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Parental optimism about childhood obesity-related disease risks

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Abstract

Objectives—Most parents believe childhood obesity is a problem for society, but not for their own children. We sought to understand whether parents' risk assessment was skewed by optimism, the tendency to overestimate one's chances of experiencing positive events.

Methods—We administered a national web-based survey to 502 parents of 5–12 year old children. Parents reported the chances that (a) their child and (b) “a typical child in their community” would be overweight or obese, and develop hypertension, heart disease, type 2 diabetes, and depression in adulthood. Respondents self-reported demographic and health information, and we obtained demographic and health information about the typical child using zip-code level census and lifestyle data. We used regression models with fixed effects to evaluate whether optimism bias was present in parent predictions of children's future health outcomes.

Results—Parents had 40 times lower adjusted odds (OR= .025, $p < 0.001$, 99% CI: 0.006, 0.100) of predicting that their child (versus a typical child) would be overweight or obese in adulthood. Of the 20% of parents who predicted their child would be overweight in adulthood, 93% predicted the typical child would also be overweight in adulthood. Controlling for health and demographic characteristics, parents estimated that their children's chances of developing obesity-related co-morbidities would be 12–14 percentage points lower those that of a typical child.

Conclusions—Parent risk assessment is skewed by optimism, among other characteristics. More accurate risk perception could motivate parents to engage in behavior change.

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INTRODUCTION

Parental recognition and concern about child overweight has been linked to weight loss attempts and the adoption of healthful behaviors such as limiting screen time, monitoring a child's diet and increasing child physical activity.^{1, 2} A lack of recognition and concern may dissuade parents from engaging in healthful behavior change to address their child's weight.^{3, 4} Fewer than 50% of parents of overweight and obese children report perceiving their child to be overweight.³⁻⁷ Furthermore, many parents do not believe that their children will be overweight or obese as adults.^{8, 9} From these data and other anecdotes^{9, 10} the question arises as to whether optimism creeps into parents' perception of risk for their children and the behaviors they consequently exhibit regarding investments in child health.^{11, 12}

Optimism is defined by Weinstein as when "people believe that negative events are less likely to happen to them than to others and positive events are more likely to happen to them than to others"¹³ and optimism bias is defined by Sharot as "the difference between a person's expectation and the outcome that follows."¹⁴ However, without individual-level data on parental perceptions of their child's own future outcomes and the average child's future outcomes, it is difficult to tell whether optimism, optimism bias, misperception, inaccuracy, discrepancy, numeracy, or other family- or community-level factors influence parent risk assessment for long-term health outcomes. Practitioners could use better knowledge of what drives parent beliefs to capitalize on or circumvent observed biases and improve parental risk assessment. In previous work, we examined the impact of misperception, numeracy, and family history on parental risk assessment.⁸ The objective of this study was to identify whether parents are optimistic, or whether other previously mentioned factors influence biases in parental expectations about their child's future health.

METHODS

Study Population

We invited 1,279 parents of 5–12 year old children in the GfK Custom Research KnowledgePanel®, a nationally-representative internet panel, to complete "a survey about child health." Details on how panel participants are recruited are published elsewhere.^{8, 15, 16} From this group, 644 members (50.4%) responded to the invitation and 502 (39.2%) completed the survey.

Survey

Parents were invited to complete a 15 to 20 minute survey in English or Spanish in December 2014. If a parent had more than one 5–12 year old child, one child was randomly selected to be the focus of the survey.

Survey Measures

Main Outcome—The primary outcomes were parental predictions about a child's future health outcomes including: a child's likely future weight status (underweight, "about the right weight", or overweight in adulthood, defined as the parent's age at the time of the

survey), and the chances that a child would develop obesity-related co-morbidities: type 2 diabetes, heart disease (congestive heart failure, coronary heart disease, angina, or heart attack), hypertension, or clinical depression in adulthood, measured quantitatively on a visual analog scale ranging from 0% to 100%. Parents answered the same questions about their child and about a typical child in their community.

Demographics—We collected data on the respondent’s race/ethnicity, household income, education, gender, age, and zip code. The final sample was 61% non-Hispanic white, 11% non-Hispanic black, 20% Hispanic and 8% other race, and 36% had an annual income below \$50,000. (Table 1) Zip code-level race, household income, and parental education, for the typical child in the community (defined as the majority in the zip code), the comparison group for the analysis, were derived from the U.S. Census and the Esri® Tapestry database, a system that classifies zip-codes based on their socioeconomic and demographic characteristics.¹⁷ If, for example, 51% of individuals in a zip code were Hispanic, we assumed that the typical child was Hispanic.

