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Parent Perception of Healthy Infant and Toddler Growth

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Abstract

We hypothesized that parents of infants prefer growth at higher percentiles and are averse to growth at lower percentiles. Of 279 participating parents, only 10% desired their child's weight to be in the lowest quartile. For children weighing in the lowest quartile, 57% of parents thought their child's weight was "too low." In contrast, 66% of parents whose child's weight was in the top quartile preferred their child weigh that much. When viewing hypothetical infant growth trajectories, 47% ranked a growth chart demonstrating growth along the 10th percentile for weight as "least healthy" of 6 growth patterns, and 29% chose charts showing an infant at the 90th percentile for weight at age 1 as "healthiest." In conclusion, parents are averse to growth at the bottom of the weight growth chart but are much less likely to feel negatively about growth at higher percentiles. This is troubling given the childhood obesity epidemic.

Keywords

infant; growth; growth chart; obesity

Introduction

The World Health Organization recently estimated that 22 million children below the age of 5 are overweight.[1] In the United States, 1 in every 4 children between ages 2 and 5 are either overweight or obese.[2] Because infancy is a time of rapid growth for cells and tissues, including adipocytes, overnutrition during this crucial period may lead to future obesity.[3] Numerous reports support this concept as the relationship between growth during infancy and subsequent weight later during childhood and adult life is well established.[4–7]

It is the responsibility of health care providers to communicate child weight status, discuss healthy patterns of growth, and explain infant growth charts at health maintenance visits. Most often, however, parents are given their child's growth chart information with little, if any, explanation. During infancy, physicians are more likely to raise concerns over slower growth and downward crossing of weight-for-age percentile lines than they are for rapid growth with upward crossing of percentile lines. Additionally, although in nearly every life circumstance scoring high on a percentile ranking is desirable and lower percentiles are undesirable, such values related to weight status should be interpreted differently, but parents may not understand this unique circumstance.

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Declaration of Conflicting Interests
The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Because infant overweight and rapid weight gain during infancy are both associated with later obesity,[8–11] parental interpretation of infant growth requires further study. Therefore, we sought to determine parent preferences for weight percentiles and how these preferences relate to their child's actual weight percentile. Additionally, we aimed to assess parent perceptions of weight-for-age growth chart appearance for infants up to 1 year of age. We hypothesized that parents would prefer their children to be above the 50th percentile for weight and that weight in the lowest quartile would be perceived negatively. Regarding parent perception of weight-for-age growth charts, we hypothesized that parents would prefer their infants to be at higher percentiles and not growing along curves near the bottom of the growth chart.

Methods

Participants

A convenience sample of 279 parent–child pairs attending a single pediatric outpatient office (Penn State Hershey Pediatrics, Hershey, PA) were recruited for this study. Eligible participants were parent–child pairs presenting for the child's health maintenance visits when the children were between 6 and 27 months of age. Information about parental age, sex, education, and self-reported race and ethnicity were collected. Infant sex was also recorded. This study was approved by the Human Subjects Protection Office of the Penn State College of Medicine.

Data Collection

After weight and length measurements were obtained by clinic nurses, plotted on the child's clinic growth chart from the Centers of Disease Control and Prevention,[12] and reported to parents, the parents were asked a series of questions regarding children's weights and growth charts. First, they were asked whether they felt that their child's weight was much too low, low, just right, high, or much too high. Parents then chose the weight percentile range in which they preferred their child to fall (<10th percentile, 10th to 25th, 25th to 50th, 50th to 75th, 75th to 90th, or >90th percentile). They were then shown a composite of 6 weight-for-age growth curves (Figure 1). Each chart illustrated different patterns of weight gain between birth and 1 year of age. Three of the charts showed consistent growth along a percentile curve (10th, 50th, 90th), 2 displayed upward crossing of major percentile lines (10th to 50th, 50th to 90th), and 1 had downward crossing of percentile lines (90th to 50th). Parents were asked to rank these curves from "healthiest" to "least healthy."

