Reviewer's report

Title: Validity of the Australian Recommended Food Score as a diet quality index for Pre-schoolers

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Reviewer: Chandana Maitra

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The article titled “Validity of the Australian Recommended Food Score as a diet quality index for Pre-schoolers” presents a useful tool which has good scope for future application, and if properly executed, will add value to the literature on dietary assessment methods.

However, I note the following concerns most of which will relate to methodology.

Major Compulsory Revisions

1. Since for preschool-aged children, information on diet is usually obtained from the primary caretaker(s), who may typically be a parent or an external caregiver, some clarification is required on who provided the responses – external caregiver or both parents, or one of the parents? This is important because there are evidences in the literature that if information is obtained only from one surrogate reporter, the reports are likely to be less complete, and foods tend to be underestimated [1]. A “consensus” recall method, in which the child and parents report as a group on a 24-hour dietary recall, has been shown to give more accurate information than a recall from either parent alone [2,3].

2. Clarification is required on how the authors have accounted for missing data with respect to food frequency questions. In processing the food frequency data, it is quite normal to encounter missing data, where many food frequency questions would not be answered, and decisions are required as to how the missing data would be handled. Even though the authors mention they had missing responses on “age” of children, they do not mention any problem of missing data regarding the food frequency questions. If they have not encountered any such problem, it should be so specified.

3. An important issue in this literature is “measurement error”. I would particularly mention the following concerns.

First, a major limitation of the food frequency method is that it contains a substantial amount of measurement error [4] – some of which are inaccuracies stemming from errors in frequency and serving size estimation. These problems get compounded when applied to children because of greater variability in potion sizes etc. with respect to children’s dietary assessment. Because of the error inherent in this approach, FAQs are generally used for ranking subjects rather than estimating quantitative parameters such as the mean and variance, of a
population’s usual dietary intake [5]. Given above, the degrees of misclassification of subjects appear to be important in such a validation exercise. Therefore, it is recommended that the authors refer to the issue of ‘measurement error’, at least briefly, and report a classification analysis, as a minimum- to examine agreement at a categorical level.

Second, in the validation of nutritional assessment methods, the reference measurement should be as accurate and as precise as possible, and any errors associated with the two methods should be independent. But this rarely happens, in practice. In most cases the reference method itself is imperfect and subject to within-person error and intake–related bias (correlation between error and true intake). In such cases, measures such as correlation coefficients may underestimate the level of agreement with the actual usual intake. In classical linear regression analysis, presence of measurement errors can bias the slope estimate in the direction of 0, commonly referred to as attenuation. This can be corrected for, using measurement error models and energy adjustment, which can be used to assess not only the validity of FAQs but also to adjust estimates of relative risk for valid outcome [6]. Measurement error models allow for within-person error in the reference instrument, resulting in more accurate estimates of correlation between the diet measure and true diet [7, 8]. Given above, my question is - Have the authors taken account of these issues in their effort to check agreement between AFRS-P and nutrients? If not, it should be mentioned as a limitation. Comparing reference measurement with those from the FAQ enables adjustment for attenuation, by employing the regression calibration approach. But correct application of this approach requires that even if the adopted reference instrument contains measurement errors the errors should be independent of true intake and errors in the FAQ. The authors have conducted regression analysis which might have given biased estimates because of the above concerns. Effects of measurement error are more complicated in multivariate context. Even if they are not able to correct for the errors at least an acknowledgement of the problem is essential, otherwise the analysis becomes too simplistic.

4. In the section on “Assessment of Agreement between AFRS-P and AES-P FFQ nutrients and food groups”, in paragraph 1, authors mention, “Demographic variables, age, gender and parent education, were controlled for by being kept in the model if significant….. The total energy intake was included as an explanatory variable if significant.” The statements are not clear. It is understandable that too few participants were Aboriginal or Torres Straight Islanders, but what about age, gender or parent education, especially total energy intake? What is the justification of not including them as controls if they are not significant? It is possible that the language is not clear. Hence requires clarification, to facilitate understanding of the reader.

5. In the section on Background, paragraph 1, the authors note, “Diet quality scores or indices are used to summarize dietary intake into a single numeric variable, which addresses some of the limitations in evaluations of diet-disease relationships based only on single nutrients”. In this context, it is important to
note that without recognizing the major concerns in this literature, some of which have been mentioned above, findings from such FFQ-based epidemiological studies of diet-disease associations might be seriously misleading.

Minor Essential Revisions

1. Time frame about which intake is queried is a design issue. Some studies indicate that the season in which the questionnaire is administered influences reporting over the entire period [9]. It is therefore important to have a note on the selected time frame – primarily to ensure that the data is free from seasonality.

2. The authors have presented cut-offs for interpreting the ARFS-P but there is no discussion on how these cut-offs have been determined. Either have a brief discussion or provide a valid reference here.

3. In reporting the results, reporting 95% confidence intervals, may be desirable.

Discretionary Revisions

1. It is fine to conduct validation exercises on sub-samples, because validation/calibration studies are expensive to conduct. However, sample should be sufficiently large to estimate the relationship between the study instrument and a reference method with reasonable precision. As mentioned above, one can have an error-adjusted correlation coefficient and this may give guidance to the sample size required in a study, as the less precise the diet measure, the more individuals will be needed to attain the desired statistical power. Given above, a discussion on how the sample size has been determined, with what statistical power, might be useful.

2. The authors have not attempted to address ‘reproducibility”. A brief note on the reason for not doing so should be mentioned in the section on limitation.

References


Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests