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## Parental Predictions and Perceptions Regarding Long-Term Childhood Obesity-Related Health Risks

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### Abstract

**Objectives**—To assess how parents perceive long-term risks for developing obesity-related chronic health conditions.

**Methods**—A web-based nationally representative survey was administered to 502 U.S. parents with a 5–12 year old child. Parents reported whether their child was most likely to be at a healthy weight or overweight, and the probability that their child would develop hypertension, heart disease, depression, or type 2 diabetes in adulthood. Responses of parents of children with overweight and obesity were compared to those of healthy weight children using multivariate models.

**Results**—The survey had an overall response rate of 39.2%. The mean (SD) unadjusted parent predicted health risks were 15.4% (17.7%), 11.2% (14.7%), 12.5% (16.2%), and 12.1% (16.1%) for hypertension, heart disease, depression, and diabetes, respectively. Despite under-perceiving

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#### Contributor's Statements

Dr. Wright (University of Washington & Seattle Children's Research Institute) 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. Dr. Wright conceptualized and designed the study, obtained funding, analyzed and interpreted the data, and wrote the initial manuscript. Dr. Paula Lozano (Group Health Research Institute), Dr. Elizabeth Dawson-Hahn (University of Washington & Seattle Children's Research Institute), Dr. Dimitri Christakis (University of Washington & Seattle Children's Research Institute), Ms. Wren Haaland (Seattle Children's Research Institute), and Dr. Anirban Basu (University of Washington) all contributed to the study design and interpretation of data, and critically reviewed and revised the manuscript. Dr. Dawson Hahn's time was supported by the Ruth L. Kirschstein National Research Service Award (#T32HP10002). Ms. Wren Haaland's (Seattle Children's Research Institute) time was supported by the Seattle Children's Research Institute.

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their child's current BMI class, parents of children with obesity estimate their children to be at greater risk for obesity-related health conditions than parents of healthy weight children by 5–6 percentage points. Having a family history of a chronic disease, higher quality of care, and older parent age were also significant predictors of estimating higher risk probabilities.

**Conclusions**—Despite evidence that parents of overweight children may not perceive these children as being overweight, parents unexpectedly estimate greater future risk of weight-related health conditions for these children. Focusing communication about weight on screening for and reducing the risk of weight-related diseases may prove useful in engaging parents and children in weight management

### Keywords

Childhood Obesity; Risk Perception; Risk Assessment; Risk Communication; Cardiovascular Disease; Mental Health; Diabetes

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## INTRODUCTION

One-third of U.S. children are overweight or obese.<sup>1</sup> Early obesity increases children's risk for many chronic health conditions throughout their lifespan, including type 2 diabetes, cardiovascular disease, and depression.<sup>1, 2</sup>

In spite of the high prevalence and serious consequences of obesity, there is strong evidence that many parents do not recognize and/or express concern about obesity in their own families.<sup>3–5</sup> Moreover, parents do not think their children will become obese adults.<sup>3, 6, 7</sup> A 2013 poll found that only 15% of American parents were concerned about their child's current weight, and of those concerned parents, 40% believed their child would “grow out of it.”<sup>3</sup>

Despite the robust evidence base around this topic, a key gap in the literature remains. While parents may construe the term “obesity” as a vague health state without tangible consequences, no studies have examined parent predictions that their child will develop specific obesity-related chronic health conditions.

Focusing pediatric clinical conversations on obesity-related health conditions in addition to obesity in general may change parents' perceptions of their child's health risks. Using chronic disease risk prediction tools (e.g. the Framingham risk score) has been shown to motivate behavior change in adults.<sup>8, 9</sup> Accordingly, belief that a child is at risk for adverse chronic health effects in adulthood could be an important motivator for a parent to initiate healthful lifestyle behavior changes. Conversely, parents who see their child as immune to adverse health effects may be unlikely to engage in behavior changes. The objective of this study was to assess parent predictions that a child will be obese and/or develop obesity-related comorbidities in adulthood using a nationally-representative survey of parents. A secondary objective was to identify factors that were associated with higher parental chronic disease predictions, which may be future targets for health education and risk communication efforts.

