

Supplement information

The Effects of Six-Weeks Change of Direction Speed and Technique Modification Training on Cutting Performance and Movement Quality in Male Youth Soccer Players

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Table S1. 6-week COD speed and technique modification training programme.

Week	COD Emphasis	Drills	Session 1			Session 2			
			Intensity (perceived speed)	Total Distance (m)	Number of Decelerations and CODs	Drills	Intensity (perceived speed)	Total Distance (m)	Number of Decelerations and CODs
Week 1	<ul style="list-style-type: none"> Drills specific to deceleration phase, before adding turn and reacceleration 	<ol style="list-style-type: none"> 10 × 5-m acceleration to deceleration (2 reps a go) 12 × 5-m acceleration to side-steps (20-60°) – 5-m exit to deceleration – 2 reps at 20°, 40°, 60° 8 × 5-m acceleration to 135° turns – 5-m exit to deceleration 	50-75%	250	25 and 20	<ol style="list-style-type: none"> 10 × 5 m acceleration to deceleration (2 reps a go) 12 × 5 m acceleration to side-steps (20-60°) – 5-m exit to deceleration – 2 reps at 20°, 40°, 60° 8 × 5-m acceleration to 135° turns – 5-m exit to deceleration 	50-75%	250	25 and 20
		<ul style="list-style-type: none"> Submaximal/ pre-planned emphasising key aspects of technique Progressive increase in COD angle and approach velocity 	<ol style="list-style-type: none"> 8 × 5-m acceleration to deceleration 14 × 5-m acceleration to side steps (45-90°) – 5-m exit to deceleration 8 × 5-m acceleration to 135-180° turns – 5-m exit to deceleration 	75%+	230	30 and 22	<ol style="list-style-type: none"> 4 × 5-m acceleration to deceleration 4 × 10-m acceleration to deceleration 3 × 80° zig-zag runs – (2 cuts a rep)- 5-m between cuts to 5-m deceleration (60% effort) 4 × 80° zig-zag runs – (2 cuts a rep) – 5-m between cuts to 5-m deceleration 2 × 80° zig-zag runs with 180° turn– 4 cuts per trial – 5-m between cuts 	100%	285

														6. 3 × 5-m approach to 180°, 5-m approach to 180°, to 10-m deceleration
Week 3	<ul style="list-style-type: none"> Pre-planned drill performed maximally Introduction of unanticipated generic stimuli (auditory or visual) 	<ol style="list-style-type: none"> 2 × 5 reps per limb: Jump-landings – lateral reactive jumps 4 × 10-m acceleration to deceleration 5 × 45° zig-zag runs (2 cuts a rep) -5-m between cuts 10 × reactive y-agility (45° cut) – 5-m entry and exit* 	100%	215	14 and 20									<ol style="list-style-type: none"> 2 × 5-m acceleration to deceleration- 4 × 2.5-10 m unanticipated decelerations – auditory stimuli 2 × 15-m zig-zag runs (2 90° cuts) – 5-m between cuts to 5-m deceleration 2 × 15-m zig-zag runs relay (2 90° cuts) – 5-m between cuts to 5-m deceleration 8 × reactive y-agility (60° cut) – 7.5-m entry and exit* 3 × 5-m approach to 180°, 5-m approach to 180°, to 10-m deceleration
Week 4	<ul style="list-style-type: none"> Unanticipated performed submaximally 	<ol style="list-style-type: none"> 2 × 5 reps per limb: Jump-landings – lateral reactive jumps 4 × 20-m acceleration to deceleration 4 × 45° zig-zag runs (2 cuts a rep) -6-m between cuts 4 × 15-m tunnel drill – side-stepping past 2 opponents every 7.5-m 4 × unanticipated 45° cuts (auditory stimuli) – 7.5-m entry and exit 6 × reactive y-agility (45° cut) – 5-m entry and exit* 	<ol style="list-style-type: none"> 100% 75%+ 100% 75%+ 75%+ 100% 	282	4 and 32									<ol style="list-style-type: none"> 4 × 5-15 m unanticipated decelerations – partner stimuli* 2 × 15-m zig-zag runs (2 90° cuts) – 5-m between cuts to 5-m deceleration 2 × 30-m zig-zag runs relay (4 90° cuts) – 5-m between cuts to 5-m deceleration 4 × unanticipated 45° cuts (auditory stimuli) – 5-m entry and exit 6 × reactive y-agility (60° cut) 2 cuts – 5-m entry and exit* 4 × 15-m tunnel drill – side-stepping past 2 opponents every 7.5-m
Week 5	<ul style="list-style-type: none"> Unanticipated drills performed maximally Introduction of sport specific stimuli – opponent or ball 	<ol style="list-style-type: none"> 2 × 15-m curvilinear sprint (s shape) 12 × 5-m acceleration to side-step (60°) – 5-m exit to deceleration 4 × 15-m tunnel drill – side-stepping past 2 opponents every 7.5-m 4 × unanticipated 45° cuts (auditory stimuli) – 7.5-m entry and exit 	100%	285	10 and 32									<ol style="list-style-type: none"> 4 × 10-15-m unanticipated decelerations – partner stimuli* 2 × 180° races – two turns at any point across 15-m distance – partner lead* 8 × X-agility: 1 pivot and 1 cut per rep – up to 15m* 3 × 35-m zig-zag runs races (5 × 90° cuts) – 5-m between cuts to 5-m deceleration – 1st cut unanticipated

