RELATIONSHIP BETWEEN PRESEASON PERFORMANCE TESTING AND IN SEASON MAXIMUM VELOCITY IN DIVISION I FOOTBALL PLAYERS

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ABSTRACT

Preseason testing is commonly used in athletics to assess athlete performance. These tests may reveal strengths and deficits in areas of an athlete's physical capabilities and can provide insight into their performance during the season. Considering speed is an essential component of football, a player's maximum velocity (V_{MAX}) can have a high degree of relevance in competition. PURPOSE: The purpose of this study was to determine the relationship between various performance metrics and maximum velocity throughout the course of a competitive season. METHODS: Fifty-six National Collegiate Athletic Association (NCAA) Division I football players completed preseason performance testing. Performance testing consisted of one repetition maximum (1-RM) bench press testing, 1-RM squat testing, 5-10-5 change of direction testing, and vertical jump testing. All players were monitored using GPS receivers with integrated accelerometers and gyroscope (Catapult) during all in season practices and games. V_{MAX} was measured throughout the duration of the season. Pearson-product moment correlations were used to assess the relationships between each performance test and V_{MAX}. An alpha level of 0.05 was used to determine statistical significance. RESULTS: There was a significant inverse correlation between 5-10-5 testing and V_{MAX} ($r = -0.808$, $p < 0.001$). There was a positive correlation between vertical jump testing and V_{MAX} ($r = 0.648$, $p < 0.0001$). The correlation between 1-RM squat and V_{MAX} was not statistically significant ($r = -0.259$, $p = 0.0533$) and there was an inverse correlation between 1-RM bench press and V_{MAX} ($r = -0.543$, $p < 0.0001$). CONCLUSION: These finding suggest the 5-10-5 test has the strongest relationship with V_{MAX} in football players, as those with a faster 5-10-5 test during preseason testing had a higher V_{MAX} during the season, on average. The inverse relationship between 1-RM bench press and V_{MAX} implies that athletes with a higher bench press tend to be slower, likely due to the physical qualities that benefit the bench press. PRACTICAL APPLICATIONS: Strength coaches should consider implementing change of direction training to aid in the development of maximal sprinting capabilities, along with change of direction capabilities, which may be even more relevant to competition performance. Future studies should investigate changes in competition performance due to the effects of various change of direction training interventions. Additionally, future studies should look at the relationships between preseason performance tests and injuries that occur during the season.

RESULTS

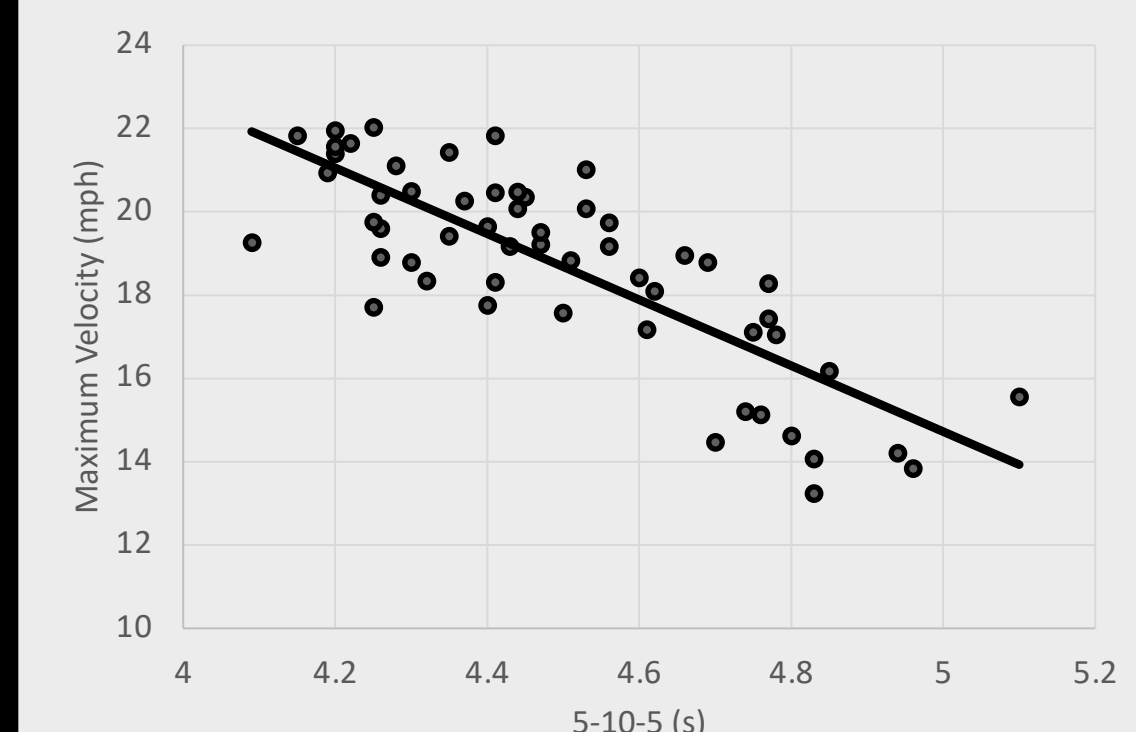Figure 1. Relationship between V_{MAX} and 5-10-5