## METHODS

### Study Population

GfK Custom Research was hired to administer an internet survey to members of their KnowledgePanel®, a nationally-representative panel recruited via probability sampling that covers 97% of the U.S. adult population and has been used to field many national surveys.<sup>10–13</sup> Panel participants were identified using random digit dialing and address-based sampling. GfK provided participants with a computer and internet access if these were unavailable. Panel participants received a small incentive payment (< \$5) from GfK for completing the survey. Parents with at least one child aged 5–12 years old were invited to complete the survey.

### Survey

A 15 to 20 minute survey was administered in December 2014. Approximately 80% of surveys were administered in English, and 20% of surveys were administered in Spanish. If a parent had more than one 5–12 year old child, one child was randomly selected to be the focus of the survey. Parents were asked a series of questions about the child's health, followed by questions about their level of numeracy, the family's health, their assessments of the child's long-term health risks, and the child's quality of healthcare.

### Survey Measures

**Outcomes**—Parents were asked whether they thought their child was most likely to be “underweight, about the right weight, or overweight” in adulthood (the parent's age at the time of the survey). Parents were then asked to predict the chances that their child would develop clinical depression, type 2 diabetes, heart disease (congestive heart failure, coronary heart disease, angina, or heart attack), and hypertension in adulthood quantitatively on a visual analog scale ranging from 0% to 100% (Figure 1) and qualitatively on a 5-point Likert scale ranging from Very Likely to Very Unlikely.

**Demographics**—Data on the respondent's race/ethnicity, family income, education, gender, age, household size, marital status, residence in a metropolitan statistical area (MSA), and census region were obtained from GfK KnowledgePanel® profile data. (Table 1)

**Numeracy**—Parents were asked a series of four validated questions<sup>14–16</sup> (see Appendix A) to assess whether they could correctly interpret proportions and percentages. Parents got one point for each correct answer and the points were summed to create a continuous health numeracy scale ranging from 0 (no correct answers) to 4 (all answers correct) (Table 1).

**Health and Healthcare**—Parents reported whether they considered their child to be currently underweight, about the right weight, or overweight. (Table 1) Parents were asked to report the child's birthdate, height, and weight, the last time the child had their height and weight measured, whether the child had personal or family history of any of the four health conditions, and child health care coverage information. Parents self-reported their own health conditions, height, and weight in the KnowledgePanel® profile data. Parents and

children were classified as healthy (i.e. normal) weight, overweight, or obese by study authors using the zanthro package in Stata<sup>17</sup> and in accordance with CDC guidelines.<sup>18, 19</sup> Self-reported height and weight can be biased due to lack of knowledge, recall error, rounding, or social desirability; parents often underreport child height.<sup>20</sup> Potential biases in adult and child height and weight were corrected using factors from the published literature.<sup>20–23</sup>

Questions from the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey were used to assess parent perceptions of their child's current health and future health prospects, and the child's frequency of healthcare utilization.<sup>24</sup> CAHPS measures were also used to determine the quality of a child's healthcare, defined as the number of best practice recommendations the usual care provider adhered to, ranging from 0 to 6 (see Appendix B for details).

### Statistical Analyses

Subjective parent-predicted probabilities of a child being obese and/or developing the conditions of interest in adulthood were compared by child BMI class (healthy weight, overweight, and obese). The primary outcomes were the parent prediction of whether a child was most likely to be at a healthy weight or overweight, and the parent-predicted probability that a child would develop four obesity-related co-morbidities in adulthood. A secondary outcome was how likely parents perceived each risk to be on a Likert scale. Analyses were conducted separately for each health condition.

A logistic regression was used to assess which factors were associated with parent predictions of a child being overweight or obese in adulthood. For the other primary outcome of the parent-predicted probability that a child would develop four obesity-related co-morbidities in adulthood, various regression model specifications that could account for left-skewed outcomes were tested. A generalized linear model with a Poisson family and log link was chosen to evaluate which factors were associated with the primary outcome—the parent-predicted probability of a child developing one of the four specified health conditions in adulthood. For our secondary outcome measure of perceived likelihood on a categorical Likert scale, we used ordinal logistic regressions to assess what characteristics were associated with perceiving risks as being more likely. We also conducted a sensitivity analysis in which parents' perceived child BMI class (as opposed to the child's actual BMI weight class) was used in regressions of parent-predicted probabilities of a child developing an obesity-related comorbidity.

