

Taking BMI off the table

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ABSTRACT

Four year-olds in New Zealand are offered a B4 School Check, during which they have their BMI percentile calculated and BMI category flagged—essentially diagnosing children as underweight, healthy weight, overweight or obese. The obese child is then referred onwards for treatment. It is assumed that parents need to be told which BMI category their child falls into so those with a child in the overweight or obese categories will be motivated to make healthy lifestyle changes. There are two fundamental problems with this:

- BMI is flawed
- A targeted approach like this is potentially harmful

In this paper, the current limitations of using BMI categories to essentially diagnose obesity are examined, recent research is discussed which calls into question the very idea of telling parents their child is obese, and an inclusive, universal approach is proposed instead.

All four-year-olds in New Zealand are offered a B4 School Check—a health and development check which aims to identify and address any concerns before children start school, eg, a hearing problem. As part of the check, children have their height and weight measured and body mass index (BMI) calculated.¹

Children will fall into one of the BMI categories. Whether they are called the green, orange and red categories or the healthy, slightly unhealthy and very unhealthy categories, they come to the same thing: underweight, healthy weight, overweight or obese. The process of categorising children in this way essentially diagnoses obesity based solely off BMI. This is not limited to the B4 School Check—the use of BMI to diagnose obesity is encouraged with children and adults of all ages when they visit their general practice team.^{2,3} Aside from the issues that may arise with singling children out as obese in this way, BMI itself has many limitations⁴⁻⁶ when used to diagnose obesity in individuals and is only considered to be a “rough guide” by the World Health Organization.⁷

Nick Trefethen, Professor of Numerical Analysis at the University of Oxford, summarised many of the limitations of BMI in an opinion piece he wrote, stating that “the body-mass index that you (and the National

Health Service) count on to assess obesity is a bizarre measure. We live in a three-dimensional world, yet the BMI is defined as weight divided by height squared. It was invented in the 1840s, before calculators, when a formula had to be very simple to be usable. As a consequence of this ill-founded definition, millions of short people think they are thinner than they are, and millions of tall people think they are fatter”.⁸

His mathematical viewpoint of the limitations of BMI is backed up by scientific studies comparing BMI cut-offs for underweight, normal weight, overweight and obesity with more accurate measures of body fatness and health. A 2016 study compared blood pressure, lipids, glucose, insulin resistance and C-reactive protein with BMI categories in 40,420 adult participants from the National Health and Nutrition Examination Survey. The authors concluded that nearly half of ‘overweight’ and 29% of ‘obese’ individuals were metabolically healthy, and over 30% of ‘normal weight’ individuals were metabolically unhealthy. In the US this equates to an estimated 75 million adults misclassified.⁹

As for children, a 2015 systematic review and meta-analysis analysed data from 53,521 patients aged four to 18 years and concluded that the ability of the BMI formula to identify those with higher levels

of body fat was only 73%; meaning that 27% of children with high fat levels were not correctly identified using BMI.¹⁰

The inaccuracy of BMI is also compounded for Pasifika, Māori and Asian children. A 2010 study of 1,676 five- to 16-year-old girls from schools in Auckland compared BMI with percentage body fat in different ethnicities and concluded that Pacific Island and Māori BMI thresholds should be raised by approximately 1.5 and 0.6kg/m² respectfully, and South and East Asian BMI thresholds lowered by 3.3 and 1.1kg/m² respectfully, to account for the relative fat to fat-free mass ratios in girls of those ethnicities. The authors also stated that further research was needed in boys of different ethnicities as well.¹¹

Along with the inaccuracy of the BMI tool to correctly identify body fatness and metabolic health in individuals, the very concept of alerting parents to the BMI or weight status of their child has been called into question by recent research.

It is well established that parents inaccurately perceive their children to be of a healthy weight and much focus has been on correcting their perceptions so that they will be motivated to engage in healthier behaviours.^{12,13} However, highlighting the child's overweight or obese BMI category to the parent has now been shown to possibly add to the problem.

A 2016 study of 3,557 Australian children and their parents found that when parents perceive their child to be overweight, the child was actually more likely to gain more weight throughout childhood. This finding was independent of the actual weight of the child.¹⁴

Although further research is required to understand how this works, one hypothesis is that this is because parents restrict their child's food intake, thereby creating feelings of deprivation and food obsession. A 2012 study in 126 mothers and 102 fathers of four- to six-year-old children in Ohio found that parental concern about their child

being overweight was related to higher restrictive feeding practices¹⁵ and restrictive feeding is known to produce additional weight gain.¹⁶

Furthermore, a large study of 47,417 children six to 17 years old in China found that parents who perceived their child to be a healthy weight (irrespective of their actual weight) were more likely to prepare breakfast for the child, exercise with them, set aside time for their exercise and restrict screen time, while they were less likely to have soft drink for the child.¹⁷ These findings call into question the very idea that parents should be corrected in their assumptions that their children are of a healthy weight.

The limitations of BMI and the potential harm of labelling children as overweight and obese presents health professionals working at the coalface of childhood obesity with an opportunity. Height and weight data could still be collected at the B4 School Check, and thus obesity tracked using BMI on a population level where errors tend to cancel themselves out, but at the individual level we could remove the BMI component from the B4 School Check.

Instead, a universal approach could be utilised. Every family, regardless of the size of their child, could have a conversation with the health professional about healthy living. In this way, a problem-focused approach becomes solution-focused by talking about the healthy behaviours we know make a big difference to families—adequate sleep,¹⁸ restricting and monitoring screen time,¹⁹ cooking at home,²⁰ eating meals together as a family,²¹ following the division of responsibility when feeding children,²² encouraging child-led play,²³ etc. Families who want further support in a particular area could then be offered an appropriate referral. This approach disregards size and focuses on wellbeing. The talking points are mainly self-reported and subjective, and they are less simply measured than BMI, but they are also far more meaningful in everyday life.

Competing interests:

Nil.

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