TACSM Abstract

Analyzing Sex Differences and the Dose-Response Relationship Between Aerobic Exercise and Cognitive Processing Speed in Young Active Adults

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ABSTRACT

Available research has identified a positive relationship between 10 minutes of aerobic exercise and improvements in cognitive processing speed (CPS) in young adults, although participant activity level was unclear Additionally, research indicates possible sex differences concerning exercise and CPS, defined as the rate in which human beings take in information and generate a response. **PURPOSE**: To investigate the potential effects of aerobic exercise bout length on cognitive processing speed in active adults. A secondary aim was to explore differences in CPS and aerobic exercise bout length between sexes. METHODS: Male (n=6) and female (*n=6*) participants who were classified as physically active based on ACSM guidelines participated in aerobic exercise sessions of different bout lengths (15, 20, and 25 minutes) in a balanced cross-over design. When participants arrived for the three testing trials, they first completed a computerized Symbol Search test. This matching test lasts two minutes and provides a score based on how many matches they answer correctly. Next, the exercise treatment consisted of a 5-minute warm-up, followed by a moderate intensity walk or jog on the treadmill (approximately 50-59% of Heart Rate reserve), and ending with a 5-minute cooldown. Participants then remained seated for ten minutes to allow for their heart rate to return to a resting state. Once in the resting state participants were administered the symbol search test again to determine if there were any changes in CPS following an exercise bout. All treatment sessions were performed at least 24 hours apart. Exercise bout length (T15, T20, T25) and time (pre-/post- exercise) were compared between sexes (M, F) using an ANOVA (1 between, 2 within) α=0.05. **RESULTS:** The main effects for bout length (p=0.849) and sex (p=0.232), bout length x sex interaction (p=0.563), bout length x time interaction (p=0.491), and bout length x time x sex interaction (p=0.956) were not significant. However, the main effect for time was significant (p=0.0001) where CPS was faster post-exercise (50±9) than pre-exercise (45±9) when pooled across bout length and sex. Also, there was a significant time x sex interaction (p=0.009) where, when pooled across bout length, there was greater CPS improvement from pre- to post-exercise in the males (Pre 46±8, Post 53±8) than in the females (Pre 43±11, Post 46±9). **CONCLUSION:** Active individuals experience improvements in CPS following an exercise bout. We did not find any significant distinction between bout lengths, indicating that active individuals do not require a specific exercise dose time to elicit improvements in CPS. However, male participants had a statistically significant increase in their processing speed assessment (pre-/post- exercise) compared to the females. This suggests that females may require additional exercise bouts or alternate exercise forms to experience similar improvements as the male participants.