



Published in final edited form as:

*Child Obes.* 2021 September ; 17(6): 429–430. doi:10.1089/chi.2021.0104.

## Response to Rolland-Cachera et al., “Early Adiposity Rebound Predicts Later Overweight and Provides Useful Information on Obesity Development” (DOI: chi-2021-0087)

David S. Freedman, PhD<sup>1</sup>, Carrie Daymont, MD<sup>2</sup>

<sup>1</sup>Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention, Atlanta, GA, USA.

<sup>2</sup>Departments of Pediatrics and Public Health Science, Penn State College of Medicine, Hershey, PA, USA.

---

We thank Rolland-Cachera<sup>1</sup> for their letter concerning our article.<sup>2</sup> We found that children with an early body mass index (BMI) rebound had a higher BMI after age 10 years, but the BMI value at the age of rebound provided more information. As stated in the text accompanying Table 2, a regression model that included age at rebound accounted for 31% of the subsequent BMI variability. In contrast, including a child’s BMI (rather than age) at rebound accounted for 45% of the variability. As illustrated in Figure 1 and Figure 2 of our article, both the age and BMI at rebound were important predictors of the probability of obesity after age 10 years.

The letter’s figure emphasizes the importance of the rebound age. However, our study’s large sample size allows for a more detailed examination of the contribution of BMI to subsequent obesity among children with a very early rebound (<3 years). Figure 1 shows the predicted relation, based on logistic regression, of BMI at age 2 years to the probability of obesity [BMI Centers for Disease Control and Prevention (CDC) 95th percentile] after age 10 years among boys with a very early BMI rebound. Boys with a BMI of 13.8 kg/m<sup>2</sup> at age 2 years (the 5th percentile of BMIs at this age) had a 10% chance of having obesity after age 10 years, whereas those with a BMI of 19.5 (95th percentile) had a 92% chance. Despite the same early rebound age, 2-year-old boys with a BMI of 19.5 were nine times more likely to have subsequent obesity than those with a BMI of 13.8 kg/m<sup>2</sup>. A similar relation was seen among girls, with the curve shifted slightly to the right. These results emphasize the importance of a child’s BMI at age 2 years even among children with a very early BMI rebound.

Much of the letter objects to our use of “BMI rebound” rather than “adiposity rebound” to refer to a child’s BMI pattern. We feel that “BMI rebound” is more accurate. All of the adiposity-rebound studies cited in the author’s 2019 article<sup>3</sup> focused on either BMI

---

Address correspondence to: David S. Freedman, PhD, Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention, CDC, F107-5, 4770 Buford Highway, Atlanta, GA 30329-4018, USA, dxf1@cdc.gov.

**Publisher's Disclaimer:** Disclaimer

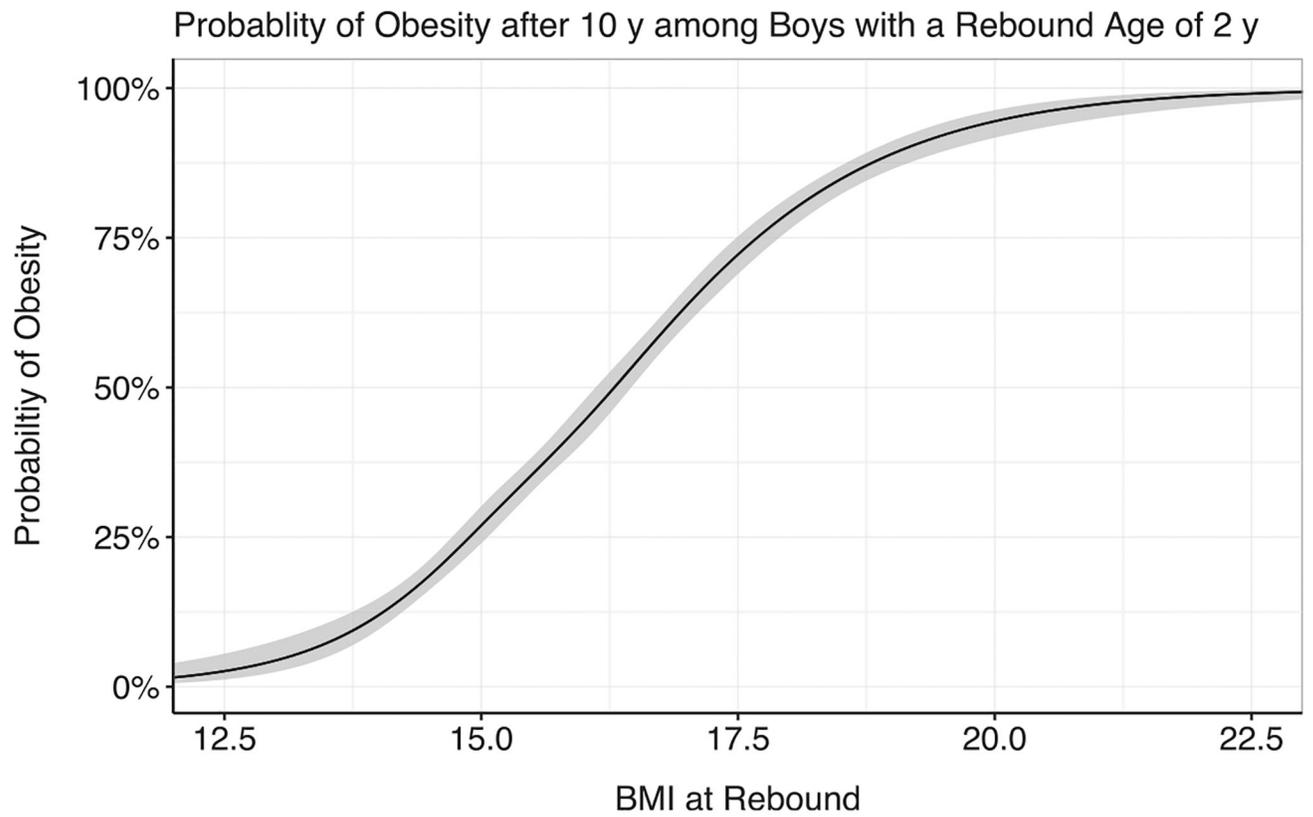
**Publisher's Disclaimer:** The findings and conclusions of this letter are those of the authors and do not necessarily reflect the official position of the CDC.

or the weight and height velocity curves of a child rather than a more direct measure of body fatness. As shown in the author's 1982 article,<sup>4</sup> BMI is not the same as adiposity; correlations between BMI and subscapular skinfold within each year of age were only moderate ( $r \sim 0.50$ ).

It should also be noted that the author's letter<sup>1</sup> states that an early adiposity rebound is a marker of advanced maturation measured by bone age. However, the reference cited for this statement<sup>5</sup> shows that before age 10 years, bone age is mainly unrelated to the age at rebound (table 2 in that article).

## References

1. Rolland-Cachera M-F, Péneau S, Bellisle F. Early adiposity rebound predicts later overweight and provides useful information on obesity development. [Epub ahead of print; DOI: chi.2021.0087].
2. Freedman DS, Goodman AB, King RJ, et al. The relation of adiposity rebound to subsequent BMI in a large electronic health record database. *Child Obes* 2020;17:51–57. [PubMed: 33351695]
3. Rolland-Cachera MF, Cole TJ. Does the age at adiposity rebound reflect a critical period? *Pediatr Obes* 2019;14. DOI: 10.1111/ijpo.12467.
4. Rolland-Cachera MF, Sempé M, Guilloud-Bataille M, et al. Adiposity indices in children. *Am J Clin Nutr* 1982;36:178–184. [PubMed: 7091028]
5. Rolland-Cachera MF, Deheeger M, Bellisle F, et al. Adiposity rebound in children: A simple indicator for predicting obesity. *Am J Clin Nutr* 1984;39:129–135. [PubMed: 6691287]



**FIG. 1.** Predicted probability of obesity after age 10 years by BMI at age 2 years based on logistic regression. Analyses are limited to the 2126 boys who had a rebound age between 2 and <3 years. Obesity is a BMI CDC 95th percentile. BMI, body mass index; CDC, Centers for Disease Control and Prevention.