

## **Training Manipulations Based on Acute Heart Rate Variability Measures**

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### **ABSTRACT**

Heart rate variability (HRV) is an accurate indicator of sympathetic and parasympathetic nervous system activity. The balance between these systems affects the time between heartbeats. A high variability between heartbeats is equated to a greater influence from the parasympathetic nervous system. In this state, an individual is well rested, and therefore possesses higher readiness to perform physical activity. Through the use of smartphone applications (apps), athletes and coaches can collect accurate short-term HRV readings to assess autonomic nervous system balance. These apps provide a readiness to train score that may prove beneficial in adjusting daily training loads to maximize performance. **PURPOSE:** The purpose of this study is to characterize the changes in lower-body strength and power before and after a 6-week strength training program while manipulating intensity based on daily HRV readiness measures in female collegiate softball athletes. **METHODS:** Nine female NCAA Division II Softball athletes completed the 6-week training protocol. Participants were split into an experimental group (E; n = 5; age = 20.5±0.7 yrs, height = 166.9±2.7 cm, weight = 59.9±7.6 kg), who completed the training with the intensity adjusted based off of daily HRV readiness scores, and a control group (C; n = 4; age = 20.6±0.8 yrs, height = 171.7±1.2 cm, weight = 70.7±30.3 kg), who completed the training with no changes in exercise intensity. Measures of HRV were taken prior to each training session and used to calculate readiness scores with the use of a smartphone app. Participants completed 3 strength-training sessions per week throughout the study. Lower-body strength and power measurements were assessed before and after the protocol. One-repetition maximums on the back squat (SQ) and clean (CL) exercises and maximum vertical jump (VJ) height were collected. **RESULTS:** Lower-body power measurements were increased in the E group (CL: 51.3 vs. 56.9 kg, p = 0.047; VJ: 40.1 vs. 44.7 cm, p = 0.037) and the C group (CL: 56.8 vs. 63.6 kg, p = 0.021; VJ: 41.6 vs. 46.2 cm, p = 0.034), following 6 weeks of strength training. No significant differences were observed in lower body strength measurements in the E group (SQ: 74 vs. 84.1kg, p = 0.21) or the C group (SQ: 75.5 vs. 86.6 kg, p = 0.2). Significant differences were found between the prescribed volume of training and the completed volume of training (25364 vs 21650 kg, p = 0.014) in the E group. No significant differences (p > 0.05) were found with SQ, CL, and VJ measures between the E and C groups following 6 weeks of strength training. No significant differences (p > 0.05) were found in daily HRV measures between the E and C groups. **CONCLUSION:** Both groups exhibited similar HRV scores throughout the 6-week training protocol. Using daily short-term HRV readings, training intensity can be reduced without leading to any differences in lower-body strength and power improvements in female collegiate softball athletes.