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, and to have an annual income above \$50,000 ($p < 0.001$).

Approximately 75% of respondents lived in zip codes that were majority white race, 5.0% of respondents lived in ones that were majority black race, 17.0% of respondents lived in ones that were majority Hispanic race, and 2.6% of respondents lived in ones that were majority other race. Respondents were wealthier than the majority of households in their community. Compared to 29.2% of respondents who made over \$100,000 per year, 6.9% of respondents lived in zip codes where the majority of households earned more than \$100,000 per year. Among the respondents, 16.3% lived in a zip code where the majority of individuals had a high school education or less, 50% of lived in a zip code where the majority of individuals had completed some college, and 33.2% lived in a zip code where the majority of individuals had completed a Bachelor’s degree or higher.

Health and Healthcare—Parents reported whether they considered their child to be currently underweight, “about the right weight”, or overweight. They also reported their child’s birthdate, height, and weight and their own height and weight. Parents and children were classified as healthy (i.e. normal) weight, overweight, or obese using the zanthro package in Stata¹⁸ and in accordance with CDC guidelines.^{19, 20} Adult and child height and weight were corrected for self-report biases.^{21–24} BMI in the sample was nationally representative; 35% of 5–12 year old children and 68% of parents were overweight or obese compared to national estimates of 34% and 69%, respectively for similarly aged groups. (Table 1)²⁵

BMI class for a typical child in the community was derived using small area estimation techniques and zip code-level demographic and lifestyle factors obtained from the U.S. census and the Esri® Tapestry database.^{17, 26} We describe our approach to estimating BMI class for a typical child in the Appendix. Using this approach, we estimated that 95.5% of

respondents lived in a zip code where the majority (i.e. over 50%) of children were at a healthy weight.

Statistical Analyses

Fixed effects econometric models, an alternative method for analyzing nested data, were employed to analyze study data. In this approach, two observations were created for each parent's rating (i.e. one observation for a parent's predictions about their own child and a second observation for a parent's predictions about a typical child) and each parent served as his or her own control. Therefore, we are able to assess within-parent differences about their future health predictions for their child versus their predictions for a typical child in their community. A major benefit of this approach is the ability to control for observed and unobserved participant characteristics that may be correlated with the community in which they live; this approach therefore circumvents omitted variable biases.

Dependent variables were the parent-predicted BMI class for a child in adulthood and the parent-predicted probabilities that a child will develop obesity-related co-morbidities in adulthood. A fixed effects logistic regression was used to predict child weight classification in adulthood for parents using child status as the primary predictor. Similarly, a series of fixed effects linear regression models were used to determine the degree to which parents predicted a child would develop each of the four obesity-related co-morbidities in adulthood using child status as the primary predictor. Analyses controlled for health and demographic factors that varied between respondent parents and typical parents in the community, including the child's BMI class, race/ethnicity, parent education, and household income. Analyses were conducted separately for each health condition (future overweight, hypertension, heart disease, type 2 diabetes, and clinical depression). Regression models were not sensitive to alternative specifications (e.g. generalized linear model).

To account for multiple comparisons, a conservative a priori $\alpha = 0.01$ was used to assess statistical significance of results and 99% confidence intervals are reported. Two-sided comparisons were used. Stata (version 14) was employed for all analyses.²⁷ The survey package was used to adjust for the complex KnowledgePanel® sampling design.²⁷ The study was approved by the Western Institutional Review Board.

Code availability

Details are available from the authors.

RESULTS

The vast majority (78.9%) of parents (n = 396) predicted that their child would be “about the right weight” in adulthood whereas only 27.7% of parents (n = 139) predicted that the typical child in the community would be “about the right weight” in adulthood. Among parents who predicted that their child would be about the right weight in adulthood, 33.4% predicted that a typical child would be about the right weight and 66.6% predicted that a typical child would be overweight or obese in adulthood. Of those parents who predicted that their child would be overweight in adulthood (n = 106), nearly all (92.7%) predicted that the typical child would also be overweight or obese in adulthood.

