

CRITICAL PARAMETERS OF A SPRINT START AND ACCELERATION PHASE

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INTRODUCTION: The sprint start and acceleration phase are determining factors of the final result of a sprint running race (Coh et al. 1998). The purpose of the present study was to identify the most critical parameters of the 'set' position and the pushing phase of a sprint start, as well as to determine the relationship between those and the maximum velocity (V_{max}) at the initial acceleration phase (0-10m).

METHOD: Sample consisted of 14 male sprinters (75.8 ± 7.2 kg, 1.79 ± 0.1 m, 24.2 ± 6.0 yrs, 100m record: 10.74 ± 0.4 s). Subjects performed 3 starts and ran for 10m and their best trial was selected for analysis, according to the final time. Times were recorded every 2m with 5 pairs of photocells (Brower Timing System) in order to compute velocity (V) and acceleration (a). Kinematic data were obtained during the start and the stride between 4 and 6m with 2 HSVC (Redlake, 125Hz) and were analyzed with Peak Motus. The 2-D kinematic model consisted of 12 segments (head, trunk, upper arms, lower arms, feet, shanks and thighs). Correlations between parameters were conducted with Pearson coefficients.

RESULTS - DISCUSSION: Mean V_{max} at the initial acceleration phase was 8.15 ± 0.55 m·s⁻¹ and was significantly - negatively - correlated with the contact time at 5m. The critical parameters of the set position and the pushing phase of the start that are significantly correlated to V_{max} or initial velocity and acceleration are presented in table 1. Pushing time was further negatively correlated to the relative angle of the rear foot, while positively to the distance between blocks and to the time to reach max power on the blocks. An efficient acceleration is therefore related to the pushing phase on the start blocks as well as to the body position during a sprint start (Mero et al. 2006).

Table 1 Significant correlations between velocity and acceleration during the initial acceleration phase and parameters of the sprint start (* $p < 0.05$, ** $p < 0.01$)

	Set position			Pushing phase			
	Block Distance	Trunk angle	Rear hip angle	Front Block angle	Total Push Time	Push Time of the Rear Foot	Time to max Power
V_{max}	-0.581*	0.550*	-0.563*		-0.602*	-0.593*	-0.668**
V_2				-0.586*			
V_4				0.688**			
A_2				-0.594*			
A_4				0.776**			

CONCLUSION: Velocity of elite sprinters at the initial acceleration is combined with critical parameters of the set position and pushing phase, parameters which should therefore attract serious attention aiming for the best final result.

REFERENCES:

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