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The Suitability of Using Body Mass Index Based on Self-Report Height and Weight for Screening Childhood Obesity: Individual Level and Population Level

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Body Mass Index; Self-Report; Children; Obesity; Individual Level; Population Level

There is overwhelming evidence that childhood obesity has increased substantially worldwide [1,2]. In 2013, almost 25% of children in developed countries and more than 10% of children in developing countries were overweight or obese [2]. Considering childhood obesity is closely associated with increased risk of various physical health problems (e.g., cardiovascular disease, type 2 diabetes, and asthma) [3-5], psychological problems (e.g., anxiety, depression, and lower self-esteem) [6,7], and lower quality of life [6,8], it is clearly that childhood obesity has been a global public health issue.

Body mass index (BMI), calculated by the body weight divided by the square of the body height, is a simple and reliable tool for presenting weight status. BMI also shows low cost and a good correlation with metabolic diseases [9]. Although direct measurement of height and weight is the "golden standard" for obtaining children's BMI, it is usually infeasible for large scale surveys, and that's why surveillance of obesity is most often based on self-reported height and weight for the low-cost and convenience of self-reporting [10-12].

The purpose of using BMI based on self-reported height and weight (BMIsr) falls into: 1) diagnosing overweight and obese cases (individual level), and 2) monitoring prevalence of overweight and obesity (population level). For the purpose of diagnosing overweight and obese cases, researchers care about the sensitivity and specificity of using BMIsr for screening weight status when compared to those based on direct measured height and weight (BMIm), while for monitoring prevalence of overweight and obesity, researchers mainly care about the difference between the prevalence derived from BMIsr and the prevalence derived from BMIm.

Currently, there have been a number of studies worldwide conducted for this purpose of evaluating the accuracy of using BMIsr for screening children's weight status in individual level and/or population level. However, the findings from previous literatures are inconsistent. For example, in individual level, one study reported a sensitivity of 27.8% for screening obesity status among children in Belgium [13], while another study reported a sensitivity of 100% for screening overweight and obesity status among female adolescents in Japan [12]. In population level, some studies reported no difference between the prevalence of overweight and obesity derived from BMIsr and that from BMIm [11,12,14-16], while there are some other studies reporting an underestimation of the prevalence of childhood overweight and obesity derived from BMIsr when compared to the prevalence derived from BMIm [17-27].

Currently, for the accuracy of using BMIsr in individual level, there has been a meta-analysis study published recently [28]. This study quantitatively summarized the accuracy of BMIsr for screening childhood overweight and obesity in individual level, and results revealed that BMIsr showed a good overall performance (e.g., Diagnostic Odds Ratio = 92.4), indicating BMIsr might be suitable to be used in individual level. However, the study also reported that the sensitivity of BMIsr for screening childhood overweight and obesity only showed a moderate value of 0.76, suggesting that the use of BMIsr is likely to under-identify overweight and obese cases [28]. Furthermore, the results of moderator analyses of the study [28] indicated that the sample regions (America vs. Europe vs. Asia), weight status screening references (IOTF vs. CDC vs. Nation-specific standard) and weight status screened (overweight vs. obesity) had influence on the accuracy of using BMIsr for such purpose.

For the accuracy of using BMIsr in population level, although there have been enough related studies, to the best of my knowledge, there are no such systematic reviews or meta-analyses are currently available. Consequently, the accuracy of using BMIsr in population level for screening childhood overweight and obesity remains unclear, and therefore, a systematic review or meta-analysis about the use of BMIsr for screening childhood obesity in the population level is highly encouraged. Such a systematic review or meta-analysis would not only allow researchers to get a better understanding on the degree of discrepancy, or lack thereof, between BMIsr-based and BMIm-based prevalence of childhood obesity, but would also help clarify the roles of some potential moderators in this context (e.g., gender [17,20,29,30] and age [17,31-33]).

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