

To investigate the Effects Post-Activation Potentiation has on Collegiate Level Basketball Athletes: A Review of the Literature

1. Background:

Team sport results can often be widely affected by individual's skills and abilities. Previous research has suggested that post activation potentiation (PAP) can increase one's overall performance of power exercises, e.g. jumping and sprinting. PAP refers to a transient improvement in explosive muscle contractile performance as a result of using a loaded conditioning exercise. It is typically induced by a voluntary conditioning contraction (CC), typically performed at just below maximal intensity and has been consistently shown throughout the literature to increase both rate of force development and peak force characteristics of skeletal muscle, which therefore leads to an increased power output. Optimizing this response could lead to a greater performance in team sport games such as basketball. This review focused on the performance benefits of PAP following one set of submaximal back squats at different percentages of 1 repetition maximum (1RM), as well as the optimal period of rest time between the loaded exercise and dynamic sport-specific activity.

2. Methods:

This idea manifested after an insightful class regarding complex training in my strength and conditioning class delivered by Dave Diggins. I was intrigued to investigate if one high resistance training exercise performed in the warm up could significantly improve biomechanically similar explosive plyometric movements in sport specific basketball activities. This is based on the post-activation potentiation phenomenon described throughout the literature. My research group conducted a literature review, using Google Scholar, PubMed and the Cochrane database of complex training and PAP. This search was conducted in the early spring semester, the literature ranged from randomized control trials to peer reviewed papers from the years 1985 - 2015. Some search terms consisted of: PAP, maximal isometric activity on performance, maximal voluntary contraction, potentiation of explosive force, acute effects of squats on vertical jump, and physiology of PAP.

3. Results:

After extensive research into the current literature published on post activation potentiation two main questions arose:

1. What is the optimal rest time post potentiation exercise in trained basketball athletes with a history of resistance training?
2. Is there a significant difference between completing pre-load stimuli at 85% 1RM vs 90% 1RM?

The first question has been explored countless times throughout the literature but no specific recommendation has been suggested. The current consensus is that durations of 7-10 minutes rest seems to prove most effective. This may be down to the high level of individualism associated with PAP. There has also been a myriad of studies investigating what intensity best exploits the

PAP effect but, again, there is evidence supporting numerous studies. It has also been suggested throughout the literature that the heavier the pre load stimuli, the greater the PAP response will be.

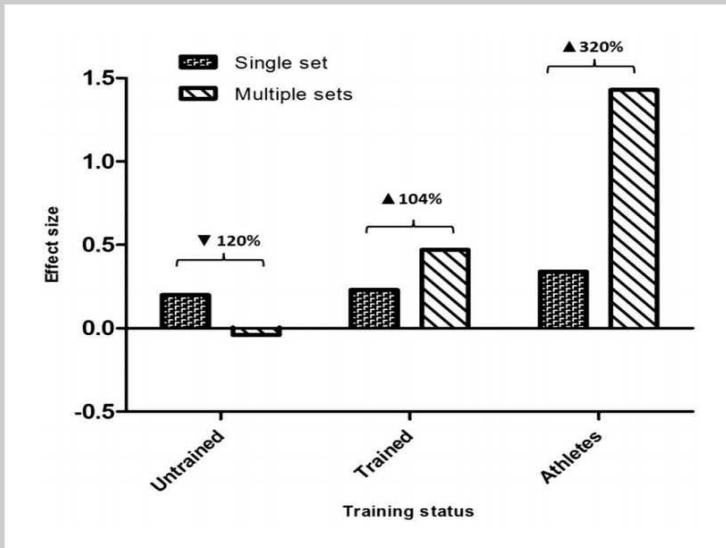


Figure 1. Effects of a single vs. multiple sets conditioning mode protocol on power in untrained, trained, and athletic populations.

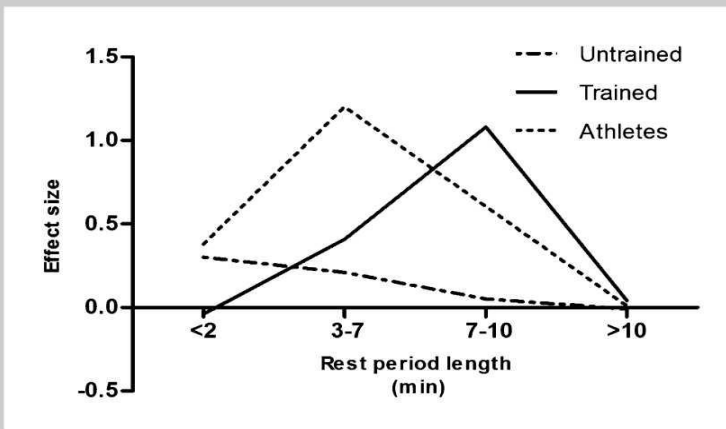


Figure 2. Power after immediate (<2 minutes), short (3–7 minutes), moderate (7–10 minutes), and long (>10 minutes) rest period lengths in untrained, trained, and athletic populations.

Figures 1 and 2 adapted from Wilson et al., 2013.

4. Discussion and Conclusions:

To summarize, we found that there is a multitude of parameters that can affect an athlete's response to PAP. These include, but are not limited to: fatigue, training status, rest period, muscle fiber type composition, exercise intensity and exercise modality. The fore-mentioned have all been demonstrated throughout the literature to have an effect on one's response to PAP. We recommend that PAP should be individualized to each athlete. This implies that every athlete should be taken through specific PAP protocols to determine which protocol suits the athlete best. Individuals with at least one year of resistance training, as are most collegiate level basketball players, may experience a low to moderate increase in power after a conditioning activity. Our initial understanding of the best rest interval was determined to be between 3-12 minutes, however we have concluded, after extensive research, that for trained athletes the ideal rest period lies between 7 and 10 minutes post PAP exercise. The best increases in power were shown in the literature to come from multiple sets, moderate intensity (60-85% 1RM Loads). It should be noted that these increases were found in trained athletes, i.e. the population demographic athletic trainers will be working with.

5. Bibliography/Works Cited

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