All regression analyses controlled for the child's BMI class, the child's family history of the health condition, the parent's BMI class, and other health and demographic characteristics. (Table 1) Model covariates were chosen using a backward elimination approach. Stata (version 12) was employed for all analyses with an a priori alpha level of 0.05.<sup>25</sup> The survey package was used to adjust for the complex KnowledgePanel® sampling design.<sup>25</sup> The study protocol was approved by the Western Institutional Review Board (#1148257).

## RESULTS

GfK invited 1,279 KnowledgePanel® members to complete the survey. From this group, 644 members (50.4%) responded to the invitation and were asked to report the height, weight, birthdate, and gender for all 5–12 year old children in their household; those that were unwilling to provide those data or who provided estimates where the z-scores for height, weight, or BMI were  $\geq 5$  or  $\leq -5$  were deemed ineligible. Of the 1,279 invited participants, 502 (39.2% of invited members and 77.9% of those who responded to the invitation) completed the survey. The sample was 61% non-Hispanic white, 11% non-Hispanic Black, 20% Hispanic and 8% other race, and 35% had an annual income below \$50,000. (Table 1) KnowledgePanel® parents who were invited to, but did not complete the survey were significantly less likely than survey participants to have obtained a Bachelor's degree, to be married, to be white, to have an annual income above \$50,000, and were on average 2 years younger than survey completers ( $p < 0.001$ ; Appendix Table 1).

Approximately 51% of survey respondents reported that their child's height and weight was measured in the last three months, and 76% of children were measured within the last 6 months. After corrections to parent-reported height and weight were applied<sup>20, 22</sup>, BMI in this weighted sample of respondents was nationally representative; 35% of 5–12 year old children and 67% of parents were classified as currently overweight or obese, compared to national estimates of 34% and 69%, respectively for similarly aged groups.<sup>26</sup> (Table 1)

A majority (81.2%) of parents of children with overweight and obesity misperceived their child to currently be underweight (5.5%) or about the right weight (75.7%). (Appendix Table 2) Regression analyses adjusted for parent BMI, age, race, and numeracy found that parents of children with obesity, whether or not the parents reported perceiving their child to be overweight or obese, were more likely than parents of healthy weight children to be among the 8% of all parents who predicted that their child would be overweight or obese in adulthood (OR= 2.4, 95% CI: 1.3, 4.7). A parent being obese (OR = 2.2, 95% CI: 1.1, 4.1), being of Hispanic ethnicity (OR = 2.1, 95% CI: 1.1, 4.3), each additional year of parent age (OR = 1.1, 95% CI: 1.0–1.1), and each additional point in the numeracy score (OR = 1.3, 95% CI: 1.0, 1.6) significantly increased the odds of a parent predicting that their children would be overweight or obese in adulthood. (Appendix Table 3)

The mean (SD) unadjusted parent predicted health risks were 15.4% (17.7%), 11.2% (14.7%), 12.5% (16.2%), and 12.1% (16.1%) for hypertension, heart disease, depression, and diabetes, respectively. Roughly 17–20% of parents estimated that their child would have zero risk of developing the four health conditions of interest in adulthood. In unadjusted bivariate analyses, neither parent nor child current BMI class were predictive of parents estimating that their child would have zero risk of developing one of the health conditions in adulthood.

In multivariate regression analyses that adjusted for family history of disease, residence in an MSA, quality of healthcare, parent BMI class, parent age, parent race, and census region, parents of children who were overweight and obese estimated some higher disease risks than parents of healthy weight children. Parents of children with overweight estimated future

disease risks for hypertension that were higher by +3.99 percentage points (95% CI: -0.19, +8.19) for hypertension and +4.18 percentage points (95% CI: +0.61, +7.76) for heart disease compared to parents of healthy weight children. Parents of children with obesity estimated future disease risks that were higher by +5.01 percentage points (95% CI: -0.62, +10.63) for hypertension, by +5.38 percentage points (95% CI: +0.10, +10.66) for heart disease, and by +6.04 percentage points (95% CI: +0.31, +11.78) for depression compared to parents of healthy weight children. Parents children with overweight and obesity did not estimate higher diabetes risks than parents of healthy weight children. (Figure 2)

Parents of children with a family history of disease were found to have reported risk estimates for all four conditions of interest that were 5.1–8.6 percentage points higher ( $p < 0.05$ ) than the predictions of those without a family history of disease. Having higher quality of care (0.69–1.2 percentage points for each additional standard of care met) and older parent age (0.21–0.44 percentage points for each additional year of parent age) were also predictors of predicting higher risk probabilities ( $p < 0.05$ ). Hispanic parents were more likely to estimate lower risks for hypertension, heart disease and depression compared to White parents (-4.5 to -3.6 percentage points,  $p < 0.05$ ). The parent's BMI class was not associated with risk estimates.

