

The Effect of Post Activation Potentiation in a Warm-up on 50m Time Trial Performance in Adolescent Swimmers



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Introduction

Post Activation Potentiation (PAP) is a training intervention which utilises sub-maximal loads in order to optimise physical performance in sport through the application of external load prior to performance. This phenomenon can improve muscle contractility, force generation and rate of force development (1).

The purpose of this study was to investigate if a PAP application in a warm-up can help to increase 50m time trial performance in adolescent swimmers.

Method

Fifteen competitive swimmers (5 males and 10 females aged 14-21) were recruited from a Waikato Swimming Club.

Participants completed two sessions.

Session 1:

The participants completed a self directed warm up and 30 seconds later completed a baseline (BL) 50m sprint.

Session 2:

The participants completed the PAP warm-up and then completed 3 time trials, set at ASAP (~30s), 6 minutes and then 12 minutes post warm-up.

50m Sprint Procedure:

The 50m sprint started with a dive start. Time started on the word "GO" and finished when a hand touched the 50m wall.

Statistical Analysis

A Hopkins spreadsheet (2) was used to analyse the effects of the PAP warm-up on 50m sprint times.

PAP Warm-up

Exercises	Sets	Reps	Rest
Banded Squat	3	10	~20s
Box Jumps	3	10	~20s
Banded Row	3	10	~20s
Banded Pull	3	10	~20s



Results

Table 1: The mean 50m swim performance in relation to PAP warm-up

Timing in relation to PAP warm-up	50m Sprint time (s) (mean ± SD)
Baseline	28.73 ± 1.67
ASAP post	28.94 ± 1.81
6 min. post	29.28 ± 1.78
12 min. post	29.41 ± 1.70

Table 2: Differences in swim time between time intervals.

	P Value	% diff.	± 90% CL	Effect size
ASAP vs BL	0.116	0.7, ± 0.7		0.11 (T)
6 min vs BL	0.0007	1.9, ± 0.8*		0.31 (S)
12 min vs BL	0.0002	2.4, ± 0.8*		0.38 (S)
6 min vs ASAP	0.051	1.2, ± 1.0		0.18 (T)
12 min vs ASAP	0.014	1.6, ± 1.2*		0.25 (S)
12 min vs 6 min	0.289	0.4, ± 0.7		0.07 (T)

*Significant difference $p < 0.05$; S = Small; T = Trivial

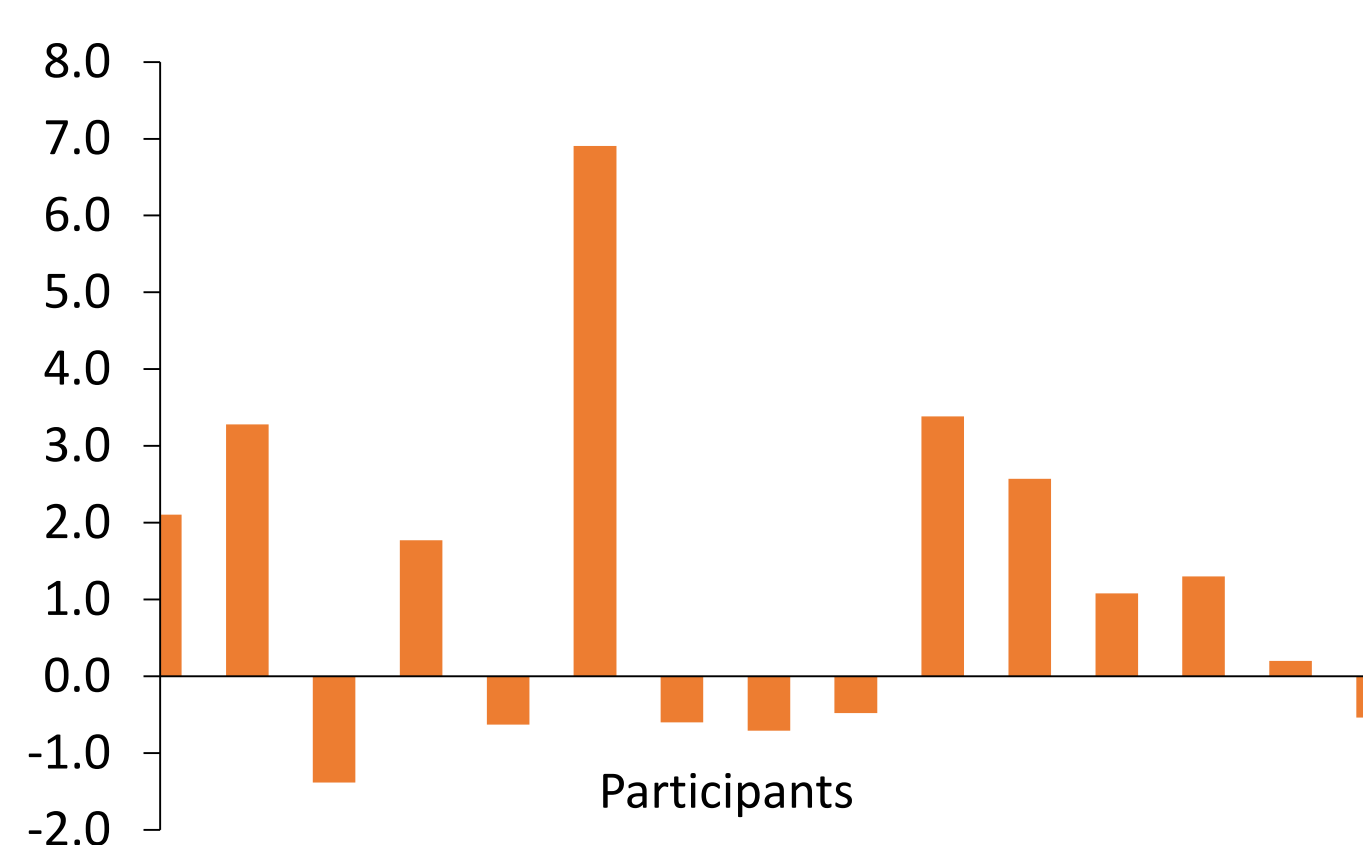


Figure 1: Individual percentage differences between ASAP post and 6 min post swim times.

