Parents' Perceptions of Their Children as Overweight and Children's Weight Concerns and Weight Gain

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Eric Robinson¹ and Angelina R. Sutin²

¹Institute of Psychology, Health and Society, University of Liverpool, and ²Department of Behavioral Sciences and Social Medicine, Florida State University College of Medicine

Abstract

The global prevalence of childhood obesity is alarmingly high. Parents' identification of their children as overweight is thought to be an important prerequisite to tackling childhood obesity, but recent findings suggest that such parental identification is counterintuitively associated with increased weight gain during childhood. One possibility is that parental identification of their child as being overweight results in that child viewing his or her body size negatively and attempting to lose weight, which eventually results in weight gain. We used data from two longitudinal cohort studies to examine the relation between children's weight gain and their parents' identification of them as being overweight. Across both studies, children whose parents perceive them to be overweight are more likely to view their body size negatively and are more likely than their peers to be actively trying to lose weight. These child-reported outcomes explained part of the counterintuitive association between parents' perceptions of their children as being overweight and the children's subsequent weight. We propose that the stigma attached to being recognized and labeled as "overweight" may partly explain these findings.

Keywords

child obesity, weight perception, body image, weight stigma

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Childhood obesity is a substantial societal issue (Trasande & Chatterjee, 2009), and in many developed countries, a large number of children are classified as obese (De Onis, Blössner, & Borghi, 2010; Ogden, Carroll, Kit, & Flegal, 2014). A common assumption in childhood obesity and public-health research is that parents' perception that their children are overweight or obese is critical to intervention efforts against obesity (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000; Duncan, 2011; Lundahl, Kidwell, & Nelson, 2014). This assumption is based on the intuitive line of reasoning that if parents do not acknowledge that their child's weight could damage his or her health, intervention will be less likely to occur. Thus, intervention efforts against childhood obesity in both the United Kingdom and the United States include weight-measurement programs, in which parents receive feedback about their child's weight status (Evans & Sonnevile, 2009; Grimmett, Croker, Carnell, & Wardle, 2008; Ruggieri & Bass, 2015).

Whether parents are accurate in identifying their children as being overweight has now been studied extensively (Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Duncan, Hansen, Wang, Yan, & Zhang, 2015; Jones et al., 2011). There is often a lack of concordance between objective measures of overweight in children and parents' perceptions that their child is overweight; a recent meta-analysis suggested that close to 50% of parents fail to identify a child as overweight (Lundahl et al., 2014). In line with this lack of concordance between objective and perceptual measures of children's weight status, some parents incorrectly believe that their child of normal weight is overweight (Boutelle, Fulkerson, Neumark-Sztainer, & Story, 2004; Robinson & Sutin, 2016). Although

Corresponding Author:

Eric Robinson, Institute of Psychology, Health and Society, University of Liverpool, L69 7ZA, United Kingdom
E-mail: eric.robinson@liv.ac.uk

parents' perception that their children are overweight has been presumed to be important to management of childhood obesity, recent studies have suggested the opposite; when a parent identifies a child as being overweight, that child is at increased risk of future weight gain (Gerards et al., 2014; Robinson & Sutin, 2016). In a similar vein, children labeled "fat" by a family member at age 10 are at increased risk of becoming obese over the next decade (Hunger & Tomiyama, 2014). Thus, accumulating evidence indicates that children whose parents perceive them to be overweight are likely to gain more weight than their peers, but to date there has been no examination of why.

We argue that the stigma attached to being an overweight child may explain why children whose parents view them as being overweight tend to have elevated weight gain during development. There are many negative stereotypes about individuals with obesity; because of these stereotypes, being overweight is viewed as negative and undesirable (Puhl & Latner, 2007). Parents who perceive their child to be overweight are therefore more likely to be concerned about the child's weight (Carnell et al., 2005; Eckstein et al., 2006), and this concern may result in parents behaving in ways that communicate to the child that their body size is undesirable (Field et al., 2001; Haines, Neumark-Sztainer, Hannan, & Robinson-O'Brien, 2008; Webber, Hill, Cooke, Carnell, & Wardle, 2010). Because overweight and obesity are negatively viewed, when children or adolescents recognize themselves as overweight, this recognition may result in dissatisfaction with their own body size and attempts to control their weight (Fredrickson, Kremer, Swinburn, de Silva, & McCabe, 2015; Strauss, 1999; Wang, Liang, & Chen, 2009).

