Reviewer’s report

Title: Social Relationships and Cognitive Functioning in Healthy Older Adults: A Systematic Review

Version: 0 Date: 31 Jul 2017

Reviewer: Lindsay Kobayashi

Reviewer’s report:

This is a systematic review of literature on social engagement (social activity, social networks, social support, and social integration) and cognitive function (memory, executive functions, global cognition) in healthy older adults aged 50 plus. This is an important and timely topic, however the heterogeneous range of domains of social engagement and cognitive function included in the review means there is a lack of synthesis and coherence in the results. Even though the review includes 39 studies, they are actually on disparate topics as the authors hypothesize heterogeneous relationships between different aspects of social engagement and domains of cognitive function. This is the biggest limitation of the review, as the 39 included papers cannot be synthesized together. I’ve included several comments below that I hope will help the authors improve their manuscript:

Abstract:

The domains of cognitive function that are listed in the Results are not mentioned in the Methods.

It is unclear in the Results whether references to 'cognitive function' are meant to be 'global cognition' as specified in the Methods? This is confusing, as is, cognitive function itself is not a domain of cognitive function, but it is presented that way.

Introduction

General: Please provide a rationale for why different aspects of social engagement (which need to be defined by the authors) might have differential effects on different domains of cognitive functioning (which also need to be defined by the authors) among older adults.

Lines 84-85: "There is problematic variation in how social factors are defined within the epidemiological literature [33]." Please provide actual definitions of the social factors of interest, and explain why variation in these definitions is problematic with respect to the research question that the review attempts to address, as it is not clear to the reader from this statement.

Line 89: Reference to the social factors in the previous sentence as "outcomes" is confusing because they are being treated as the exposure variables in this review. Please clarify.
Lines 91-93: "Social factors are infrequently measured together within the same analyses [40], precluding any meaningful comment on their distinct contributions towards cognitive ageing." What "social factors" are the authors referring to, and why do they need to be measured together in order to understand their unique contributions to cognitive aging? E.g. are studies where only one is measured confounded by the other aspects of social factors? It is not clear.

Lines 93-96: "One recent attempt to focus on the differential impacts of specific social factors led to the conclusion that subtle effects of social factors on cognitive functioning exist, and even discrepancies between these factors can be shown to have clinically meaningful effects on cognitive function [41]." What do the authors mean by 'subtle effects'? Which social factors? What do they mean by 'discrepancies between these factors'? And, which cognitive outcomes were included?

Methods:

Line 114: Why were studies before January 2000 excluded?

Lines 113-117: Why were MeSH subject headings not used? These are standard and should be used in all PubMed/Medline searches.

Additional File 1 Search Strategy: The column with dates under the 'Articles Found' heading is confusing - were the searches limited to these dates, or were these just the dates that were returned? Are the rows separated by different database searches, or were these really multiple separate searches of all databases? If the latter, why were so many searches done?

Line 120: Please provide the inclusion criteria for the literature search.

Lines 131-137: Why were these specific domains of cognitive function included? This is something that must be established in the Introduction, as there must be rationale for a relationship between different aspects of social engagement and each of these different domains of cognitive function.

Lines 138-148: Same issue as previous comment - why these specific domains of social engagement? Again, the definitions and rationale for each of these domains should be given in the literature review.

Line 160: How were different aspects of study design allocated to be either 'high', 'moderate', or 'low' risk? These seem like very subjective allocations.

Line 161: The STROBE statement is not a measure of risk of bias. STROBE simply assesses whether key aspects of study design, methods, and results are reported, it does not assess whether that they are likely to be biased. Please remove and use an appropriate measure of risk of bias in observational studies.
Results:

Lines 203-210: What aspects of social networks were associated with cognitive function? This section is quite vague. Presumably most people have a social network, unless they are completely isolated, so did these studies look at simply at the presence of a social network, or was it social network size, or density of connections, or quality of connections, etc.? Please clarify these findings.

Discussion:

Lines 252-258: The reference to cognitive function and then individual domains of cognitive function is confusing, as it's unclear whether the authors mean 'global cognition' by 'cognitive function'. Please clarify.

Lines 267-273: This interpretation seems overly simplistic. If social engagement measures have been consistently associated with global cognitive function scores, but then have also been differentially associated with different individual cognitive domains, then surely the individual domains that show associations with social engagement measures should be driving the results for global cognitive scores?

Lines 275-276: This doesn't seem to be an accurate representation of this review. Although it was comprehensive by including 39 studies, they could not be pooled together as they were so heterogeneous so it is not an improvement upon Brown's previous collation of four studies. Please revise.

Lines 279-280: The statement "Additional research is required to examine the differential effects of social activity on executive functioning" doesn't make sense with respect to how the authors have categorized 'social activity': they define 'social activity' it as one single domain of social engagement, and executive functioning is also one single domain of cognitive function as well.

Lines 292-295: Negative social interactions (references 67, 68, 70) may actually be symptomatic of sub-clinical cognitive impairment or dementia having adverse effects on social engagement. The causality of this interpretation may be incorrect.

General: I have found several typos and grammatical errors throughout (eg. unclosed brackets), please proofread once more.

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An article of limited interest

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