Data Analysis

Demographic comparisons between quartiles of child's weight-for-age percentile were made using χ^2 tests or Fisher's exact tests as needed for categorical characteristics and Spearman's rank correlation coefficient for continuous characteristics. Logistic regression was used to test contrasts of quartiles of child's weight-for-age percentile. Mantel-Haenszel χ^2 tests were used to compare quartiles of child's weight-for-age percentile with respect to parent's feeling about child's weight-for-age percentile and parent's preference for child's weight-for-age percentile.

Results

Of the 279 participating parents, 238 (87.2%) were self-described as white, most were female, and the mean parental age was 30.3 years (Table 1). Of the participating parents, 72.1% had at least some college or technical school training. For the children, there was an even distribution between male (n = 139) and female (n = 140) children, and a relatively

even distribution of children at each age where health maintenance visits occur between 6 months and 2 years of age. The median weight-for-age percentile for children was 45.

Perception of Current Weight

When asked about their child's current weight, for the entire cohort, 200 of 279 (71.7%) parents felt their child's weight was "just right" (Table 2). However, significant differences existed depending on the child's current weight percentile. Whereas the vast majority of parents whose children weighed between the 25th and 75th percentile and greater than the 75th percentile thought their child's weight was just right, less than half of those whose children were in the lowest quartile for weight felt the same ($P<.0001$). Instead, the majority of those whose children were in the lowest quartile felt that their child's weight was low or much too low, whereas very few with children weighing in the middle or highest quartiles answered this way ($P<.0001$). In contrast to the dissatisfaction regarding their child's weight for parents of lighter children, only 21.2% of parents whose child weighed in the highest quartile felt that their child's weight was "too high."

Desired Weight Percentile Range

Regarding parents' desired weight percentile range for their child, only 10% of parents desired their child's weight to be in the lowest quartile, whereas 21% desired their child's weight be in the highest quartile. These preferences were related to the child's actual weight-forage percentile ($P < .0001$). Of parents whose child's actual weight was in the highest quartile, 65.7% preferred their child's weight to be in that range. In contrast, for parents of children in the lower 3 quartiles, only 11.0% desired their child's weight to be in the top quartile range. Parental preference for higher weight-for-age percentile was associated with not having a college education ($P = .04$) but not with the child's sex, race, ethnicity, or age at the visit.

Growth Chart Preference

When parents were asked to rank their preferences for the 6 patterns of growth seen in the figure, nearly half ranked the growth chart demonstrating consistent growth along the 10th percentile as the "least healthy" choice making it the lowest ranked choice overall. Parents without any college education were more likely to rank this choice as the "least healthy" option ($P = .03$), but no other demographic variable was associated with their choice. As for parents' views of the healthiest growth pattern, 57% chose the chart with steady growth along the 50th percentile, and 29% chose either growth chart C or F (each with weights at the 90th percentile at age 1 year). For these rankings, significant differences were associated with the child's weight status ($P = .03$). Specifically, whereas only about 25% of parents with children whose weight-for-age was less than the 75th percentile chose charts ending at the 90th percentile as the most preferred, that pattern was chosen by nearly 40% of parents with children in the top weight-for-age quartile.

Discussion

During the first 2 years after birth, growth charts are typically used by health care providers to ensure adequate and proportional growth with respect to weight, length, and head circumference, but information is usually communicated to parents without significant explanation so long as the child does not (*a*) raise concern for failure to thrive or (*b*) demonstrate disproportionate or very excessive growth on 1 of the 3 measurements. The results of this study suggest that improved communication between health care providers and parents about normal infant growth is necessary. These data suggest that many parents are averse to their children growing in the lowest quartile for weight. In contrast, many parents have a preference for their child's weight to show progression toward the higher

percentiles on the growth chart despite evidence that during infancy, weight in the higher percentiles and rapid patterns of growth elevate the risk for obesity and its comorbidities.[4–7,13–23] Parents' bias in favor of higher percentiles may reflect their response to the use of percentiles as a way of presenting their infant's growth relative to others because in nearly every other life circumstance, higher percentiles are better, as for example, in the case of academic achievement.

