The Impact of a Ballet and Modern Dance Performance on Heart Rate Variability in Collegiate Dancers

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Abstract:

Background: Prior research has exposed inconsistencies between physiological adaptation and preparation between dance class and performance for ballet and modern dancers. Heart rate (HR)variability (HRV) is a useful tool for assessing cardiac autonomic function, identifying potential training maladaptation in athletic populations, but has yet to be investigated in ballet or modern dance populations. As such, HRV may be able to provide valuable insight into the preparedness of dancers and the demands of performance in a high level collegiate dance population. Methods: Collegiate dancers (29 female, 2 male) were monitored in the lead up to, and following a dance performance. All HR recordings were analyzed for time domain (the square root of the mean squared differences of the successive RR intervals [RMSSD], the percentage of consecutive RR intervals greater than 50 ms [pNN50]) and non-linear (standard deviation of instantaneous RR variability [SD1], and Sample Entropy [SampEn]). Magnitude based inferences (MBI) with effect sizes (ES) were used to identify the practical significance of changes during the Winter Dance Concert. Results: Mean HR increased frombaseline to both pre-show recordings. The parameters RMSSD, SD1, and pNN50 were diminished at pre-show recordings compared to baseline. SD1 and pNN50 were found to be likely lower at the first show (SD1=0/0/100 ES=-0.61; pNN50=0/1/99, ES=-0.57) and second show (SD1= 0/0/100, ES=-0.58; pNN50 = 0/5/95, ES=-0.41) when compared to baseline values. Changes in SampEn were trivial. Self-efficacy was found to be significantly higher at the second show and post-show weekend. The dancers reported significantly lower measures of emotional stress and lack of energy compared to baseline after one-month post performance. The dancers reported feeling increasingly stressed and lacking energy going into the performances, as well as significantly higher feelings of fatigue after the weekend of performances when compared to baseline values. Dance exposure was significantly higher during performance week when compared to baseline. Discussion: Physiologically, the dancers were primed to perform by exhibiting a slight decrease in parameters of parasympathetic activity. These psychological findings may indicate that the dancers were not anxious, but aroused by the physiological demands. Conclusion: Dancers responded to concert dance performances similarly to other athletic populations approaching intense competition by exhibiting decreased PNS activity, indicating optimal preparedness for performance.