Figure 2. Relationship between V_{MAX} and 1-RM squat

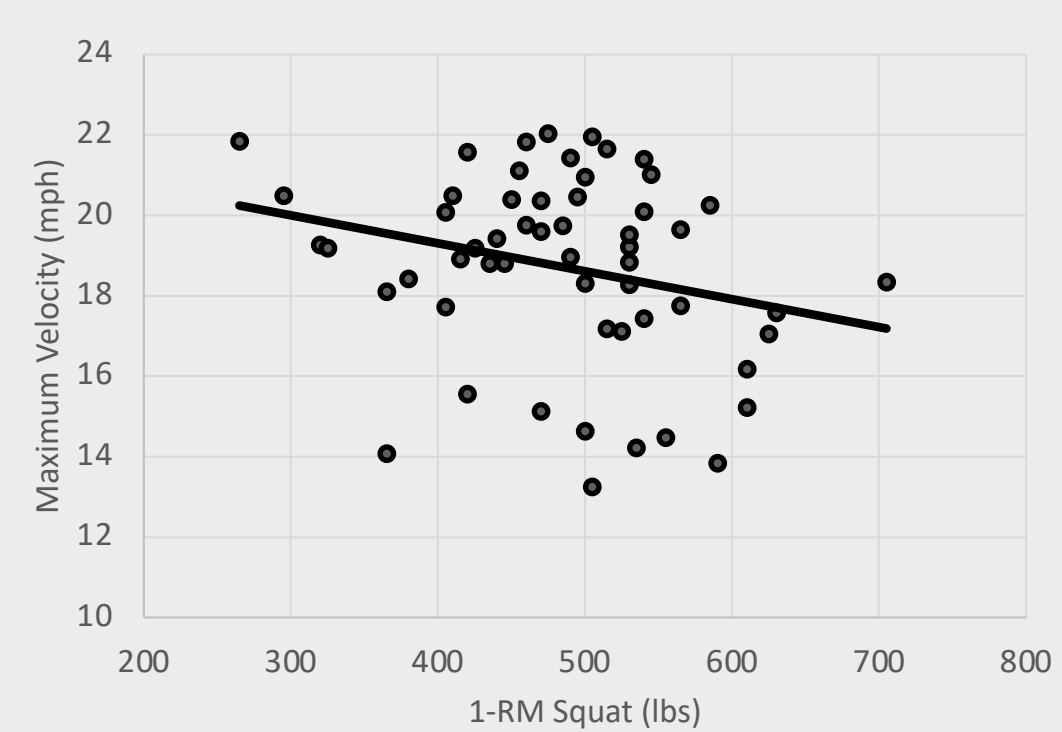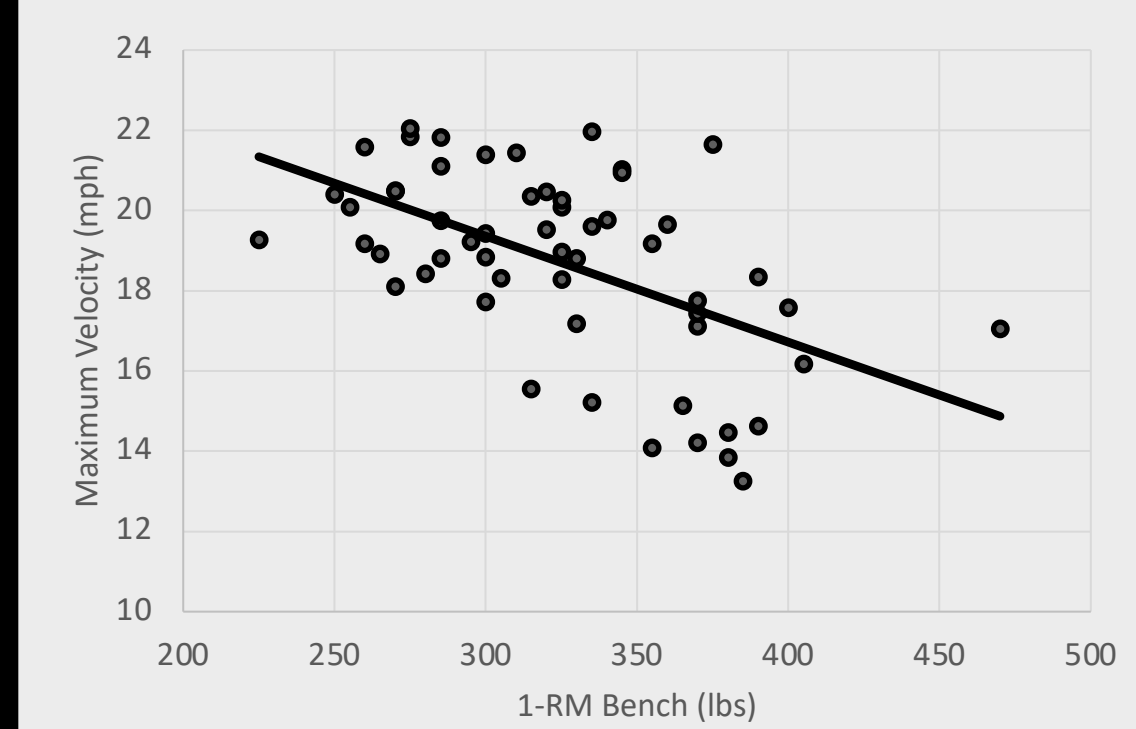Figure 3. Relationship between V_{MAX} and 1-RM bench

