

testosterone, perceived mental toughness, and athletic performance are not well understood. The purpose of this study was to examine the inter-relationships between aerobic fitness performance, concentrations of salivary testosterone, and perceived mental toughness. Ten men and thirteen women participated in this study. Variables collected were maximal oxygen uptake, pre- and post-exercise salivary samples, and pre- and post-exercise MTS scores. Participants were ranked from highest to lowest based on VO₂ max and post-exercise concentrations of salivary testosterone and then split into higher and lower ranking groups within both of these categories. When categorized into higher and lower VO₂ max groups, participants in the higher group reported significantly higher scores on the MTS post-exercise ($p=0.004$). Additionally, participants in the higher VO₂ max group demonstrated significantly higher concentrations of salivary testosterone both pre-and post-exercise ($p=0.002$; $p=0.001$). When categorized into higher and lower post-exercise concentrations of salivary testosterone groups, participants in the higher group reported significantly higher scores on the MTS post-exercise ($p=0.040$). These data suggest that those with higher concentrations of testosterone and perceived mental toughness may demonstrate higher athletic ability. These findings support those from previous research examining these relationships. Additionally, these data illustrate that higher concentrations of testosterone may lead to higher levels of perceived mental toughness. However, this relationship is most likely bidirectional and further research should attempt to determine causality through manipulation of either variable, or at least attempt to further understand the relationship by observing chronic changes in these variables. Funding source: University of Wisconsin La Crosse-Research, Service, and Educational Leadership (RSEL) Grant.

Aerobic Fitness Does Not Predict Acquisition of Hippocampal-dependent Memory in College-aged Adults

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Despite compelling evidence demonstrating positive relationships between the health-related attribute of aerobic fitness and the retrieval of information from hippocampal-dependent memory, we have little understanding of the extent to which aerobic fitness relates to the encoding of relational information. The acquisition of hippocampal-dependent relational memory, however, has substantial importance for supporting activities of daily living and navigating spatially within the environment. Accordingly, the present investigation examined the association between aerobic fitness and acquisition of a hippocampal-dependent spatial configuration task in a sample of college-aged adults ($N=152$). In the spatial configuration task, five geometric shapes were arranged within a virtual space environment. Participants were shown two geometric shapes at a time from a first-person perspective and were asked to indicate which one of the geometric shapes they were viewing from to see this perspective. Memory acquisition was defined as the trial in which the participant was correctly able to identify the viewing position six out of seven consecutive trials in a row. Following completion of the spatial configuration task, a VO₂max test was performed to determine individuals' aerobic fitness. Hierarchical regression analysis controlling for demographic factors revealed no association between aerobic fitness and the acquisition of hippocampal-dependent memory ($R < 0.01$, $p=0.2$). These findings suggest that aerobic fitness does not relate to a greater ability to acquire relational memories. Such findings have implications for the characterization of the importance of aerobic fitness in that it may not enhance the speed of learning but, given previously reported evidence, may instead aid in recalling information.

Effects of Acute Exercise Volume on Cognitive Function in Late-Middle-Aged Older Adults with ApoE ϵ 4: A Pilot Study

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Cognitive aging and dementia have been linked to several modifiable factors, such as personal characteristics and lifestyle practices. Research has showed that there is a significant influence of the ApoE ϵ 4 alleles on the cognitive functions, as well as affecting the prevalence of dementia among the elderly. Research has also demonstrated that acute exercise (AE) is positively linked to cognitive functions, and indeed the examination of exercise and cognition has been recognized as one of the most important and currently topical issues within exercise psychology. The purpose of the pilot study was to examine the AE effect on cognitive functions in an older population with ApoE ϵ 4, whereby the effects of the exercise volume were particularly emphasized. 13 healthy, older adults with ApoE ϵ 4 were recruited. Participants were required to complete four treatment sessions on separate days with a counterbalance order, including a) reading control, b) vigorous intensity with a short duration, c) moderate intensity for 30 minutes, and d) low intensity for a long duration. These participants were administered the Stroop test following each treatment. The results from response times aspect revealed that there were negative effects sizes among the three AE sessions (Cohen's d range from -0.23 to -0.46), compared to the reading control session, across all the Stroop test conditions. Regarding accuracy rates, there were positive effects sizes resulting among the three AE sessions (Cohen's d ranged from 0.09 to 0.81), compared to the reading control session, across all the Stroop test conditions. These findings suggest that AE could improve cognitive functions, regarding the levels of cognitive functions, in older adults with ApoE ϵ 4. Future research is encouraged in order to explore the relation between AE volume and cognitive functions, for example, by increasing the sample size and examining underlying mechanisms between acute exercise, cognitive function, and ApoE ϵ 4 from cognitive neuroscience perspectives.

The Effects of Physical Activity Training on Executive Function in Older Adults: A Meta-Analytic Review of Randomized Control Trials

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Several studies have demonstrated a positive relationship between physical activity (PA) and executive function (EF) in older adults. However, the effect of PA on EF might be affected by moderators, including the classification of EF, exercise prescriptions, and sample characteristics. Therefore, the present meta-analysis was designed to investigate the effects of PA training on EF in older populations with normal cognitive status or memory impairments. The electronic databases (e.g. EMBASE, Medline) were searched for studies published from January 2003 to January 2018. The main analysis showed a significant improvement in overall EF with a small effect size (Hedges' $g=0.23$). For EF domains, the moderator analysis demonstrated significantly positive effects of PA on inhibition, updating, and shifting. Regarding specific exercise prescriptions, different frequencies (i.e. low frequency and moderate frequency), intensities (i.e. moderate and vigorous), types [e.g. aerobic exercise, resistance exercise, Tai Chi and yoga, multiple PA exercise], session times (< 45 min, 45-60 min, and > 60 min), and lengths (1-3 month, 4-6 month, and > 6 month) of PA training interventions were found to have significant positive effects. In terms of sample characteristics, the analysis indicated that PA training interventions resulted in improved EF in both male and female participants and in both sedentary and physically fit participants. However, we only found significantly positive effects on EF among young-old