The effect of functional movement training on sprint performance in youth males

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Introduction

Understanding the role biological maturity plays in responsiveness to changes in speed post functional movement training may have implications for athlete development programmes (Oliver et al., 2013).

The purpose of this study was to identify the effect of functional movement training on sprint performance in youth males.

Methods

Design: This study used a pre – post parallel group design.
Participants: Forty seven High school youth males (characteristics are presented in Table 1) completed a 10m sprint assessment pre and post a 6-week intervention period.

Data collection: Post warm-up and familiarisation participants completed two maximal effort sprints with 2-minutes rest. Performance time was measured utilising Swift dual beam timing lights. Maturation was assessed using the non-invasive predictive methods of Mirwald et al. (2002). Anthropometrics allowed for maturity offset years (y) from peak height velocity (PHV) to be estimated and categorised similar to Read et al. (2017) for pre-PHV (-3.0 to -0.49 y) , circa-PHV (-0.50 to +0.49 y), or post-PHV(+0.5 to +3.0 y).

Intervention: Participants were categorised by maturation and allocated to either a 6-week (2 sessions per week) functional movement training group or control group (PE curriculum). Training consisted of body weight strength and sprint technique activities that were progressively overloaded to induce a training stimulus (See Table 2).

Analyses: Hopkins (2006) comparative methods spreadsheets for the analysis of post only trials and the analysis of pre-post parallel group trials were utilised to identify and compare change scores in 10m sprint times for each maturity group. Mean nett effects, p values and nett differences of training were calculated.

Results

Table 3: 10m sprint time outcomes (s) and corresponding effects pre and post-6week allocations for all maturity groups.

	Baseline Mean (SD)	Post-6weeks Mean (SD)	Effect size; Inference
pre-PHV			
Training	2.01 (0.10)	1.98 (0.08)	-0.22; Small
Control	2.05 (0.17)	2.08 (0.14)	0.14; Trivial
circa-PHV			
Training	1.92 (0.10)	1.87 (0.10) *	-0.44; Small
Control	1.91 (0.08)	1.93 (0.08)	0.25; Trivial
post-PHV			
Training	1.96 (0.08)	1.95 (0.09)	-0.07; Trivial
Control	1.90 (0.18)	1.93 (0.19)*	0.25; Small

** = significantly (p<0.05) different than baseline*

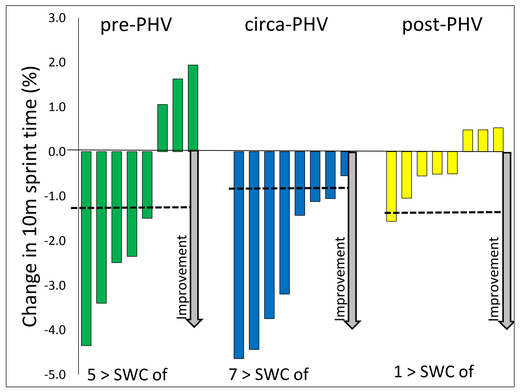

Figure 2: Individual percentage change in sprint performance in response to functional movement training. For all maturity groups. Horizontal dash lines represent the smallest worthwhile change (SWC) for respective maturity groups.

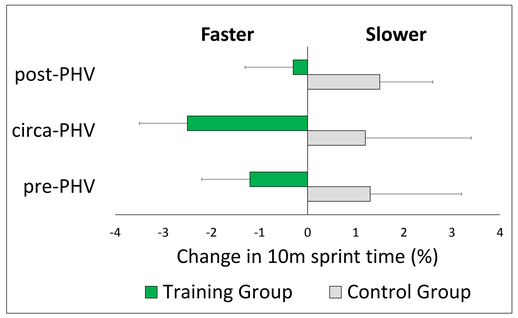

Figure 1: Mean percentage change in sprint performance post 6-week allocations for all maturity groups.
Error bars: 90% confidence interval of the change score.

Table 4: The nett effects of functional movement training on percentage change in sprint performance for all maturity groups (% change, 90% confidence interval (CI) of the change score).

	% change, ±90% CI	p value	Effect size; Inference
pre-PHV	-2.4, ±2.4	0.085	-0.35; Small
circa-PHV	-3.7, ±2.3	0.012	-0.78; Moderate
post-PHV	-1.8, ±1.1	0.014	-0.25; Small

- Table 3 and Figure 1 allow for an appreciation of the effects of 6-week allocations for all maturity groups.
- Relative to the control group the training group netted small to moderate improvements in 10m sprint time post 6-weeks of functional movement training for all maturity groups (Table 4).
- Individual responses to functional movement training exceeding the smallest worthwhile change were more prevalent in the circa peak height velocity (PHV) group (see Figure 2).
- Overall average group completion of the 12 training sessions was 91%, 86% and 92% for pre-PHV, circa-PHV and post-PHV.

Findings

Within training group responses seem to be sensitive to the maturation status of the individuals which is consistent with the findings of Radnor et al. (2017) and Rumpf et al. (2012). Specifically, training elicited small effects on 10m sprint performance for pre and circa-PHV individuals whereas post-PHV individual's responses were trivial. Maturation "training windows of opportunity" are further supported.

Take home message

A 6-week functional movement training programme consisting of body weight strength, basic plyometric and sprint technique activities:

- Induces meaningful improvements in 10m sprint performance for youth males circa-PHV.
- May lead to beneficial improvements in 10m sprint performance for youth males pre-PHV.
- Is not useful for improving 10m sprint performance for youth males post-PHV.

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Table 1: Participant anthropometric characteristics (Mean (SD))

Maturation	Group (N)	Age	Height (cm)	Body mass	PHV
pre-PHV	Training (8)	13.3 (0.5)	153.0 (5.7)	43.6 (4.3)	-1.0 (0.3)
	Control (8)	13.5 (0.4)	154.8 (0.4)	46.2 (8.9)	-0.8 (0.2)
circa-PHV	Training (8)	13.7 (0.7)	166.6 (4.9)	54.8 (4.9)	-0.1 (0.3)
	Control (7)	13.9 (0.5)	166.3 (3.0)	54.6 (10.6)	0.0 (0.3)
post-PHV	Training (8)	14.2 (0.3)	174.5 (7.6)	67.3 (9.9)	1.2 (0.4)
	Control (8)	14.5 (0.2)	173.5 (4.8)	66.1 (16.9)	0.9 (0.4)

Table 2: Functional movement training parameters

Programme parameters		Day 1 activities		Day 2 activities	
Training period	6 weeks	Squat	Vertical plyometric	Hinge	Horizontal plyometric
Session frequency	2 per week (Day 1 & 2)	Lunge	Linear speed	Vertical push	Change of direction
Session duration	20 to 30 minutes	Horizontal push		Vertical pull	
Sets	1 to 3	Horizontal pull		Brace	
Repetitions	5 to 15	Bracing		Rotation	
Rest	< 2 minutes	Rotation			

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