

Publication

Does heart rate variability mediate the association between chronic stress, cardiorespiratory fitness, and working memory in young adults?

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Young adulthood is a demanding development phase rendering individuals at risk for high levels of stress. While chronic stress may impair working memory maintenance, cardiorespiratory fitness is suggested to have a protective effect. Heart rate variability (HRV) contributes to this cognitive domain, but also retaliates to stress and aerobic exercise. Therefore, the present study investigated the mediating role of resting HRV on the association between chronic stress, cardiorespiratory fitness, and working memory maintenance in young healthy adults. Healthy participants ($N=115$, 48% female) aged 18-35 ($M=24.1$, $SD=3.8$) completed the Åstrand test on a bicycle ergometer to estimate maximal oxygen consumption [VO_{2max} ; (ml/min/kg)]. In addition, working memory maintenance was assessed using the modified Sternberg task with low (three items) and high cognitive load (six items). Using electrocardiography, HRV was recorded and the LF/HF ratio was extracted for mediation analyses. Path analysis revealed that cardiorespiratory fitness was significantly associated with accuracy on high cognitive load trials ($\beta=0.19$, $p=0.035$), but not on trials with low cognitive load. Perceived levels of chronic stress failed to show a significant association with working memory maintenance, independently of cognitive load. The pattern of results remained unchanged after introduction of HRV as a mediator ($\beta=0.18$, $p=0.045$). In conclusion, higher cardiorespiratory fitness is associated with better maintenance of verbal information in working memory. However, this association cannot be explained by vagal influences on memory processing driven by the autonomic nervous system.

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