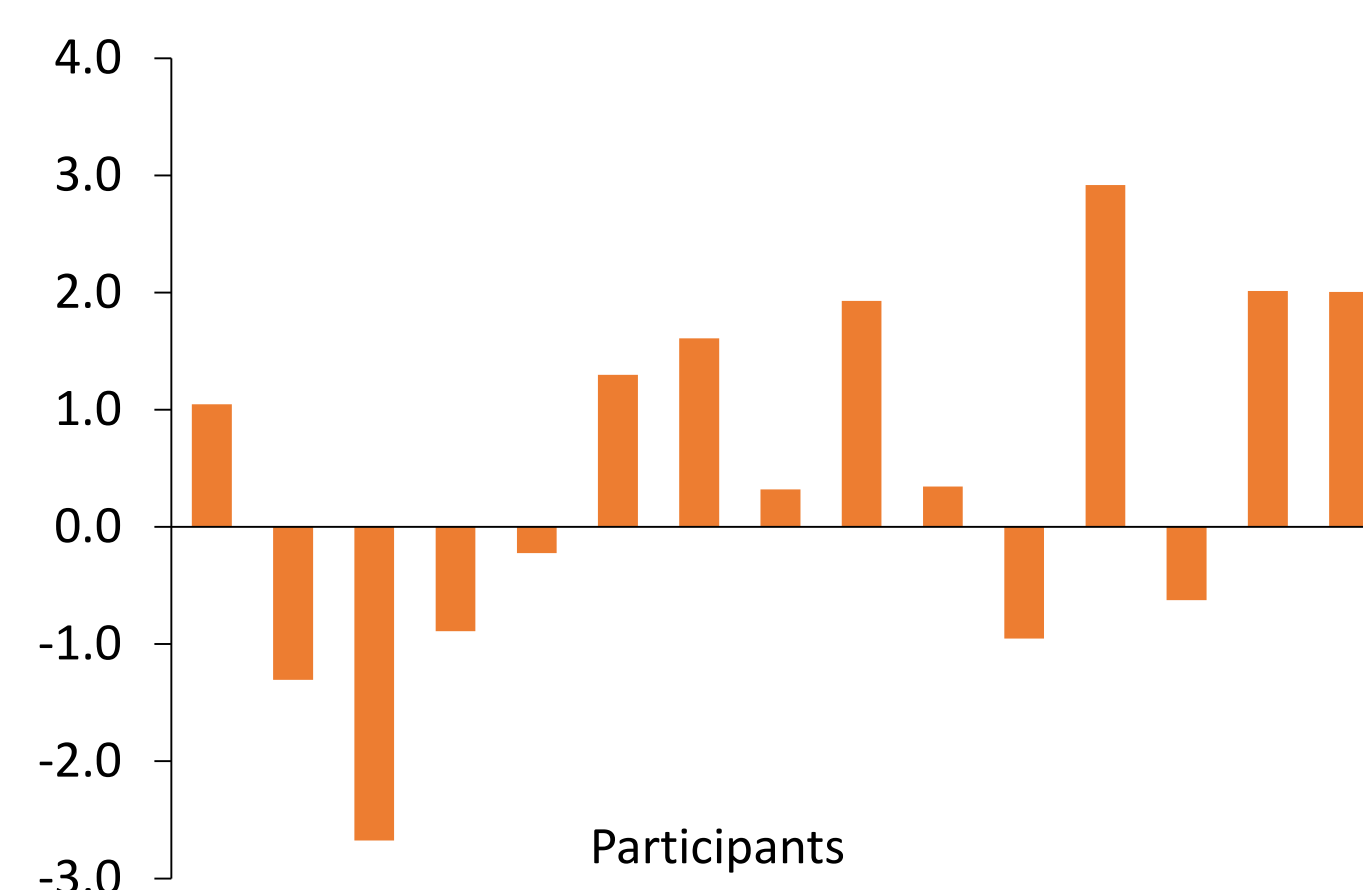


Figure 2: Individual percentage differences between 6 min post and 12 min post swim times.

Findings

Figure 1. demonstrates the individual percentage differences between ASAP Post and 6 min post. Figure 2 demonstrates the individual percentage differences between 6 min post and 12 min post.

Overall, the PAP warm-up caused significantly slower 50m times at all time points. Specifically, at the 12min time point the majority of swimmers were slower (2.4%, ± 0.8%).

In order for a PAP warm-up to be useful, research shows that an 8 minute recovery time is required between the PAP stimulus and the explosive exercise (3) rather than the 6 minute periods displayed in this study. The use of a longer recovery time may help to diminish fatigue.

Fatigue can be seen to be more dominant in the earlier stages of recovery, a longer recovery period may help to identify the benefits of the PAP warm-up (4).

Practical Applications

- Future research should explore the idea of extending the rest period in between the PAP warm-up and the trials (+12 mins) in order to provide adequate recovery time to take full advantage of the effects that a PAP warm-up may have on swim performance.
- Further research could analyse adding the PAP warm-up to a traditional swim warm-up to see if it has an effect on swim performance.

References

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