

THE RELATIONSHIP BETWEEN ISOMETRIC STRENGTH TESTS AND DYNAMIC PERFORMANCE: A COMPARISON OF TWO BAR TYPES



Parker Scott^{1,3}, Kenzie B. Friesen², Joel Lipinski³, Joel L. Lanovaz¹, and Jonathan P. Farthing¹
¹College of Kinesiology, University of Saskatchewan, Saskatoon, SK, Canada
²Faculty of Kinesiology, University of Calgary, Calgary, AB, Canada
³Ignite Athletics, Saskatoon, SK, Canada



Introduction

- Different biomechanics during isometric strength tests can enhance or diminish the relationship between isometric strength and dynamic performance.²
- Previous reports show muscle activation differences during isotonic back squat strength tests when comparing conventional barbells (CB) and safety squat bars (SSB).^{1,3}
- Different bar types can alter biomechanics during isometric strength tests, but no research to date has directly compared available bar types used for isometric testing.^{1,3}

Purpose

Examine the relationships between relative peak force (rPF) derived from unilateral maximal isometric tests using a SSB and CB with dynamic sport-specific performance in elite athletes.

Methods

Participants

- 41 college athletes
- >1 Year of competitive experience
- No injuries preventing maximal muscular contraction

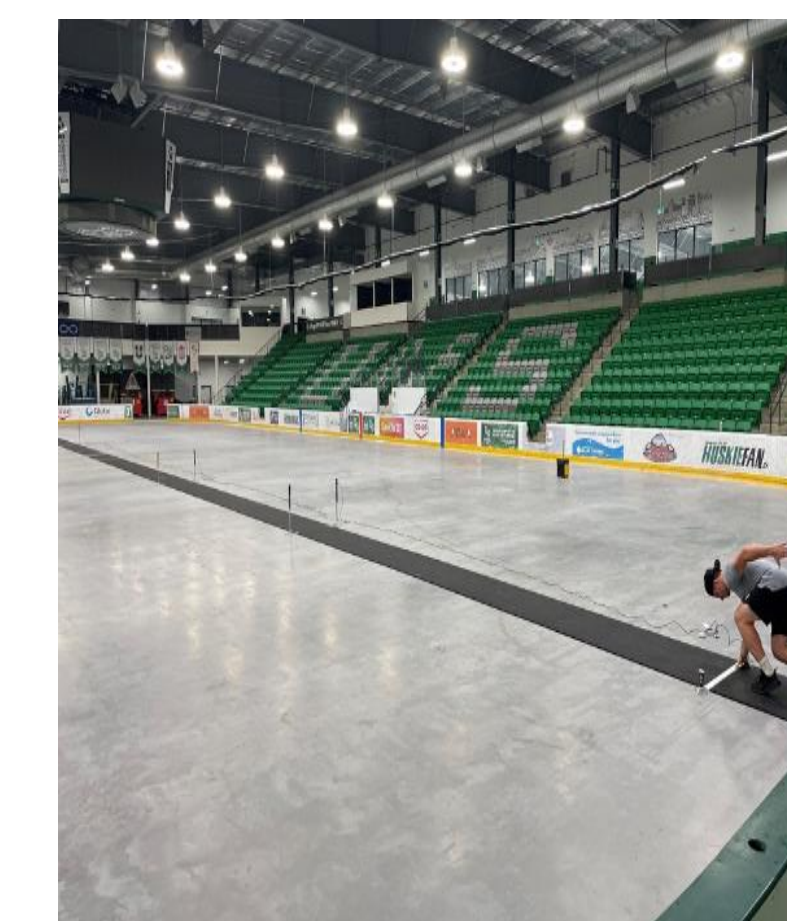
Demographics

- Age (years): 21.1 ± 2
- Height (cm): 187.7 ± 8.5
- Weight (kg): 95.5 ± 14.5
- Training Status (days): 5.2 ± 0.8