These perceptions and behaviors may be problematic in the long term because body dissatisfaction and dieting intentions among adolescents and young adults are predictors of future weight gain (Lowe, Doshi, Katterman, & Feig, 2013; Sonnevile et al., 2012). The causal effect of dieting on weight gain remains under debate (Lowe, 2015), but studies suggest that feeling dissatisfied with one's own body size or wanting to be thinner could result in adolescents developing disordered eating patterns (e.g., attempted dietary restriction followed by binge eating), that can eventually lead to weight gain (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006; Shomaker & Furman, 2009; Sonnevile et al., 2012). We also know that children and adolescents who perceive themselves to be overweight have been shown to be at an increased risk for future weight gain (Liechty & Lee, 2015; Sutin & Terracciano, 2015). It is therefore plausible that children whose parents perceive them to be overweight have an increased likelihood of negatively perceiving their own body size, which in turn could result in

behaviors that promote further weight gain. Thus, rather than facilitating healthy behavioral change, parents' perception that their child is overweight may be associated with a sequence of events that results in the child's becoming dissatisfied with his or her weight and engaging in behaviors that promote weight gain.

In two studies, we tested the hypothesis that parents' perception that their children are overweight is prospectively associated with elevated weight gain in those children because such parental perception increases the likelihood that a child will view his or her body size negatively. To test these hypotheses, we used data from two large longitudinal cohort studies, which allowed us to measure parents' perceptions of their children's weight status and to track weight gain in those children over time. Moreover, in both studies, we tested whether children's self-reported body-size perception and weight-loss attempts mediated the association between parents' perception of their children as being overweight and future weight gain. In Study 1, we tested our hypotheses using data from an Australian study (Robinson & Sutin, 2016). In Study 2, we extended the findings of Study 1 by examining the generalizability of results to a larger European study.

Study 1

Method

Sample information. The Longitudinal Study of Australian Children (LSAC) is a longitudinal cohort study of Australian families that started in 2004 (Soloff, Lawrence, and Johnstone, 2005). We made use of data from children and their families recruited into the 2004 LSAC child cohort (i.e., the children were 4 or 5 years old at entry). We used this cohort because measurements of children's weight were available at baseline (4 or 5 years old) and for children up to 14 or 15 years old (dependent variable), parents reported their perceptions of their child's weight status at baseline (independent variable), and children reported their perceptions of their own body size and weight-loss attempts at 12 or 13 years old (proposed mediator variables). Thus, these measures allowed us to test whether children whose parents perceived them to be overweight were likely to gain more weight than their peers, because such parental perception is associated with an increased likelihood that children will view their body size negatively or attempt to lose weight. Written informed consent was obtained for each studied family, and the LSAC was approved by the Australian Institute of Family Studies Ethics Committee.

Response rate. A total of 4,983 families were recruited into the child cohort of LSAC (Growing Up in Australia,

2016). Of these families, 2,823 had complete data at follow up and were thus included in our analyses. Children for whom we did not have complete data (and who were thus not included in our final analysis) were more likely to be from an indigenous population and were more likely to have a chronic medical condition ($ps < .05$). There were no differences between included and excluded children in either gender or baseline body mass index (BMI).

Measurement of the children's BMI. The children's weight and height were measured by trained research staff during an in-home interview at baseline (age 4 or 5) and again at follow up (age 14 or 15). Bathroom glass scales were used to measure weight (to the nearest 50 g), and the children were instructed to wear light clothing. Height was measured using a portable stadiometer and recorded to the nearest 0.1 cm. Age- and gender-specific z scores for BMI were calculated for each child according to Centers for Disease Control and Prevention (CDC) growth charts (Must & Anderson, 2000).

Parents' perceptions of their children's weight status. As part of the in-home-visit interview when the children were 4 or 5 years old, their parents (97% mothers) were asked, "Which of these best describes your child?" The response options were "underweight," "normal weight," "somewhat overweight," and "very overweight." As in previous research on parents' perceptions of their children's weight status (Gerards et al., 2014; Robinson & Sutin, 2016), responses were collapsed into two categories; a parent was considered to have identified his or her child as overweight if the parent responded either "somewhat overweight" or "very overweight."

The children's perception of their own weight and weight-loss attempts. As part of the in-home-visit interview when the children were 12 or 13 years old, the children completed a health behavior questionnaire through the use of audio computer-assisted self-interview software, which allowed each child to privately respond to questions directly on a computer. Child perception of body size was measured with a seven-body version of the Contour Drawing Rating Scale (Thompson & Gray, 1995). Specifically, the children were shown seven body sizes in ascending order (higher numbers equal larger sizes) and were asked, "Which picture looks most like your body shape?" To measure weight-loss attempts, the researchers asked the children, "During the last 12 months, have you done anything to try and lose weight or keep from gaining weight?" The possible responses were "no" and "yes." Then, children were asked, "If so, what are you trying to do about your weight now? The possible responses were "lose weight," "gain weight,"

"stay the same weight." If a child answered "yes" to the first question and "lose weight" to the second question, they were categorized as having attempted to lose weight.

Demographic variables. Measured demographic variables likely to be associated with weight gain in children or parents' perceptions of their children's weight status were included in the analyses to control for potential confounders. These variables included the gender and age of the child, presence of a chronic medical condition, child ethnicity, household income, household language use, and baseline z scores calculated from BMI. In a supplemental analysis, we also controlled for parents' BMI and parents' depressive symptoms ($n = 2,370$ because of missing data on these variables).

Analysis strategy. We used standard bootstrapping methods to test whether children's perception of their own weight and weight-loss attempts mediated the relation between parents' perception of their children as being overweight at age 4 or 5 and weight gain over the next decade, controlling for the covariates. For mediation to be present, there must be an association (total effect; path c) between the independent variable (parents' perception of child's weight at age 4 or 5) and the dependent variable (weight gain between age 4 or 5 and age 14 or 15); an association (path a) between the independent variable and the mediators (children's weight perception and weight-loss attempts); and an association (path b) between the mediators and the dependent variable. Once these preconditions were established, we used PROCESS (Hayes, 2013) to formally test for multiple mediation. For the bootstrap analysis, we used 5,000 samples with replacement. Specifically, the model for each of the 5,000 bootstrap samples was estimated from a sample selected at random from the original N . Estimates derived from these samples were saved, and the indirect effect was considered significant if the confidence interval around the distribution did not include zero.

Results

Sample characteristics. At baseline, 20% of the children were classified as overweight or obese (according to z -scored BMIs), and 76% were classified as normal weight. For sample characteristics, see Table 1. Of the children whose z -scored BMIs classified them as being overweight or obese, most were identified by their parents as being of normal weight (80%); 19% were identified by their parents as being overweight. Of children whose z -scored BMIs classified them as being of normal weight, the majority (86%) were identified by their parents as being of normal weight. See Table 2 for information on parents' perceptions of their children's weight.

Table 1. Characteristics of the Samples at Baseline

Characteristic	Study 1 (4- and 5-year-olds; N = 2,823)	Study 2 (9-year-olds; N = 5,886)
Underweight children (%)	4.3	7.5
Normal-weight children (%)	76.0	61.9
Overweight and obese children (%)	19.8	30.6
Female (%)	49.8	52.4
Ethnicity ^a	2.2	14.9
Chronic condition (%)	19.3	9.9

^aFor Study 1, the table presents the percentage of children of aboriginal or indigenous descent. For Study 2, the table presents the percentage of children with parents born outside of Ireland.

The children perceived as being overweight by their parents (mean z -scored BMI = 2.03, SD = 0.81) tended to be heavier at baseline than children perceived by their parents as being at about the right weight (mean z -scored BMI = 0.60, SD = 0.88).

Children's weight gain. As in our previous analysis of LSAC participants up to ages 12 or 13 (Robinson & Sutin, 2016), parents' perception that their children were overweight at age 4 or 5 was associated with greater weight gain through age 14 or 15: Children who were perceived to be overweight at age 4 or 5 gained more weight by age 14 or 15 than children who were perceived to be of normal weight (Table 3). Between age 4 or 5 and age 14 or 15, the children whose parents perceived them to be overweight gained 53.90 kg (SD = 14.69), but the children perceived by their parents to be at about the right weight gained 43.28 kg (SD = 11.31). This association was mediated, in part, by the children's perception of their own weight and weight-loss attempts: Children who were perceived as being overweight at age 4 or 5 gained more weight over the next decade, in part because they perceived themselves to be overweight and had more attempts to lose weight through dieting at age 12 or 13 than the children who were perceived as normal weight earlier in childhood. This association was not moderated by gender. The results remained significant when controlling for parents' BMI and depressive symptoms—indirect effect of the children's perception of their own weight = 0.142, 95% confidence interval (CI) = [0.086,

0.203]; indirect effect of the children's weight-loss attempts = 0.046, 95% CI = [0.010, 0.084].

Our previous study with this sample indicated that the children whose parents perceived them to be overweight at age 4 or 5 gained more weight by age 12 or 13 (Robinson & Sutin, 2016). In Study 1, we replicated this association across an additional 2 years to age 14 or 15, for a total of 10 years across childhood. More important, we found evidence for the mechanism: Compared with the children who were not identified as overweight by their parents, children whose parents perceived them to be overweight early in childhood later were more likely to perceive themselves to be overweight and to make more attempts to lose weight at age 12 or 13. The latter two variables accounted for part of the relation between being perceived by a parent as overweight and gaining more weight.

Study 2

In Study 1, children whose parents perceived them to be overweight were more likely than their peers to perceive their weight negatively and to report weight-loss attempts early in adolescence; both of these variables mediated the association between parents' perception that their children were overweight and subsequent weight gain. Because the counterintuitive relation between being identified by a parent as overweight and gaining more weight has been examined in only a small number of studies (Gerards et al., 2014; Robinson & Sutin, 2016),

Table 2. Parents' Perceptions of Their Children's Weight Status at Baseline in Studies 1 and 2

Actual weight status	Study 1 (4- and 5-year-olds)			Study 2 (9-year-olds)		
	Perceived as underweight (<i>n</i>)	Perceived as about the right weight (<i>n</i>)	Perceived as overweight (<i>n</i>)	Perceived as underweight (<i>n</i>)	Perceived as about the right weight (<i>n</i>)	Perceived as overweight (<i>n</i>)
Underweight	43	76	1	133	303	5
Normal weight	278	1,852	15	384	3,188	71
Overweight or obese	4	449	105	25	984	793

Table 3. Results for Study 1: Children's Perception of Their Own Weight and Weight-Loss Attempts as Mediators of the Effect of Parents' Perception of Their Children as Overweight on Children's Weight Gain Between the Ages of 4 or 5 and 14 or 15 ($N = 2,823$)

Path and mediator	Point estimate	SE
Path <i>a</i>		
Parent overweight perception → child-perceived weight	0.479*	0.081
Parent overweight perception → child weight-loss attempts	0.155*	0.045
Path <i>b</i>		
Child-perceived weight → BMI at age 14 or 15	0.341*	0.023
Child weight-loss attempts → BMI at age 14 or 15	0.398*	0.041
Path <i>c</i>		
Parent overweight perception → BMI at age 14 or 15	0.298*	0.102
Path <i>c'</i>		
Parent overweight perception → BMI at age 14 or 15	0.073	0.095
Indirect effect (<i>ab</i>)		
Via child-perceived weight ^a	0.163*	0.030, 95% BC CI = [0.110, 0.226]
Via weight-loss attempts ^b	0.062*	0.019, 95% BC CI = [0.026, 0.101]

Note: Models were adjusted for baseline body mass index (BMI), gender, age, indigenous status (yes or no), whether a medical condition was present (yes or no), household income, whether a language other than English was spoken at home (yes or no), and parents' perception that their child was underweight (yes or no). Coefficients for indirect effects are from a bootstrap analysis with 5,000 bootstrap samples. BC CI = bias-corrected confidence interval.

^aThe effect ratio (i.e., indirect effect/*c*) was .547 for child-perceived weight. ^bThe effect ratio (i.e., indirect effect/*c*) was .208 for weight-loss attempts.