Overall, parents tended to have negative perceptions of patterns of early life growth in the lower percentiles. These negative perceptions may have negative consequences; parents who perceive their children as too thin are more likely to pressure them into eating.[24] This hinders children's ability to recognize internal cues for hunger and satiety.[25] Furthermore, parents often perceive their children as picky eaters even when their weight gain is progressing normally,[26] and infants and children perceived as too small are often given developmentally inappropriate nutrition, including the early introduction of solids and/or table foods.[27,28] This, combined with findings that parents tend to underestimate rather than overestimate their child's weight, might create a major obesogenic force.[17,29–35]

Many parents believe that greater infant weight is an indicator of good infant health and higher levels of parenting competence.[27,28,36–40] Furthermore, parents may not value their child's weight status as a health indicator but, rather, may refer to their ability to perform activities accomplished by their peers or the lack of chronic medical illness.[41] Whereas in the past these findings have been shown in low-income or minority populations where there is often an association of food with love,[42] the current results show general preferences for higher weight infants in a mostly white, well-educated, middle class community.

The results of this study are limited by several factors. First, the participants were from a single, suburban, outpatient office, and the population was homogeneous, with limited minority group representation. This is important to note because ethnicity has been demonstrated to play a significant role in parental assessment of child weight status.[27,28,40,42] Nonetheless, the current data suggest that the phenomenon of "more is better" regarding infant weight is not limited to minority groups. A second limitation is that the results rely solely on weight percentiles, not weight-for-length percentiles, which may better represent infant adiposity.[43] Despite this, weight-for-length percentiles are much less commonly used by clinicians in day-to-day practice and may be a more difficult measurement for parents to understand. Furthermore, the accuracy of length measurements in the clinic setting may be questionable.[44] Whereas weight measures can be obtained accurately if proper quality control is practiced, length measures are more difficult to obtain accurately.

In conclusion, this sample of parents perceived infant and toddler growth at lower percentiles on the weight-for-age growth chart more negatively than growth in the upper percentile range. In the midst of a childhood obesity epidemic, the reasons for such parental preferences require further exploration, as does study in differing population groups. Because early life overweight and obesity are increasingly common, children currently considered "normal" may include infants and toddlers who are larger than those in the past. Clinicians must recognize that parents may have potentially unhealthy preferences for their infant's weight as well as perceptions of normal that are different from those in previous generations and educate families on what constitutes a healthy growth pattern.

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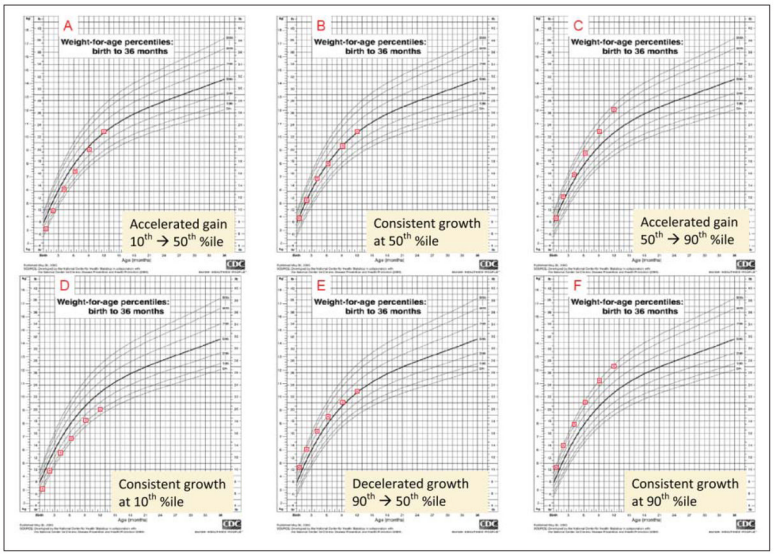

