Maternal Perceptions of Toddler Body Size

Accuracy and Satisfaction Differ by Toddler Weight Status

Erin R. Hager, PhD; Margo Candelaria, PhD; Laura W. Latta, MHS; Kristen M. Hurley, PhD; Yan Wang, MD, DrPH; Laura E. Caulfield, PhD; Maureen M. Black, PhD

Objectives: To examine (1) accuracy of maternal perceptions of toddler body size; (2) factors associated with accuracy of toddler body size; and (3) how maternal satisfaction relates to accuracy/toddler body size.

Design: Cross-sectional.

Setting: Low-income community sample from suburban Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)/urban pediatric clinics.

Participants: Two hundred eighty-one mother-toddler dyads (toddlers: 54.1% male; mean age, 20.2 months; 70.8% African American; 8.5% underweight [<15th weight-for-length percentile]; and 29.2% overweight [≥85th weight-for-length percentile]).

Main Exposure: Measured anthropometry (mother/toddler) and demographics.

Outcome Measure: Validated toddler silhouette scale (accuracy and satisfaction).

Results: Nearly 70% of mothers were inaccurate in assessing their toddler’s body size. Compared with mothers of healthy-weight toddlers, mothers of underweight toddlers were 9.13 times more likely to be accurate (95% CI, 2.94-28.36) and mothers of overweight toddlers were 87% less likely to be accurate (95% CI, 0.05-0.33); accuracy did not differ by toddler age, sex, or race or mother’s education or weight status. More than 70% of all mothers and 81.7% of mothers of overweight toddlers were satisfied with their toddler’s body size. Accurate mothers of underweight toddlers were less likely to be satisfied than accurate mothers of healthy-weight toddlers (30.0% vs 76.8%; P < .001).

Conclusions: Mothers of overweight toddlers had inaccurate perceptions of their toddler’s body size and were highly satisfied, suggesting a view of heavy toddlers as normative. Mothers of underweight toddlers had accurate perceptions yet were dissatisfied, suggesting recognition of their child as outside the norm. Because inaccurate perceptions begin early in toddlerhood, pediatric providers should help improve families’ understanding of healthy body size. Future studies should examine how satisfaction and accuracy relate to parenting behaviors.


Parental perceptions of a child’s growth and weight status (underweight or overweight) are key factors in determining a family’s readiness to modify their environment and lifestyle.1 Parents often misinterpret the weight status of their young children.1-8 Because feeding behaviors are influenced by perceptions of the child’s body size,9-14 misperceptions could lead to inappropriate feeding behavior (ie, encouraging a healthy-weight child to eat more/less or to gain/lose weight). Extremes in poor growth during toddlerhood, both underweight and overweight, affect child health and development over time. Excess weight gain before age 5 years can persist through adolescence,15-17 increasing the risk for obesity-related comorbidities later in life. Early growth faltering can have long-term effects on cognition, learning, and behavior.18 Without accurate perceptions regarding their child’s individual risk for underweight or overweight, parents may not respond to health- and nutrition-promoting strategies.19

Recent reviews of parental assessments of children’s body size have focused on overweight, not underweight, and...
on preschool- and school-aged children, not toddlers. Child overweight, male sex, African American race, and low parental education contributed to parental inaccuracy, with inconsistent findings related to parental obesity. Aside from not including toddlers, there were inconsistencies in the measurement of parental accuracy and minimal attention to perceptual differences among ethnic groups or high-risk populations.

One possible explanation for parental inaccuracies lies in the theory of idealization, whereby individuals perceive more favorable attributions than are accurate. Applied to body size, parents may have difficulty recognizing discrepant sizes because they idealize their child to be of normal size. It follows that parents who perceive their child's body size to be normal, regardless of actual body size, would also be satisfied. Dissatisfaction would depend on parents' recognition that their child's body size is discrepant from the norm, either under or over. A recent study demonstrated that children's weight was overestimated by parents of underweight children and underestimated by parents of overweight children, suggesting that parents "correct" for deviations from normal.

The present study addresses gaps in our understanding of parental perceptions of and satisfaction with their child's body size by focusing on toddlers, using a validated toddler silhouette scale (TSS) for assessing accuracy and satisfaction, and examining both underweight and overweight in low-income children, a population at risk for growth problems early in life. Guided by the theory of idealization, we tested 3 hypotheses.

