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Heart Rate Variability and Plank Exergaming with an Always-Superior Partner

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Heart rate variability (HRV) may be an indicator of exercise training and autonomic nervous system regulation. However, the relationship between HRV and isometric abdominal plank exercise has not been studied. **PURPOSE:** To explore HRV in response to a series of isometric exercises between conditions in which subjects exercise alone or with software-generated partners (SGP) of varying superior ability. **METHODS:** One-hundred eighty-one participants completed five sets of planks to volitional fatigue with 30 sec of rest between each set (block 1). Participants were randomized into one of four conditions, which required performing five additional planks after a 10-min rest period, alone (control) or with an SGP who was either 1%, 40% or 100% better based on block 1 plank averaged times. Partner condition dynamics were created for the participant by providing visual and verbal feedback on the SGP's block 1 and concurrent plank performance. HRV was measured continuously as the root mean square standard deviation (RMSSD) during a 5-min rest, during each block, and during a 10-min rest. Analyses of variance assessed differences in HRV between conditions, across blocks, and during the 10 min rest period with resting HRV as a covariate. **RESULTS:** Significant decreases in HRV for the total sample were observed across the entire plank exergame session ($F = 3.758, p = .05$). Pairwise comparisons revealed significant decreases in HRV for the total sample between blocks 1 and 2 ($t = -0.413, p < .001$) and block 1 and the 10 min rest period ($t = -0.407, p < .001$). No main effect differences in HRV were found between conditions for the RMSSD at rest, within each block or during the 10 min rest period ($p > .05$); however, pairwise comparisons for block 2 revealed significant differences in HRV between control and the 100% partnered exergame plank condition ($t = -0.188, p < .017$). Plank performance time (in sec) was significantly different between the control and 40% condition ($p = .014$) but not between partnered conditions or the 1% and 100% conditions and control (reported previously but not the primary aim of this study). **CONCLUSION:** Isometric plank exercise may facilitate decreases in HRV, as demonstrated by subjects planking alone. This effect may be mitigated when exercising with an SGP who is always extremely superior in ability than the subject themselves.