Warm Up

- ↑ HR
- Dynamic Stretching
- Stimulate CNS



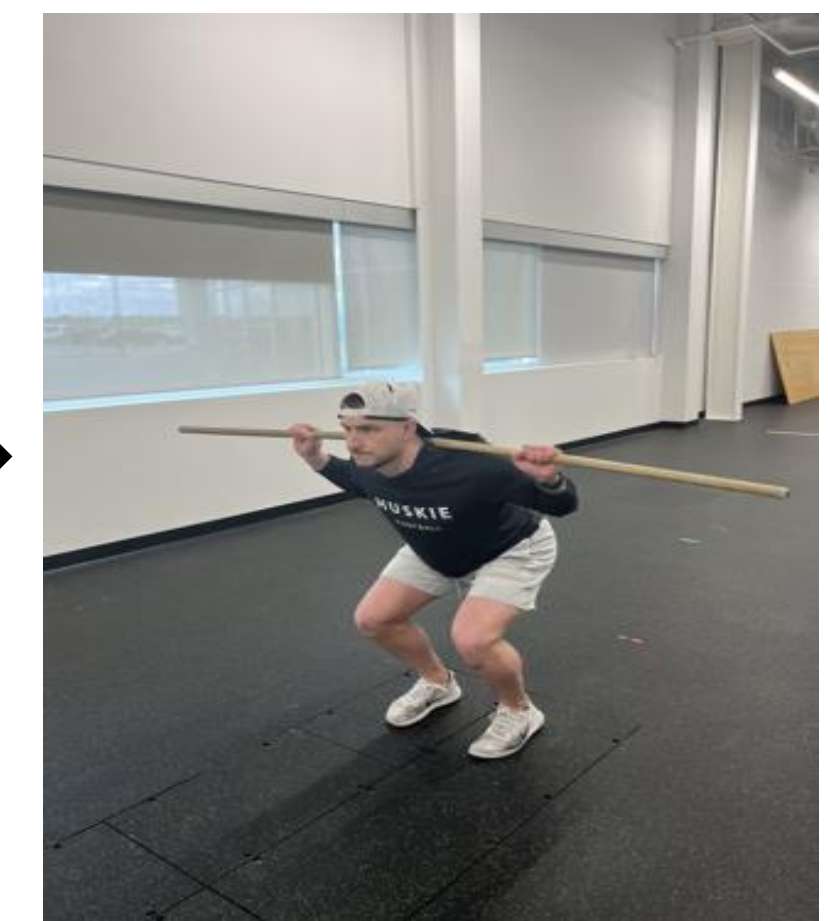
40-yard sprint



Conventional Barbell (Randomized)



Safety Squat Bar (Randomized)



CMJ (Randomized)

