Timing is Everything: Post-Activation Potentiation in Jumping
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ABSTRACT
The National Association for Sport and Physical Education (NASPE) has developed National Standards for Sport Coaches (NSSC) with Standard 12 focusing on designing programs of training, conditioning, and recovery that properly utilizes exercise physiology and biomechanical principles. Recent research has shown the effectiveness of a dynamic warm-up routine over a static stretching routine. With advances in dynamic warm-ups, coaches can better prepare their athletes for physical activity. Knowing when the athlete should start and conclude his/her dynamic warm-up routine is critical to obtaining optimal performance which supports the vision of the USA Coaching Coalition by strengthening coaching as a profession. This presentation will provide coaches information to help determine the proper time frame involved in a dynamic warm-up routine to create effective Post Activation Potentiation (PAP).

Post-Activation Potentiation (PAP) occurs when muscular performance characteristics are acutely enhanced as a result of their contractile history. The underlying principle surrounding PAP is that heavy loading prior to explosive activity induces a high degree of Central Nervous Stimulation which results in greater motor unit recruitment. The question arises as to how long before the performance activity should the PAP occur and when do the positive effects of the PAP begin to diminish.

A one-way repeated measure ANOVA was calculated that compared the vertical jump scores from each of the test conditions. A significant effect was found F(4, 76) = 13.20, p < .05). Pairwise comparisons revealed that scores significantly increased from the no warm-up condition (m = 14.40, sd = 3.58) to the 30 second condition (m = 16.10, sd = 3.81). There was no significant difference between the 30 second condition and the 60 second condition (m = 16.05, sd = 3.17). Nor was there a significant difference between the 60 second condition and the three minute condition (m = 15.60, sd = 3.42). There was a significant decrease from the three minute condition to the 5 minute condition (m = 14.85, sd = 3.18). In addition, the 30 second condition was significantly better than the three minute condition and five minute condition and the 60 second condition was significantly better than the 5 minute condition.

Overall, the results of all four time conditions after a dynamic warm-up showed improvement in the vertical jump over the no warm-up or rest condition. The improvement was highest at 30 seconds rest, and gradually decreased as the time condition was extended to five minutes rest. The results indicate that after 3 minutes, a PAP loses its benefits in regard to peak performance. A dynamic warm-up PAP routine is best utilized 30 seconds to 3 minutes before physical activity. A dynamic warm-up PAP before a maximal vertical jump can have a positive effect. After 3 minutes, additional dynamic warming-up will be needed to optimize the athlete’s performance level.
References


Author’s Note

Jason Busche is the 2013 NASPE National Middle School TOY, 2013 Central District Middle School TOY, and the Kansas Middle School TOY in 2011. Jason received his undergraduate degree in Health and Physical Education from NWOSU and his master’s degree in Physical Education from ESU. Jason currently teaches at NWOSU.