

# BMJ Open Maternal perceptions of underweight and overweight for 6–8 years olds from a Canadian cohort: reporting weights, concerns and conversations with healthcare providers

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## ABSTRACT

**Objectives:** The majority of mothers do not correctly identify their child's weight status. The reasons for the misperception are not well understood. This study's objective was to describe maternal perceptions of their child's body mass index (BMI) and maternal report of weight concerns raised by a health professional.

**Design:** Prospective, community-based cohort.

**Participants:** Data were collected in 2010 from 450 mothers previously included in a longitudinal birth cohort. Mothers of children aged 6–8 years reported their child's anthropometric measures and were surveyed concerning their opinion about their child's weight. They were also asked if a healthcare provider raised any concerns regarding their child's body weight. Child BMI was categorised according to the WHO Growth Charts adapted for Canada. Descriptive statistics and bivariate analyses were used to evaluate mothers' ability to correctly identify their children's body habitus.

**Results:** 74% of children had a healthy BMI, 10% were underweight, 9% were overweight and 7% were obese. 80%, 89% and 62% of mothers with underweight, overweight and obese children, respectively, believed that their child was at the right weight. The proportion of mothers who recalled a health professional raising concerns about their child being underweight, overweight, and obese was low (12.5%).

**Conclusions:** The majority of mothers with children at unhealthy weights misclassified and normalised their child's weight status, and they did not recall a health professional raising concerns regarding their child's weight. The highest rates of child body weight misclassification occurred in overweight children. This suggests that there are missed opportunities for healthcare professionals to improve knowledge exchange and early interventions to assist parents to recognise and support healthy weights for their children.

## INTRODUCTION

Increasing rates of childhood overweight are a societal concern given the trajectory of

## Strengths and limitations of this study

- This study explored mothers' perceptions of child body status as well as their experiences with healthcare providers concerns regarding optimal child body weight.
- Pilot testing of the survey showed the appropriateness of the questions to the target population and the reliability of the questionnaire.
- The cohort is representative for the Canadian population and best generalised to middle- and high-income families in urban settings.
- Child anthropometric measures were reported by mothers; no objective measure of children's weight status was available.

adverse health impacts into adulthood. According to WHO standards, rates of overweight and obesity were estimated at 32.8% and underweight at 2.2% for Canadian children aged 5–11 years between 2009 and 2011.<sup>1</sup> Obesity in children and adolescents has been linked to sustained weight problems and related morbidities and mortalities throughout the life course including dyslipidemia, type 2 diabetes, metabolic syndrome, coronary heart disease and hypertension.<sup>2–4</sup> On the other hand, restrictive eating disorders, while at much lower prevalence rates (2.6 out of 100 000 5–12 years olds), also have significant morbidities and mortalities associated with extreme low body weights.<sup>5–6</sup> Children who are overweight or obese may be at higher risk for bullying and exclusion from play with negative mental health outcomes.<sup>7–9</sup> Effective weight management care is needed to help children achieve improved health and wellness, with the family and the family–health professional relationship having a profound impact for paediatric weight management.<sup>10–11</sup> Of note,

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families have identified a preference for healthcare providers to inform them about child-related health information.<sup>12</sup>

Parents and families play a vital role in supporting healthy weights for children.<sup>13 14</sup> Parents concerned about their children's weights are more likely to take action to improve weight status such as limiting screen time, increasing physical activity, and improving children's diets and nutrition.<sup>14</sup> Practices such as eating together as a family and limiting the time spent alone at home after school have been shown to protect against high body mass index (BMI).<sup>13</sup>

Nevertheless, studies from the UK, Norway, Germany, Portugal, Italy, Israel, Australia, Mexico, the USA and Canada have demonstrated that parents have low recognition of unhealthy weights in their own children with the majority of studies reporting that between 50% and 94% of parents of overweight children fail to identify their child as overweight, and 65% of parents of underweight children fail to identify their child as underweight.<sup>15–28</sup> Less than 50% of parents understood that there are physical and mental health problems associated with unhealthy weights.<sup>28 29</sup> A recent systematic review concurs that mothers have difficulty perceiving the nutritional status of their children. This finding indicates a need for additional studies that would first, elucidate how mothers perceive their child's body weight and second, how risk communication about weight, nutrition and health is perceived.<sup>14 30</sup>

