Author’s response to reviews

Title: Skipping breakfast among 8-9 year old children is associated with teacher-reported but not objectively measured academic performance two years later

Authors:
Kylie Smith (k.j.smith@utas.edu.au)
Leigh Blizzard (Leigh.Blizzard@utas.edu.au)
Sarah McNaughton (Sarah.McNaughton@deakin.edu.au)
Seana Gall (Seana.Gall@utas.edu.au)
Monique Breslin (Monique.Breslin@utas.edu.au)
Melissa Wake (Melissa.Wake@rch.org.au)
Alison Venn (Alison.Venn@utas.edu.au)

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Author’s response to reviews:

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Dear Dr Yaxley,

Thank you for the opportunity to submit a revised version of our manuscript entitled ‘Skipping breakfast among 8-9 year old children is associated with teacher-reported but not objectively measured academic performance two years later’ (NUTN-D-16-00140R1). We have addressed the reviewers’ comments, as outlined in our response to reviewers. The changes made to the manuscript have been highlighted in yellow.

Thank you in advance for your time and consideration of our work. I look forward to hearing from you.

Best wishes,
Kylie Smith
Editor Comments:

BMC Nutrition operates a policy of open peer review, which means that you will be able to see the names of the reviewers who provided the reports via the online peer review system. We encourage you to also view the reports there, via the action links on the left-hand side of the page, to see the names of the reviewers.

Reviewer reports:
Lucy Bell (Reviewer 1): Comments to the author:

The authors have addressed the reviewer comments sufficiently. I only have a few outstanding minor comments for the authors.

Abstract:
1. Results: add in age of participants at baseline and 2 years later.
REPLY: The age of participants is reported in the methods section of the abstract “The Longitudinal Study of Australian Children (LSAC) collected data during 2008 (aged 8-9 years) and 2010 (aged 10-11 years).”
CHANGE TO TEXT: None.

2. Conclusion: indicate what interventions you are referring to – those to improve breakfast consumption?
REPLY: In the revised manuscript we now specify that we are referring to interventions to increase breakfast consumption.
CHANGE TO TEXT: (Page 4, para 2). “This underscores the importance of using objective measures of academic performance to avoid inflated effect estimates and, potentially, unnecessary and costly population interventions to increase breakfast consumption”.

Background:
3. Page 6, lines 37-45 - I suggest revising to the present tense.
Using data from a national study of Australian children, this study examined if skipping breakfast at age 8-9 years predicted poorer academic performance and classroom behavior two years later. We hypothesized that breakfast skippers would have poorer school performance and classroom behavior than those who ate breakfast.

REPLY: The aim has been reworded to the present tense as suggested by the reviewer.

CHANGE TO TEXT: (Page 6, para 3) “Using data from a national study of Australian children, this study examines whether skipping breakfast at age 8-9 years predicts poorer academic performance and classroom behavior two years later. We hypothesize that breakfast skippers will have poorer school performance and classroom behavior than those who eat breakfast.”

Methods:
4. Page 9, lines 44-52 - I suggest some minor revision as per below.
Covariates considered for inclusion in the adjusted models included sociodemographic variables associated with skipping breakfast (described below) and the other outcome variables (behavior, teacher-reported performance and the standardized tests; for example the behavior variables were considered as covariates in the analysis examining the association between skipping breakfast and academic performance).

REPLY: The suggested changes have been made in the revised manuscript.

CHANGE TO TEXT: (Page 9, para 3) “Covariates considered for inclusion in the adjusted models included sociodemographic variables associated with skipping breakfast (described below) and the other outcome variables (teacher-reported performance, classroom behavior, and the standardized tests; for example the behavior variables were considered as covariates in the analysis examining the association between skipping breakfast and academic performance).”

5. Page 10, lines 29-34- I suggest some minor revision as per below.
Ethnicity was considered as a potential confounder in the analysis, but was not included in any of the final models as it did not change the coefficient of breakfast skipping by at least 10% (our criterion for including a potential confounder [18]) when included in the model.

REPLY: The suggested change has been made

CHANGE TO TEXT: (Page 10, para 1)”Ethnicity was considered as a potential confounder in the analysis, but was not included in any of the final models as it did not change the coefficient
of breakfast skipping by at least 10% (our criterion for including a potential confounder) when included in the model.”

Results:
-No comments

Discussion:
-The discussion has been strengthened by the changes made.

Conclusion:
6. Page 14, line 25-27 "Our results may not be generalizable to populations where children regularly go without breakfast" Please justify/reference this with an explanation for your hypothesis. This relates to the last sentence of the conclusion where 'poverty' is first mentioned - this should be discussed earlier if stated in the conclusion. Further explanation of this is required.
REPLY: Only 10% of the children were reported to skip breakfast on at least one of the three days, and consistent skipping was rare, which is similar to recent national data (see response to reviewer 3, point 2). This suggests that our findings may be generalizable to the Australian population but not to groups where a higher percentage regularly go without breakfast. The reason children go without breakfast does not add to our argument therefore we have removed the section referring to poverty from the concluding sentence of the discussion.
CHANGE TO TEXT: (Page 18, para 2) However, our findings may not apply to populations with a high proportion of children who regularly go without breakfast.