In sensitivity analyses that utilized parent-perceived current child BMI class instead of the child's actual current BMI class, parents who considered their child to be currently overweight or obese estimated disease risks that were higher by +8.17 percentage points (95% CI: 1.47, 14.87) for hypertension and +7.03 percentage points (95% CI: -0.33, 14.39) for heart disease relative to parents who considered their child to be currently at a healthy weight or underweight. There were no differences in type 2 diabetes or depression risk prediction between groups.

Overall, 10–16% of parents categorized their child's future health risks as likely or very likely. (Appendix Figure 1) In our ordinal logistic regression that examined characteristics associated with perceiving risks as being more likely, adjusted for family medical history, residence in an MSA, quality of healthcare, parent BMI class, parent age, parent race, and census region, parents of children with overweight were more likely to rank their predicted risk as being in a higher category (unlikely or very unlikely vs. neither likely or unlikely vs. likely or very likely) for hypertension (OR = 1.19, 95% CI: 1.1, 3.3) relative to parents of healthy weight children. Parents of children with obesity were more likely to rank their predicted risk as being in a higher category for hypertension (OR = 1.9, 95% CI: 0.97, 3.8), heart disease (OR = 2.26, 95% CI: 1.1, 4.7), and type 2 diabetes (OR = 2.2, 95% CI: 1.1, 4.4) relative to parents of healthy weight children.

## DISCUSSION

This is the first study to assess the parent-perceived risk that a child will develop obesity-related health conditions in adulthood, and factors associated with higher risk estimates. Our results suggest that obesity-related comorbidity risks are perceived differently than obesity itself. Similar to prior studies<sup>6, 7, 27</sup>, we found that most parents of children with overweight and obesity underestimate their child's current BMI class. While parents of children with

obesity were more likely than parents of healthy weight children to predict that their child would be overweight in adulthood, our parent sample as a whole was unlikely to predict that their child would be overweight or obese in adulthood. Considering these findings, we surprisingly found that parents of children with obesity estimated their children to be at greater risk for developing obesity-related diseases in adulthood compared to parents of healthy weight children, by 5 to 6 percentage points. Parents of children with obesity also perceived their children to be at higher risk than parents of healthy weight children on a Likert Scale.

Accurate parental perception of long-term health risks could motivate a family to engage in behavior change to improve a child's BMI. A recent study by Peyer et al. found that parents who perceived their child to be heavier expressed more concern about child weight.<sup>27</sup> Additionally, parents who engage in childhood obesity treatment programs cite a desire to improve their child's long-term health outcomes as motivation to initiate behavior change.<sup>28, 29</sup> The evidence on the relationship between risk perception and behavior change among adults is mixed<sup>8, 30, 31</sup>, but little is known about this relationship in child populations. Future research should assess whether more accurate health risk perception around specific obesity-related comorbidities would improve health behaviors.

Parents of children with obesity did not estimate higher type 2 diabetes risks than parents of healthy weight children. One explanation for parent reluctance to report that their child was likely to become obese and/or develop diabetes may be stigma around those conditions.<sup>32, 33</sup> While depression is also generally stigmatized, it may not be as strongly associated with obesity as diabetes. The severity of the four conditions did not seem to affect parent responses; respondents in a recent poll reported considering heart disease to be more serious than diabetes, but parents of children with obesity were not more reluctant than parents of healthy weight children to predict high heart disease-related risks.<sup>34</sup>

Parents whose children had high quality healthcare and consistent with another study, whose children had a family history of disease<sup>35</sup>, estimated higher disease risks than their counterparts. These findings suggest that improving physician communication about a child's physical and emotional development and focusing counseling on conditions for which there is a family history may have some benefit. Collection of family medical history is recommended by the American Academy of Pediatrics.<sup>36</sup> Future studies should assess the impact of incorporating these techniques into clinical care on risk perception and patient health behavior.