Few studies have examined the awareness of Canadian parents and their perceptions of interactions with the universal healthcare system related to their child's weight status. An Ontario study from 2007 revealed that 63% of parents with overweight or obese children inaccurately identified their child's weight status.<sup>19</sup> Furthermore, since excess or suboptimal weight is under-recognised, parents may not receive evidence-based strategies to address weights, and interventions to support children may not be identified. Given that mothers may not perceive their children's weight status, effective communication from healthcare providers is essential to improving parental health literacy.<sup>31</sup> Healthcare providers need to determine child nutrition status and ascertain parents' perception of their child's body weight in order to provide specific parental counselling and education. Parental perception of children's BMI and their ability to recall health provider information are critical in understanding knowledge exchange that occurs in clinical care.

The objective of this study was to explore parental perception of BMI of their child aged 6–8 years and their report of concerns about weight raised by a health professional in a longitudinal cohort from Alberta, Canada.

## METHODS

The Community Perinatal Care (CPC) study recruited pregnant participants between 2001 and 2004 into a

randomised control trial of prenatal care supports.<sup>32 33</sup> Women were recruited from three low-risk maternity clinics in the urban centre of Calgary, Alberta, Canada and were subsequently invited to participate in follow-up studies as their children turned 3 and 5 years old.<sup>33–35</sup> In 2009, mothers who had participated in previous data collection waves were contacted and invited to participate in another follow-up study when their children were between 6 and 8 years of age. Data collection began in January 2010 and finished in June the same year. Questionnaires were mailed to 706 women. A total of 450 completed questionnaires were returned for a final response rate of 64% (figure 1).

## Measures

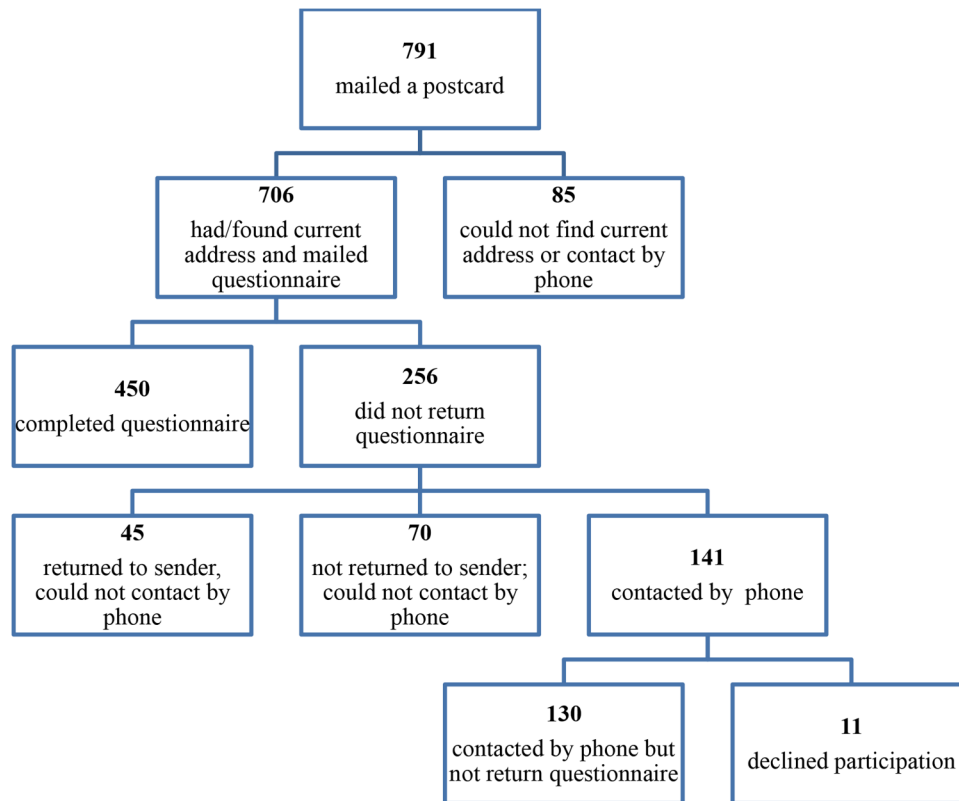
Families were provided with tape measures and instructions for taking their child's anthropometric measurements at survey mail-out. BMIs were calculated from the maternal reports of child's height and weight and categorised according to WHO Growth Charts for Canada for the appropriate gender and age ranges between 6 and 8 years. Overweight BMIs were the 85–97th centiles, obese BMIs were above the 97th centile and underweight BMIs were below the 3rd centile.<sup>36</sup>