Figure 1.
Growth chart choices for parents to rank from “healthiest” to “least healthy”

Table 1

Demographics of Study Parents and Their Children (N = 279)

Characteristic	
Parent characteristics	
Sex, n (%)	
Female	239 (85.7)
Male	40 (14.3)
Age (years), mean ± standard deviation	30.3±6.5
Hispanic ethnicity, n (%)	22 (7.9)
Race, N (%)	
White	238 (87.2)
Black	19 (7.0)
Asian	14 (5.1)
Other	2 (0.7)
Education, n (%)	
Eighth grade or less	1 (0.4)
Some high school	13 (4.7)
High school graduate	64 (22.9)
Some college/technical school	68 (24.4)
College graduate	85 (30.5)
Postgraduate training/degree	48 (17.2)
Child characteristics	
Sex, n (%)	
Female	140 (50.2)
Male	139 (49.8)
Age at health maintenance visit, n (%)	
6–8 Months	53 (19.2)
9–11 Months	54 (19.6)
12–14 Months	49 (17.68)
15–17 Months	47 (17.0)
18–23 Months	36 (13.0)
24 to <27 Months	37 (13.4)
Weight-for-age perecentile, median (intraquartile range)	45 (20–73)

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Table 2

Parent Impression of Their Own Child's Weight and Desired Weight Percentile Range

	Entire Cohort, N = 279	Children <25th Percentile, n = 83	Children 25th to 75th Percentile, n = 144	Children >75th Percentile, n = 52	*P*
Parent's feeling about child's weight, n (%)					<.0001
Much too low	6 (2.2)	5 (6.0)	1 (0.7)	0 (0)	
Low	60 (21.5)	42 (50.6)	17 (11.8)	1 (1.9)	
Just right	200 (71.7)	36 (43.4)	124 (86.1)	40 (76.9)	
High	13 (4.7)	0 (0)	2 (1.4)	11 (21.2)	
Much too high	0 (0)	0 (0)	0 (0)	0 (0)	
Parent preference for child's weight-for-age percentile[a]					<.0001
<10th	4 (1.4)	4 (4.9)	0 (0)	0 (0)	
10th to 24th	25 (9.0)	23 (28.4)	2 (1.4)	0 (0)	
25th to 49th	67 (24.2)	28 (34.6)	38 (26.4)	1 (1.9)	
50th to 74th	122 (44.0)	20 (24.7)	85 (59.0)	17 (32.7)	
75th to 90th	48 (17.3)	6 (7.4)	19 (13.2)	23 (44.2)	
≥90th	11 (4.0)	0 (0)	0 (0)	11 (21.2)	
Parent choice as "least healthy" growth chart[b]					.84
A	14 (5.2)	5 (6.3)	7 (5.0)	2 (4.1)	
B	2 (0.8)	0 (0)	1 (0.7)	1 (2.0)	
C	42 (15.7)	12 (15.0)	21 (15.1)	9 (18.4)	
D	125 (46.6)	32 (40.0)	69 (49.6)	24 (49.0)	
E	27 (10.1)	9 (11.3)	13 (9.4)	5 (10.2)	
F	58 (21.6)	22 (27.5)	28 (20.1)	8 (16.3)	
Parent choiceas "healthiest" growth chart[c]					.35
A	7 (2.6)	2 (2.4)	5 (3.6)	0 (0)	
B	154 (57.3)	52 (63.4)	78 (56.6)	24 (49.0)	
C	26 (9.7)	5 (6.1)	15 (10.9)	6 (12.2)	
D	10 (3.7)	6 (7.3)	3 (2.2)	1 (2.0)	
E	20 (7.4)	4 (4.9)	11 (8.0)	5 (10.2)	
F	52 (19.3)	13 (15.9)	26 (18.8)	13 (26.5)	

[a] 2 Participants did not answer this question.

[b] 11 Participants did not answer this question.

[c] 10 Participants did not answer this question.