Hispanic parents were more likely to predict that their child would be overweight or obese in adulthood, but unexpectedly predicted significantly lower cardiovascular and depression risks compared to White parents. This antithetical relationship has also been documented among Hispanic parents of preschool-aged children. Parents reported an awareness of weight-related adverse health outcomes, but a lack of concern specific to that age group.<sup>37</sup>

In the absence of longitudinal studies that follow children from early childhood to late adulthood, mathematical simulation models are a frequently used and the most feasible method for assessing the impact of early obesity intervention on long-term pediatric

risks.<sup>38-41</sup> Future work should compare parents' risk estimates collected in this survey to risk estimates forecasted by validated simulation models to assess whether parents are underestimating their children's long-term health risks.

Finally, this analysis focuses on health-related risk assessment, but obesity also affects social and emotional development throughout the life course.<sup>42</sup> Future research may assess parent predictions of outcomes such as marriage and educational attainment. Risk communication related to these non-health outcomes may also affect uptake of behavior change.

### Limitations

There were significant differences in the demographic characteristics of survey responders and non-responders. Potential respondents were only shown information about the subject (health) and the length of the survey (20 minutes); lower socioeconomic status populations may have limited time to complete long surveys. However, survey responses were weighted to be nationally-representative using probability sample weights. Probability-based internet samples like the one employed in this study have been found to provide the optimal combination of representativeness and self-report accuracy relative to random digit-dialing telephone and online volunteer survey samples.<sup>43</sup> Shorter surveys may improve response rates among low socioeconomic status families.

Results did not include Bonferroni adjustments for multiple comparisons, as this method assumes that the outcomes are independent. Because our outcomes are expected to be correlated with each other, this correction would be too conservative. Instead, we have chosen to report our results with multiple p-values (< 0.05; < 0.01; <0.001) and report the 95% confidence interval, which provides additional information about the magnitude of our effects.

The web-based modality of survey administration may have affected parent responses. On one hand, parents may have been more honest in this anonymous forum, and on the other hand, parents may have also been more likely to misreport their child's height, weight, and perceived weight class. Due to the web-based nature of this survey, there was no way for us to validate parent responses. We were able to correct reported height and weight measurements for self-report biases. Still, given these limitations, it may be helpful to replicate this survey using different modalities (i.e. in-person or by phone). Additionally, if these results are adapted for clinic-based interventions, researchers should consider that responses may differ in face-to-face versus web- or tablet-based interactions.

### CONCLUSION

Some parents of children with obesity do not consider their children to be overweight or obese, but parents of children with obesity in our sample are more likely to estimate their children to be at increased long-term risk for some chronic health conditions compared to parents of healthy weight children. Providers may consider talking with parents about specific comorbidity risks as opposed to obesity in general in order to increase risk perception and subsequent action. Future work should assess whether improved risk



assessment leads to better engagement in behavior change to reduce a child's risk for developing obesity-related co-morbidities in adulthood.

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## Abbreviations

<b>BMI</b>	body mass index
<b>MSA</b>	metropolitan statistical area

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## Appendix A: Numeracy

Four questions were used to assess parents' health numeracy, parent's ability to interpret percentages and proportions. These questions were adapted from questions previously used in the literature.<sup>14–16</sup>

1. Imagine that we flip a fair coin 1,000 times. What is your best guess about how many times the coin would come up heads in 1,000 flips?
2. In the BIG BUCKS LOTTERY, the chance of winning a \$50 prize is 1%. What is your best guess about how many people would win a \$50 prize if 1,000 people each buy a single ticket to BIG BUCKS?
3. In ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets to ACME PUBLISHING SWEEPSTAKES will win a car?
4. Maria drives to work and takes the same route every day. On her way to work, there is a 1 in 96 chance that Maria will drive past a house that is painted blue and a 1 in 57 chance that Maria will drive past a house that is painted white. Which is bigger, Maria's chance of driving past a blue house or her chance of driving past a white house?