First, we examined the ability of low-income mothers to accurately rank their toddler's body size using a validated TSS. We hypothesized that mothers of underweight and overweight toddlers are less likely to accurately rank their toddler's true body size, compared with mothers of healthy-weight toddlers.

Second, we examined the factors associated with maternal inaccuracy, based on proximal and distal systems from the Social Ecological Model, which conceptualizes that parenting and development are simultaneously influenced by child, family, community, and larger sociocultural systems. We focused on both proximal (eg, factors close to/within the child) and distal (eg, more distant maternal/familial characteristics) systems of influence and hypothesized that proximal child characteristics, including older age, male sex, African American race, and overweight, and distal familial characteristics, including maternal overweight, low education, and low socioeconomic status, relate to maternal inaccuracy regarding toddler's body size.

Finally, we hypothesized that mothers of underweight or overweight children who accurately identify their children as underweight or overweight are significantly less satisfied with their toddler's body size compared with accurate mothers of healthy-weight children.

**METHODS**

**SAMPLE**

Biological mothers of toddlers (aged 12-32 months, born at term, birth weight >2500 g) were recruited from 2 sites: a sub-urban Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinic and an urban pediatric clinic serving predominantly low-income families. Trained data collectors conducted evaluations. Mothers provided written informed consent and completed self-administered, computer-based questionnaires using voice-generating software. This study was approved by institutional review boards from the University of Maryland and the Maryland Department of Health and Mental Hygiene.

**TODDLER SILHOUETTE SCALE**

To assess maternal perceptions of and satisfaction with their child's body size, we used a validated 7-image TSS, which represents sex and racially and ethnically neutral toddlers between 12 and 36 months of age. The TSS images range from the 0 to the 100th weight-for-length percentile, in increments of 0 (0, 10, 20, 30, 40, 50, 60, 70, and 80). Accuracy was determined by the mother's response to the question, "Which picture looks most like your child?" with an allowance of 1 silhouette on either side of the child's measured weight for length. Responses that were 2 or more images smaller/larger than her child's weight for length (≥32 percentile points difference) were considered inaccurate. Data were pooled and examined in 3 categories (inaccurate/perceived child as smaller, accurate, or inaccurate/perceived child as larger).

Satisfaction was determined by the mother's response to the question, "Which picture do you want your child to look like?" with the same silhouette chosen for both questions. Data were pooled and examined in 3 categories (desire for child to be larger, satisfied, or desire for child to be smaller).

**DEMOGRAPHICS**

 Mothers reported on their toddler's birth date, sex, and race/ethnicity and on their own birth date, marital status, education, employment status, public assistance (Medical Assistance and Supplemental Nutrition Assistance Program [formerly Food Stamp Program]), and the number of household members/annual household income (used to calculate a poverty ratio based on US Census Bureau 2009 thresholds).

**ANTHROPOMETRICS**

 Mothers undressed their toddler to a clean diaper. Weight (in kilograms) was measured in triplicate using a TANITA 1584 Baby Scale (Tanita Corp). Recumbent length (in centimeters) was measured in triplicate using a Shorr measuring board. Body weight and length were calculated according to the World Health Organization growth charts (using an SPSS program [IBM SPSS] provided by the World Health Organization), then converted to percentiles. Weight status was defined based on weight-for-length percentiles: underweight is less than the 15th percentile, healthy weight is in the 15th percentile or more and less than the 85th percentile, and overweight is the 85th percentile or more. The top and bottom 15th percentiles represent ends of the distribution, not clinical indicators of overweight or underweight. The weight-for-length growth index was used (as alternative growth indices, ie, body mass index [calculated as weight in kilograms divided by height in meters squared] [BMI] for age or weight for age) to be consistent with TSS categories. Maternal height (in centimeters) was measured in triplicate using a Shorr measuring board. Body weight (in kilograms) was measured in duplicate (TANITA 300GS; Tanita Corp). Overweight was defined as a BMI of 25 or more and less than 30 and obese, as a BMI of 30 or more.
DATA ANALYSIS

