

## The authors reply

Os autores respondem

Los autores responden

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Schlüssel et al. welcome the thoughtful comments on our article, the subject of this debate. The article integrates the results of the 2006 *Brazilian Demographic and Health Survey* (DHS) on household food insecurity (HFI) and obesity across the life course, based on a series of three separate papers<sup>1,2,3</sup>. As mentioned by Cook, Frongillo, Himmelgreen, and Castro, an important limitation to our study is that although we examined the relationship between HFI and obesity using a life course framework, we tested our hypotheses with cross-sectional analyses. This concern raises two separate issues. First, we agree that it would be more accurate to describe the framework as “over the life course” rather than as a “life course approach”, given that we studied only one moment in the life course of different individuals with three different ages. Second, we agree that prospective studies are needed to confirm these relationships, which Cook and Frongillo indicate are fully consistent with findings from the United States. As indicated by both researchers, future prospective studies and qualitative research (i.e., mixed methods) are needed, not only to confirm the HFI-obesity relationship and its directionality, but also to better understand potential mechanisms explaining this relationship and why it changes over the life course.

Castro raises the important concern that the validity of body mass index for identifying overweight/obesity may not be the same across the life course. We are aware that our obesity indicator may not be fully comparable at different ages and encourage readers to bear these limitations in mind when interpreting the associations between HFI and overweight/obesity at different ages, as described in our integrative article and original studies<sup>1,2,3</sup>. Despite this potential limitation, we continue to defend our hypothesis that the nutrition transition in Brazil may be shaping the differentially deleterious effect of HFI on body fat accumulation over the life course, whereby the association is already evident in female adolescents and adult women but still not in children. We agree with Castro that this hypothesis should be tested with cohort designs using mea-

asures of overweight/obesity that are shown to be comparable at different ages over the life course. Additionally, as Santos points out, it is essential that future studies examine this relationship in male adolescents and adult men. We agree with Santos that there are several reasons to expect the HFI-obesity relationship to be modified by gender and for this statistical interaction to be highly context-specific.

A key conceptual issue highlighted by Cook, Frongillo, Belik, and Burlandy is that the *Brazilian Food Insecurity Scale* (EBIA) provides a household-level measure that fails to explain intra-household food distribution or the differential effects of food insecurity on household members as a function of their life course stage. As recommended by Frongillo, qualitative research is needed to better characterize the “adult-child” buffering hypothesis (i.e., the claim that adults protect children against the negative consequences of HFI), which his research in Latin America and the United States has shown to be multidirectional and highly dynamic and complex. Consistent with this, we agree with Himmelgreen’s recommendations for a better understanding of HFI coping mechanisms and how they influence obesity risk via different bio-behavioral pathways. Specifically, we welcome his suggestion to incorporate a bio-cultural approach into this line of research that builds on life history theory and the early developmental origins of adult health and disease theory. This approach could help disentangle the complex pathways and web of relations that are likely to explain how HFI affects obesity risk across the life course. This recommendation is consistent with the concerns raised by Belik and Burlandy concerning the need to further elucidate the complex web of relations between poverty, HFI, and obesity, paying special attention to exactly what is measured by scales like the EBIA. Our research supports the view that experience-based scales like EBIA provide information that transcends traditional measures of socioeconomic status<sup>1,2,3,4,5</sup>. In our view, mixed-methods approaches such as those used to validate the EBIA<sup>4,5</sup> are needed to develop additional valid and suitable measures for epidemiological studies examining intra-household food distribution and dietary behaviors (e.g., meal-skipping, changes in portion sizes per meal) in response to HFI and as a function of life course stage.

As Cook indicates, most studies on HFI and obesity have not included adolescents. Our findings highlight the importance of better representing adolescents in future HFI studies. We also agree with Cook that future research in Brazil and elsewhere in Latin America and the Caribbean

needs to take obesity risk factors into account that go beyond diet, such as the influence of HFI on maternal mental health, as well as physical activity patterns. As Cook and Frongillo indicate, future HFI research in Brazil should extend beyond obesity to include child development and mental health and chronic disease outcomes across the life course. Such an approach is essential for better characterizing and responding to the numerous challenges posed by HFI for Brazil's human and national development in the context of a profound epidemiological and nutrition transition.

In conclusion, we thank the discussants for their thoughtful comments. Together with our own work, they have allowed us to frame solid recommendations for improving future mixed-methods research design(s) to answer the key questions raised in this debate. We hope that our work will motivate other researchers in Latin America to move the field in this direction and believe that this will be the most important legacy of the current research project.

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