STRRIDE-Extension: The cumulative effects of training at different weekly energy expenditures on cardiorespiratory fitness and markers of metabolic syndrome

Authors: Garrett A Moseley, Leanna M Ross, Katherine A Collins, Rebecca North, Johanna L Johnson, William E Kraus

BACKGROUND: Evidence suggests individuals accrue similar health benefits regardless of exercise session frequency or duration so long as total daily or weekly exercise amounts are held constant. However, it is unknown whether variations in weekly exercise amounts can yield similar health benefits once total exercise volumes are similar after months-to-years of training.

PURPOSE: Determine the cumulative effects of training at different weekly exercise energy expenditures but similar total program volume and intensity on markers of cardiorespiratory fitness (CRF) and metabolic syndrome (MetS).

METHODS: Following the initial 9-month STRRIDE trial, 22 participants underwent further exercise training for 6 to 24 months in one of two groups: 1) Low-Amount/Vigorous-Intensity (LAVI; n=14): 14 kcal/kg/week (KKW) at 65-80% peak VO_2; 2) High-Amount/Vigorous-Intensity (HAVI; n=8): 23 KKW at 65-80% peak VO_2. Outcomes included absolute VO_{2peak} (AVO_2), relative VO_{2peak} (RVO_2), body fat percentage, waist circumference, HDL-C, triglycerides, fasting glucose, insulin sensitivity index (S_I), and a modified MetS *z*-score. Comparisons between groups were performed at equivalent timepoints and differential timepoints of equivalent total exercise volumes.

RESULTS: Improvements in S_I were significantly greater in HAVI compared to LAVI at the LAVI 21-month/HAVI 15-month contrast (mean difference ± standard deviation: 2.13±0.68 mU/L/min, p=0.008) in a univariate analysis. In a multivariable model, improvements in AVO_2 and RVO_2 were significantly greater in HAVI compared to LAVI at the LAVI 21-month/HAVI 15-month contrast: model contrast estimate (standard error)=0.21 (0.01, 0.40) L/min, p=0.038 and 3.05 (0.14, 5.96) mL/kg/min, p=0.041, respectively; and the LAVI 33-month/HAVI 21-month contrast: 0.25 (0.04, 0.45) L/min, p=0.022 and 3.21 (0.10, 6.32) mL/kg/min, p=0.044, respectively. Contrasts in AVO_2 remained significant after adjusting for age and sex. Adherence decreased over time.

CONCLUSION: Although adherence decreased over time and complicated the analysis interpretation, LAVI experienced less robust improvements in CRF and MetS markers as HAVI at differential timepoints of similar total program volumes.