Resting-state functional network connectivity differs between healthy aged individuals with and without reports of subjective cognitive change

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Objective
To examine whether resting-state functional connectivity (rsFC) of 4 common resting-state networks differs between healthy aged individuals with and without subjective memory complaints (SMC).

Introduction
Subjective cognitive changes, specifically subjective memory complaints (SMC), have been shown to be independent predictors of future cognitive decline and its severity. Differences in brain structure (Saykin et al., 2006; Hafkemeijer et al., 2013) and rsFC (Wang et al., 2013; Hafkemeijer et al., 2013; Conteras et al., 2017) have been found between individuals with and without reports of subjective cognitive change.
Both elevated (Hafkemeijer et al., 2013) and decreased (Wang et al., 2013; Conteras et al., 2017) rsFC have been found in individuals with subjective cognitive change.
We examined differences in rsFC strength between individuals with and without SMC in four resting-state networks: frontoparietal control network (FPN), default mode network (DMN), dorsal attention network (DAN), and ventral attention network (VAN).
Participants with a Cognitive Change Index (CCI) (Saykin et al., 2006) score of 16 or higher on the first 12 memory items (mCCI) were classified as having SMC.
Networks were defined a priori using six seed regions per hemisphere (Yeo et al., 2011).
Linear correlations between the average BOLD timecourses of seed regions represented rsFC between seed regions. Average rsFC between all seeds in a network represented the rsFC of that network. Average rsFC of all seeds of two different networks represented the rsFC between those networks.

Participant Information
Participants were part of the Health Outcomes Program for the Elderly (HOPE) study run through the Boston University Alzheimer’s Disease Center (BU-ADC). All participants completed the Cognitive Change Index (CCI). If their CCI score was 16 or greater on the first 12 items (memory items), they were classified as having SMC. Within a year of completing the CCI, participants were scanned at the Center for Biomedical Imaging (CBI) at the BU School of Medicine on a 3T Philips Achieva System with a 32-channel head coil. Within a year of completing the CCI, participants were scanned at the Center for Biomedical Imaging (CBI) at the University Alzheimer’s Disease Center (BU-ADC). All participants completed the Cognitive Change Index (CCI). If their CCI score was 16 or greater on the first 12 items (memory items), they were classified as having SMC.

Methods
Resting-state fMRI (rsfMRI): Participants fixated on a white dot on a black screen and were asked to stay awake and let their minds wander as BOLD fMRI data with the following parameters was acquired: TR = 3000 ms, TE = 30 ms, 3000 images (200 dynamics), voxel size = 3.31 x 3.31 x 3.31 mm.

Resting-State Functional Connectivity

Results

Left FPN Seeds

Adapted from Yeo et al., (2011)

Summary

- rsFC between the FPN and VAN was weaker in SMC vs. controls.
- Inter-hemispheric rsFC between the left and right FPN was weaker in SMC vs. controls.
- Inter-hemispheric rsFC between the left and right DMN was weaker in SMC vs. controls.
- Intra-hemispheric rsFC in the left FPN, left DMN, and right DMN was weaker in SMC vs. controls.
- A significant negative correlation was present between mCCI score and FPN rsFC in this sample.
- SMC were educated for a longer period of time than controls.