	5.	6 × reactive y-agility (60° cut) 2 cuts – 7.5m entry and exit*							
Week 6	1.	12 × 5-m acceleration to side-step (60°) – 5-m exit to deceleration				1.	4 × 10-15-m unanticipated decelerations – partner stimuli*		
	2.	3 × Zig-zag races – 25-m length 4 × 45° cuts per race – 1 st cut unanticipated	100%	345	48 (COD)	2.	2 × 180° races – two turns at any point across 15-m distance – partner lead*		
	3.	4 × unanticipated 45° cuts (auditory stimuli) – 7.5-m entry and exit				3.	8 × X-agility: 1 pivot and 1 cut per rep – up to 15m*	100%	~405-425
	4.	10 × reactive y-agility (60° cut) cuts – 7.5m entry and exit*				4.	3 × 35-m zig-zag runs races (5 × 90° cuts) – 5-m between cuts to 5-m deceleration – 1 st cut unanticipated		15 and 35
Additional information:									
1. 30-60 seconds' rest provided between 100% effort reps. 2 minutes' rest provide between exercises									
2. All CODs and decelerations to be performed with the aim of modified braking and COD strategy									
3. Feedback to be provided to each player after each rep regarding braking strategy/ COD technique									

Key: * = Alternate between leading and reacting / attacking and defending; COD = Change of direction; PFC = Penultimate foot contact; Dec: Deceleration.

Table S2. Task-specific pre-post changes in CMAS deficits.

CMAS criteria	IG – Pre-to-post changes in CMAS criteria				CG – Pre-to-post changes in CMAS criteria			
	Right cut		Left cut		Right cut		Left cut	
	n of deficits	%	n of deficits	%	n of deficits	%	n of deficits	%
No clear PFC braking strategy	-5	-23.8	-12	-57.1	-8	-33.3	-2	-8
Wide foot plant	3	33.3	-2	-22.2	1	7.7	2	22
Hip internal rotation	-7	-100.0	-5	-100.0	-1	-25.0	-1	-33
Initial knee valgus	-9	-39.1	-5	-27.8	-2	-9.1	-2	-11
Internal/external foot	3	27.3	-5	-26.3	1	5.6	9	60
Upright trunk	2	22.2	3	50.0	-5	-41.7	1	9
Lateral trunk flexion	-4	-26.7	-5	-27.8	8	66.7	-1	-5
Trunk leaning back	-4	-57.1	-5	-62.5	4	133.3	5	250
Limited Knee Flexion	-1	-16.7	-5	-50.0	-2	-12.5	6	50
Excessive Knee valgus	-12	-66.7	-5	-50.0	-3	-18.8	-3	-43

Key: CMAS: Cutting movement assessment score; PFC: Penultimate foot contact; IG Intervention group; CG: Control group; n: number.

