SHORT COMMUNICATION

At what BMI are parents of pre-schoolers concerned? National cross-sectional study

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Abstract

Many parents do not recognize that their young children are overweight or obese, possibly because epidemiological cutpoints may not reflect parent perceptions of overweight. We determined whether any Body mass index (BMI) cutpoint reliably triggers parent concern, drawing on the first wave (2004) of the Longitudinal Study of Australian Children (LSAC). BMI (kg/m²) and parent concern about their child’s weight categorized in three different ways (any, moderately or greater, very) were available for 4,983 children aged 4–5. We used logistic regression to assess the relationship between BMI and parent concern, and receiver operating characteristic (ROC) curves to determine BMI cutpoints that best discriminate parent concern. Parent concern about their preschoolers’ weight related only modestly to body mass and was not triggered by any definable BMI threshold. This may partly explain why current childhood obesity policies are ineffective, as they typically require individual concern leading to family behavioural change.

Key words: Child, preschool, epidemiological study, obesity, parent concern, sensitivity and specificity

Childhood obesity – a most visible condition – often goes unremarked both by parents and professionals (1). Why is it that close to 80% of parents of overweight children and about half of parents of obese children consistently do not express concern about their child’s weight (e.g., 2–6)? Perhaps parents simply do not view childhood overweight as a problem. Alternatively, current body mass index (BMI) cutpoints (7,8) – which are based on epidemiological population distributions (9) – may be less extreme than parents’ perceptions of obesity. Further, as for adults (10), under-identification is likely to rise as childhood obesity rises, regardless of the cutpoints used.

Behaviour change theories, such as the stages of change model (11), presuppose recognizing a problem. If a BMI level could be identified equating more directly to parent concern, this might help target efforts to the BMI range where change is most likely to be embraced and health gain greatest. This could be particularly pertinent for young children, who rarely suffer obesity-related ill-health (12) and whose environments are uniquely dependant on their parents. Attempting to create parent concern about the many obese preschoolers who are apparently healthy could do more harm than good, given the very limited effectiveness of current interventions (13).

We therefore aimed to determine whether there is any BMI cutpoint above which parents are usually concerned about their pre-school child’s weight, but below which they rarely express concern. Participants were 4–5-year-old children from the first wave (2004) of the nationally-representative Longitudinal Study of Australian Children (LSAC; 59% response rate) (14).

Children were weighed at home in light clothing to the nearest 50 g using digital scales (Salter Australia, Code 79985), and measured to the nearest 0.1 cm using a rigid stadiometer (Invicta, Code IPO955). The parent was asked, ‘How concerned are you about your child’s current weight?’ (‘not at all’, ‘a little’, ‘moderately’, or ‘very’), and whether they felt that the child was underweight, normal weight or

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overweight. Concern about underweight was coded as not concerned, since we were interested in concerns about overweight. To probe severity, we dichotomised concern in three different ways:

(a) Any – ‘not at all’ vs. ‘a little/moderately/ very’
(b) Moderate or greater – ‘not at all/a little’ vs. ‘moderately/very’
(c) Severe – ‘not at all/a little/moderately’, vs. ‘very’.

Firstly, we fitted three logistic regression models exploring relationships between BMI z-score (8) and parent concern. Secondly, we plotted receiver operating characteristic (ROC) curves for each concern dichotomization to assess how well BMI discriminates between concerned and non-concerned parents; an area under the curve (AUC) value of 0.5 indicates no ability to discriminate, while a value of 1 indicates perfect discrimination (15). Optimal BMI discrimination was the point of best balance of sensitivity (proportion of true positives) vs. specificity (proportion of true negatives). Stata release 10.0 (Statacorp, 2007) was used throughout.

A total of 4,928 (98.9%) participants had both BMI and parent concern data (mean age 4.2 (SD 0.4); 49.2% female). Mean BMI z-score was 0.55 (SD 1.03, range −4.60 to 4.88); 749 (15.2%) children were overweight and 257 (5.2%) obese. Excluding underweight children, only 434 (8.8%) of parents expressed any concern about their child’s weight, including 98 of 749 (13.1%) with overweight, and 135 of 257 (52.5%) with obese, children.

The odds of parents expressing concern increased with each BMI z-score unit (OR (95% CI): 2.3 (2.1 – 2.6); 3.2 (2.6–3.9); and 3.9 (2.8–5.4) for any (a), moderate or greater (b), and severe (c) concern respectively; all \(p<0.001\)). The pseudo R\(^2\) values, however, were low (8.9, 13.6 and 17.3% for a, b and c, respectively), indicating that BMI z-score explains only a small amount of the variation in parent concern.

Figure 1 illustrates how higher true positive rates (sensitivity, y-axis) comes at the cost of higher false positive rates (1-specificity, x-axis). The areas under the ROC curves ranged from 0.69–0.80, indicating that BMI is at best a fair discriminator of parent concern about overweight in pre-school children. Table I shows associated BMI values at the point of optimal discrimination and at an arbitrary sensitivity of 75% (around the acceptable lower limit of sensitivity for other parent-reported childhood screens [16]).

Some 8.8% of parents expressed any concern about their child’s weight, with optimal discrimination at a BMI of 15.8 (between the 50th and 75th percentile). Regarding ‘not/a little/moderately’ vs. ‘very’ concerned, only 0.7% of parents were ‘very’ concerned about their child’s weight, with optimal discrimination at a BMI of 14.9 (between the 25th and 50th percentile).

In summary, parent concern was not triggered at any definable BMI cutpoint, though it did increase with BMI. Thus, it is not that mothers’ thresholds for weight concern differ from clinical or epidemiological BMI-based thresholds. There is simply no BMI threshold above which mothers reliably become concerned about their preschool children’s weight.

Strengths include the study’s population nature and large sample size, so that we were able to explore the implications of differing severities of parent concern across the entire BMI spectrum. LSAC is broad in scope and, because it does not focus on childhood
parent concern dichotomization & Sensitivity & Specificity & Correctly classified BMI at this point \\
\hline
(a) Any & Point of optimal discrimination & 72.1% & 41.4% & 44.1% & 15.8 \\
& Sensitivity of 75% & 75.1% & 39.1% & 42.3% & 15.7 \\
(b) Moderate-severe & Point of optimal discrimination & 72.7% & 45.8% & 46.3% & 16.0 \\
& Sensitivity of 75% & 75.0% & 44.6% & 45.2% & 15.9 \\
(c) Severe & Point of optimal discrimination & 87.5% & 17.1% & 17.6% & 14.9 \\
& Sensitivity of 75% & 75.0% & 64.8% & 64.8% & 16.6 \\
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A defined as that corresponding to the point on the curve that is closest to (or has the shortest distance from) the top of the y-axis (i.e., where there would be 100% sensitivity and 100% specificity).

Obesity, may have reduced respondent bias. Limitations include the lack of body composition data regarding actual adiposity.

In public health terms, the spectrum of potential obesity reduction activities ranges from universal and selective prevention through population screening to surveillance, case finding and, finally, to clinical management. Implicit in all but the first two of these are: (i) cutpoints that categorize children by BMI into ‘normal’ vs. ‘high’ groups, and (ii) an expectation that intervention will ensue.

However, parents are the gatekeepers for intervention in children. One reason why current childhood obesity policies have not been more effective (17) is that they typically depend on concern about a child’s weight leading to family behavioural change (18). Our findings suggest that it is unlikely that adopting different cutpoints to trigger action would alter this situation.

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References