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Salience network functional connectivity associates with levels of social interactions in healthy and mild cognitively impaired older adults

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Abstract

Background: Older adults are at high risk for both cognitive decline and social isolation. A higher level of social interaction, however, confers a protective effect against cognitive decline, and intervention studies have demonstrated the efficacy of social interactions to enhance cognitive function. The biological mechanism of this enhancement is unclear. Here we evaluate the association between social interaction and the functional connectivity of the salience (SN) and default mode (DMN) networks, two large-scale brain networks implicated in social and cognitive function.

Method: Michigan Alzheimer's Disease Center at University of Michigan (Ann Arbor, MI, USA) collected data on the Lubben Social Network Scale (LSNS-6), which indicates levels of social interaction, and resting-state functional MRI data for 62 older adults with normal cognition (NOR; mean age +/- SD = 69.72 years +/- 6.24) and 51 mild cognitively impaired (MCI; 71.61 years +/- 8.57) participants. We evaluated the association between SN or DMN functional connectivity (DV) and level of social interaction using a linear regression model with age and sex as covariates.

Result: NOR and MCI participants did not differ in age ($t=-1.31$, $p=0.19$), level of social interactions ($t=1.47$, $p=0.14$), or SN connectivity ($t=1.86$, $p=0.065$), but MCI did have lower DMN connectivity ($t=2.839$, $p=0.005$). Level of social interaction associated positively with SN connectivity ($t=2.34$, $p=0.02$, $r_p=0.218$). The Lubben items most strongly associated with SN connectivity were: "How many relatives do you feel at ease with that you can talk about private matters?" ($r_p=0.268$, $p=0.004$) and "How many relatives do you feel close to such that you could call on them for help?" ($r_p=0.284$, $p=0.003$).

Conclusion: Our data support an association in older adults between greater salience network connectivity and higher levels of social interaction, driven by quality of family interactions. Notably, an association with level of social interaction was not found for default mode network connectivity, suggesting the association found with salience network is not a global network effect. This finding highlights salience network functional connectivity as a meaningful outcome measure for social interventions on cognition in older adults.