Alison Yaxley (Reviewer 2):
Thank you for addressing comments from the first review so comprehensively.

1. My only comment on the revised manuscript is in relation to the introduction of 'poverty' in the final sentence of the conclusion. This should be discussed and if the mention of SES in the discussion is related to poverty this should be more clearly linked.
REPLY: See response to Reviewer 1, point 6 above.
Nicole Lazar (Reviewer 3):
This paper explores the relationship between skipping breakfast in young school-age children, and teacher-reported and standardized test results two years later. The study includes a large (several thousand) cohort of children in Australia. At age 8-9 their breakfast-eating was assessed on three occasions in near temporal proximity. Two years after that, the scores of the children on standardized tests, as well as teacher evaluations of their behavior and proficiency, were collected. Investigators looked at the differences between the children who didn't skip breakfast on any of the three occasions and children who skipped at least once.

Assessment of statistical aspects

1. The sampling strategy was based on defining strata at the levels of state/territory and urban/rural. Within each stratum, a "random sample" of 10% of children was taken. The description sounds to me like a stratified simple random sample, but the authors describe it as a "two-stage clustered design." Please clarify this; the two designs are similar, but not precisely the same. Also please clarify if, within each region, a simple random sample of children was taken, or if this was done in some other way.

REPLY: We have added more detail to explain how the sample was selected. We also removed the word ‘clustered’ and now describe the sampling as a ‘two-stage design’.

CHANGE TO TEXT: (Page 7, para 1) “The children were selected using a two-stage design. In the first stage, postcodes were stratified by state/territory and urban/rural location to ensure geographical representation. Very remote postcodes were excluded. Postcodes were then randomly selected. In the second stage, a 10% sample of children born between March 1999 and February 2000 were randomly selected. For each postcode, children were listed according to date of birth, and a systematic random sample was taken from this list to ensure a representative range of birth dates.”

2. The definition of "breakfast skippers" and the extrapolation of missing breakfast more than once (out of three days checked) to behaviors and test results two years later is quite shaky. Hardly any children skipped more than once, out of those three, which does lead one to question the definition and the reliability of the results. Analysis would have been strengthened had data
on breakfast consumption been collected at more than one wave. Maybe this wasn't possible but I'd like to see some discussion of the choice made here. In some sense, it's not surprising that so many of the comparisons yielded little or no difference.

REPLY: Consistent breakfast skipping was rare in this sample, with intermittent skipping being more common. It is difficult to compare the prevalence of breakfast skipping due to the different age groups studied and the different methods used to measure breakfast. However, the percentage of children who skipped breakfast does appear to be similar with national prevalence data reported in our paper recently accepted for publication in the Australian New Zealand Journal of Public Health [1]. Using data from the 2011-12 Australian National Nutrition and Physical Activity Survey, in that study we defined skipping breakfast using two 24-hour recalls. We found that 8% of boys aged 4-8 years and 14% of boys aged 9-11 years skipped breakfast on at least one of the two days. Among girls 9% of 4-8 year olds and 14% of 9-11 year olds skipped breakfast on at least one day. These finding are similar to the current study, where 10% of 8-9 year-old boys and girls skipped on at least one of the three days. Skipping breakfast has been shown to increase with age, and therefore may be higher in the LSAC sample at follow-up, when the children were aged 10-11 years. However, the national data suggests that at this age, consistent skipping is still low, with only 0.3% of boys and 5% of girls aged 9-11 years skipping breakfast on both days the breakfast data were collected.

In the limitations section of the discussion we acknowledge that few children were consistent skippers and that breakfast data were not available at follow-up. We suggest future studies examine change in breakfast behavior on academic performance. ‘Stronger associations with academic performance may be observed in children who regularly skip breakfast. However, consistent skipping was very rare and intermittent skipping better reflects what was occurring in this age group. Breakfast data were collected over three days. While this allowed us to identify intermittent skippers better than would have been possible with data collected on just one day, this may still not fully reflect children’s usual breakfast habits. The children who usually skip breakfast one out of three days may go to school without breakfast one or two days each week but other children classified as skippers may go without breakfast less frequently. We were unable to examine change in breakfast habits in this analysis as breakfast consumption was not assessed at follow-up, and it is possible that children’s breakfast habits may have changed during
the 2-year follow-up. Future research should examine whether becoming a breakfast skipper is associated with poorer performance on standardized tests or if becoming a breakfast eater is associated with improved standardized test results.’ (Page 14, para 3).

CHANGE TO TEXT: (Page 17, para 2) ‘However, the percentage of children who skipped breakfast is similar to national prevalence estimates from the 2011-12 Australian National Nutrition and Physical Activity Survey, where skipping breakfast was defined using two 24-hour recalls. In that study 8% of boys aged 4-8 years and 14% of boys aged 9-11 years skipped breakfast on at least one of the two days. Among girls 9% of 4-8 year olds and 14% of 9-11 year olds skipped breakfast on at least one day.’

