

First Step Length and 20-Meter Sprint Time in Male Collegiate Track & Field Sprinters

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Introduction

- Multiple factors contribute to overall sprint performance.^{1,2}
- The start and acceleration phases of the sprint contribute greatly to the overall performance in a sprint race.^{3,4}
- Although previous research indicates that step length is a key factor in the sprint, the role of first step length out of the blocks in determining sprint time is poorly understood.^{2,3}

Purpose

- The purpose of this study was to examine the relationship between first step length and sprint time through the start and acceleration phases of the sprint.

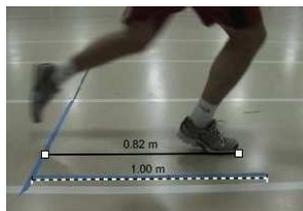
Methods

Participants

- Eight Division III male track & field sprint runners participated in this investigation.
- All participants were out of season, but participating in pre-season workouts at the time of data collection.

Procedure

- The subjects performed 3 trials of a 20-meter sprint from a block start, with each trial separated by a 6 minute rest period.
- Sprint time was measured for each trial using a Brower electronic timing system.
- First step length was quantified by analyzing video footage of the first step out of the blocks using Dartfish software.
- The length of the step in the video footage was compared to a known 1-meter length placed on the track.
- This measured first step length was normalized to leg length to account for differences among subjects.

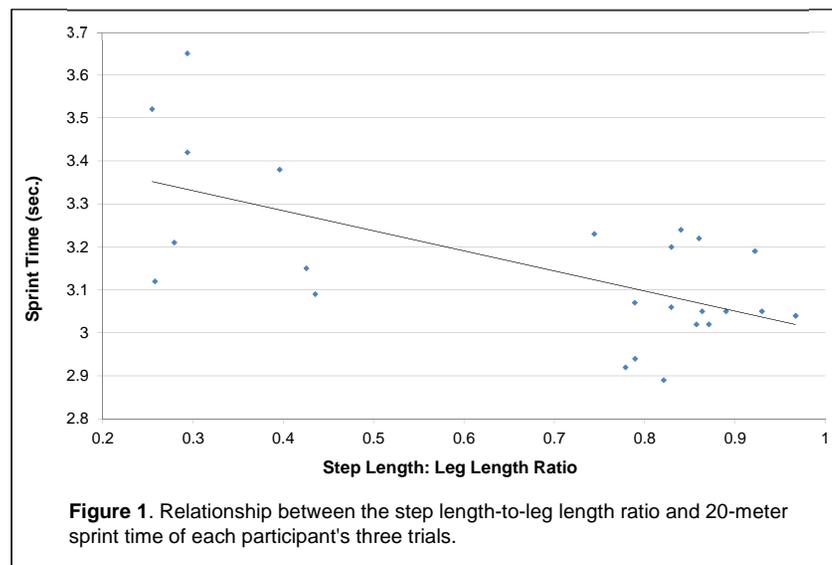


Results

Table 1. Pearson Correlation Analysis for step length and sprint time.

		First Step Length	Sprint Time
First Step Length Correlation	Pearson Correlation	1	-.631**
	Sig. (2-tailed)		.001
	N	24	24
Sprint Time Correlation	Pearson Correlation	-.631**	1
	Sig. (2-tailed)	.001	
	N	24	24

** Indicates significant results ($p < 0.05$)



Discussion

- First step length is a significant determinant of sprint performance in the start and acceleration phases, consistent with previous research.³
- Although this suggests a longer first step length will lead to enhanced sprint performance, a number of confounding variables, including stance type, starting block angle and position, and center of mass, may have contributed to the data variability.

Conclusion

- First step length is a significant factor of performance within the start and acceleration phases of the sprint.
- Rather than a longer or shorter first step being most beneficial, an optimal first step length is key for enhanced performance, which is individualized.

Future Research

- Other factors, such as center of mass, block angle and position, and stance type, should be accounted for when analyzing first step length among multiple subjects.
- A greater number of subjects would create greater statistical power.

References

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