* $p < .01$.

our first aim in Study 2 was to investigate this association in an independent sample. Our second aim was to determine whether the mediation results from Study 1 would apply to a different cohort of participants to gauge the generalizability of our findings.

Method

Sample information. Growing Up in Ireland (GUI) is a nationally representative cohort study of children living in the Republic of Ireland, Europe (Irish Department of Children and Youth Affairs, 2007). The present analyses made use of data collected from the child cohort of GUI, into which 9-year-old children were recruited during 2007 and 2008. Measurements of the children's weight were made at 9 and 13 years old (dependent variable), parents reported their perceptions of their children's weight status at baseline and when the children were 9 years old (independent variable), and the children reported on perception of their own body size and weight-loss attempts at 13 years old (proposed mediator variables). This combination of variables allowed us to test whether parents' identification of their children as being overweight was associated with greater weight gain in their children, because parents' identification of their children as being overweight is associated with an increased likelihood that the children will view their body size negatively or that they will attempt to lose

weight. Written informed consent was obtained from the children and from parent or guardians. GUI was approved by the ethics committee at the Health Research Board, Dublin, Ireland.

Response rate. A total of 8,568 families were recruited into the child cohort of GUI (Growing Up in Ireland, 2016). Of these families, 5,886 had complete data at both baseline and follow up and were thus included in our analyses. Children for whom we did not have complete data (and who were thus not included in our final analyses) were more likely to be male and were more likely to have a parent born outside of Ireland ($ps < .05$); there were no differences in baseline BMI or in chronic medical conditions.

Measurement of children's BMI. Measurements were obtained during a household visit from a trained researcher. The children were asked to wear light clothing for the measurements. Height was measured using a portable stadiometer and was recorded to the nearest millimeter. Weight was measured using flat mechanical scales (SECA, Chino, CA) and was recorded to the nearest 0.5 kg. Age- and gender-specific *z*-scores for BMI were calculated for each child according to CDC growth charts.

Parents' perceptions of their children's weight status. As part of the in-home-visit interview when the

children were 9 years old, parents (98% mothers) were asked, "Which do you think your child is?" The response options were "very underweight," "moderately underweight," "slightly underweight," "about the right weight," "somewhat overweight," "moderately overweight," and "very overweight." Parents were considered to have identified their children as overweight if they responded "somewhat overweight," "moderately overweight," or "very overweight."

Children's perception of their own weight and weight-loss attempts. As part of the in-home visit interview when the children were 13 years old, they completed a questionnaire. To measure the children's perception of their own body size, we asked, "How would you describe yourself?" Response options were "very skinny," "a bit skinny," "just the right size," "a bit overweight," and "very overweight." To measure weight-loss attempts, the researchers asked the children, "Which of the following are you trying to do about your weight?" The response options were "lose weight," "gain weight," "stay the same weight," and "I am not trying to do anything about my weight." If a child selected "lose weight," he or she was categorized as having attempted to lose weight.

Demographic variables. Measured demographic variables likely to be associated with weight gain in children or parents' perceptions of their children's weight status were included in analyses examining the prospective association between parents' perceptions of their children's weight status and weight gain in children, in order to control for potential confounders. The demographic variables included were the same as in Study 1. As in Study 1, in a further analysis, we also examined the effect of including parents' BMI and parents' depressive symptoms as additional control variables ($n = 5,259$ because of missing data on the parent variables).

Analytic strategy. We followed the analytic strategy used in Study 1.

Results

Sample characteristics. At baseline, 31% of the children were classified as overweight or obese (per z-scored BMIs), and 62% were classified as normal weight. For sample characteristics, see Table 1. Among the children whose z-scored BMIs classified them as being overweight or obese, most were identified by their parents as being of normal weight (55%), whereas 44% were identified by their parents as being overweight. Of the children whose z-scored BMIs classified them as being of normal weight, the majority (88%) were identified by their parents as being normal weight. See Table 2 for information on

parents' perceptions of their children's weight. Children perceived as being overweight by their parents (mean z-scored BMI = 1.65, $SD = 0.55$) tended to be heavier at baseline than children perceived by their parents as being at about the right weight (mean z-scored BMI = 0.32, $SD = 0.88$).