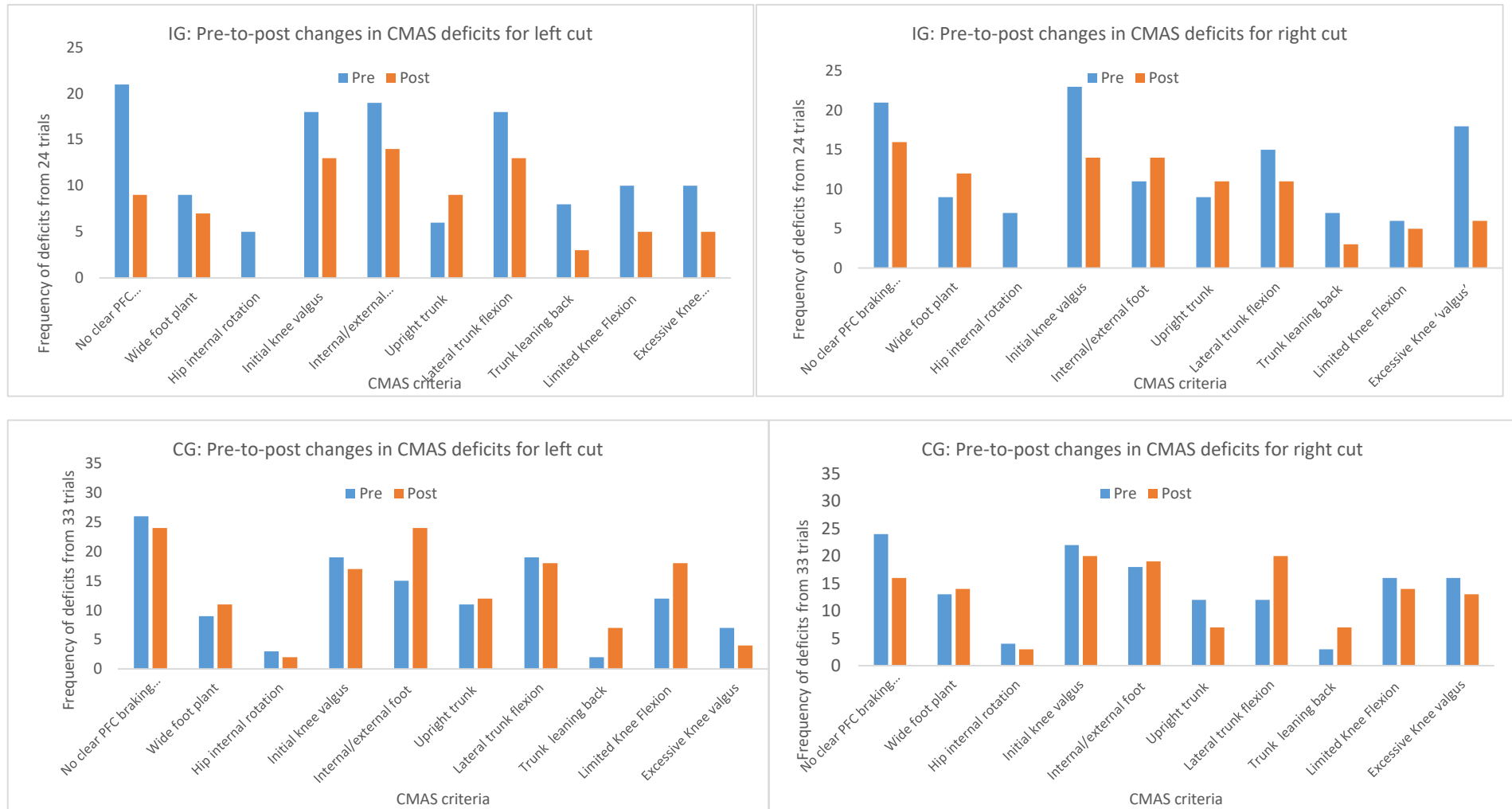


Figure S1. Cutting task-specific changes in CMAS deficits. IG: Intervention group; CG: Control group; CMAS: Cutting movement assessment score.



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