Mothers were asked if they thought their child should weigh less, was about the right weight or should weigh more. A second question asked if they recalled a health professional raising concerns about their child's weight. The questionnaire was pilot-tested with 10 women with children of similar age to the cohort and revised for unclear wording. The final survey took ~20–25 min to complete and collected the height and weight of children through maternal self-report, in addition to other lifestyle, health and demographic information. Women were provided with a one-time recreation pass in appreciation for their time that was mailed with the questionnaire with a postage-paid envelope to facilitate return of the questionnaire.

## Data analysis

Descriptive analysis of participant characteristics, including demographics and healthcare utilisation, was undertaken. The proportion of mothers who correctly identified their child's weight status was calculated. The proportion of children who had BMIs outside the normal range was calculated. The proportions of 'correct' responses for each weight category were described. Finally, the proportion of those who recalled a conversation with a healthcare provider by child's BMI was described. Bivariate comparisons were conducted using  $\chi^2$  test. Data were analysed using the IBM SPSS statistical software program (V.20.0).

Of note, there were no clinically meaningful differences between those randomised to the prenatal care supports and controls in the original trial, so the analysis did not control for intervention group. In addition, the intervention ended at delivery, and further engagement



**Figure 1** Study flow chart mapping eligibility and recruitment of mothers who participated in the follow-up study at the age of 6–8 years.

was identical for all participants and entailed completion of a questionnaire.

### Consent

Informed consent was obtained from the study participants at the time of recruitment.

### RESULTS

Forty-nine percent of children in the study were male. The mean age for children was 7.4 years (SD=0.6) and for mothers 38.9 years (SD=4.5). According to calculated BMI levels, 25.9% of children had unhealthy BMIs, with 9% of children in the overweight category, 7.2% in the obese category and 9.7% in the underweight category, while the remaining 74.1% fell into the normal weight category (table 1).

Mothers were mostly married or living common law (93.6%), had a household income above \$80 000 (63.5%) and had finished some level of post-secondary education (74.3%). Over half were employed (53.3%) (table 1).

Table 2 summarises the survey data on parental perceptions of their child's health. More than 87% of children were reported to be in very good to excellent health, and 84.5% of mothers were satisfied or highly satisfied with their child's physical activity levels. Overall, 88.2% of mothers thought their child was about the right weight, and 11.8% had concerns about their

child's weight. Over 95% reported having a regular family doctor or paediatrician, and 75% had seen them in the recent past. Approximately 4% of parents recalled a healthcare provider raising concerns about their child's weight. Although 25.9% of children had unhealthy BMIs, 95.8% of mothers reported that no concerns had been raised (table 2).

As shown in table 3, almost three-quarters of mothers (72.8%, 292/401) correctly identified their child's weight status. However, among mothers of children with unhealthy weights, only 18.3% (19/104) correctly identified their child's unhealthy weight status. Healthcare provider concerns were reported for only 12.5% of children with unhealthy weights. Among mothers of underweight children, 79.5% reported their child's weight to be about right and only 12.8% recalled healthcare providers raising concerns. Among the mothers with overweight children, 89% reported that their child was about the right weight and only 5.6% recalled a healthcare provider raising concerns. Among mothers of obese children, 62.1% thought their child was the right weight and 17.9% recalled a healthcare provider saying their child should weigh less. Finally, among mothers of children deemed to have a healthy weight, 2% (n=6) recalled that concerns were raised, of which the majority (67%) were related to the child being underweight (table 3).

Among the 47 mothers who identified that their child should weigh either more or less, only 4.7% (19/401)

**Table 1** Characteristics of study participants (N=450\*)

	n	%
<i>Children</i>		
Age (years) (mean±SD)	7.4±0.6	
Gender male	219	48.7%
BMI status		
Underweight (<3rd centile)	39	9.7%
Normal weight (3rd–85th centiles)	297	74.1%
Overweight (>85th–97th centiles)	36	9.0%
Obese (≥97th centile)	29	7.2%
<i>Mothers</i>		
Age (years) (mean±SD)	38.9	4.5
Marital status		
Married/common law	421	93.6%
Divorced/separated	24	5.3%
Single/widowed	5	1.1%
Main activity		
Employed or self-employed	237	53.3%
Homemaker	188	42.2%
Other	20	4.5%
Household income		
≤\$40 000	22	4.9%
\$40 000–\$79 999	85	18.9%
\$80 000–\$119 999	136	30.3%
\$120 000–\$159 999	65	14.5%
≥\$160 000	84	18.7%
Prefer not to answer	57	12.7%
Education		
High school or less	44	9.8%
Some college, trade or university	72	16.0%
College/trade	102	22.7%
University	171	38.0%
Post graduate studies	61	13.6%

\*Denominator varies due to missing data.