Children's weight gain. As in Study 1, parents' perception that their children were overweight was associated with greater weight gain: Children who were perceived to be overweight at age 9 gained more weight over the next 4 years than children who were not perceived to be overweight (Table 4). From ages 9 to 13, the children whose parents perceived them to be overweight gained 24.52 kg ($SD = 8.38$), whereas the children perceived by their parents to be at about the right weight gained 20.09 kg ($SD = 6.37$). Thus, the relation between parents' perceptions and weight gain in the children observed in Study 1 was replicated in an independent sample from a different cultural context.

As in Study 1, this association was mediated, in part, by the children's perception of their own weight and their weight-loss attempts: Compared with the children whose parents perceived them to be of normal weight, the children who were perceived as overweight at age 9 gained more weight by age 13, in part because they perceived themselves to be overweight and made more attempts to lose weight. As in Study 1, this association was not moderated by gender, and the results remained significant when we controlled for parents' BMI and depressive symptoms—indirect effect of the children's perception of their own weight = 0.165, 95% CI = [0.100, 0.237]; indirect effect of the children's weight-loss attempts = 0.133, 95% CI = [0.094, 0.183]. Study 2 thus fully replicated the association between parents' perception of their children's weight and the children's weight gain, and the mechanisms responsible for this association, in an independent cohort from a different cultural context.

Additional Analyses

In both studies, we examined whether the association between the children's weight gain and parents' perception of their weight was dependent on the children's weight at baseline. We did so by including a baseline z-scored BMI and a perceived-weight-status interaction term in our analyses. The interaction term was nonsignificant in both Study 1 (interaction $\beta = -0.02$, $p = .62$) and Study 2 (interaction $\beta = -0.02$, $p = .25$). This finding indicates that the effect of parents' perception of their children as being overweight on the children's weight gain did not depend on the children's weight at baseline. In Study 1, we also examined whether the association between parents' perception that their children were overweight and weight gain (z-scored BMI increase)

Table 4. Results for Study 2: Children's Perception of Their Own Weight and Weight-Loss Attempts as Mediators of the Effect of Parents' Perception of Their Children as Overweight on Children's Weight Gain Between the Ages of 9 and 13 ($N = 5,886$)

Path and mediator	Point estimate	SE
Path <i>a</i>		
Parent perception → child-perceived weight	0.173*	0.030
Parent perception → child weight-loss attempts	0.160*	0.020
Path <i>b</i>		
Child-perceived weight → BMI at age 13	0.992*	0.047
Child weight-loss attempts → BMI at age 13	0.853*	0.069
Path <i>c</i>		
Parent perception → BMI at age 13	10.137*	0.108
Path <i>c'</i>		
Parent perception → BMI at age 13	0.829*	0.101
Indirect effect (<i>ab</i>)		
Via child-perceived weight ^a	0.171*	0.032, 95% BC CI = [0.112, 0.237]
Via weight-loss attempts ^b	0.136*	0.022, 95% BC CI = [0.096, 0.183]

Note: Models were adjusted for baseline body mass index (BMI), gender, age, whether parents were born outside of Ireland (yes or no), whether a medical condition existed (yes or no), household income, whether a language other than English was spoken at home (yes or no), and parents' perception that their child was underweight (yes or no). Coefficients for indirect effects are from a bootstrap analysis with 5,000 bootstrap samples. BC CI = bias-corrected confidence interval.

^aThe effect ratio (i.e., indirect effect/*c*) was .15 for child-perceived weight. ^bThe effect ratio (i.e., indirect effect/*c*) was .12 for weight-loss attempts.

* $p < .01$.

remained when controlling for the children's baseline waist circumference. We did so by including this as a covariate in our analyses, and we found that the association held, $\beta = 0.04$, $p < .05$.

