



University  
of Victoria

Graduate Studies

Notice of the Final Oral Examination  
for the Degree of Master of Science

of

**ASHLEIGH PARKER**

BSc Hons. (University of British Columbia, 2017)

**“Identification of earlier biomarkers for Alzheimer’s disease:  
A neuroimaging study of individuals with subjective cognitive decline”**

Department of Psychology

Thursday, August 15, 2019  
9:00 A.M.  
Cornett Building  
Room A125

Supervisory Committee:

Dr. Jodie Gawryluk, Department of Psychology, University of Victoria (Supervisor)  
Dr. Colette Smart, Department of Psychology, UVic (Member)

External Examiner:

Dr. Brian Christie, Division of Medical Sciences, UVic

Chair of Oral Examination:

Dr. John Walsh, Department of Educational Psychology and Leadership Studies, UVic

## Abstract

**Background:** Given that individuals with subjective cognitive decline (SCD) report a change that is not yet measurable with standard neuropsychological assessment measures, they are thought to be the earliest along the cognitive continuum between healthy aging and Alzheimer's disease (AD). The current study used a neuroimaging approach to examine differences in brain function and structure between individuals with SCD and healthy controls (HC).

**Method:** 3T resting state functional MRI and high resolution anatomical images were retrieved from 23 individuals with SCD (mean age = 72.9 years, SD = 5.4, 12 females) and 23 HC (mean age = 73.0 years, SD = 5.2, 12 females) from the screening time point from the AD Neuroimaging Initiative database. All data were processed using the FMRIB Software Library. Seed-based analyses of the default mode network (DMN) were used to compare differences in brain function between SCD and HC groups ( $Z > 2.3$ ; cluster significance:  $p < 0.05$ , corrected). Voxel-based morphometry (VBM) was used to examine differences in grey matter volume between the SCD and HC groups.

**Results:** The SCD and HC groups were not significantly different in age or education level. Results revealed significantly greater activity in the DMN including the bilateral precuneus cortex, bilateral thalamus, and right hippocampal regions in individuals with SCD relative to controls. Conversely, those with SCD showed decreased activation in the bilateral frontal pole, caudate, angular gyrus, lingual gyrus, right superior frontal gyrus, right occipital pole, right superior temporal gyrus, left superior temporal gyrus in the posterior division, left precuneus cortex, left precentral gyrus, left occipital fusiform gyrus, left temporal pole, and left cerebellum compared to HC. Finally, VBM results did not show significant differences in grey matter volume between the groups.

**Conclusion:** Findings revealed changes in brain function but not structure between individuals with SCD and HC. Overall, this study represents a crucial step in characterizing individuals with SCD, a group recognized to be at increased risk for AD. It is imperative to identify biomarkers prior to significant decline on clinical assessment, so that disease-delaying interventions may be delivered at the earliest possible time point.