**Table 2** Parental perceptions of children's health (N=450)\*

	n	%
Health status		
Very good to excellent	394	87.8
Good	47	10.4
Fair to poor	8	1.8
Satisfaction with child's physical activity levels		
Satisfied or highly satisfied	376	84.5
Neutral	44	9.9
Dissatisfied or highly dissatisfied	25	5.6
Mother concerns about child's weight		
Yes	53	11.8
No	397	88.2
Recall healthcare provider raising concerns about child's weight		
Yes	19	4.2
No	429	95.8
Routine health examination with GP in last year		
Yes	338	75.1
No	112	24.9

\*Denominator varies due to missing data.

were correct based on the child's having a BMI that was not in the normal range. Half of concerns were for normal weight children. Among the 14 mothers who reported their child should weigh less, 85.7% were correct. Among the 33 mothers who reported their child should weigh more, just 21.2% were correct as the majority of mothers reporting this concern had children already in the normal weight range. Nineteen (4.2%) mothers reported conversations with the healthcare provider about child's weight. Among the small number of mothers who recalled a healthcare provider conversation about their child's body weight, almost 78% accurately recalled that the conversation was about their child being overweight and ~37% inaccurately recalled the discussion about the child's weight status (table 4).

## DISCUSSION

In this study, parents of children aged 6–8 years were asked about their child's body weight and to recall if they remembered a healthcare provider raising concerns. Our findings suggest that those mothers with normal weight children were most likely to identify their child as a 'healthy' weight. Of note, when concerns were raised for normal weight children, mothers often thought that their children should weigh more. However, between 62% and 89% of mothers with children who were obese or overweight, respectively, incorrectly identified their child as 'about the right weight'. The highest rate of misclassification occurred for overweight children. Furthermore, <18% of mothers with children in the underweight, overweight or obese category for BMI recalled having a conversation with a healthcare provider about their child's weight, and recall was particularly low if the child was overweight.

Obesity is prevalent in children of all ages in North America and other developed countries. Evidence shows that BMIs between the ages of 6 and 8 years are important predictors of adult obesity and associated health risks.<sup>1</sup> High rates of maternal misperceptions of their child's unhealthy body weight status have been reported in several studies.<sup>30</sup>

Overall accuracy of weight identification in this Alberta-based study (73%) was somewhat higher than that in the 2007 study in Ontario, which reported 62% accuracy, yet both studies show that parents have misperceptions regarding their children's weight status. Discrepancies could be due to different definitions and methodologies.<sup>19</sup> Similar findings were found in a study of 223 children aged 2–17 years, attending paediatric practices in Chicago, USA.<sup>37</sup> Accurate identification of weight problems for children who were underweight, overweight or obese was also low. Among mothers with an overweight or obese child, 82% did not recognise that their child had a BMI that was too high. Similarly, 82% of mothers with underweight children did not recognise that their child had a BMI that was too low.<sup>37</sup> Mothers of overweight children, in particular, had

**Table 3** BMI of child and concerns about child's weight

	Underweight (<3rd centile) N=39		Healthy (3rd–85th centiles) N=297		Overweight (>85th–97th centiles) N=36		Obese (≥97th centile) N=29	
	n	%	n	%	n	%	n	%
Mother's opinion of child's weight								
Should weigh more	7	17.9	23	7.7	1	2.8	2	6.9
About the right weight	31	79.5	273	91.9	32	88.9	18	62.1
Should weigh less	1	2.6	1	0.3	3	8.3	9	31.0
Concerns recently raised by a health professional								
Child being underweight	5	12.8	4	1.3	1	2.8	0	0.0
No concerns	34	87.2	291	98.0	33	91.7	23	82.1
Child being overweight	0	0.0	2	0.7	2	5.6	5	17.9

