**Method**

**Participants**

The Memory and Aging Project (MAP) is a longitudinal study that began in 1997 with an ongoing enrollment (Bennett et al., 2005). The study was approved by the Institutional Review Board of Rush University Medical Center and funded by the National Institute on Aging. The broad aim of the study was to “identify factors associated with the maintenance of cognitive health despite the accumulation of AD and other pathology” (Bennett et al., 2012). Participant recruitment was focused on retirement communities in northeastern Illinois. Continuous care retirement communities, ranging from independent living to unskilled and skilled nursing care, were specifically targeted because these types of facilities enabled better rates of follow up. Frail elderly who might otherwise be unable to participate could still be visited for assessment and facility staff could be contact persons for participants and inform study coordinators if participants became ill or moved (Bennett et al., 2005). Participants were also encouraged to speak to family members about their involvement in the study. Because residents of continuing care facilities are more likely to be white and affluent, an effort was made to include residents of subsidized retirement homes, and recruit from local churches and social service agencies to ensure low-income and minority elderly were included. Individuals were required to be free from dementia at study enrollment, to participate in annual clinical evaluations, and agree to donation of their spinal cord, muscle and nerve tissues, and brain at the time of death. There were no other exclusion criteria and all clinical evaluations were all conducted as home visits. This enabled a more inclusive study sample where common conditions and multiple comorbidities are represented and minimized participant drop out due to health.

At the time of this analysis, 1290 women and 470 men had completed some portion of the MAP protocol. However, individuals who developed dementia over the course of the study period were excluded from this analysis. This resulted in a sample of 1,362 participants. A further 104 participants were excluded because they did not complete one or more of the three physical measures at any wave and 18 were excluded because the relevant covariate information was not available resulting in a sample of 1240 included in the present analysis, 931 women and 309 men. 86% of whom identified as non-hispanic white, 7% as having Spanish, Hispanic, or Latino origin, 6% as Black or African-American, and the remaining 1% included individuals who identified as Native American, Indian, Asian or Pacific Islander.

**Measures**

**Demographics**

Education and race and ethnicity were gathered from what was reported in the 1990 U.S. Census. Participants were additionally asked if they considered themselves of Spanish, Hispanic or Latino origin. Age was calculated from date of birth.

**Physical Functioning Measures**

*Pulmonary function*

Pulmonary function was tested using a hand-held spirometry (MicroPlus Spirometer MS03, MicroMedical Ltd.) which gives measures of forced expiratory volume (liters in one second), forced vital capacity (liters), and peak expiratory flow (liters/second). This device has been validated to American Thoracic Society standards and has been previously used in large epidemiological studies of respiratory function (Bennett et al., 2005). Measures of maximal inspiratory pressure (cm H2O) and maximal expiratory pressure (cm H2O) were taken using a hand-held device containing a pressure-sensitive transducer (MicroMouth Pressure Meter MP01; MicroMedical Ltd.). These are measures of respiratory muscle strength.

*Grip strength*

Grip strength was measured using the Jamar hydraulic hand dynamometer (Lafayette Instrument, Lafayette, Ind., USA) (Bennett et al., 2005; Buchman, Wilson, Bienias, & Bennett, 2005). Two trials of grip strength were obtained for each hand. A composite measure of grip strength was calculated from the average of the four trials.

*Walking Speed*

Gait speed was measured as the amount of time taken to walk 8 feet. Participants were instructed to walk at a normal pace and given two trials (Bennett et al., 2005).

**Covariates**

Self- report information about various health conditions was gathered via a structured questionnaire. Participants were asked if they had ever been told by a doctor, nurse or therapist that they have had a heart attack or coronary, coronary thrombosis, coronary occlusion, or myocardial infarction during the baseline interview and then asked if any of these events had occurred since the last assessment at subsequent interview. A score of 0 was assigned if none were ever reported and 1 if the participant ever responded yes to the question. Participants were asked about their history of smoking at the baseline interview as part of a structured questionnaire. Values were assigned from 0 (never smoked), 1 (former smoker), or 2 (current smoker). A diagnosis of diabetes was based on self-report and medication use (e.g., insulin). Participant’s height was measured (meters) as part of the baseline clinical examination.

*Dementia diagnosis*

Diagnoses of dementia and AD were made on the basis of all available information from clinical evaluation, self-report, and medication review following the criteria of the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer’s Disease and Related Disorders association (NINCDS/ADRDA) (Bennett et al., 2005; McKhann et al., 1984). The diagnosis of vascular dementia was made following the National Institute of Neurological Disorders and Stroke/Association Internationale pour la Rechere et l’Enseignement en Neurosciences (NINDS/AIREN), although brain scans were not available (Román et al., 1993). A diagnosis of dementia with Lewy Bodies was adapted from the Report of the Consortium on DLB International Workshop (Bennett et al., 2005; McKeith, Perry, & Perry, 1999). A three step diagnostic process was followed. A computer algorithm assigned an education-adjusted impairment rating on the basis of 11 tests identified as commonly used in diagnosing AD. Then a board-certified clinical neuropsychologist reviewed the results of all of the cognitive tests, the computer-generated impairment rating, and other relevant information including education, occupation, sensory and motor deficits, and effort and subsequently made a clinical judgment about whether a diagnosis of cognitive impairment was appropriate. As a final step, participants were evaluation by a physician experienced in the evaluation of older persons for suspected dementia. A diagnosis of mild cognitive impairment was also made for individuals who the neuropsychologist judged to have cognitive impairment but did not meet accepted criteria for dementia by the clinician. Individuals not meeting criteria for dementia or mild cognitive impairment were categorized as having no cognitive impairment (Bennett et al., 2005) (Bennett et al., 2005). Other diagnoses included Parkinson’s disease and parkinsonism which was made according to clinical criteria put forth by the Core Assessment Program for Intracerebral Transplantation (CAPIT) (Langston et al., 1992).

**Results**

Men gait-grip

The slope of gait is not significant. The slope of grip is. The variance of gait is not significant the variance of grip is. The slope of fev is significant. The variance of fev was not significant.

Women

The slope of fev was significant. The slope of gait was not. The variance around fev was not significant the variance of gait was significant. The slope of fev was significant the slope for grip was not. The variance in grip was significant.

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