In the model assessing future overweight, adjusting for fixed effects only, parents had 26 times lower odds of predicting that their child, versus a typical child, would be overweight or obese in adulthood (OR = 0.038, 99% CI: 0.016 – 0.089) (Table 2, Model 1). Adjusting for fixed effects, the BMI class for both the parent's child and the typical child in the community, and differences in income, education, and race of the parent's own child versus the typical child, parents had 40 times lower odds of predicting that their child, versus a typical child, would be overweight or obese in adulthood (OR = 0.025, 99% CI: 0.006, 0.100). No demographic characteristics significantly influenced parent predictions (Table 2, Model 2).

Parent mean (SD) estimated probabilities for their own child developing hypertension, heart disease, type 2 diabetes, and depression were 15.4% (17.7), 11.2% (14.7), 12.1% (16.1), and 12.5% (16.3), respectively. Parent mean (SD) estimated probabilities for a typical child were 28.8% (20.4), 22.5% (18.8), 25.7% (19.4), 26.1% (19.1), respectively.

In analyses adjusting for fixed effects and health and demographic characteristics, parents' estimated probabilities of developing hypertension, heart disease, type 2 diabetes, and depression were 13.3, 11.6, 13.4, and 14.1 percentage points lower for their child versus a typical child, respectively (Table 3). For depression, being of black race decreased the parent risk prediction by 9.7 percentage points. No other demographic factors had a significant impact on parent risk predictions. (Table 3)

DISCUSSION

Controlling for demographic and health characteristics, parents of 5 to 12 year old children were almost 40 times less likely to predict that their child, versus a typical child in their community, would be overweight or obese in adulthood. Parents also estimated their own children to be less likely than typical children to develop obesity-related co-morbidities in adulthood. These results suggest that parents are optimistic with respect to long-term obesity-related health risks: parental predictions align with their preferences.¹³

Differences in respondent predictions for their own child versus for a typical child may be driven by the fact that the parent's family does not resemble the typical demographics in the community, which we controlled for in our fixed effects model. But demographic characteristics were not especially predictive of outcomes. Black parents did estimate that their children would have significantly lower risks of developing depression relative to children of white parents. These findings raise an opportunity for thinking about intervention tailoring for different racial or cultural groups.

Sharot suggests that optimism is ubiquitous and can be protective in part by facilitating health-promoting activities.¹⁴ By her reasoning, individuals' belief in a healthful future would motivate them to act in a salubrious manner.¹⁴ In contrast to findings by Chen et al. who found accurately perceived weight was associated with attempted weight loss², there is some evidence that parental recognition of child overweight may have unexpected consequences.³⁴ Several recent studies have found that children of parents who identified their child as overweight were more likely than their counterparts to view their body size

negatively and are at risk for future weight gain.^{35–37} Similarly, adolescents with overweight who accurately view themselves as being overweight are more likely to gain weight over time than their counterparts who view themselves as normal weight.³⁸

While this is troubling, Katz suggests that a focus on long-term health may counteract our obsession with weight.⁴ Our own previous research suggests that parents may think differently about obesity than they do about obesity-related co-morbidities.⁸ Risk communication messages that focus more on obesity-related comorbidities than obesity itself may avoid some of the unintended negative consequences around child body image. Accurate comorbidity risk perception may be an important factor in encouraging positive parental behavior change to attenuate risks.

The counterintuitive observed outcomes associated with parental recognition of overweight support the argument that giving parents knowledge about a child's weight status is not enough to ensure improved health.⁴ Practitioners must give parents the tools and skills needed to engage in obeseogenic behavior change—tools and skills conferred to parents in intensive obesity interventions that have known efficacy.³⁹

Another approach for detecting optimism may be to measure dispositional optimism using a measure such as the Life Orientation Test and assessing whether disposition is associated with parent predictions.²⁸ Future work should conduct such an analysis to assess whether the findings in this manuscript are robust.

While it is the focus on this manuscript, optimism is not the only potential source of bias. However, good tools exist for addressing other sources of biases such as health numeracy and literacy.^{29–33} Understanding that optimism is an additional source of bias will allow researchers to develop strategies and tools to help parents think more appropriately about long-term child outcomes if corrections to parent expectations are warranted.

