Parental Perception of Weight Status and Weight Gain Across Childhood

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abstract

BACKGROUND AND OBJECTIVE: Parents of children who are overweight often fail to accurately identify their child's weight status. Although these misperceptions are presumed to be a major public health concern, little research has examined whether parental perceptions of child weight status are protective against weight gain during childhood. Our objective was to examine whether parental perceptions of child weight status are associated with weight gain across childhood.

METHODS: Data from the Longitudinal Study of Australian Children were used to assess parental perceptions of child weight status and to examine changes in researcher measured child BMI *z* scores across childhood, from 4 to 13 years old. Participants included 3557 Australian children and their parents.

RESULTS: Children whose parents perceived their weight as being "overweight," as opposed to "about the right weight," gained more weight (increase in BMI *z* score) from baseline to follow-up in all analyses. This finding did not depend on the actual weight of the child; the association between perceiving one's child as being overweight and future weight gain was similar among children whose parents accurately and inaccurately believed their child was overweight.

CONCLUSIONS: Contrary to popular belief, parental identification of child overweight is not protective against further weight gain. Rather, it is associated with more weight gain across childhood. Further research is needed to understand how parental perceptions of child weight may counterintuitively contribute to obesity.

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WHAT'S KNOWN ON THIS SUBJECT: Parental misperceptions of child weight status are common, but we do not know whether parental identification of child overweight is protective against weight gain across childhood or whether it may be associated with increased weight gain.

WHAT THIS STUDY ADDS: Contrary to popular belief, these findings suggest that a parent's perception of his or her child as "overweight" is not a protective factor against weight gain and is instead associated with an increased risk of future weight gain across childhood.

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The health consequences of childhood obesity are well recognized. In the United States alone, >15% of children are classed as being of obese body weight.[1,2] One consequence of the worldwide obesity pandemic is that more people are now classified as overweight than "normal" weight in many countries.[3] With overweight now the norm, both medical professionals and the general public have difficulty identifying who is overweight or obese.[4–6] Consistent with this evidence, parents of children who are overweight often fail to recognize their child as overweight.[7,8]

A common assumption is that parental failure to recognize childhood overweight is a major public health concern[7–9] because parents regulate both what a child eats and his or her opportunities for physical activity. Parental perceptions of child weight status are a key part of many obesity intervention and prevention programs, such as school measurement programs in the United Kingdom and United States, in which parents receive feedback about their child's weight status.[10–12] The cornerstone of such programs rests on the assumption that parents will be better placed to address their child's weight when they perceive it accurately.[13] Evidence of the effectiveness of these types of interventions is limited, and it is not clear that altering parental perceptions of child weight status has an effect on the child's weight.[11] Although accurate parental identification of child overweight is thought to be an important step in challenging childhood obesity, an opposing view is that the stigma attached to the label of being "overweight" may actually be more harmful than beneficial.[14,15] Overweight is a stigmatized condition,[16] and identifying oneself as overweight is stressful[17] and associated with maladaptive coping responses[18] that could lead to weight gain.[19] For example, regardless of actual weight, adolescents who reported having been labeled as "too fat" by a family member or peer were more likely to become obese nearly a decade later.[20]

To date, few longitudinal studies have examined whether parental identification of overweight is associated with more or less weight gain across childhood. The 2 studies[21,22] that examined the association between parental perceptions of child weight status and weight gain produced mixed findings. The mixed findings may be due, in part, to the use of small nonrepresentative samples and self-reported measures of child weight change. The aim of the present research was to examine the relation between parental perceptions of child weight status and longitudinal changes in weight across childhood. To achieve this aim, we made use of recently collected nationally representative data from the Longitudinal Study of Australian Children (LSAC), which allowed us to track changes in objectively measured child weight from ages 4 to 13 years.

METHODS

Sample Information

The LSAC is a longitudinal cohort study of Australian children and their families. In 2004, 2 representative cohorts of Australian children (infants and children aged 4–5 years) were recruited into the study. For detailed information about the LSAC see Soloff and Johnstone.[23] In the current study, we made use of data from children and their families recruited into the 2004 older cohort (ie, the children were 4 or 5 years at entry). In this cohort, parents reported their perceptions of their child's weight status and anthropometric measurements of child weight were taken at every assessment from ages 4 to 5 years through ages 12 to 13 years at regular (2-year) intervals. The infant cohort of LSAC did not measure parent perceptions of their child's weight and thus could not be included in the analyses. Parental written informed consent for each studied family was obtained and the protocols for the LSAC study were approved by the Australian Institute of Family Studies Ethics Committee.

