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## **The Report Card on BMI Report Cards**

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## **Abstract**

Half of states in the U.S. have legislation requiring that schools conduct body mass index (BMI) screening among students; just under half of these states report results to parents. The effectiveness of school-based BMI screening and reporting in reducing childhood obesity is not established and the practice has raised concerns about the potential for increased weight-based stigmatization. Recent experimental studies of BMI screening and reporting have not demonstrated a positive impact on students' weight status. However, the language and formatting of BMI reports used in studies to date have been suboptimal and have likely limited the potential effectiveness of the practice. This article reviews the recent literature on school-based BMI screening and reporting and highlights important areas for future inquiry. The present review suggests that evidence to date is not sufficient to support definitive conclusions about the value of school-based BMI screening and reporting as a childhood obesity prevention tool.

## **Introduction**

Childhood obesity persists as a major public health problem in the United States,[1] and disparities by race/ethnicity are increasing.[2] The National Academy of Medicine recommends school-based body mass index (BMI) screening and reporting as a tool to prevent and reduce pediatric obesity.[3] As of 2014, half of states (n=25) had legislation requiring that schools monitor students' BMI, 11 (44%) of which reported the results to parents.[4] Communicating students' weight status to parents/guardians via a notification letter or "BMI report card" could raise parents' awareness of their child's weight status and motivate positive action to improve their child's health.[5] While reporting BMI to parents is a small-dose intervention, because of its widespread use, it is a potentially valuable public health tool for addressing childhood obesity. Understanding the impact of the practice is critical to inform both practice and policy.

The effectiveness of school-based BMI screening and reporting in reducing childhood obesity has yet to be established.[6-8] To date, studies examining BMI screening and reporting have not demonstrated a positive impact on students' weight status. However, best practices for reporting (e.g. using report language and formatting that is easy-to-understand) have not been employed.[9, 10] Further, the practice of school-based BMI screening and reporting has been controversial, and debate persists about the potential for unintended consequences related to weight stigmatization.[4, 5]

While some reviews of school-based BMI screening and reporting have suggested that the potential harm from BMI screening and reporting may outweigh the possible benefits,[6, 7] the most recent review[4] concluded that these programs are vital components of school-based obesity prevention efforts and are valuable for schools, students, and parents. The present review aims to provide an updated comprehensive picture and interpretation of the evidence on BMI screening and reporting, including a discussion of controversies and potential best practices. We highlight important areas for future inquiry necessary to inform decision-making on the widespread use of school-based BMI screening and reporting as a childhood obesity prevention tool.

### **The impact of BMI report cards on students' weight**

In their 2015 review, Ruggieri and Bass[4] highlighted findings on the effects of implementing BMI screening programs from studies in 7 states. Only 3 studies, coming from Pennsylvania, Arkansas, and California, assessed the impact of screening and reporting on students' weight status. The earliest study was from a single school district in Pennsylvania, which reported that prevalence of overweight students remained stable over the course of a 3-year screening program.[11] The lack of a control group made it difficult to draw conclusions about the effectiveness BMI reporting. The study from Arkansas, using data from the first 4 years of state-mandated BMI screening and reporting, demonstrated a halt in the progression of obesity.[12] However, during the same time period, Arkansas introduced several additional health-related initiatives, and similar trends in weight stabilization were seen nationally,[7] reducing confidence in BMI screening and reporting as the cause of improvements in students' weight status. The study from California found that BMI reporting did not reduce obesity for 5th, 7th, and 9th grade youth over the first 8 years in which BMI screening was instituted.[13] However,

later research demonstrated that the reports used in California were difficult for parents to understand, did not use clear language to describe BMI, and did not provide actionable suggestions for parents whose children were identified as overweight.[9] Qualitative work on BMI reports has shown that parents would like reports to include actionable recommendations for improving their child's health.[14]

Since Ruggieri and Bass' 2015 review, several new studies examining the impact of BMI screening and reporting programs in schools have been published and are described in the following paragraphs. While none of these more recent studies showed a positive impact on children's BMI or weight status, each had limitations that preclude drawing definitive conclusions about the effectiveness of BMI screening and reporting.