With respect to the observed optimism, several risk communication strategies may help improve risk perception. Sharot argues that optimism bias is resistant to disconfirming information and evidence because people respond more to positive information about the future than to negative information about the future.¹⁴ Therefore, building upon Sharot's research and research by Rothman et al, on gain and loss-framing⁴⁰, presenting the alleviation of future health risks to parents in a positive light as a gamble they could potentially win (e.g., “You could increase your child's chance of avoiding type II diabetes in adulthood by improving his health habits.”) as opposed to a potential loss (e.g., “Maintaining your child's current eating habits will increase her chance of developing type II diabetes in adulthood.”) may help engage parents in behavior change. Weinstein suggests that previous personal experience with an event increases the likelihood that people will believe their own chances are greater than average.¹³ Therefore, focusing on health conditions for which a child has a family history may improve engagement. Because unrealistic optimism is rooted in uncertainty, grounding parents' expectations in empirical data, or presenting a child's risks relative to other children in their community may also help to counteract unproductive optimism and inaccurate risk perception.^{14, 41–43} Information should be presented to parents in a way that is accessible, using icon arrays, color coding,

and proportions to differentiate between risk levels to reduce disparities in risk predictions.^{31, 44–46} These strategies may encourage parents to engage their family in evidence-based care to address child overweight.

Limitations

Demographics and the BMI class for a typical child were estimated using zip code-level characteristics²⁶, which may not represent the community that parents envisioned. Given that national surveys are not representative at a block-group level and that each parent would define their community differently, we believe this is the best approach to estimate community-level BMI. Our estimation of BMI class utilizes race, income, and a variety of zip-code level factors, improving the representativeness of the data.

Survey respondents were more likely than non-respondents to be less educated, non-white, and single or divorced. Given the 20-minute length of the survey, these populations may have been less inclined to complete the survey due to limited time. All survey responses were adjusted using probability sample weights to ensure U.S. national representativeness.

Due to our use of a fixed effects model, we do not assess the random effects of parent weight status on optimism. However our previous work found that parent weight class did not influence parental predictions of a child's future weight class.⁸

Lastly, we did not ask parents to differentiate between overweight and obesity. Prior studies have demonstrated parents do not accurately assess their child as being overweight or obese until their child is at the 99.7th percentile,⁴⁷ and that parents of children with obesity are more likely to categorize their child as overweight than obese.⁴⁸ Therefore, our use of the term “overweight” may have allowed us to more accurately reflect parent perceptions than if we had used the term “obese.”

CONCLUSIONS

Parent risk assessment is skewed by optimism and some sociodemographic characteristics. The desire to avoid future obesity-related co-morbidities may influence parental willingness to engage in behavior change⁴⁹, therefore, it may be important to improve parent assessment of obesity-related health risks in order to improve uptake of behavior change. Evidence-based risk communication strategies can be utilized to compensate for some of these biases, and future work should aim to adapt these strategies for childhood obesity-related risk communication and evaluate them for use in clinical practice.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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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. Wright's time was supported by the University of Washington Institute for Translational Health Sciences (UL1 TR000423). Dr. Dawson Hahn's time was supported by the Ruth L. Kirschstein National Research Service Award (#T32HP10002). Ms. Wren Haaland (Seattle Children's Research Institute) time was supported by the Seattle Children's Research Institute.

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Abbreviations

BMI body mass index

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Table 1

Population Demographic and Health Characteristics

<i>Demographic Characteristics</i>	<i>Survey n= 502 Percentage/Mean (SD)</i>
Parent Race/ethnicity (%)	
White, non Hispanic	60.8
Black, non Hispanic	10.7
Hispanic	19.9
Other ^b	8.5
Income (%)	
<\$50,000	35.3
\$50,000–99,000	35.5
>= \$100,000	29.2
Parent education (%)	
High School or Less	36.5
Some College	31.4
Bachelor's degree or higher	32.1
Number of children in household (n (SD))	2.2 (1.1)
<i>Health Characteristics</i>	
Parent BMI Class, estimated ^a (%)	
Healthy Weight	31.9
Overweight	30.3
Obese	37.7
Child BMI Class ^a (%)	
Healthy Weight	64.8
Overweight	20.8
Obese	14.3
Parent Assessment of Current Child BMI Class (%)	
Underweight	12.3
About the right weight	79.7
Overweight	8

Notes: all percentages represent weighted estimates

SD = standard deviation

^aHeight and weight used to calculate BMI were corrected for self-report biases. For adults, healthy weight represents a BMI < 25 kg/m², Overweight represents a BMI ≥ 25 kg/m² and < 30 kg/m², and Obese represents a BMI ≥ 30 kg/m². For children, healthy weight represents a BMI < 85th percentile for age and sex, Overweight represents a BMI ≥ 85th percentile and < 95th percentile, and Obese represents a BMI ≥ 95th percentile.