Response Rate

The response rate for the older cohort in the overall LSAC sample was 80%.[24] Not all families had complete data on the variables of interest for the current study, however. At the baseline assessment at age 4 to 5 years, 4598 families had information on all variables necessary for the analysis. At the most recent assessment at age 12 to 13 years, a total of 3557 of the children were measured again. The main analysis is based on this sample size.

Measurement of Child BMI

A trained researcher took measurements of child weight and height during the in-home interview. Weight was measured using glass bathroom scales (children were in light clothing) and recorded to the nearest 50 g. Height was measured by using a portable stadiometer and recorded to the nearest 0.1 cm. Age- and gender-specific child BMI *z* scores were calculated according to Centers for Disease Control and Prevention growth charts[25] with increases in BMI *z* scores denoting weight gain.

Parental Perceptions of Weight Status

As part of an in-home visit interview about the child's health, parents (97% mothers) were asked to select a response to the question "Which of these best describes your child?"; responses were underweight, normal

TABLE 1 Descriptive Statistics for Participants at Baseline (Age 4–5 Years; $N = 3557$)

Variable	%
Underweight children	4.8
Healthy-weight children	75.4
Overweight/obese children	19.7
Female	48.5
Indigenous/Aboriginal	2.7
Chronic conditions	19.5

Child weight status determined according to international standards developed by Cole et al.[26,27]

TABLE 2 Parental Perceptions of Child Weight Status (Age 4–5 Years; $N = 3557$)

	Underweight Perception	Normal Weight Perception	Overweight Perception
Underweight children	77	94	1
Normal weight children	375	2291	16
Overweight/obese children	9	563	131

weight, somewhat overweight, very overweight, don't know. In the current study, as in previous research on parental perceptions of child weight status,[7] our interest was in identification of childhood overweight; thus, parents who identified their child as being somewhat or very overweight were combined and categorized as having perceived their child as being "overweight."

Demographic Variables

A range of demographic variables were measured as part of LSAC. We made use of measured demographic variables likely to be associated with either child weight gain or parental perceptions of child weight status to control for these variables in analyses examining the longitudinal association between parental perceptions of child weight status and child weight gain. These variables included child gender, household income, number of child medical conditions, ethnicity, household language use, and baseline child BMI *z* score. In a further set of analyses we also examined the effect of including parental BMI (both mother and father) as additional control variables.

Analysis Strategy

To assess the longitudinal association between parental perceptions of child weight status and child weight gain (operationalized using BMI *z* score data), we made use of OLS linear regression models to predict follow-up child BMI *z* score while controlling for baseline BMI *z* score and all other demographic variables. Because parents could perceive their child as being underweight, normal weight, or overweight ("somewhat" or "very" combined), we used dummy coding to compare the effect of perceived overweight and perceived underweight to perceived normal weight in the same regression models. In our main analysis, we examined the statistical effect of parental perceptions of child weight status measured at the earliest baseline time point (age 4–5 years) on child weight measured at age 12 to 13 years (the most current available data). We also examined the effect of parental perceptions of child weight status on weight gain at 2-year intervals to test whether any effect of parental perceptions of child weight status on weight gain was limited to a specific period in childhood or was observed consistently across childhood. In an additional set of analyses, we also computed interaction terms between parental perceptions of weight status (overweight and underweight separately) and baseline child BMI *z* score. This final analysis allowed us to examine whether any statistical effect of perceived weight status on weight gain was moderated by the child's actual weight at baseline.

RESULTS

Sample Characteristics

At baseline (age 4–5 years in 2004), 19.7% of children were overweight or obese and 75.4% were of "normal" weight. The sample was predominantly white. See Table 1 for sample characteristics.

Parental Perceptions of Weight Status

A substantial proportion of overweight children were perceived as being "normal weight" by their parents. Children of parents who perceived their weight as being "overweight" tended to be in either the "normal" or overweight range, whereas children of parents who perceived their weight as being "underweight" tended to be in the underweight or "normal" weight range (Table 2).

Parental Perceptions of Overweight: Longitudinal Changes to Child BMI

Parental perceptions of overweight measured at age 4 to 5 years predicted increases in BMI *z* scores from age 4–5 to 12–13 years: all children gained weight, but parents who perceived their child's weight status as "overweight" had children who gained more weight across the 8-year follow-up compared with children whose parents perceived their weight as being "normal" (Table 3). Controlling for parental BMI did not attenuate the statistical significance of this effect (see Supplemental Tables). Moreover, we found that this association was observed across childhood, with parental perceptions of child overweight consistently predicting more weight gain across all of the 2-year intervals during the study (Table 3). Thus, a parent identifying his or her child as overweight was not protective against weight gain but was instead associated with greater weight gain across childhood.

