both parents and only one with a heavier sketch than the median by both parents. None of the obese children was depicted with the heaviest sketch.

**Table 1** Clinical characteristics of children and parents

Children	Normal weight children n = 361	Overweight children n = 20	Obese children n = 16
Boys (%)	44	40	
Caucasian ethnicity child (%)	81	95	
Age of child (years) <sup>†</sup>	4.15 (3.52–5.80)	4.31 (3.73–5.40)	4.49 (3.68–5.72)
Weight of child (kg) <sup>†</sup>	17.7 (12.3–27.0)	21.7 (17.2–26.0)	24.7 (19.8–37.8)
Height of child (kg) <sup>†</sup>	108.0 (94.0–128.0)	109.0 (97.0–120.0)	108.0 (95.0–123.0)
BMI of child (kg/m <sup>2</sup> ) <sup>†</sup>	15.26 (11.78–17.47)	18.28 (17.36–19.12)	20.83 (19.36–25.27)
Living in city area (%)	55	40	50
More than 2 children in household (%)	85	85	94
Mothers			
Caucasian ethnicity (%)	90	100	93
Weight (kg) <sup>†</sup>	71 (50–164)	73 (50–125)	80 (55–131)
Height (kg) <sup>†</sup>	171 (151–190)	171 (156–186)	168 (159–182)
BMI (kg/m <sup>2</sup> ) <sup>†</sup>	24.5 (17.3–65.7)	24.8 (18.8–42.3)	28.3 (21.5–46.4)
Fathers			
Caucasian ethnicity (%)	91	100	100
Weight (kg) <sup>†</sup>	86 (53–146)	92 (75–135)	92 (74–128)
Height (kg) <sup>†</sup>	184 (157–203)	187 (173–201)	184 (170–197)
BMI (kg/m <sup>2</sup> ) <sup>†</sup>	25.3 (18.4–39.6)	26.3 (20.8–33.4)	27.8 (21.1–35.8)

<sup>†</sup>Mean with (range) presented.

Figure 1 demonstrates the extent of misclassification per weight class by mothers: normal weight children were most depicted with one sketch below the actual BMI, whereas in overweight and obese children, parents selected a sketch that was approximately three sketches skinnier compared with the BMI percentile of the child. Data for fathers were similar.

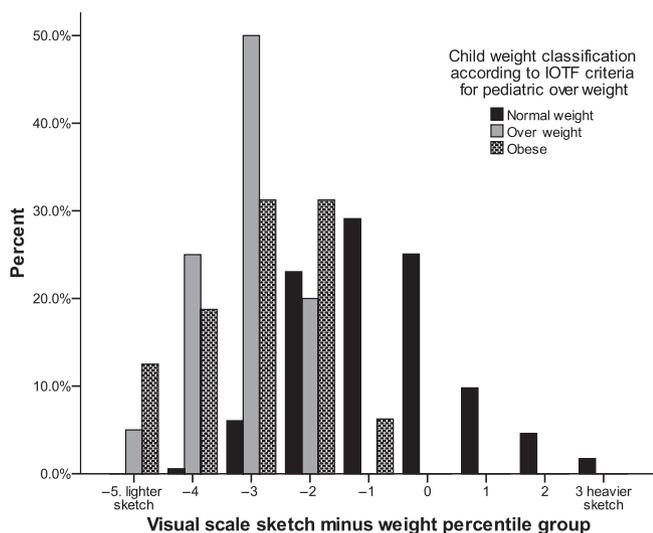
Most parents did not worry about their child's current weight status. Only two mothers (10%) and one father (7%) of overweight children worried somewhat about their child's weight. This was similar compared with that in the normal weight children in whom 24 (7%) of the mothers expressed some concerns about their child's weight. Mothers of obese children expressed significantly more concerns

of their child's current weight status compared with mothers of normal weight children (44% compared to 7%,  $p < 0.001$ ).

Only one mother and two fathers of overweight children stated to be concerned about the child becoming overweight in the future, which was similar to the proportion of parents of normal weight children who expressed this concern. In obese children, nine (56%) mothers and six (42%) fathers claimed to worry that their child would become overweight in the future, this was significantly different from parents of normal weight children ( $p < 0.001$ ). There was a significant positive correlation between maternal BMI and a concern regarding the child's weight status, both for their current and their future weight status ( $p < 0.001$ ). Paternal concern about their child's weight status was not related to the paternal BMI.

Of all the parents, 96% perceived their child to be in good or excellent health. There was no difference in health perception according to weight class. Parents of overweight and obese children did not think their child was less active compared with their peers. Most parents believed that children would be more active if their parents played sports. A majority of both mothers and fathers stated that they could influence their child's weight. Of all mothers and fathers, 94% stated that they could influence their child's food choices and that the child's eating habits were dominated by parental eating habits. More than half of the mothers and fathers believed that an overweight child would become an overweight adult in the future. There were no significant differences according to weight class in these perceptions on food and activity patterns.