Analyses were conducted using SPSS version 18.0 (IBM SPSS) and SAS version 9.0 (SAS Institute). To test the first hypothesis, association between toddler body size and maternal accuracy, the Fisher exact test was used to evaluate differences in the distributions of accuracy vs toddler weight status. To test the second hypothesis, factors associated with maternal accuracy (proximal [age, sex, race, and weight status] and distal [maternal weight status and education and socioeconomic status]) systems of influence were obtained from both the demographic and anthropometric data, we used bivariate (t tests and χ² analyses) and multivariates (block logistic regression models, adding variables in blocks based on the Social Ecological Model). Cox and Snell pseudo R² values were used to show added variance as model complexity increased. Log-likelihood ratio tests (difference between −2 log likelihood values [−2LL]) with approximate χ² distribution were used to test model fit between 2 nested models. Exact logistic regression was used for the most parsimonious model to ensure odds ratios were not inflated owing to small cell sizes. Finally, we tested the third hypothesis, examining how satisfaction varies by maternal accuracy across toddler body size, using the Fisher exact test on the restricted sample of accurate mothers.

RESULTS

SAMPLE CHARACTERISTICS

There were 304 mother-toddler dyads recruited to participate; 20 did not complete the TSS and 3 toddlers did not have anthropometric data, leaving a sample size of 281 (92.4%).

About 54% of the toddlers were male and 70.8% were African American, and the mean age was 20.2 months (Table 1). Few toddlers were in less than the fifth weight-for-length percentile (1.4%) and 7.1% were between the fifth and 15th percentile, leading to 8.5% considered underweight for this analysis. Nearly a third of toddlers (29.2%) were considered overweight for this analysis, with 13.9% between the 85th and 95th percentile and 15.3% in more than the 95th percentile.

Mothers ranged in age from 18 to 46 years, 27.4% were married, most were overweight/obese (71.9%), and half were obese (50.2%). Two-thirds (67.3%) were at or below the poverty level (poverty ratio ≤1.0), and most were unemployed (59.9%) and had a high school diploma or equivalent (81.1%). More than half of the families received the Supplemental Nutrition Assistance Program (53.6%), and most received Medical Assistance (73.6%).

ACCURACY

Nearly one-third (30.2%) of mothers selected a silhouette that accurately represented their toddler's true body size, with no difference by toddler age, sex, race, or mother's age, marital status, education, or socioeconomic status.

For the first hypothesis, mothers who were inaccurate had toddlers with a higher mean weight-for-length percentile (73.8) than mothers who were accurate (35.4) (t=12.81; P <.001). The overall prevalence of inaccuracy was highest among mothers of overweight toddlers (94%, all perceived child to be smaller) and lowest among mothers of underweight toddlers (17%, all perceived child to be larger) (P value for Fisher exact test <.001) (Figure 1). Among inaccurate mothers of healthy-weight and overweight toddlers, 96% and 100% perceived their child to be 2 or more silhouettes smaller than their child’s true body size, respectively.

Mothers who were inaccurate had a higher mean BMI (32.8) compared with mothers who were accurate (29.1).
Table 2. Logistic Regression Model to Evaluate Influences on Maternal Accuracy

<table>
<thead>
<tr>
<th>Toddler’s weight status</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>9.13 (2.94-28.36)</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>0.14 (0.05-0.33)</td>
</tr>
<tr>
<td>Overweight</td>
<td>0.71 (0.40-1.27)</td>
</tr>
<tr>
<td>Other race vs African American</td>
<td>0.90 (0.48-1.71)</td>
</tr>
<tr>
<td>Mother’s eduction</td>
<td>0.79 (0.38-1.64)</td>
</tr>
<tr>
<td>Toddler age, mo</td>
<td>0.98 (0.93-1.03)</td>
</tr>
</tbody>
</table>

aReference category: healthy weight, 15th to less than 85th percentile weight for length.

bReference category: normal-weight or overweight mothers.

(t = 3.23; P = .001). A higher prevalence of overweight/obese mothers were inaccurate (75.5%) compared with normal-weight mothers (63.5%) (χ² = 4.21; P = .94).