TABLE 3 Association Between Parental Perception of Weight Status and Longitudinal Change in Weight

	4–5 to 12–13 Years		4–5 to 6–7 Years		6–7 to 8–9 Years		8–9 to 10–11 Years		10–11 to 12–13 Years	
	N = 3557		*N* = 4112		*N* = 3796		*N* = 3520		*N* = 3073	
	B	95% CI	B	95% CI	B	95% CI	B	95% CI	B	95% CI
Gender	0.05	−0.01 to 0.10	−0.04	−0.07 to 0.01	−0.06	−0.09 to −0.02*	−0.09	−0.13 to −0.05**	0.14	0.11 to 0.18**
Income[a]	0.03	0.01 to 0.04**	0.01	0.01 to 0.02*	0.01	0.00 to 0.00	−0.01	0.00 to 0.00	−0.01	0.00 to 0.00
Indigenous[b]	0.12	−0.05 to 0.29	−0.05	−0.15 to 0.06	0.04	−0.08 to 0.15	0.09	−0.04 to 0.21	0.09	−0.05 to 0.23
Medical conditions[c]	0.07	−0.01 to 0.14	0.03	−0.16 to 0.08	0.02	−0.04 to 0.07	−0.01	−0.07 to 0.06	0.06	−0.03 to 0.14
Household language[d]	0.13	0.06 to 0.20**	0.08	0.03 to 0.12*	0.06	0.01 to 0.11***	0.02	−0.04 to 0.07	−0.01	−0.07 to 0.05
BMI *z* score	0.57	0.54 to 0.60**	0.69	0.67 to 0.72**	0.80	0.77 to 0.82**	0.84	0.81 to 0.86**	0.80	0.78 to 0.83**
Perceived overweight[e]	0.25	0.10 to 0.39*	0.31	0.21 to 0.41**	0.24	0.15 to 0.34**	0.17	0.09 to 0.24**	0.15	0.08 to 0.21**
Perceived underweight[e]	−0.10	−0.19 to −0.02***	−0.17	−0.23 to −0.11**	−0.12	−0.19 to −0.05*	−0.08	−0.16 to −0.01***	−0.23	−0.31 to −0.15**

CI, confidence interval.

[a] Estimated weekly/yearly income on a 15-point Likert scale ranging from 1 (≥$2400/wk or ≥$124 800/per y) to 15 (<$49 per week or <$2599 per year).

[b] Indigenous status coded as 1 = Aboriginal and/or Torres Strait Islander versus 0 = not indigenous.

[c] Any chronic medical conditions, coded as 1 = yes versus 0 = no.

[d] Language coded as 1 = study child regularly spoken to in a language other than English versus 0 = study child spoken to in English.

[e] Dummy coded against perceived normal weight.

* $P < .01$;

** $P < .001$;

*** $P < .05$.

We also tested whether parental perceived overweight interacted with baseline child weight (BMI *z* score). When included in all of the preceding models, there were no significant interactions between child BMI *z* score and parental perceptions of overweight (see Supplemental Tables). This suggests that the association between identifying one's own child as being overweight and weight gain was not dependent on the actual BMI of the child; both accurate and inaccurate identification of child overweight were similarly associated with weight gain in this study.

Perceived Underweight: Longitudinal Changes to Child BMI

Perceived underweight measured at age 4 to 5 years also predicted changes to BMI *z* scores between 4–5 years to 12–13 years. Children whose parents perceived their weight as being "underweight" gained less weight compared with children whose parents perceived their weight as "normal." We found that this association was significant across all 2-year intervals during the study (Table 3). We also tested whether perceived underweight interacted with baseline child BMI *z* score in all models. This interaction was negative and significant in the majority of analyses (see Supplemental Tables). This interaction indicated that the association between parental perceptions of underweight and reduced weight gain was most pronounced for children who were already underweight.

Additional Analyses

We also examined whether child gender moderated the associations between parental perceived overweight or parental perceived underweight (measured at age 4–5 years) and weight gain (BMI *z* score, 4–5 years at baseline and followed up at age 12–13 years) in our main analysis by computing separate gender * parental weight

status perception interactions. Gender did not interact with parental perceptions of overweight (P = .80) or parental perceptions of underweight (P = .32). To examine the robustness of the association between parental perceptions of overweight and child weight gain, we also examined whether the same pattern of results we observed when using BMI z scores was replicated when using raw BMI data, and this was the case (Supplemental Tables).