I'd like to see an even more detailed accounting of the original wave 1 sample and how/where attrition of different types occurred. Figure 1 goes a long way toward providing this information, but I think that the step of drop-out because of no permission to access NAPLAN data is maybe missing. This would help with the discussion at the bottom of manuscript page 8, top of page 9, where it looks like there are some inconsistencies, but I suspect that they arise because of this missing step.

REPLY: The inconsistency between the numbers reported in the methods and in Figure 1 is because the methods section reports the number of children in the LSAC dataset who had linked NAPLAN data, not the sample used for this analysis. For clarity we have added a sentence to the revised manuscript stating the number of children with NAPLAN data in the sample used for this analysis. In the results section, we report the number of children who sat the Year 5 NAPLAN tests in 2009, 2010 and 2011 and these numbers are consistent those reported in Figure 1.

CHANGE TO TEXT: (Page 9, para 1) ‘NAPLAN data were available for 2,158 children included in this analysis.’

3. Please report the response rates from the teachers on behavioral and academic measures. It's possible to get some idea of this from Figure 1, but there could also be other reasons why the teacher-reported data weren't available.

REPLY: At follow-up the questionnaires were completed by 3,269 teachers (75.6% response rate). This information been added to the revised manuscript. Due to missing data the sample
size for the behavioral analysis was slightly lower (n=1,665), as all components of the Strengths and Difficulties Questionnaire are required to calculate the score.

CHANGE TO TEXT: (Page 8, para 3) Questionnaires were completed for 3,269 children (response rate 75.6%).

4. With so few Indigenous children (n=31) it is very hard to draw any concrete conclusions about this variable. A shift of even one child from "not skipper" to "skipper" or vice versa could have a big effect on the statistical test here.

REPLY: We reported in the results section that there were few Indigenous children in the sample ‘Compared with non-skippers, a higher proportion of breakfast skippers were Indigenous, or from one-parent families (Table 1). However, there were few Indigenous children in the study sample (n=31, 1.4%).’ We have added additional text to the revised manuscript to make it clearer that this small sample size means the results may not be generalizable to the Indigenous population.

CHANGE TO TEXT: (Page 12, para 5) ‘However, there were few Indigenous children in the study sample (n=31, 1.4%) so these findings may not be generalizable to the Indigenous population.’

5. What would be considered a "meaningful" difference in teacher-reported assessments or standardized test performance? On page 13, a 3% difference is mentioned as "unlikely to be of great importance" (even though it was "statistically significant"). It would be helpful for interpretation of the analysis to have this context more broadly, to the extent possible.

REPLY: For the numeracy domain, we found skippers had a 13-point lower score than breakfast eaters, which was a difference of less than 3%. We were unable to find a definition for what would be considered a meaningful difference. However, in consideration of the reviewer’s comment in the revised manuscript we now include data from the 2010 NAPLAN report [2], where the national results for the Year 5 numeracy test are stratified by a range of sociodemographic variables. Compared to the national data, our observed 13-point difference was similar to the difference between boys and girls (11 points) but smaller than the difference observed for parent education (up to 46 points) and living in urban/rural areas (up to 33 points).
A meaningful difference for NAPLAN has not been defined. In the adjusted analysis, we found breakfast skippers had a 13-point lower score in the Year 5 numeracy test than non-skippers. Every year the national NAPLAN results are reported for each test, stratified by a variety of sociodemographic variables. To put our observed difference into context, the national NAPLAN report showed a similar difference for sex, with the mean Year 5 numeracy score being 11 points higher among boys than girls. Compared to children living in metropolitan areas, those from provincial areas had a 16-point lower numeracy score, and those from remote and very remote areas had a 31-33 point lower score. Larger differences were observed in the national data for parent education, compared to those who had a parent with a university degree, mean Year 5 numeracy scores were 31 points lower among those whose parent had a diploma and 46 points lower among those whose parents had only completed year 12.

6. Do the teachers know much about the home life of the children, e.g. who might be "likely" to be skipping breakfast, or who they think might be likely to skip breakfast? Teacher prejudice or buying into social stereotypes might partially explain why students who skipped were rated more poorly by teachers but not on more objective measures. The authors mention this briefly at the end, however I wonder if there might be a way (in future studies) to quantify this?

REPLY: It is not known what the teachers know or assume about the children’s home life. We report in the discussion ‘Residual confounding is a possible reason for the association between skipping breakfast and teacher-reported assessment, which was subjective and may have been influenced by other factors associated with skipping breakfast such as perceptions of the home environment and family support.’ (page 16, para 3). In future studies, rather than trying to measure and adjust for teacher prejudice, which may introduce more error, it would be better to avoid completely by using standardized tests. In the conclusion of our paper we state ‘It is important to use objective measures of academic performance in further studies, otherwise false conclusions may drive unnecessary and costly interventions.’

CHANGE TO TEXT: None.
References
