Response to Cummins and Finaret (2019)

Dear Dr. Turner, Editor-in-Chief of the American Journal of Physical Anthropology,

1 NATURE OF MEASUREMENT ERROR

We agree with J. Cummins and A. Finaret when declaring that in our research (Comandini et al., 2019) we did not "mimic the methods used by large international demographic surveys." This would have been almost impossible, as our study was not based on household saplings as in the surveys, but was realized within institutions where many children were boarding, some of them from many years, many were orphans, and some came from the main slum of Kampala and had been selected there by the school for being the more in need (i.e., in most cases, without a protective family). However, the longitudinal approach of the research allowed us to collect repeated information on child age from school registers and social worker archives, and to integrate them with data obtained by interviewing the teachers, the nurses, and in some cases the mothers. Actually, we aimed to con- sider statistically the magnitude and impact of age imprecision in a large sample of school children, which is an interesting but poorly studied group of children.

In fact, the Demographic and Health Survey (DHS), as well as the Multiple Indicators Clusters Surveys (MICS), focuses only on adults and children under the age of 5 years. Anyway, although we agree on the excellent quality of data from DHS and MICS, they meet age errors too, as indicated by the frequent age heaping (Larsen, Headey, & Masters, 2019), and by cases exclusion due to invalid age data (Comandini, Cabras & Marini, 2016). Indeed, nonresponse rates for child ages as high as 30% have been detected in DHS surveys (Larsen et al., 2019). The problem is particularly relevant in countries where the practice of registering children at birth is lower, such as Uganda. As an extreme case, the MICS reports on the Northeast Zone of Somalia, a region with the lowest rates of birth registration in the world, omitted all the information on child undernutrition because it was "extremely difficult to get correct age-related data" (UNICEF Somalia and Ministry of Planning and International Cooperation, 2014). Furthermore, noteworthily, the values of age data omission declared by the DHS and MICS are likely underestimated, as the standard surveys refer to the population living in households, while people living in the slums are generally underrepresented (Elsey et al., 2018).

The systematic and random error in age detected in nutritional studies has a significant impact on malnutrition estimates. We thank J. Cummins and A. Finaret for their clear synthesis on the effects of age imprecision, particularly of random error in the month of birth and of age heaping. We also thank them for noticing that Larsen et al. (2019) detected an impact of age imprecision on stunting similar to that estimated in our sample, which is about one percentage point. This degree of effect magnitude is lower than the one calculated in previously published studies, using simulations of DHS data on children under the age of 5 years (Comandini et al., 2016; Comandini, Cabras, & Marini, 2017). Indeed, this is not surprising because the effect of age imprecision depends on several factors, such as the extent and spread of the error within the sample, and the child's age, being lower in older children (Comandini et al., 2016, 2017).

2 STUDY POPULATION

We agree with J. Cummins and A. Finaret that school children generally show a higher stunting prevalence than younger ones. However, the direct comparison of stunting prevalence between our sample (11.9–12.7%) and the Ugandan population of children under the age of 5 years (28.9%) surveyed by UDHS (UBOS & ICF, 2018) is not appropriate, as we never declared or intended to imply that our results were representative of children at risk for malnutrition in the whole Uganda nor in the Ugandan regions where the sampling has been done. Also, the employed bootstrap method does not allow generalization to the population level. Indeed, according to the 2016 UDHS (UBOS & ICF, 2018), the distribution of malnutrition in Uganda is strongly variable, with some areas, such as the Karamoja region, showing levels of malnutrition twice those detected in the Kampala region (35.2 vs. 18.1%), that is, the more common provenance of the children in our sample. Furthermore, though the majority of children in our sample came from impoverished families, they have attended private schools, thanks to Bhalobasa Association help. In these schools, children can benefit from hygienic and dietary support, according to practices studied and improved during the research and briefly described in our article.

That said, we are aware that children with a better nutritional status are less affected by age mis-measurement than more malnourished children, as their *z*-scores are higher and less interested by random oscillations around—2SD cutoff threshold for undernutrition. Indeed, along with the influence mentioned above of the different magnitudes of imprecision and the different children ages, mean nutritional status is another relevant factor in the variable effect of age misreporting on nutritional status estimates.

3 LEVELS VERSUS DIFFERENCES

We agree entirely with J. Cummins and A. Finaret on the significant interference of age error with understanding of the etiology of malnutrition, especially of stunting, and the health impact of either policies, programs, or interventions.

Until the goal of registering all children at birth will be satisfactory approached, a more solid consciousness of the relevance of age data within the nutritional and anthropological research community is to be hoped. A careful procedure to collect age data is strongly advisable. Furthermore, reports on nutritional status in children and adolescents from low-income countries should report a comment on the quality of age data. Such an approach would be particularly useful in studies on nutritional status in school children, where more scattered information is available. Indeed, the majority of the existing knowledge originates from data collected using methodologies different from the DHS ones, and without discussing the problem of age bias or imprecision. On the other hand, regrettably, DHS and MICS data are not suitable to analyze nutritional status in school children, as these children show different growth patterns and are influenced by different causal factors than those under the age of 5 years.

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We thank Joseph Cummins and Amelia Finaret for their interest in our article (Comandini et al.,) and their insightful comments, which allowed us to further discuss the issue of age imprecision in nutritional studies. In this response, we aim to stress some points that interfere with the analysis of the three major concerns highlighted by the authors.

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