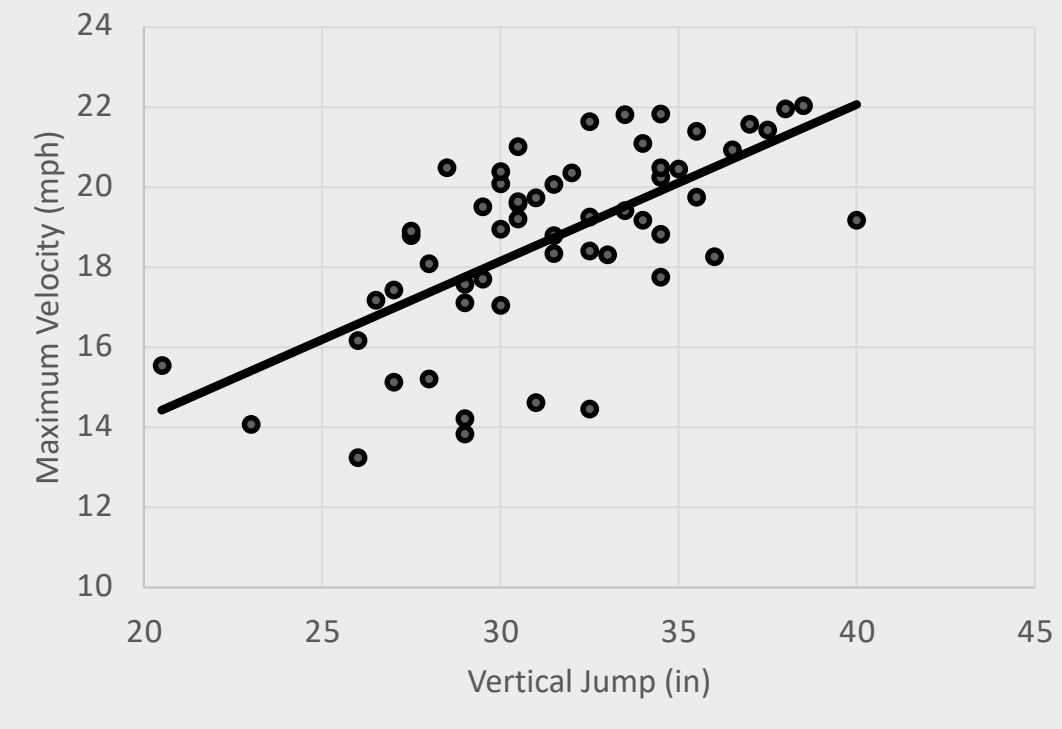Figure 4. Relationship between V_{MAX} and vertical jump