A large quasi-experimental study using data from New York City public schools showed no effect of BMI reporting.[15] Among students with a baseline BMI just above or below the 85<sup>th</sup> percentile, Almond et al found that being labeled "overweight" (those with a BMI just at or above the 85<sup>th</sup> percentile), as opposed to "normal" weight (those with a BMI just below the 85<sup>th</sup> percentile), had no beneficial impact on students' BMI the following year. Using the same regression discontinuity design among students with a BMI very close to the 95<sup>th</sup> percentile, BMI reports labeling a student as "obese" as opposed to "overweight" similarly had no effect on BMI. Despite a strong design, this study does have two notable limitations. First, youth with a BMI very near the 85<sup>th</sup> percentile generally do not appear overweight to their families.[16] Thus, a family receiving a BMI report saying their healthy-looking child is "overweight" may be disinclined to believe it. BMI reports may, therefore, have the least impact among those students closest to the 85<sup>th</sup> percentile. The second limitation relates to the use of the term "obese." While students with a BMI near the 95<sup>th</sup> percentile are likely to appear overweight, studies have demonstrated that many parents find the term "obese" offensive,[14, 17, 18] which may reduce their likelihood of taking action based on such a report.

In Massachusetts, Li et al[19] reported that prevalence of overweight and obesity declined by 3% between 2009 and 2014, coincident with instituting statewide BMI screening and reporting in grades 1, 4, 7, and 10. In stratified analyses, the largest differences between prevalence figures in 2009 and 2014 were seen among 1<sup>st</sup> (-4.2%) and 4<sup>th</sup> (-4.8%) grade students. The similar decline for grades 1 and 4, taken together, do not lend support for a causal effect of BMI reports; by 2014, 4<sup>th</sup> graders would have received a report in 1<sup>st</sup> grade, but no 1<sup>st</sup> grade student would have been exposed to a report (BMI assessments start in grade 1). Similar to Gee's findings in Arkansas,[20] Li et al saw no decline in prevalence among 10<sup>th</sup> graders, which could reflect lesser impact of BMI reporting among older students. Importantly, the Massachusetts' reports also used the term "obese," which led to public backlash[21] and may have diminished the effectiveness of the report.

A randomized controlled trial from Mexico of BMI screening and reporting in primary schools demonstrated no detectable effects on students' BMI or weight after five months.[22] While BMI reporting is theorized to draw parents' attention to their child's weight status and motivate positive health-related action,[5] parents in this study did not report any significant changes in weight control behaviors following report receipt. The authors concluded that the information provided in the BMI reports was not enough to induce change in this context, and suggested

future research to test the impact of BMI reports combined with specific actions parents could take to improve their child's weight (e.g. reduce portion sizes) on changes in BMI.[5]

A follow-up study from Arkansas using a difference-in-differences approach (in which changes in BMI between 10th and 12th grade were compared between students exposed to BMI screening and reporting versus a control group) similarly found no effect of BMI screening and reporting.[20] However, this study relied on students' self-reported BMI data, which is highly prone to bias.[21, 23] Further, it focuses on high-school age students, who have greater autonomy than younger students and may, therefore, be less influenced by a BMI report sent home to parents.

These recent studies have made important contributions to the evidence on the impact of school-based BMI screening and reporting. However, the studies lacked sufficient attention to the actual intervention – the report itself - to allow for a definitive statement on the value of BMI reports. The BMI reports from 3 of the 4 studies used the term “obese,” despite qualitative evidence suggesting the term is off-putting to many parents, especially parents in low-income communities and communities of color.[10, 14, 24] Several recent qualitative studies involving predominantly African American and Latino parents have found that parents want reports that: 1) are clear and concise; 2) are easy-to-understand; 3) use non-stigmatizing language that is protective of students' well-being; and 4) provide actionable advice to improve child's health, especially advice relevant for the entire family.[10, 14, 17, 25]

To the extent the letters are difficult to understand (e.g., written at an inappropriate reading level), that resources to support families in helping their child reach a healthy weight are unavailable to low-income families, or that letters are sent home in English to non-English speaking parents, BMI reporting could increase weight-related health disparities. While Li's study in Massachusetts[19] documented a decline in obesity prevalence at the state level, prevalence in the poorest school districts remained unchanged, widening income-related disparities in prevalence of obesity. Although it is not clear that reductions in BMI were due to BMI reporting, the study timing was concurrent with the state's mandated BMI screening and reporting period. Rigorously testing culturally sensitive reports aimed at addressing the needs of low-income and racially diverse families could strengthen the effectiveness of BMI reports. An ongoing randomized trial of BMI screening and reporting (NIH R01HL120666) that developed a BMI report with parental input[14] may provide a better understanding of the effectiveness of BMI reports.