For the second hypothesis, we analyzed factors associated with maternal accuracy using block logistic regression, gradually adding the proximal and distal factors from the Social Ecological Model hypothesized to be associated with accuracy. In the first logistic regression model, toddler weight status was the only variable predicting maternal accuracy (pseudo R² = 0.19; −2LL = 284.3). Using healthy weight as the reference group, mothers of underweight toddlers were 9.38 times more likely to be accurate (95% CI, 3.13-29.31), and mothers of overweight toddlers were 88% less likely to be accurate (95% CI, 0.05-0.33). The relationship between maternal accuracy and maternal obesity was not significant when adjusting for toddler’s weight status. In the final model (Table 2), all hypothesized variables from the Social Ecological Model were included (toddler weight status, maternal weight status, toddler sex, age, race, and maternal education, pseudo R² = 0.20; −2LL = 282.8). In the model, using healthy weight as the reference group, mothers of underweight toddlers were 9.37 times more likely to be accurate (95% CI, 3.06-28.74), and mothers of overweight toddlers were 87% less likely to be accurate (95% CI, 0.05-0.33). The relationship between maternal accuracy and maternal obesity was not significant when adjusting for toddler’s weight status.

SATISFACTION

Overall, 71.5% of mothers were satisfied with their toddler body size, with 8.9% (n = 25) desiring for their child to be smaller and 19.6% (n = 55) desiring for their child to be larger. Mothers who were dissatisfied had toddlers with a lower mean weight-for-length percentile (50.1) compared with mothers who were satisfied (67.1) (t = 4.57; P < .001). A smaller proportion of mothers of underweight toddlers was satisfied (33%) compared with mothers of healthy-weight (72%) or overweight toddlers (82%) (P < .001) (Figure 2). Most mothers of underweight toddlers wanted their toddler to be larger (67%); however, 21% of mothers of healthy-weight toddlers and 4% of mothers of overweight toddlers also wanted their children to be larger (Figure 2).

In analyzing the third hypothesis, among mothers who accurately ranked their toddler’s body size (n = 85), mothers of healthy-weight toddlers were more likely to be satisfied than mothers of underweight toddlers (76.7% vs 30.0%; χ² = 14.4; P < .001). Only 5 mothers of overweight toddlers accurately ranked their toddler’s body size; therefore, overweight toddlers were not included in this portion of the analysis.

COMMENT

This study had several key findings. First, more than two-thirds of low-income mothers of toddlers inaccurately determined their toddler’s body size, consistent with findings on preschool- and school-aged children.1-7,12,14 Accuracy was highest for underweight toddlers and lowest for overweight toddlers. Mothers of overweight toddlers were more than 88% less likely to accurately perceive their child’s body size. Consistent with the theory of idealization,10 mothers of overweight toddlers perceived favorable attributes with difficulty recognizing

Figure 2. Satisfaction by toddler weight status.
of idealization, demonstrating that satisfaction is higher among overweight toddlers than underweight toddlers, which opposes the theory of idealization. This may reflect parents’ ability to recognize the lack of baby fat in underweight children or a focus among pediatric practitioners on underweight or growth faltering. 

Second, proximal and distal factors hypothesized to be associated with accuracy based on the Social Ecological Model (child’s age, sex, race, maternal education, and weight status) were not related to inaccuracy in a multivariate model that included toddler weight status. The most comprehensive model accounted for only 20% of the variance in accuracy among mothers of low-income toddlers, suggesting that additional factors not accounted for in these models are influencing maternal accuracy. Future studies should incorporate factors that represent higher systems in the ecological model, such as social, cultural, and community-level influences. For example, the “what is common is alright” theory posits that larger body sizes will become more culturally acceptable as populations get larger. In the present study, objectively measured maternal weight status was included to account for this phenomenon but was not related to accuracy when controlling for toddler weight status.

Third, maternal satisfaction was high, with mothers of overweight toddlers the most satisfied and mothers of underweight toddlers the least satisfied. Accurate mothers of underweight toddlers were less satisfied with their toddler’s body size compared with accurate mothers of healthy-weight toddlers. Again, this supports the theory of idealization, demonstrating that satisfaction is higher among mothers who perceive their child’s body size to be within normal, regardless of their actual body size. This finding also highlights the cultural value against underweight among toddlers, perhaps as a marker of less successful parenting, which may be supported by increased recognition of underweight among pediatric practitioners. The lack of satisfaction among mothers of underweight toddlers illustrates the critical role of accuracy in readiness to change. Parents are more likely to adopt health-promoting strategies when they accurately perceive a concern and are not satisfied with the status quo.