- There was a significant, strong inverse correlation between 5-10-5 testing and V_{MAX}
  - Findings suggest the 5-10-5 test has the strongest relationship with in-season V_{MAX}

- Further exploration should be done to determine if implementing change of direction training helps develop maximal sprinting capabilities

- Future research is needed to examine the relationship between preseason performance tests and injuries occurring during season

Table 1. Pearson-product Moment Correlation to Determine Relationship Between Preseason Testing and V_{MAX}

	V_{MAX}	Vertical Jump	5-10-5 Test	1-RM Bench	1-RM Squat
V_{MAX}	1.000	0.648	-0.808	-0.543	-0.260
		<0.0001	<0.0001	<0.0001	0.053
Vertical Jump	0.647	1.000	-0.641	-0.308	-0.085
	<0.0001		<0.0001	0.021	0.533
5-10-5 Test	-0.808	-0.641	1.000	0.517	0.221
	<0.0001	<0.0001		<0.0001	0.101
1-RM Bench	-0.543	-0.308	0.517	1.000	0.712
	<0.0001	0.021	<0.0001		<0.0001
1-RM Squat	-0.260	-0.085	0.221	0.712	1.000
	0.053	0.533	0.101	<0.0001	

- There was a significant, strong inverse correlation between 5-10-5 testing and V_{MAX} ($r = -0.808$, $p < 0.001$)
- There was a significant, moderately strong correlation between vertical jump testing and V_{MAX} ($r = 0.648$, $p < 0.0001$)
- There was a weak correlation between 1-RM squat and V_{MAX} ($r = -0.259$, $p = 0.0533$)
- There was significant, moderate inverse correlation between 1-RM bench press and V_{MAX} ($r = -0.543$, $p < 0.0001$)
- There was a very weak correlation between 1-RM squat and vertical jump ($r = -0.085$, $p = 0.533$)

INTRODUCTION

- Preseason performance testing is used to assess athlete performance
- Testing provides information for injury prevention, weak points in performance which can be addressed through strength and conditioning, and future performance.
- Speed is an essential component of football; a player's maximum velocity (V_{MAX}) can have a high degree of relevance in competition
- The purpose of this study was to determine the relationship between various performance metrics and V_{MAX} throughout the course of an NCAA season
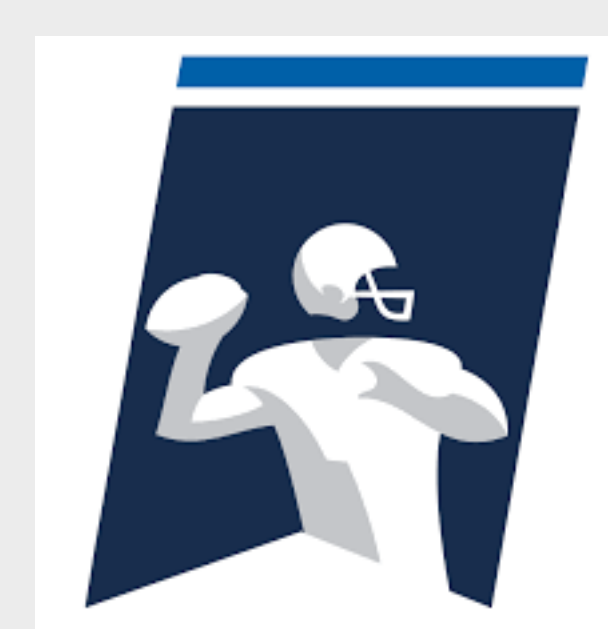
METHODS

Participants
- Male football players (n = 56)
  - Skill (n = 28)
  - Mid (n = 6)
  - Linemen (n = 22)

Preseason Performance Testing
- 1-RM Bench Press
- 1-RM Squat
- 5-10-5 Change of Direction
- Vertical Jump

Maximum Velocity Assessment
- Maximum velocity was assessed using GPS receivers with integrated accelerometers and gyroscope (Catapult) during in-season practices and games

Statistical Analysis
- Pearson-product moment correlations were used to assess relationships between each performance test and V_{MAX}
- An alpha level of 0.05 was used to determine statistical significance