## Appendix B: Quality of Care

Healthcare quality was assessed using questions derived from CAHPS measures.<sup>24</sup> The survey asked parents the following questions:

1. In the last 12 months, how often do [CHILD's] doctors or other health providers explain things in a way that was easy to understand?
  - a. Never
  - b. Sometimes
  - c. Usually
  - d. Always
  - e. Don't Know
2. In the last 12 months, has a doctor or other health provider ever discussed [CHILD's] eating or exercise behaviors with you?
  - a. Yes
  - b. No
  - c. Don't Know
3. In the last 12 months, did you seek information or advice about changing [CHILD's] eating or exercise behaviors from a doctor or other health provider?
  - a. Yes
  - b. No
  - c. Don't Know
4. In the last 12 months, has a doctor or other health care provider ever talked to you about [CHILD's]
  - a. Learning ability
  - b. Age-appropriate behaviors
  - c. Moods and emotions
  - d. How much time [CHILD] spends on a computer and in front of TV
  - e. Physical development
  - f. How [CHILD] gets along with others

To improve the efficiency of the survey, Question 4 was presented in a grid, and parents answered "Yes," "No," or "Don't Know." Don't Know responses were categorized as missing.

The responses to question #4 were dichotomized, where a score of 1 was assigned to "yes" responses and a score of 0 was assigned to "no" responses. The six responses were summed to create a scale for quality of care, ranging from 0 (low quality, health provider met no standard of care items) to 6 (high quality, health provider met all standard of care items). This measure composite measure was used as a proxy for quality of care in statistical analyses.

**What's New**

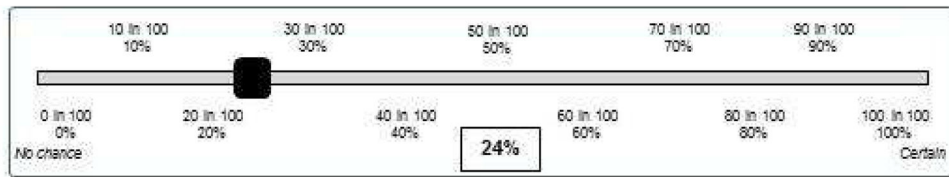
Although most parents think their children are unlikely to become obese adults, parents of children with obesity estimate their children to be at higher risk for developing obesity-related comorbidities in adulthood relative to parents of healthy weight children.

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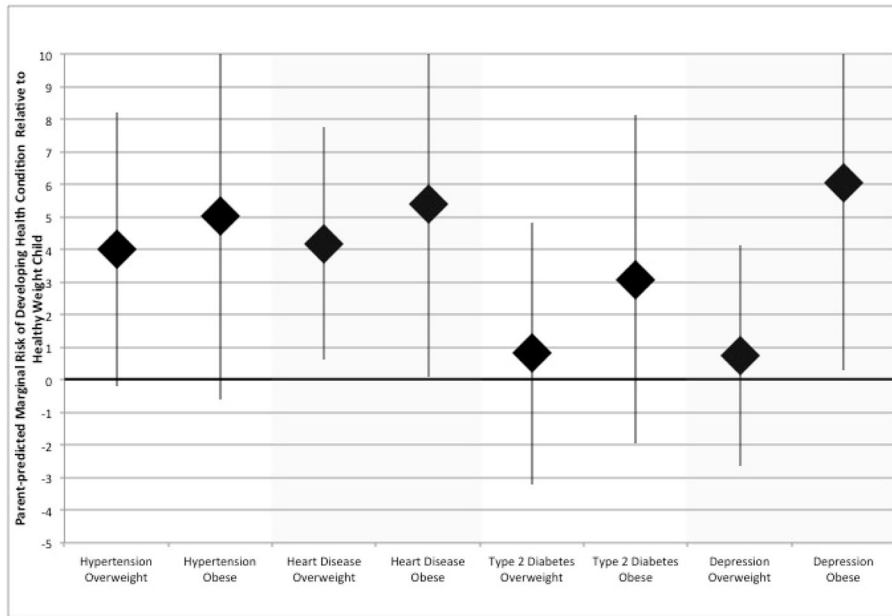
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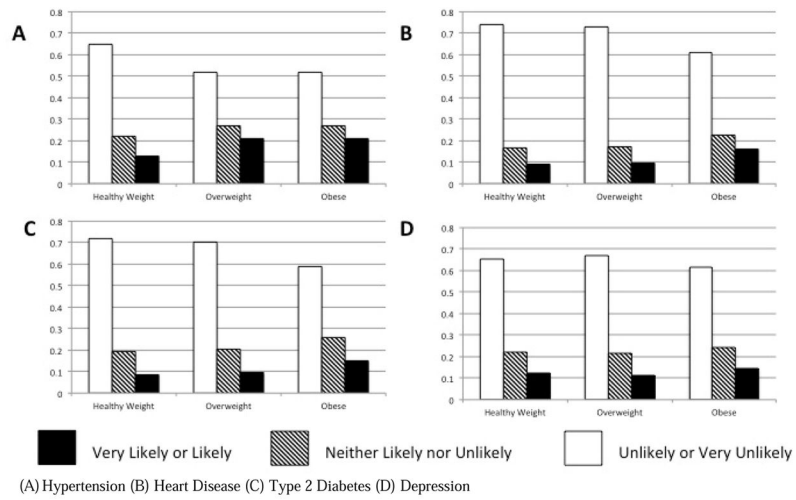
**Figure 1. Visual analog scale**