BMI, body mass index.

difficulties recognising their child's unhealthy weight, with 89% inaccurately saying that their child was about the right weight. These findings suggest that maternal identification of overweight BMI is the most difficult. Half of mothers with concerns had children who were already at a healthy weight. Among mothers with normal weight children who reported concerns, the majority thought that their child should weigh more. This pattern may reflect a shift in perceptions of higher weights as normal, with more parents inaccurately reporting their child should weigh more to be at a normal weight.<sup>15</sup>

In the present study, recall of healthcare provider concerns about weight was very low. This suggests that healthcare providers may not be raising concerns about BMI in routine check-ups and other visits, or that concerns are not being communicated in ways that are salient and memorable to mothers.<sup>20</sup> Previous studies suggest that paediatricians and physicians are a preferred source of weight-related information.<sup>20</sup> Regular feedback on weight status from schools and healthcare providers has been shown to be positively received by the majority of parents.<sup>20 38 39</sup> However, such conversations can be difficult and time-consuming, and some parents can be defensive, defiant or in denial regarding

this sensitive issue particularly when they have weight concerns of their own.<sup>40</sup> Approaching the conversation with visual aids or more salient aspects of unhealthy BMIs such as decreased abilities for physical activity and fat folds along with information regarding potential physical and mental health effects may help make conversations about weight concerns more memorable.<sup>21 28 29 40</sup> Since parents will not seek out assistance for children's weight if they perceive it to be normal,<sup>26</sup> Canada's universal health system, which includes annual child growth and health assessment, provides an opportunity to have regular conversations with parents concerning weight status with a trusted source assessment. However, weight feedback should also include strategies shown to improve health behaviours such as having a family meal time, healthy eating, and reducing snacking and sedentary activities.<sup>41</sup>

### Study limitations

Our study has limitations. There was no information collected about whether healthcare providers measured the child's BMI during consultations; however, measurements of height and weight are standard clinical practice for child check-up protocol in the Canadian practice. Maternal reports on doctor visits have included routine follow-ups and visits for acute illnesses, and it is less likely that doctors would raise concerns about weight status when the child is acutely ill. Also, we did not collect objective information as to whether the healthcare worker actually raised concerns about the child's weight gain during consultations. However, if mothers do not recall discussion concerning their child's body status could be assumed that either, the issue has not been raised or, if raised, was not memorable.

Another limitation of this study is that height and weight were self-reported by mothers. This introduces potential bias in the study as parent-reported measures for children aged under 11 years often underestimate heights and result in overestimations of overweight and obese BMIs.<sup>42</sup> Some unconcerned mothers who

**Table 4** Accuracy of concerns about child's weight

	Accurate		Inaccurate	
	n	%	n	%
Mother's opinion of child's weight				
Should weigh more	7	21.2	26	78.8
Should weigh less	12	85.7	2	14.3
Total	19	40.4	28	59.6
Mothers recall of concerns recently raised by a health professional				
Child being underweight	5	50.0	5	50.0
Child being overweight	7	77.8	2	22.2
Total	12	63.2	7	36.8

reported weights and heights in the overweight range may have children who are actually in the normal weight range. However, in this study, the proportion of children with overweight or obese BMIs is well below national averages at the time, of 13.1% obese and 19.7% overweight.<sup>42</sup> Consequently, overestimation of overweight in this study is likely to be low. Although the socio-demographic characteristics representative for the population in this study are similar to the Canadian parenting population, the findings from this study are best generalised to middle- and high-income families in urban settings. In addition, pilot testing of the survey showed the appropriateness of the questions to the target population and the reliability of our questionnaire.

## CONCLUSIONS

This study suggests that mothers have difficulty in perceiving their children's weight status, particularly when their child is overweight, and few mothers recall healthcare providers raising concerns about their child's weight. These findings highlight the need for further research to understand parental misperceptions of child growth and risk communication from healthcare providers about child weight.<sup>43</sup> These results suggest that there are opportunities for healthcare professionals to improve knowledge exchange with parents about the healthy BMI for their child. Raising and repeating concerns about BMI, and discussing patient-specific strategies to improve weight, could support parents in implementing behaviour changes to improve child health. Results in the overweight category indicate that parents need extra support to clarify the distinction between healthy and overweight, especially as overweight status becomes normalised due to increasing prevalence.<sup>15</sup>

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**Patient consent** Obtained.

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