Risk of Bias for Nutrition Observational Studies (RoB-NOS) Tool*

Bias due to confounding
1.1 Is there potential for confounding of the effect of exposure in this study?
1.2. *If Y or PY to 1.1*: Was the analysis based on splitting follow-up time according to exposure received?
1.3. *If Y or PY to 1.2*: Were exposure discontinuations or switches likely to be related to factors that are prognostic for the outcome?
1.4. *If N or PN to 1.3:* Did the authors use an appropriate analysis method that adjusted for all the critically important confounding variables at baseline?
1.5. *If N or PN to 1.3:* Were confounders that were adjusted for measured validly and reliably by the variables available in this study?
1.6. *If N or PN to 1.3:* Did the authors avoid adjusting for post-exposure variables?
1.7. *If Y or PY to 1.3:* Did the authors use an appropriate analysis method that adjusted for all the critically important confounding variables, including baseline and time-varying confounding?
1.8. *If Y or PY to 1.7*: Were confounders that were adjusted for measured validly and reliably by the variables available in this study?
Bias in selection of participants into the study
2.1. Was selection of participants into the study (or into the analysis) based on participant characteristics observed after the start of exposure?
2.2. *If Y or PY to 2.1:* Were the post-exposure variables that influenced selection of participants (into the study or analysis) associated with exposure?
2.3. *If Y or PY to 2.2*: Were the post-exposure variables that influenced selection of participants (into the study or analysis) associated with the outcome?
2.4 Do start of follow-up and start of exposure coincide for most participants?
2.5 *If Y or PY to 2.2 and 2.3, or N or PN to 2.4*: Were adjustment techniques that were likely to correct for the presence of selection biases used?

Bias in classification of exposures
3.1. Is the exposure that was assessed clearly defined?
3.2. Does the exposure that was assessed represent the exposure of interest?
3.3. Were the methods used to assess the exposure clearly described?
3.4. Were the methods used to measure the exposure valid and/or reliable?
3.5. Were the same methods used to assess the exposure status for all participants/groups?
3.6. Were the methods used to define exposure status for participants/groups clearly described?
3.7. Were the methods used to define exposure status for participants/groups likely to result in minimal random or systematic exposure misclassification?
3.8. Could classification of exposure status been affected by the presence of the outcome, knowledge of the outcome or risk of the outcome?
Bias due to departures from intended exposures
4.1. Is there concern that changes in exposure status occurred among participants that were unbalanced across groups and likely to impact the outcome?
4.2 Were any critical co-exposures that occurred unbalanced between exposure groups and likely to impact the outcome?
4.3. *If Y or PY to 4.1, or 4.2:* Were adjustment techniques that are likely to correct for these issues (i.e., changes in exposure status and/or unbalanced co-exposures) used?
Bias due to missing data
5.1 Were there missing outcome data?
5.2 Were participants excluded due to missing data on exposure status?
5.3 Were participants excluded due to missing data on other variables (besides outcome data and exposure status) needed for the analysis?
5.4 *If Y or PY to 5.1, 5.2 or 5.3*: Are the proportion of participants and reasons for missing data similar across exposure groups?
5.5 *If Y or PY to 5.1, 5.2 or 5.3*: Were appropriate statistical methods used to account

for missing data?
Bias in measurement of outcomes
6.1 Could the outcome measure have been influenced by knowledge of the exposure received?
6.2 Were outcome assessors aware of the exposure received by study participants?
6.3 Were the methods of outcome assessment the same across exposure groups?
6.4 Were any systematic errors during measurement of the outcome related to exposure received?
Bias in selection of reported result
7.1. Is the reported effect estimate likely to be selected on the basis of the results from multiple *outcome measurements* within the outcome domain?
7.2 Is the reported effect estimate likely to be selected on the basis of the results from multiple *analyses* of the exposure-outcome relationship?
7.3 Is the reported effect estimate likely to be selected on the basis of the results from different *subgroups*?

*****NESR created the RoB-NOS by making modifications to the ROBINS-I and a preliminary instrument designed to assess risk of bias in non- randomized studies of exposures.[1,2] These modifications were made to ensure that the tool was applicable to observational studies of food, nutrition, and public health.[3,4]

[1] Morgan, R.L., Thayer, K.A., Santesso, N., Holloway, A.C., Blain, R., Eftim, S.E., Goldstone, A.E., Ross, P., Guyatt, G., Schunemann, H.J., 2018a. Evaluation of the risk of bias in non-randomized studies of interventions (ROBINS-I) and the 'target experiment'concept in studies of exposures: rationale and preliminary instrument development. Environ. Int. 120, 382–387.

[2] Morgan RL, Thayer KA, Santesso N, Holloway AC, Blain R, Eftim SE, Goldstone AE, Ross P, Ansari M, Akl E, Filippini T, Hansell A, Meerpohl JJ, Mustafa RA, Verbeek J, Vinceti M, Whaley P, Schünemann HJ; GRADE Working Group. A risk of bias instrument for non-randomized studies of exposures: A users' guide to its application in the context of GRADE. Environ Int. 2019 Jan;122:168-184. doi: 10.1016/j.envint.2018.11.004. Epub 2018 Nov 22 PMID: 30473382

[3] Hörnell A, Berg C, Forsum E, Larsson C, Sonestedt E, Åkesson A, Lachat C, Hawwash D, Kolsteren P, Byrnes G, De Keyzer W, Van Camp J, Cade JE, Greenwood DC, Slimani N, Cevallos M, Egger M, Huybrechts I, Wirfält E. Perspective: An Extension of the STROBE Statement for Observational Studies in Nutritional Epidemiology (STROBE-nut): Explanation and Elaboration. Adv Nutr. 2017;8(5):652-678. PMID: 28916567

[4] Bero, Lisa & Chartres, Nicholas & Diong, Joanna & Fabbri, Alice & Ghersi, Davina & Lam, Juleen & Lau, Agnes & McDonald, Sally & Mintzes, Barbara & Sutton, Patrice & Turton, Jessica & Woodruff, Tracey. (2018). The risk of bias in observational studies of exposures (ROBINS-E) tool: Concerns arising from application to observational studies of exposures. Systematic Reviews. 7. 10.1186/s13643-018-0915-2.