

# RELATIONSHIPS BETWEEN MODIFIED REACTIVE STRENGTH INDEX AND SPRINT PERFORMANCE IN MALE NCAA DIVISION III SOCCER PLAYERS



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## Introduction

Reactive strength is described as how quick a person is able to complete a stretch-shortening cycle (4). Stretch shortening cycles occur in both running and jumping. Modified reactive strength index (RSImod) is found by dividing jump height by time to take off. Higher jumps have been associated with greater peak powers at the knee and ankle (3), and greater lower limb relative strength may improve one's ability to accelerate and decelerate, suggesting a greater relative strength may create greater acceleration. Force production has also been shown to be critical to sprint performance (2). Multiple studies have been done looking at RSI or RSImod and sprint performance. These studies have found moderate to large correlations. (1,5) Most of these studies however were done with semi-professional or higher leveled athletes. Therefore, the purpose of this study was to examine the relationship between countermovement jump (CMJ) RSImod and sprint performance in NCAA Division III male athletes. It was hypothesized that there would be moderate relationships between RSImod and 0-10m and 10-20m sprint times.

## Methods

- 41 male NCAA Division III athletes (age:  $19.0 \pm 1.1$  years, height:  $178.4 \pm 6.7$  cm, weight:  $72.7 \pm 8.7$  kg) completed unloaded CMJs and sprint testing as part of their long-term athlete monitoring testing.
- Force-time data were collected via dual PASCO force plates and analyzed using ForceDecks software. 10m and 20m sprint times were collected using Brower timing gates.
- Force-time data were used to determine jump height (JH) and time to take off (TTT). RSImod was then calculated as the ratio between JH and TTT.
- All athletes performed two attempts in the CMJ and the sprint test. The average of the CMJ and sprint performances were used for correlational analysis.
- Pearson correlational coefficients (r) and coefficients of determination ( $R^2$ ) were used to examine the relationships between RSImod, JH, TT, and sprint performances.

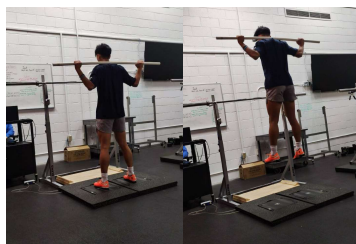


Figure 2. Starting position and flight during countermovement jump

## Results

- All relationships were statistically significant ( $p < 0.05$ ) except for the relationships between TTT and both sprint performances ( $p > 0.05$ ).
- There were moderate relationships between RSImod and JH with 0-10m sprint 13.7% and 22.8% of variance being explained, respectively.
- There was a trivial relationship between TTT and 0-10m time with only 2.9% of the variance being explained
- There were small, moderate, and trivial relationships between RSImod, JH, TTT and 10-20m sprint time, respectively
- RSImod, TTT and JH explained 6.6%, 13.5%, and 0.2% of the variance in 10-20m sprint time, respectively

**Table 1.** Relationships between countermovement jump performance characteristics and sprint times.

	RSImod	JH	TTT	0-10m time
JH	0.752**			
TTT	-0.835**	-0.318*		
0-10m time	-0.370*	-0.477**	0.172	
10-20m time	-0.258*	-0.368**	0.043	0.381*

RSImod = modified reactive strength index, JH = jump height; TTT = time to takeoff; \* correlation is significant at the 0.05 level; \*\* correlation is significant at the 0.01 level

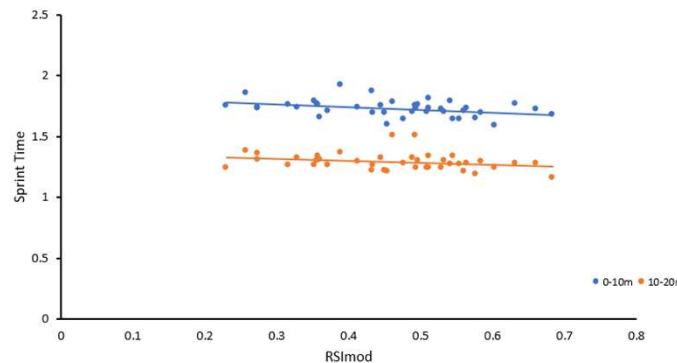


Figure 1. Scatter Plot of RSImod and 0-10m sprint time (blue), and 10-20m sprint time (orange).

## Conclusions

- Small to moderate relationships were found between RSImod and JH and 0-10m and 10-20m sprint times
- JH explained the largest portion of the sprint time variance, although only a small portion was explained

## Practical Applications

- Jump and sprint performance should both be monitored as they are key performance indicators to soccer players. However, current results would suggest that the performances of each may not largely relate to each other
- Strength and conditioning practitioners should continue to develop both the jumping and sprinting abilities of soccer players to maximize the performance of each.
- Future research may consider examining the relationships between current variables with other performance characteristics in collegiate soccer players.

## References

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