Parents were asked, “What do you think the chance is that [CHILD] will have [DISEASE] at age [PARENT’S CURRENT AGE]?” for each of the four health conditions on a visual analog scale (pictured). The scale reported numbers in terms of percentages and proportions and parents were able to see exactly what number they had chosen using the slider (any integer from 0 to 100) in the box underneath the scale.



**Figure 2. Marginal difference in parent-predicted child health risk by BMI class (mean and 95% CI)**

Regression models examining the relationship between parent-predicted risk and child current BMI were adjusted for, family history of disease, residence in an MSA, quality of healthcare, parent BMI class, parent age, parent race, and census region.



**Appendix Figure 1.**  
Parent perception of risk likelihood by child BMI class (unadjusted)  
(A) Hypertension (B) Heart Disease (C) Type 2 Diabetes (D) Depression



**Table 1**

Population Demographic and Health Characteristics (n = 502)

Demographic Characteristics	Percentage/Mean (SD)
Female Parent (%)	54.8
Parent Age (years (SD))	39.5 (7.8)
Child Age (years (SD))	8.5 (2.4)
Parent Race/ethnicity (%)	
White, non Hispanic	60.8
Black, non Hispanic	10.7
Hispanic	19.9
Other	8.5
Region (%)	
Northeast	16.7
Midwest	22.1
South	36.5
West	24.7
Residence in a Metropolitan Area (%)	84.5
Income (%)	
<\$50,000	35.3
\$50,000–99,000	35.4
>= \$100,000	29.2
Parent education (%)	
Less than High School	12.7
High School	23.8
Some College	31.4
Bachelor's degree or higher	32.1
Parent Numeracy (# correct answers)	
0	7.1
1	24.2
2	25.3
3	21.6
4	21.8
Number of children in household (n (SD))	2.2 (1.1)
<i>Health Characteristics</i>	
Parent BMI Class, estimated <sup>a</sup> (%)	
Healthy Weight	32.9
Overweight	30.4
Obese	36.7
Child BMI Class <sup>a</sup> , (%)	

Demographic Characteristics	Percentage/Mean (SD)
Healthy Weight	64.8
Overweight	20.8
Obese	14.4
Parent Assessment of Child BMI Class (%)	
Underweight	12.8
About the right weight	79.0
Overweight	8.2
Child has family history of (%)	
Depression	15.1
Diabetes	28.0
Heart Disease	24.5
Hypertension	41.5
Child health insurance (%)	
Private only	60.9
Any public	35.3
Uninsured	2.1
Don't Know	1.7
Child healthcare utilization over the past 12 months (visits) (%)	
None	14.7
One	28.9
Two	29.1
Three or more	27.2
My child seems to be less healthy than other children I know <sup>b</sup> (%)	6.3
I expect my child will live a very healthy life <sup>b</sup> (%)	92.8

Notes: all percentages represent weighted estimates

SD = standard deviation

<sup>a</sup>Height and weight used to calculate BMI were corrected for self-report biases.<sup>20, 22</sup> For adults, healthy weight represents a BMI < 25 kg/m<sup>2</sup>, Overweight represents a BMI ≥ 25 kg/m<sup>2</sup> and < 30 kg/m<sup>2</sup>, and Obese represents a BMI ≥ 30 kg/m<sup>2</sup>. For children, healthy weight represents a BMI < 85<sup>th</sup> percentile for age and sex, Overweight represents a BMI ≥ 85<sup>th</sup> percentile and < 95<sup>th</sup> percentile, and Obese represents a BMI ≥ 95<sup>th</sup> percentile.