More than 80% of parents of children with a normal weight status stated that they would like to receive information or guidance if their child would be overweight. A similar percentage of mothers and fathers of overweight and obese children stated that they would like to receive



**Figure 1** Mothers' classification of their child's weight status on the visual scale compared with calculated weight percentile group per weight category.

information or guidance if their child would be overweight. There were no differences according to weight class for the acceptance of guidance in each condition.

Unfortunately, the number of overweight and obese children in our sample did not provide enough power to look into determinants of weight misclassification, like for example, child age, gender or parental educational level. However, in univariate analyses, we found no significant associations between weight classification group (i.e. normal weight, overweight or obese) and parental underestimation of child weight, neither on the verbal nor on the visual weight perception scale.

## DISCUSSION

In this study, we show that parents of normal weight children describe and figure their children as normal or frequently as thinner than normal. Parents of overweight children describe their child to be of normal or less than normal weight. When asked to depict the child on a figure, all parents estimated their child to be one (normal weight) to three (overweight and obese) figures lighter than their actual weight and height. Almost half of the obese children were figured as being of normal weight; the remaining cases were depicted as being a little too heavy.

Two conclusions can be drawn from these data. First, the public perception of normal weight for children has shifted towards a higher weight than can be calculated from accepted growth curves. Second, parents of overweight and a majority of obese children do not recognize their child as such.

Our results are important for a number of reasons. Overweight in young children does not seem to be considered as a problem, but in contrast, it has become the norm. Children with weight below the 50th percentile are regarded as skinny. We conducted the study in The Netherlands where approximately 10% of children are overweight or obese in contrast to that in the USA, where at least 20% of children are overweight (8,10). It is conceivable that detecting overweight is becoming more difficult in situations where overweight is more prevalent. Eckstein et al. studied the weight perception of parents of normal weight as well as overweight children, who visited a paediatrician in the USA (5). Their results are very comparable with ours. Parents of normal weight children rated their infants as lighter than average, whereas overweight and obese children were rated as normal or slightly overweight. The age range in that study was 2–17 years; only 50 children with age  $\leq 5$  years were included. Our results therefore confirm and expand the results of Eckstein et al.

Almost all studies evaluating the parental perception of the weight of their children concerned overweight children (4–7). A number of studies, also summarized in a recent systematic review of Parry et al. (4), show that parents of overweight children frequently fail to recognize that their child is overweight. In 19 of the 23 reviewed studies, the parental perception of overweight in the children was  $<50\%$ . No data on the perception of the weight of normal weight children is

presented in this review. In addition, most studies quoted in this review included older children or children of a rather wide age range. Our study was restricted to 4- to 5-year-old children.

In adults, there is a clear trend that the heavier weight is becoming the norm (11–13). In countries where the incidence of overweight is higher, this trend has been shown to be even more pronounced. Recent studies from the USA and United Kingdom reported that the increase in prevalence of obesity has been accompanied with fewer overweight people perceiving themselves to be overweight (10,12). This further shift in the distorted weight perception was found to be particularly present in the lower BMI level (25 to  $<27.5$ ), which suggests that the perception of a healthy weight is expanding to include being mildly overweight. Our results show that this is also occurring in young children.

Overweight at a young age is an important risk factor for overweight in adolescence and adult age (2,3). Intervention at 3–5 years of age might prevent the continuation of being overweight in later life. To let parents and their children participate in lifestyle interventions, parents need to recognize the problem in their child. The finding that both the father and the mother underestimate their child's weight status is an important barrier in obesity prevention. Efforts must be made to reach both caregivers of the child to make them aware of the health risk for their child because interventions for an overweight child are very unlikely to be successful without the support of both the parents.

Another risk factor for overweight in children is the activity of the child. The parents of overweight and also obese children reported their child to be as active as or even more active than other children. Further studies are needed to confirm this. A recent review did not observe a relation between the physical activity of preschool children and their BMI (14). It will be difficult to convince parents of overweight and obese children to engage in lifestyle or physical activity interventions if the parents already consider their child to be very active.

The response rate in this study (38%) is lower than that in other studies, e.g. the study of Eckstein et al. (5). However, in this and other studies, children who visited a paediatric clinic were included, which might represent a selected population. Our study sample comprised only the Dutch population, which caused a lower response rate. We have no indication that overweight or obese children are over- or underreported in our sample, as the incidence of obesity and overweight was equal to a recent national survey (8).

A weak point in our study is the report of weight and height of the children by the parents. Although we encouraged parents to either measure weight and height for the questionnaire, or use data from the most recent visit to a paediatric clinic, inaccuracies might have occurred. It is unlikely, however, that the parents would have reported a weight lower than actual, while reporting the correct height. Therefore, we are convinced that our data represent a real picture of the situation in The Netherlands.

In conclusion, the perception of a healthy weight for 4- to 5-year-old children has shifted to a higher weight, even in a country with a relatively low prevalence of overweight. Health education must be directed towards the recognition of a normal healthy weight in children.

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