Author’s response to reviews

Title: Physical growth: is it a good indicator of development in early childhood in low- and middle-income countries?

Authors:

Thach Tran (thach.tran@monash.edu)
Sara Holton (sara.holton@monash.edu)
Hau Nguyen (hau.nguyen@monash.edu)
Jane Fisher (jane.fisher@monash.edu)

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Dr Darren Byrne
Managing Editor
BMC Pediatrics

Dear Dr Byrne,

Re: Manuscript entitled “Physical growth: is it a good indicator of development in early childhood in low- and middle-income countries?”

We are really grateful for your appraisal and the reviewer’s thoughtful comments. We have endeavoured to address each one and have identified amendments in the manuscript with tracked changes. Please find attached our point-by-point responses to the reviewer’s comments and suggestions.

We hope our manuscript can now be considered for publication.

Yours sincerely,

On behalf of the authors

Thach Tran
Introduction:

Reviewer comment: Paragraph 1: It is important to note that the 43% figure representing children globally who are failing to meet their developmental potential is based on stunting (and poverty) as proxy indicators.

Response: We have added a sentence to make that note. It reads:

‘This figure was estimated based on the prevalence of children stunted and/or living in extreme poverty as a proxy indicator.’

Reviewer comment: Paragraph 2: The authors can elaborate on the debate and challenges that emerge with the association of linear growth (and stunting specifically) and early child development outcomes?

Response: We have amended this paragraph to elaborate the debate and challenges.

Reviewer comment: Paragraph 4: It is worth examining in the previous literature and meta-analyses whether concurrent height or prior (predictive) child height has been used to examine associations with children's early development?

Response: We have provided more details on the cross-sectional and prospective data of the association. It reads:

The correlation between child height for age and cognitive domain score in cross-sectional studies (11 studies) is 0.28 (95% CI, 0.19 to 0.36) and in prospective studies (5 studies) that child height for age is the predictor is 0.22 (95% CI, 0.17 to 0.27). The correlation coefficient between child height for age and motor domain score in cross-sectional studies (4 studies) is 0.24 (95% CI, 0.11 to 0.36) and in prospective studies (2 studies) is 0.29 (95% CI, 0.15 to 0.42).

Reviewer comment: In general, some explanation about the theoretical/potential pathways between linear growth, nutrition and child development should be expanded upon.

Response: We have added a paragraph to explain about the relationship. It reads:

‘The relationship between child linear growth and development is complicated. Physical growth can positively influence other developmental domains through the development of the brain and musculoskeletal system. Children with delays in cognitive, motor, and social-emotional development might have compromised interactions with caregivers and others. These can adversely affect the quality of care they receive and the opportunity to participate in activities
that are crucial for healthy physical growth. Therefore, the relationship can be one way or the other way causal relationship or one confounded by common factors, or a combination of these.'

Analysis:
Reviewer comment: ‘Was any analysis conducted to examine correlation after also adjusting for early learning opportunities’ and ‘maternal education’. ‘Adjusting for these variables, which have sound theoretical and empirical evidence, will likely influence the final results.’

Response: We acknowledge that learning opportunities and maternal education are potential confounders. Previous analyses of these datasets show that household wealth is strongly associated with those factors (McCoy et al. 2016; Tran et al. 2017). Including those variables along with household wealth in this analysis will not improve the model fit because of collinearity. Therefore, we included only household wealth in the analysis as a proxy variable for those as well as all other potential confounders. We have added a sentence in the Analysis section to elaborate that.

Discussion:
Reviewer comment: The limitations of these data and analyses are not discussed. It will be useful to include a brief section describing the study limitations.

Response: We have amended the second last paragraph to discuss about the limitations of this study. It reads:

We acknowledge some limitations of this study. This was a secondary analysis of existing survey data so it was not possible to alter the data collection design. Firstly, the tool used to assess ECD in MICS and DHS is a brief and parent-self-reported scale which does not involve assessor observation of the child. A locally-validated, abilities, child-direct-assessment like the Bayley Scales of Infant and Toddler Development– Third Edition [33] produces more comprehensive and objective indices of ECD. However, direct assessments of individual children require considerable resources and are not feasible for use in large-scale surveys. The scale used in the MICS and DHS was rigorously developed by UNICEF’s expert team and tested in multiple low-and middle-income settings [19]. Second, the MICS and DHS did not collect a comprehensive set of common risk factors for child growth and development. We used household wealth as a proxy indicator of the home environment and HDI as a proxy indicator of the country environment which does not include country specific policies about access to early childhood education and health care. Finally, this study included only children aged from 3 to 5 years. Child growth and overall development are cumulative over time and cannot be changed in a short period. Therefore, the outcomes measured at 3 to 5 years can reflect the status and changes in the first two years of life but are not a direct measure of early growth and development.
Reviewer comment: The final paragraph highlights the role of integrated interventions targeting multiple child outcomes. I suggest this is rephrased to discuss complex interventions given the current evidence on combined nutrition and parenting interventions has limited benefits on nutrition/growth outcomes.

Response: We have revised this paragraph to make recommendations that are more general.