old) is sparse. The present cross-sectional study explores the relationship between exercise and cognition in the oldest-old.
Participants and Methods: The final sample includes 194 cognitively healthy participants (106 females, MoCA mean score = 24.75) aged 85 to 99 years old (mean = 88.48). Each participant completed the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire and a cognitive battery comprising of the NIH Toolbox, digit coding, symbol search, verbal fluency, and Stroop task. Three groups (sedentary, cardio, and cardio plus strength training) were derived from responses on CHAMPS.
Results: The cardio plus strength training group performed significantly better on the cognitive measures compared to the sedentary group. For two measures, digit coding and symbol search, the cardio plus strength training group also performed significantly better than the cardio group. Cardio group did not significantly differ from the sedentary group on the cognitive measures. All at $p < 0.05$ and adjusted for multiple comparisons.
Conclusions: Our findings suggest exercise in the oldest-old is linked with higher fluid intelligence and better performance on cognitive measures of processing speed and that there may be an additive effect of exercise types on cognition.

Categories: Aging
Keyword 1: aging (normal)
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4 Misinterpreting cognitive change over multiple timepoints: When practice effects meet age-related decline

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Objective: Practice effects (PE) on cognitive testing impede our ability to accurately assess change. In particular, they hamper the detection of mild cognitive impairment (MCI) and progression to dementia by delaying the point at which test scores fall below diagnostic impairment cutoffs. When decline over time is expected, as with older adults or progressive diseases, failure to adequately address PEs may lead to inaccurate conclusions because PEs artificially boost scores while pathology-related or age-related decline reduces scores. The participant-replacement method accounts for PEs by comparing performance of demographically-matched replacement participants to returnees who have been tested previously. Unlike most methods, the participant-replacement method can separate pathology- or age-related decline from PEs; however, this method has only been used across two timepoints. Neuropsychologists tend to think that PEs level out after the first follow-up, but this issue has not been evaluated in models that allow PEs in the presence of overall decline. Including more than two timepoints makes it possible to determine if PEs level out after the first follow-up, but it is analytically challenging because individuals may not be assessed at every timepoint.
Participants and Methods: We examined 1190 older adults in the Alzheimer's Disease Neuroimaging Initiative who were cognitively unimpaired (n=809) or had MCI (n=381) at baseline. Participants completed six neuropsychological measures (Trails A, Trials B, Boston Naming Test, Category Fluency, Logical Memory, Rey Auditory Verbal Learning Task) at three timepoints (baseline, 12-month, 24-month). We implemented the participant-replacement method using generalized estimating equations in comparisons of matched returnees and replacements to calculate PEs. Propensity scores matched individuals on age, education, sex, and an estimate of premorbid functioning. Generalized estimating equations modeled PEs and age-related decline separately for each cognitive measure.

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Results: We observed significant PEs for 5 of the 6 measures in the cognitively unimpaired group and 4 measures in the baseline MCI group. PEs did not uniformly decrease across time; some—specifically on episodic memory measures—continued to increase beyond the first follow-up for both groups of participants. Without accounting for PEs, cognitive function appeared to improve or stay the same. In contrast, when PEs were included in the models, cognitive function appeared to decline or stay the same across time.
Conclusions: The replacement method of PE adjustment revealed significant PEs across two follow-ups. PEs for episodic memory, in particular, did not level out, but actually increased after the first follow-up, two years after baseline. As expected in these older adults, accounting for PEs revealed cognitive decline, in some cases, even when PE-unadjusted scores improved. This method of assessing PEs, in turn, means earlier detection of cognitive deficits, including progression to MCI, and more accurate characterization of longitudinal change.

Categories: Aging
Keyword 1: aging (normal)
Keyword 2: mild cognitive impairment
Keyword 3: neuropsychological assessment
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5 Large-Scale Network Connectivity and Cognitive Function after Exercise Training in Older Adults

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Objective: Despite growing evidence regarding the association between exercise training (ET) and functional brain connectivity, little is known about the effects of ET on within- and between-network functional connectivity (FC) of core brain networks. We investigated the effects of ET on within- and between-network functional connectivity of the default mode network (DMN), frontoparietal network (FPN), and salience network (SAL) in older adults with intact cognition (CN) and older adults diagnosed with mild cognitive impairment (MCI). We further examined whether the ET-induced changes in FC were associated with changes in cognitive performance.
Participants and Methods: 33 older adults (78.0±7.0 years; 16 MCI and 17 CN) participated in the present study. Before and after a 12-week walking ET intervention, participants underwent cardiorespiratory fitness tests, the Controlled Oral Word Association Test (COWAT), the Rey Auditory Verbal Learning test (RAVLT), a narrative memory test (logical memory; LM), and a resting-state fMRI scan. We examined the within- and between-network connectivity of the DMN, FPN, and SAL before and after ET. We also used linear regression to examine associations between ET-related changes in the within- and between-network connectivity and cognitive function.
Results: There were significant improvements in $\dot{V}O_{2peak}$, COWAT, RAVLT, and LM after ET across participants. Significant increases in within-network connectivity of the DMN and SAL were observed in response to ET across participants. FC between the DMN-FPN, DMN-SAL, and FPN-SAL were also increased after ET. Moreover, greater SAL within connectivity and FPN-SAL between connectivity were associated with enhanced LM immediate recall performance after ET. There were no significant interactions between Time (before vs after ET) and Group (CN vs MCI) for network connectivity or cognitive function.
Conclusions: Our findings suggest that increased within- and between-network connectivity following 12-weeks of walking exercise may subserve improvements in memory performance in older individuals with intact cognition and in those diagnosed with MCI.

Categories: Cognitive Intervention/Rehabilitation
Keyword 1: mild cognitive impairment
Keyword 2: neuroimaging: functional connectivity
Keyword 3: cognitive neuroscience
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