DISCUSSION

Results from the current study are consistent with the observation that parents of children who are overweight often fail to recognize their child as being overweight.[7–9,28] Although presumed to be a major public health concern, little research has examined whether parental perceptions of child weight status are actually protective against weight gain during childhood. The main finding of the current study is that a parent identifying his or her child as overweight was not protective against further weight gain. Rather, it was consistently associated with a greater risk of more weight gain (measured using BMI z scores). Moreover, this association was not dependent on the actual weight of the child; perceiving one's child as being overweight was associated with greater weight gain among children whose weight status was accurately identified as being overweight and those whose weight status was overestimated. These results are consistent with a recent study that relied on self-reported changes in child weight,[22] although a smaller nonrepresentative study did not find an association between parental perceptions of child weight status and weight gain.[23]

The present findings have implications for childhood obesity initiatives. It has long been presumed that parental identification of overweight is important to obesity intervention efforts.[7–9,28] For example, in the United Kingdom and United States, national measurement programs are in place to correct parental perceptions of child weight.[10,11,29] Until now there has been little formal assessment of whether such interventions do in fact protect against further weight gain.[13] The current study is among the first reported to examine how parental perceptions of child weight status predict changes to weight gain across childhood. Our findings suggest that contrary to popular belief, parental identification of child overweight is associated with greater weight gain. Thus, there is now a greater need than ever to systematically assess the effectiveness of child measurement and obesity screening interventions delivered to parents.[13]

The present findings on the association that parental perceptions of overweight had with elevated weight gain are consistent with emerging data from studies that examine personal self-perceptions of weight status. In particular, a series of studies have shown that among both normal weight and overweight adolescents and adults, identifying one's weight as being overweight is associated with an increased risk of future weight gain.[14,30,31] In addition, adolescents who reported being labeled "fat" by family or peers earlier in childhood were most likely to gain more weight across adolescence.[20] Although these findings appear counterintuitive, a developing body of evidence suggests that the stigma attached to the label of overweight can be damaging and make self-regulation more difficult.[18,32] For example, because overweight and obese individuals are often stigmatized or derogated in popular media,[33] this may cause appearance-based concerns among those who identify as overweight and be demotivating for exercise.[34] Likewise, experiencing stigma and feeling judged negatively because of one's body size is associated with disordered eating and maladaptive coping responses, such as overeating.[17,35] Whether these observations relate to the present findings now warrants detailed investigation because a number of psychological models suggest that stigma can be threatening and damaging.[36,37] It is possible that the negative connotations attached to labeling a child as overweight could change the way parents interact with their child (eg, providing food for comfort) or has an effect on child weight-related behaviors, resulting in a form of "self-fulfilling prophecy."[31] In addition, it is conceivable that once a child is thought to be overweight, his or her parent may be more inclined to encourage unhealthy dieting behavior,[38] serve larger portions of food, or believe the child's weight precludes him or her from some forms of exercise, all of which could in theory contribute to weight gain. These potential explanations are speculative, so further research is now needed.

There was also evidence that children who were perceived as underweight by their parents gained less weight than children whose weight was perceived as being normal, and this association was most pronounced among the slimmest of children. One explanation of this finding may be that parents who were likely to identify their child underweight did so because they were already aware of underlying medical or developmental problems that contribute to weight loss or reduced weight gain during childhood. However, we were unable to formally test this explanation in the current study. Further examination of this finding would be valuable.

Strengths of the present work include the use of nationally representative data and objectively measured child weight and height because there may be reporting biases that

can have an effect on both parental reports of child weight and parental perceptions of child weight status. A limitation of using BMI data (as we did in the current study) is that there are other more accurate measurements of adiposity (eg, body composition), although BMI tends to be highly correlated with more objective measures of adiposity.[39] In the present research, we were unable to examine the causes of parental perceptions of overweight or identify possible behavioral factors that explain how parental perceptions of overweight were linked to child weight gain, so further work better suited to answering these questions would be valuable. The present findings are also based on data from predominantly white Australian children and their mothers, so we cannot make conclusions about how well these findings would generalize to other populations or to paternal perceptions of weight status. As is the case with most longitudinal research, there was a degree of attrition because children and their families were required to remain in the study for 8 years. However, it should be noted that the results we observed when attrition was minimal (ie, the association between parental perceptions measured at ages 4–5 years and child weight at 6–7 years old) were similar to the results observed in the reduced sample size at 8-year follow-up.

CONCLUSIONS

A parent identifying that his or her child was overweight did not act as a protective factor against further weight gain; instead, it was associated with a greater risk of elevated weight gain across childhood (measured by using BMI *z* scores). Further research is required to understand how parental perceptions of child weight status may counterintuitively contribute to overweight and obesity.

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ABBREVIATION

LSAC: Longitudinal Study of Australian Children

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