^bOther category includes respondents who indicated that they were of two or more races, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaska Native

Table 2

Model Coefficients for Logistic Regression on Outcome of Parent Predicting Child Will be Overweight or Obese in Adulthood

	Model 1		Model 2	
	OR	99% CI		99% CI
Subject				
Typical Child	ref		ref	
Your Child	0.038	[0.016, 0.089]	0.025	[0.006, 0.100]
BMI Class^a				
Healthy Weight			ref	
Overweight			0.695	[0.049, 9.872]
Obese			4.932	[0.683, 36.559]
Race				
White			ref	
Black			3.56	[0.366, 34.654]
Hispanic			2.011	[0.104, 38.892]
Other ^b			0.322	[0.001, 78.797]
Education				
High School or less			ref	
Some College			8.136	[0.962, 68.798]
College			5.411	[0.421, 69.590]
Income				
< \$50,000			ref	
\$50,000–99,999			0.643	[0.111, 3.717]
≥ \$100,000			0.556	[0.037, 8.449]

BMI: Body Mass Index; OR: Odds Ratio; ref = reference category

^aHeight and weight used to calculate BMI were corrected for self-report biases. For children, healthy weight represents a BMI < 85th percentile for age and sex, Overweight represents a BMI 85th percentile and < 95 percentile, and Obese represents a BMI 95th percentile.

^bOther category includes respondents who indicated that they were of two or more races, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaska Native

Table 3
Model Coefficients for Regression on Outcome of Parent Predictions of Future Health Risks

Subject	Hypertension		Heart Disease		Type 2 Diabetes		Depression	
	Coefficient	99% CI	Coefficient	99% CI	Coefficient	99% CI	Coefficient	99% CI
Typical Child	ref		ref		ref		ref	
Your Child	-13.234	[-16.302, -10.166]	-11.804	[-14.770, -8.837]	-13.204	[-16.319, -10.087]	-14.131	[-17.077, -11.185]
BMI Class^a								
Healthy Weight	ref		ref		ref		ref	
Overweight	1.259	[-5.275, 7.792]	1.009	[-4.006, 6.024]	1.691	[-3.621, 7.004]	-1.132	[-6.116, 3.852]
Obese	0.477	[-6.493, 7.447]	0.988	[-5.509, 7.486]	1.248	[-5.428, 7.924]	2.939	[-3.382, 9.261]
Race								
White	ref		ref		ref		ref	
Black	-2.458	[-11.071, 6.156]	-5.566	[-12.199, 1.067]	0.086	[-6.815, 6.988]	-9.702	[-16.273, -3.131]
Hispanic	-3.704	[-12.415, 5.007]	-5.792	[-12.751, 1.167]	-3.92	[-11.174, 3.335]	-5.521	[-12.416, 1.374]
Other ^b	-1.972	[-10.856, 6.913]	-0.084	[-8.139, 7.971]	-1.244	[-9.691, 7.203]	-5.372	[-13.356, 2.612]
Education								
High School or less	ref		ref		ref		ref	
Some College	0.538	[5.143, 6.219]	1.511	[-2.893, 5.915]	1.071	[-3.528, 5.670]	-1.611	[-5.961, 2.739]
College	-1.936	[-7.934, 4.062]	0.269	[-5.397, 5.934]	-1.881	[-7.762, 3.999]	-1.468	[-7.064, 4.128]
Income								
< \$0,000	ref		ref		ref		ref	
\$50,000-99,999	1.252	[-3.571, 6.075]	0.783	[-3.161, 4.726]	0.565	[-3.564, 4.692]	-1.865	[-5.766, 2.036]
>= \$100,000	1.331	[-5.457, 8.119]	3.61	[-2.238, 9.606]	-0.537	[-6.856, 5.781]	1.077	[-4.864, 7.019]

BMI: Body Mass Index; OR: Odds Ratio; ref = reference category

^aHeight and weight used to calculate BMI were corrected for self-report biases. For children, healthy weight represents a BMI < 85th percentile for age and sex, Overweight represents a BMI 85th percentile and < 95 percentile, and Obese represents a BMI 95th percentile.

^bOther category includes respondents who indicated that they were of two or more races, Asian, Native Hawaiian/Pacific Islander, American Indian/Alaska Native