### **Avoiding potential harm**

Numerous experts have raised concerns about the potential for BMI screening and reporting in schools to lead to unintended negative consequences, including increased weight-based stigmatization.[26-28] Anecdotal reports from public health practitioners, parents, and students, as well as case studies, highlight worries about the practice leading to teasing, disordered eating, and psychological damage.[29-31]

Research on the potential for BMI screening and reporting to increase weight-based stigmatization has been largely descriptive and suggests that parents are more worried about

BMI screening and reporting in schools than students. Recent qualitative studies demonstrate caregivers are concerned that weighing students in school may lead to negative weight-related comments,[32] cause their child embarrassment[17] or negatively impact their self-esteem.[10, 25] Parents also report that unhealthy weight control behaviors increase subsequent to BMI reports,[32-34] (although no studies have assessed the persistence of these behaviors).

Recent evidence from studies involving students does not demonstrate the same level of concern about potential harms of BMI screening and reporting. In Oregon, 4<sup>th</sup>-11<sup>th</sup> grade students expressed generally neutral opinions about school-based BMI assessments.[35] Similarly, the vast majority (94%) of 5<sup>th</sup> grade Canadian youth in another study felt “okay” or “happy” about having their BMI measured in school.[36] Arkansas students in grades 10-12 who were exposed to repeated BMI screening and reporting through late adolescence did not report unintended consequences (such as increased use of weight control behaviors, including diet pills) compared to students who were not exposed to screening in late adolescence.[20]

BMI screening and reporting may increase weight-based stigmatization and lead to unintended consequences, but more evidence is needed to allow for truly informed discussions of risks versus benefits. The aforementioned ongoing randomized trial of BMI screening and reporting in California (NIH R01HL120666) is assessing unintended consequences such as increased weight-based teasing, unhealthy weight control behaviors, and body dissatisfaction. Findings from the California study will provide further evidence about students’ perspectives on school-based BMI screening and reporting.

### **The value of BMI surveillance in schools**

In their review from 2015, Ruggieri and Bass highlight the important distinction between collecting BMI for the purposes of screening versus surveillance. The evidence described thus far in the present review deals with the effectiveness of BMI collected for the purpose of screening, i.e., identifying an individual at risk in order to intervene and reduce subsequent negative outcomes. From a surveillance perspective, where individual treatment is not a goal, large-scale collection of BMI enables us to describe trends and changes in weight status over time and measure progress towards achieving health objectives.[4] While data collected by the Centers for Disease Control and Prevention, such as the National Health and Nutrition Examination Survey,[37] provide an invaluable means of surveillance at the national level, these data cannot provide insights into local and regional trends. Making more granular data available to researchers and decision makers can support informed program and policy implementation decisions, and can advance science. Future investigations could explore the effectiveness of using data as a means of channeling funding towards schools with the highest percentage of students at risk for overweight and obesity. However, if surveillance is to continue, it is important to ensure that screening practices do not cause harm to students or families.

### **BMI screening and reporting and the school environment**

Given the important role social, environmental, and structural factors play in the development of obesity,[38] interventions comprised of education only (including letters informing parents of their children’s weight status) are unlikely to meaningfully reduce pediatric obesity. Interventions that improve children’s nutrition and physical activity environments are far more

likely to have an impact on weight status. Combining BMI screening and reporting with other programs aimed at improving the school nutrition and physical activity environment could be synergistic. In Kearney, Nebraska, schools implemented several evidence-based physical activity and healthy eating strategies aimed at addressing childhood obesity, including a BMI screening, reporting, and referral program.[39] Researchers saw a 15% relative decrease in the prevalence of childhood obesity over the six-year period. While no control group was available, the decline in obesity is far greater than that seen nationally.[40] There is good evidence documenting the effectiveness of multi-faceted school-based interventions in reducing obesity;[41, 42] however, these interventions require significant investment and schools need additional resources to implement such programs. The question remains whether BMI reporting, a far less expensive but low-dose tool, can improve weight status in the absence of additional changes to children's environments.

## **Conclusion**

BMI reports, in their current format, do not appear to positively impact student weight status and questions remain about their potential to cause harm to students. Additional research should examine the impact of BMI reports that use appropriate and easy-to-understand language, and that provide actionable suggestions to improve students' nutrition and physical activity. Future studies should simultaneously examine the potential unintended consequences of BMI screening and reporting in schools. Such evidence can inform the adoption and implementation of school policies and practices related to BMI screening and reporting.



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