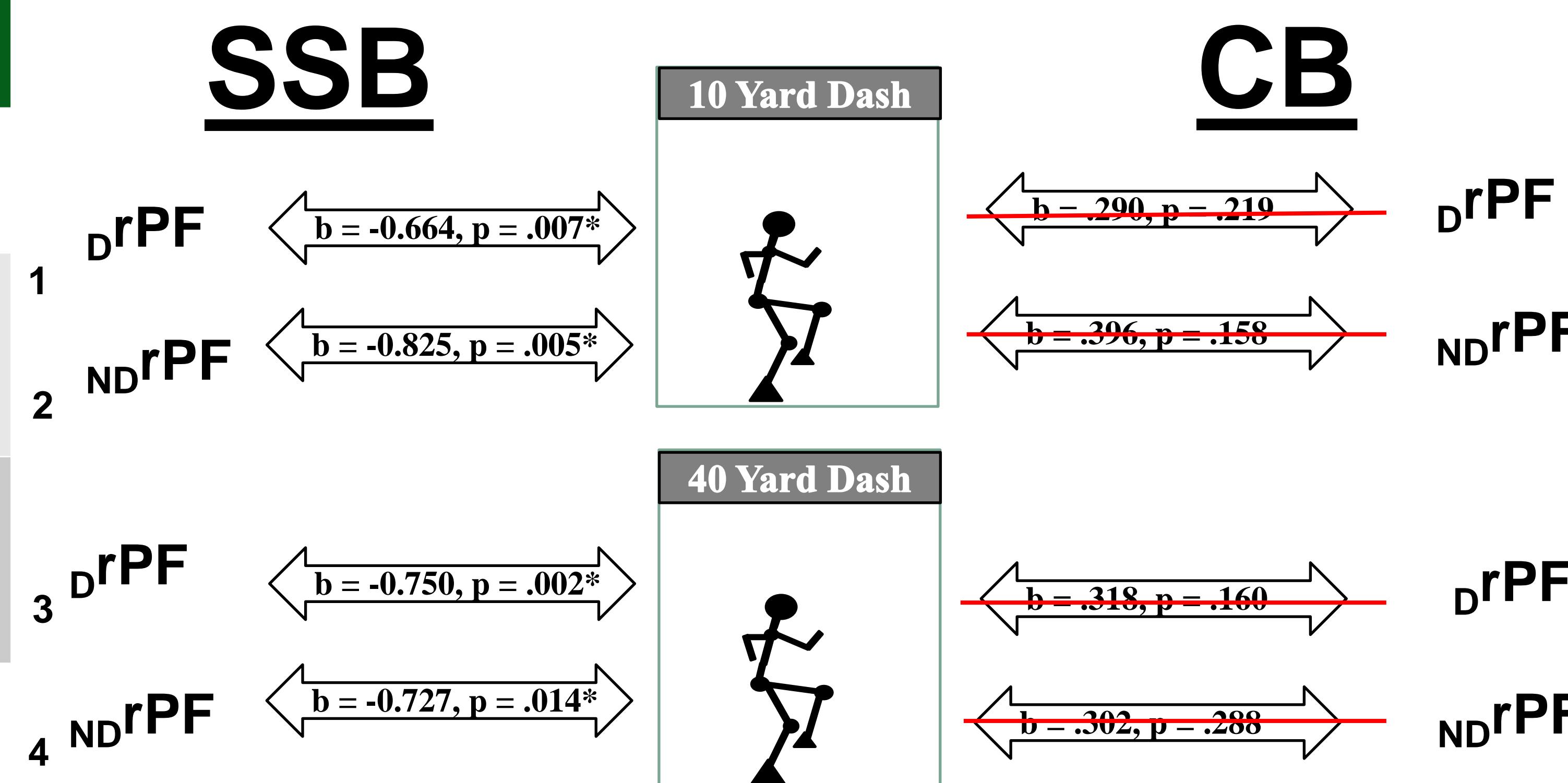
Results

Correlations

Sprint/Limb	SSB		CB	
	Dom	Non-Dom	Dom	Non-Dom
10 Yard Split	-0.436	-0.483	-0.233	-0.317
40 Yard Split	-0.499	-0.466	-0.272	-0.326

Note: Correlation r values presented for significant relationships at an alpha level of 0.05.

Regression Models



Note: rPF in Newtons/BW. D= dominant, ND= non-dominant.

Conclusions

- The SSB produced higher rPF than the CB during unilateral isometric tasks and emerged as the stronger predictor of sprint times.
- Greater force output and a stronger relationship with dynamic performance during the SSB ISqT may be due to biomechanical positions which allow for greater torque development.

Practical Applications

- Highlights the importance of utilizing bar implements that are more specific to the desired outcome task (Sprinting and Jumping)
- Strength and conditioning coaches and rehabilitation professionals can consider the SSB in isometric testing for high-performance athletes, as it produces higher peak force values and better predicts dynamic performance than CB.



Parker@igniteathletics.com

YTN237@usask.ca

- References:
1. Hecker, K. A., et al. (2019). J Strength Cond Res, 33, S45.
 2. Beckham, G. K., et al. (2018). J Strength Cond Res, 32(1), 48–56.
 3. Vantrease, W. C., et al. (2021). J Strength Cond Res, 35, S1.