Reviewer's report

Title: Epidemiologic studies of modifiable factors associated with cognition and dementia: Systematic review and meta-analysis

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Reviewer: Raj N Kalaria

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Authors systematically reviewed 247 studies on modifiable socio-economic status (education), behavioural (smoking, alcohol, physical activity), and nutritional (caffeine, antioxidants, homocysteine (Hcy), n-3 fatty acids) risk/protective factors of various cognitive health outcomes, including incident Alzheimer’s Disease (AD). They found that each risk factor suggested positive findings ranging from about 39% for caffeine to 90% for physical activity. Education also had a significantly higher propensity for “a positive finding” compared to caffeine, smoking and antioxidant-related studies. Meta-analysis of 31 studies with incident AD yielded pooled RR for low education, high Hcy, and current/ever smoking status while indicating protective effects of higher physical activity and n-3 fatty acids. Estimated PAR% were particularly high for physical activity and smoking. Overall, no significant publication bias was found. Higher Hcy levels, lower educational attainment, and decreased physical activity were particularly strong predictors of incident AD. Further studies are needed to support other potential protective modifiable factors, such as caffeine.

This is an interesting report with systematic and meta-analysis on modifiable risks. This is an important question to address at this time point as there are numerous studies being published and consensus report/analysis helps to formulate current opinions. The study appears well performed with use of sound methods and appropriate analysis. It is not surprising that low level of education is a risk for cognitive impairment. This the case even in LMIC. Attention to some format and stylistic comments would improve this excellent report.

Authors can improve the report by separating the results and discussion sections. There is no reason for these to be together as they too the trouble to go through all the analyses and then weave their findings with discussion? Clear statements on their findings would be helpful to the interested reader. The Discussion would be curtailed and made more succinct. Without necessarily expanding the Discussion section authors could also briefly highlight the common shortfalls of some of the previous studies.

Abstract: some clarifications and brevity could improve it. For example, why equate education with socio-economic status why not say education?

The concluding paragraph (page 27) should be re-written with clear direct statements. There are several convoluted and confusing sentences e.g.
“…consistency analysis and meta-analysis indicate…a wide range of consistency in findings…”. Avoid phrases in parentheses for better flow.

There are a few typos e.g. abstract “varioius”. Authors should proof read the manuscript.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

No conflicts of interest