Associations between cognitive leisure activities, social health factors and neural markers for brain health – a systematic literature review and meta-analysis

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Abstract

Background. Cognitive and social leisure activity engagement along with social health factors (e.g. social network size or loneliness), have been associated with cognitive decline and dementia risk. However, underlying structural brain mechanisms have not been clearly mapped out. Therefore, the objective of the current systematic review and meta-analysis is to summarize the best available evidence on the association between these factors and brain macro and microstructure.

Method. A systematic literature search was conducted in MEDLINE, PsycINFO, CINAHL and the Cochrane Central Register of Controlled Trials. Eligible studies had to fulfill the following criteria: 1) inclusion of cognitively and physically healthy participants older than 18 years and 2) assessment of the direct association between cognitive or social leisure activity engagement, social health factors (social network size and diversity, contact frequency, social support or loneliness) and structural magnetic resonance imaging or computerized tomography outcomes. Both observational and experimental study designs were eligible. Whenever appropriate, random effects meta-analysis based on (age, sex and intracranial volume adjusted) partial correlations was conducted and heterogeneity and risk of publication bias assessed.

Results. Of 6636 identified articles, 42 were included for qualitative analysis. Cognitive and social leisure activities were related to global and regional grey and white matter volume, white matter lesion volume, along with white and grey matter microstructure. Social

health factors were related to regional grey matter volume and white matter microstructure. Meta-analysis revealed small but significant partial correlations between engagement in cognitive or social leisure activities and global grey matter (three studies representing 3416 persons; $r_{p(Fisher)}$=.04; 95%CI= .01-.08; *p*=.010), hippocampal (three studies representing 892 persons; $r_{p(Fisher)}$= 0.07; 95%CI=.01-.14; *p*=.03) and white matter lesion volume (four studies representing 3508 persons; $r_{p(Fisher)}$= -0.04; 95%CI=(-.07)-(-.01); *p*=.02) but not with white matter fractional anisotropy.

Conclusion. CA/SA and social health factors are associated with brain macro and microstructural measured and may be potential targets for healthy brain ageing. Future studies should address the risk for reversed causality.

Keywords: Activity engagement, social health, brain structure