



HHS Public Access

Author manuscript

Obesity (Silver Spring). Author manuscript; available in PMC 2024 June 15.

Published in final edited form as:

Obesity (Silver Spring). 2022 June ; 30(6): 1135. doi:10.1002/oby.23431.

Response to “BMI at age 3 years predicts later BMI but age at adiposity rebound conveys information on BMI pattern-health association”

David S. Freedman,
Lyudmyla Kompaniyets

Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention,
Atlanta, Georgia, USA

TO THE EDITOR:

We thank Rolland-Cachera et al. for their letter concerning our paper on the importance of age at the BMI rebound (1). The authors agree with two main points of our paper. First, BMI at age 3 years is more strongly associated with BMI at age 14 years than is the age of the BMI rebound (second paragraph of their letter). Second, that it is easier to assess BMI at age 3 than to determine the age of the BMI rebound (third paragraph). We agree that there is an “an infinity of trajectories that can pass through a single [BMI] point,” but we think the BMI patterns shown for the two children in Figure 1 of their letter may apply to relatively few children. As seen in Figure 3 of our paper, these BMI patterns were not typically seen among a randomly selected subset of 16 children. Subsequent analyses of hundreds of children confirmed that very few showed the BMI patterns of the two children in their Figure 1. As noted in our article, measurement error and weight variability resulted in most children having a zigzag pattern, with several BMIs close to the minimum, making it challenging to determine the age of BMI rebound. The authors also suggest that as compared with the BMI at age 3 years, an early BMI rebound is more strongly correlated with body fatness and metabolic complications in later life. We feel there is little evidence for this. Ylihèrsilè et al. (2) did show that a rapid BMI increase before age 2 years and the BMI at age 2 years among persons born in the 1930s and 1940s were only weakly associated with fat mass (measured using bioelectrical impedance) among older adults. However, it is not clear if these findings are relevant to the much heavier contemporary children. Furthermore, others have shown that rapid weight gain in early life, which may result in a high BMI at ages 2 or 3 years, is associated with increased levels of body fatness in later life as measured with more accurate methods. A study (3) of children born in the mid- 1980s, for example, found that weight gain between birth and 6 months was associated with higher levels of fat mass at age 17 years assessed with air-displacement plethysmography. Another study (4), based on children born in the early 2000s, found that weight gain between 3 and

Correspondence: David S. Freedman, Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention, CDC F107-5, 4770 Buford Highway, Atlanta GA 30341, USA dxfl@cdc.gov.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

24 months of age was associated with percentage body fat at ages 6 to 11 years as measured by dual-energy x-ray absorptiometry. Rapid weight gain in early life also was associated with reduced insulin sensitivity and increased body fatness among young adults (5). Our study showed the importance of BMI at age 3 years in predicting subsequent BMI levels. The relative importance of early age at BMI rebound versus BMI at ages 2 or 3 years in subsequent body fatness and adverse metabolic effects is uncertain.

ACKNOWLEDGMENTS

This report's findings and conclusions are those of the authors and do not represent the Centers for Disease Control and Prevention's official position.

REFERENCES

1. Freedman DS, Goodwin-Davies AJ, Kompaniyets L, et al. Interrelationships among age at adiposity rebound, BMI during childhood, and BMI after age 14 years in an electronic health record database. *Obesity (Silver Spring)*. 2022;30:201–208. [PubMed: 34932881]
2. Ylihèrsilè H, Kajantie E, Osmond C, Forsén T, Barker DJP, Eriksson JG. Body mass index during childhood and adult body composition in men and women aged 56–70 y. *Am J Clin Nutr*. 2008;87:1769–1775. [PubMed: 18541567]
3. Ekelund U, Ong K, Linné Y, et al. Upward weight percentile cross-ing in infancy and early childhood independently predicts fat mass in young adults: the Stockholm Weight Development Study (SWEDES). *Am J Clin Nutr*. 2006;83:324–330. [PubMed: 16469991]
4. Ong KK, Cheng TS, Olga L, et al. Which infancy growth parameters are associated with later adiposity? The Cambridge Baby Growth Study. *Ann Hum Biol*. 2020;47:142–149. [PubMed: 32429763]
5. Leunissen RWJ, Kerkhof GF, Stijnen T, Hokken-Koelega A. Timing and tempo of first-year rapid growth in relation to cardiovascular and metabolic risk profile in early adulthood. *JAMA*. 2009;301:2234–2242. [PubMed: 19491185]