Associations of Cardiorespiratory Fitness and Muscular Strength with Cognition in Older Adults

Angelique Brellenthin and Duck-chul Lee, FACSM

Iowa State University, Ames, Iowa

Purpose: Cardiorespiratory fitness (CRF) has been associated with better cognitive function. However, considerably less is known about relationship between muscular strength (MS), independent of and combined with CRF, on cognitive function in older adults.

Methods: This cross sectional study included 499 older adults (56% women; mean age 72 years old). CRF and MS were assessed with the 400-meter walking test (minutes) and handgrip strength (kg), respectively. Poor cognitive function was defined the slowest 20% of congruent (CRT) and incongruent (IRT) reaction times from the Stroop Color-Word Task. Logistic regression was used to calculate odds ratios (ORs) and 95% confidence intervals (CIs) for CRT and IRT among sex-specific tertiles (thirds) of CRF and MS. Participants were further categorized as Fit (middle/upper CRF) or Unfit (lower CRF) and Strong (middle/upper MS) or Weak (lower MS) for a joint analysis. Covariates included sex, age, body mass index, smoking, heavy alcohol intake, depression, daily steps, diabetes, hypertension, hypercholesterolemia, and CRF or MS in respective analyses.

Results: Compared with the lower third of CRF, the middle and upper thirds had 0.47 (0.26-0.86) and 0.42 (0.21-0.84) reduced odds of poor CRT, respectively, and 0.44 (0.24-0.80) and 0.48 (0.24-0.97) reduced odds of poor IRT, respectively, after adjusting for all covariates including MS. Compared with the lower third of MS, the middle and upper thirds had 0.54 (0.31-0.94) and 0.51 (0.28-0.94) reduced odds of poor CRT, respectively, after adjusting for all covariates including CRF. No associations were found between MS and poor IRT. In a joint analysis, compared with the Weak & Unfit group, the odds of poor CRT were 0.48 (0.23-1.00), 0.37 (0.17-0.79), and 0.25 (0.13-0.49) for the Strong & Unfit, Weak & Fit, and Strong & Fit groups, respectively. Compared with the Weak & Unfit group, the odds of poor IRT were 0.75 (0.37-1.55), 0.31 (0.13-0.71), and 0.39 (0.20-0.75) for the Strong & Unfit, Weak & Fit, and Strong & Fit groups, respectively.

Conclusion: These results indicate that both CRF and MS are independently associated with faster processing speed (i.e., CRTs), but that CRF may be more strongly associated with tasks requiring executive function (i.e., selective attention in the IRTs) than MS.