<sup>b</sup>“Definitely true” or “mostly true” versus “Don’t know,” “Mostly False,” and “Definitely False”

**Appendix Table 1**

Demographic characteristics of survey responders and non-responders

Category	Participants n=502	Non-participants* n = 777	P
Female Parent (%)	42.8	38.8	0.16
Parent Age (years (SD))	39.5 (789)	37.3 (8.0)	< 0.001
Parent Race/ethnicity (%)			< 0.001
White, non Hispanic	66.5	46.7	
Black, non Hispanic	7.4	15.4	
Hispanic	18.5	31.8	
Other	7.6	6.0	
Region (%)			0.37
Northeast	15.3	14.1	
Midwest	23.5	20.5	
South	33.8	28.3	
West	27.3	27.2	
Residence in a Metropolitan Area (%)	88.1	84.2	0.06
Income (%)			< 0.001
<\$50,000	31.5	48.6	
\$50,000–99,000	37.0	27.9	
>= \$100,000	31.5	23.5	
Parent education (%)			< 0.001
Less than High School	7.2	15.9	
High School	22.9	27.2	
Some College	25.3	32.1	
Bachelor's degree or higher	44.6	24.9	
Number of children in household (n (SD))			
Age 0–1	0.1 (0.3)	0.1 (0.4)	0.49
Age 2–5	0.5 (0.7)	0.5 (0.7)	0.13
Age 6–12	1.3 (0.9)	1.2 (0.8)	0.03
Age 13–17	0.4 (0.7)	0.4 (0.7)	0.18
Number of people in household (n (SD))	4.4 (1.3)	4.4 (1.3)	0.55
Respondent is married (%)	82.3	68.9	<0.001

Note: Percentages are unweighted and may therefore differ from estimates in Table 1

\* 777 non-participants includes 635 of the 1,279 invited participants who did not respond to the invitation; 97 of the participants who responded to the survey invitation, but who refused to provide required child height, weight, or age data; and 45 of the participants who responded to the survey invitation, but provided data where the height, weight, or BMI z-scores were 5 or -5.

**Appendix Table 2**

## Differences in Child Actual BMI Class and Parent-Perceived BMI Class

Actual child BMI class <sup>^</sup>	Parent-perceived BMI class		
	Underweight	About the right weight	Overweight
Healthy weight	16.7%	80.9%	2.4%
Overweight or Obese	5.5%	75.7%	18.8%

<sup>^</sup> Actual child BMI class calculated using parent-reported height and weight estimates. Height and weight used to calculate BMI were corrected for self-report biases.<sup>20, 22</sup> For children, healthy weight represents a BMI < 85<sup>th</sup> percentile for age and sex, Overweight represents a BMI 85<sup>th</sup> percentile and < 95 percentile, and Obese represents a BMI 95<sup>th</sup> percentile.

**Appendix Table 3**

Model Coefficients for Logistic Regression on Parent Predicting Child Would be Overweight/Obese in Adulthood

	<b>OR</b>	<b>95% CI</b>
Child BMI		
Healthy weight	ref	
Overweight	0.95	[0.49, 1.79]
Obese	2.44 **	[1.26, 4.73]
Parent BMI		
Healthy weight	ref	
Overweight	1.16	[0.59, 2.25]
Obese	2.17 *	[1.14, 4.13]
Parent Age (years)	1.07 ***	[1.04, 1.11]
Parent Race		
White	ref	
Black	2.00	[0.73, 5.49]
Hispanic	2.12 *	[1.05, 4.28]
Other	0.87	[0.35, 2.17]
Numeracy (0–4)	1.28 *	[1.02, 1.61]
Constant	0.003	[0.001, 0.02]

Notes: Child age, child gender, child frequency of healthcare utilization, quality of child healthcare, child health insurance, census region, residence in an MSA, family income, parent numeracy, parent education, and household size were tested, but ultimately dropped from the model due to lack of significance.

\* Statistically significant at P = 0.05

\*\* Statistically significant at P = 0.01

\*\*\* Statistically significant at P = 0.001

BMI: Body Mass Index; MSA: Metropolitan Statistical Area; OR: Odds Ratio