Fourth, more than a quarter of mothers of healthy-weight children were dissatisfied with their child’s body size, with more than 20% desiring for their child to be larger than their current body size. Thus, awareness should be raised among parents of very young children as to what constitutes a healthy body weight in toddlerhood. This may also reflect larger social and cultural norms represented in the higher levels of the Social Ecological Model but not addressed in this study. Future studies should more comprehensively apply the Social Ecological Model at all levels to maternal satisfaction with toddler body size.

This study has several limitations. First, because our analysis was cross-sectional, we were unable to determine if accuracy or satisfaction were impacted by a child’s growth trajectory. Second, familial factors that were explored were primarily related to mothers. We did not include data on biological fathers; only about one-quarter of mothers were married. Third, the cut points of less than the 15th percentile and the 85th percentile or more are not clinical indicators of underweight and overweight using weight-for-length growth charts but instead represent equal ends of the distribution. Finally, our findings may not be generalizable to other populations because of the fact that this sample was exclusively low-income, with nearly three-quarters receiving Medical Assistance for their toddler, and the majority of the mothers were overweight or obese.

This study has several strengths. We used validated and objective methods, including a validated toddler silhouette scale to determine maternal accuracy and satisfaction, and objectively measured weight and height of length of mothers and toddlers. Also, we studied a racially and geographically diverse population of low-income mothers and toddlers who are at an increased risk for obesity and growth problems.

Universal assessment of parental perceptions of child body size has been recommended in clinical settings. The American Academy of Pediatrics recommends that pediatric providers plot and discuss BMI for age (2 years and older) or weight for length (ages 0–2 years) for all children. Such in-clinic discussions with parents regarding their child’s weight status improve parental accuracy. The clinical implications of this study emphasize the need for plotting and discussing weight status with families of young children. Additionally, assessment of body size accuracy and satisfaction (ie, using a contour drawing scale) are needed to determine if parents desire their child to be larger or smaller and implications for feeding behaviors.

In conclusion, the majority of mothers were satisfied with their toddler’s body size, yet were inaccurate in their perception of their child’s actual body size. Accuracy and satisfaction differ by the weight status of the toddler. Future studies should examine how parental satisfaction and/or accuracy are related to parenting behaviors including feeding behaviors and encouragement of physical activity.

Accepted for Publication: December 20, 2011.
Correspondence: Erin R. Hager, PhD, Division of Growth and Nutrition, Department of Pediatrics, University of Maryland School of Medicine, 737 W Lombard St, Room 163, Baltimore, MD (ehager@peds.umaryland.edu).

Author Contributions: Dr Hager had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Hager, Candelaria, Latta, Hurley, Wang, Caulfield, and Black. Acquisition of data: Hager, Latta, and Black. Analysis and interpretation of data: Hager, Candelaria, Latta, Hurley, Wang, Caulfield, and Black. Drafting of the manuscript: Hager, Candelaria, and Latta. Critical revision of the manuscript for important intellectual content: Hager, Candelaria, Latta, Hurley, Wang, Caulfield, and Black.
Respecting Cultural Values of Toddler Weight Perception While Discouraging Parental Overfeeding

With our focus on anticipatory guidance, we pediatricians are called on by our professional societies as well as First Lady Michelle Obama’s Let’s Move! campaign to monitor weight trends and counsel appropriately at younger and younger ages. However, our medical assessment of weight status and health impact can conflict with parents’ (and even our own) perceptions of healthy weight; for we all live in a world where the obesity trend has skyrocketed faster than our cultural values and perceptions can change.

In this issue of the Archives, Hager et al1 provide a well-written Exhibit A of this effect. Similar to a wealth of literature on older children, they report that mothers of overweight toddler (aged 12-32 months) were 87% less likely to be accurate in their weight perceptions than were mothers of healthy weight toddlers. More novel contribu-

REFERENCES