General Discussion

Parents' perception of their children as being overweight or obese has long been thought to be an important prerequisite to tackling childhood obesity. However, recent longitudinal data have painted a different picture: Children whose parents label them as being overweight go on to gain more weight than children that are not identified as being overweight (Gerards et al., 2014; Robinson & Sutin, 2016). In the present studies, we examined whether this counterintuitive finding might be explained in part by the stigma attached to being labeled as overweight. We tested whether parents' perception of their children as being overweight is associated with elevated weight gain in children because parents' perception of their children as overweight increases the likelihood that children will view their body size negatively and attempt to lose weight. Across two studies, we replicated the finding that children whose parents perceive them to be overweight are likely to gain more weight than peers who parents do not consider them to be overweight. Moreover, we found that children whose parents perceived them to be overweight

subsequently view their own body size more and actively try to lose weight. These child-reported outcomes explained part of the association between parents' perceptions of child overweight and subsequent weight gain in children. This same pattern of results was observed across two cohorts of children and their families in two different countries, which suggests that these mechanisms are not culture-specific.

Our results suggest that once parents recognize that their children are overweight, their children are more likely to perceive their body size as being larger than their peers. In a society that values thinness and stigmatizes adiposity, realizing that one is overweight is likely to be stressful and psychologically scarring (Hunger, Major, Blodorn, & Miller, 2015).

Children and adolescents who recognize that they are overweight are more likely than their peers to be psychologically distressed and to gain weight (Hayward, Millar, Petersen, Swinburn, & Lewis, 2014; Liechty & Lee, 2015). The findings of the present studies support the proposition that parents' perception of their children as overweight could have unintended negative consequences on their children's health; the findings are also consistent with those from a recent study showing that being labeled as "fat" by a family member in childhood was associated with an increased risk of becoming obese over the next decade (Hunger & Tomiyama, 2014).

Although we found consistent evidence across both studies for our proposed mechanisms, the children's self-reported perception of their body-size and weight-loss efforts only partially mediated the relation between being identified by a parent as overweight and gaining weight. It is therefore likely that there are other reasons why children whose parents identify them as being overweight tend to gain more weight than their peers. For example, parents who recognize that their children's weight is excessive may be more likely to use food to comfort their children (Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008) or to put pressure on their children to want to be thinner, which inadvertently results in disordered eating in the children (Shomaker & Furman, 2009). In addition, children who are perceived by their parents as being overweight may have other personal characteristics that contribute both to their parents' perceptions of their weight and to their increased weight gain. For example, parent's perceptions of their children as being overweight could be influenced by their children's recent weight gain trajectory or regular overeating, both of which could contribute to elevated future weight gain. Consequently, we cannot infer that parents' perceptions of their children as being overweight had a causal effect on the children's behavior and weight gain in the present studies. In neither study did we find any evidence that our results were dependent on the gender of the child. These results could be described as unexpected, because it is generally assumed that for girls, greater stigma is attached to being overweight.

Strengths and limitations

Strengths of the present work included (a) our ability to track objectively measured weight gain across childhood and adolescence in two large cohorts of participants from different countries and (b) the timing of psychological measures, which allowed us to examine whether parents' early identification of their children as being overweight was associated with later child self-report measures and objective weight gain. Because the present studies were observational in nature, however, it is not possible to infer causality. Although we controlled for a large number of potential confounding variables (e.g., baseline differences in weight between children perceived to be overweight compared with those perceived not to be overweight), we cannot rule out that other confounding variables could explain, at least in part, the findings that we observed. Studies that experimentally manipulate parents' perception of their children's weight will now be required to better understand the causal influence of such perceptions on weight gain. Given that encouraging accurate identification of childhood obesity by parents is a component of obesity interventions, such studies will

be timely. However, results of recent pseudoexperimental work indirectly support the present findings. In a U.S. study, adolescents received written feedback notifying them that they had healthy weight or that they were overweight (Almond, Lee, & Schwartz, 2016). Although written feedback did not affect weight gain among male adolescents, being categorized as overweight was associated with greater subsequent weight gain among female adolescents.

Conclusions

Children whose parents perceive them to be overweight are more likely to view their body size negatively and are more likely than their peers to be actively trying to lose weight. These child-reported outcomes explain part of the counterintuitive association between parents' perceptions of their children as being overweight and subsequent weight gain in those children. We propose that the stigma attached to being recognized and labeled as overweight may partly explain these findings.

Action Editor

Brian P. Ackerman served as action editor for this article.

Author Contributions

E. Robinson and A. R. Sutin developed the study concept. A. R. Sutin performed the data analysis. E. Robinson drafted the manuscript, and A. R. Sutin provided critical revisions. E. Robinson and A. R. Sutin approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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