

Introduction

In American football, where size is advantageous, players have been categorized as obese or overweight based on body fat percent (BF%), body mass index (BMI) or total mass.¹ Linemen have increased in total mass over the last 50 years more than any other player position putting them at risk for orthopedic pathologies¹.

Players of all positions must train for and run the 40 yd dash at the NFL combine. Little is known about their running force profiles.²



Obese recreational distance runners had lower ground reaction forces (GRF) than nonobese when the forces were normalized to body mass.³

Research question: Will larger and heavier football players, who theoretically can apply larger GRF, still modulate their magnitude and/or application time to preserve tissues?

Methods

Subjects

Fifty subjects (age, 22.9±1.0 yrs; height, 187.4±6.2 102.7±17.7 kg) participated in this cohort study



Body Composition Measurement

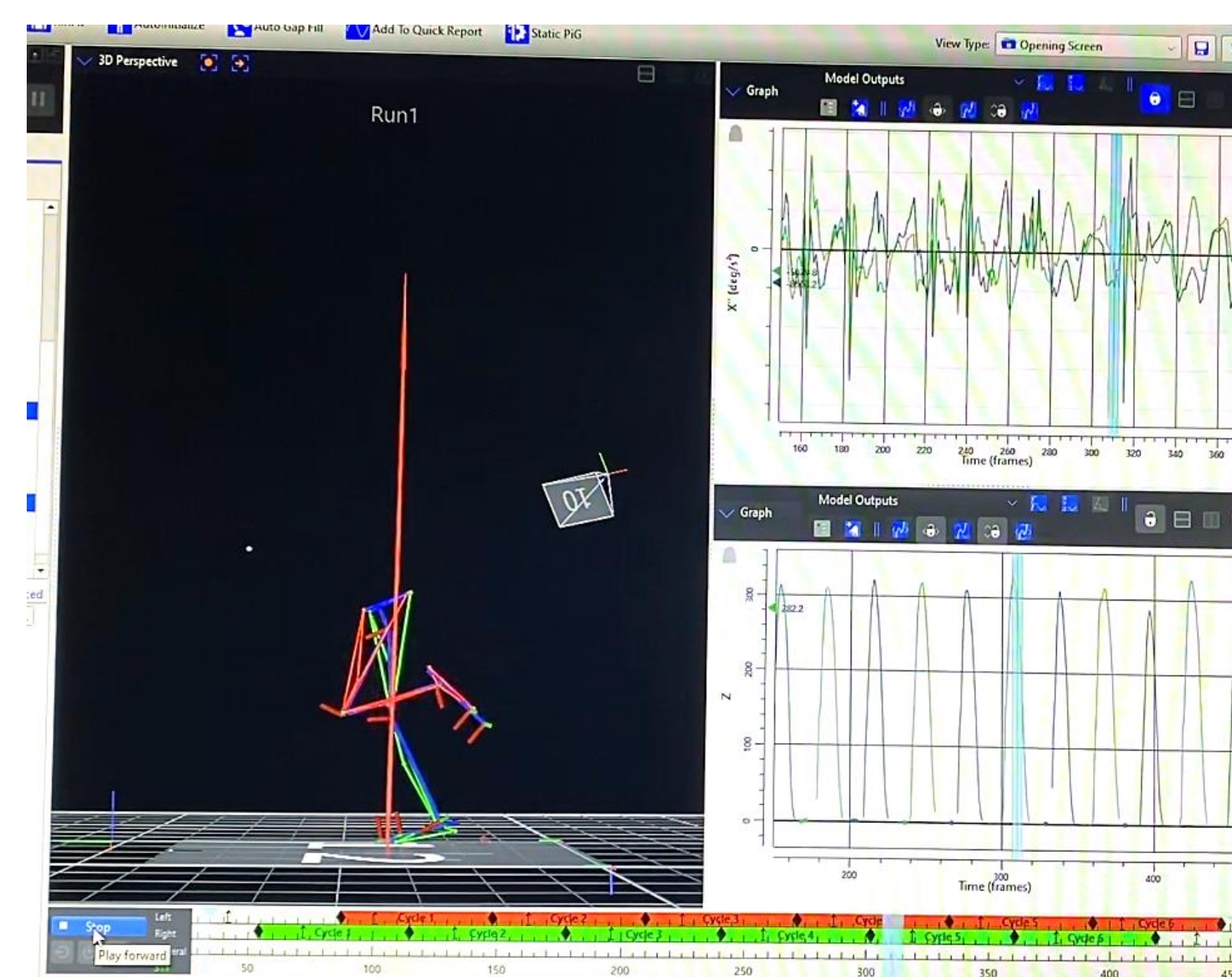
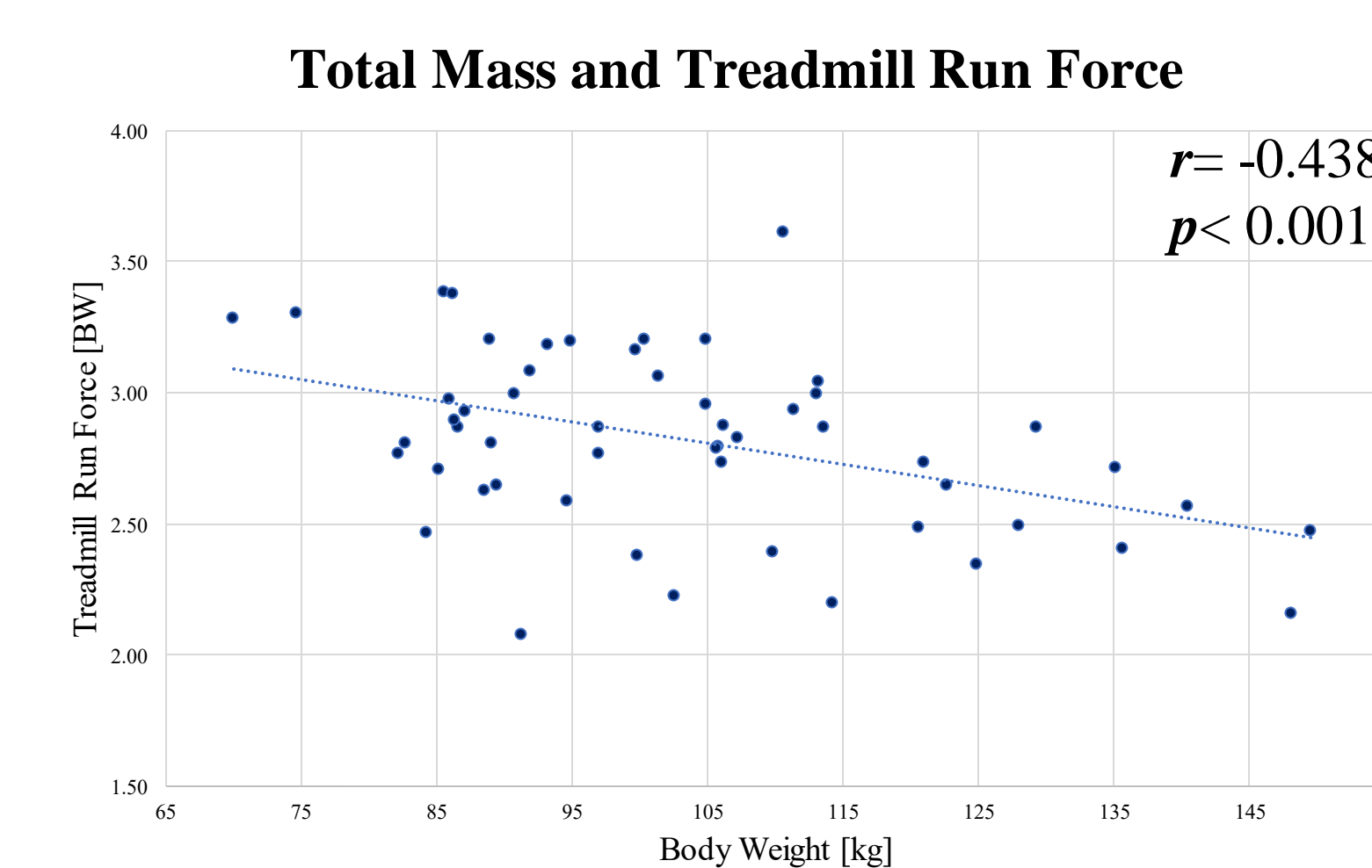
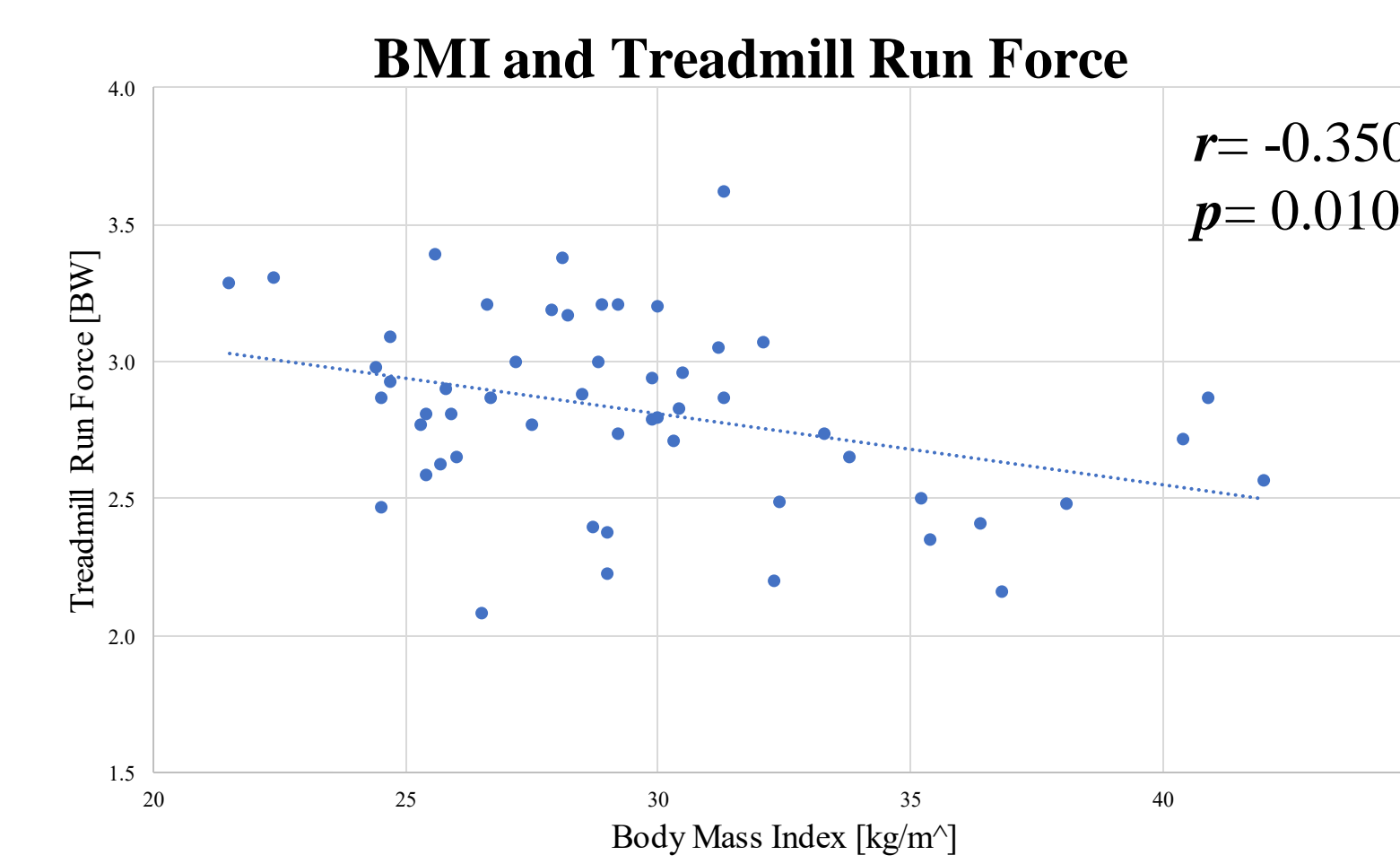
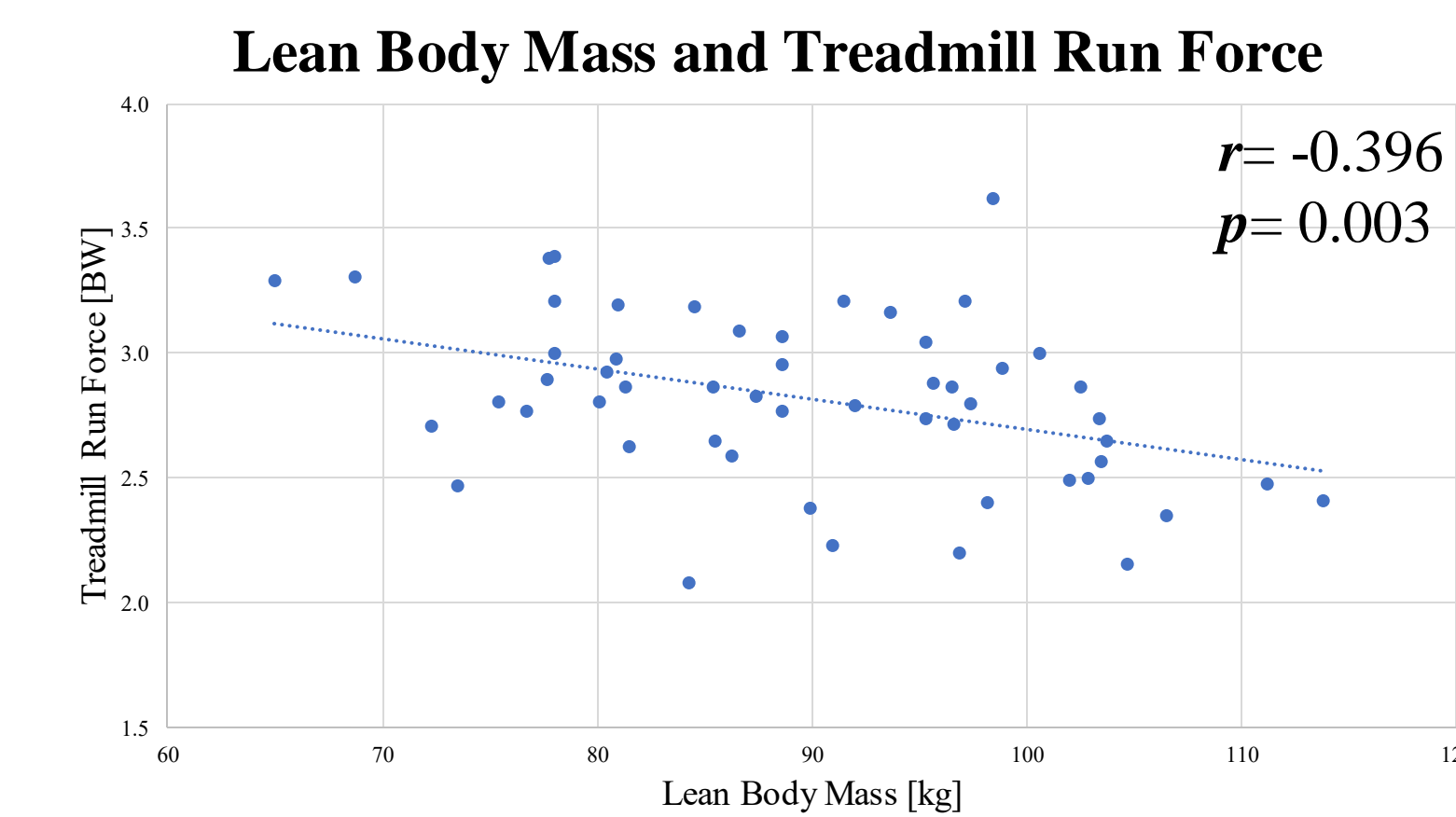
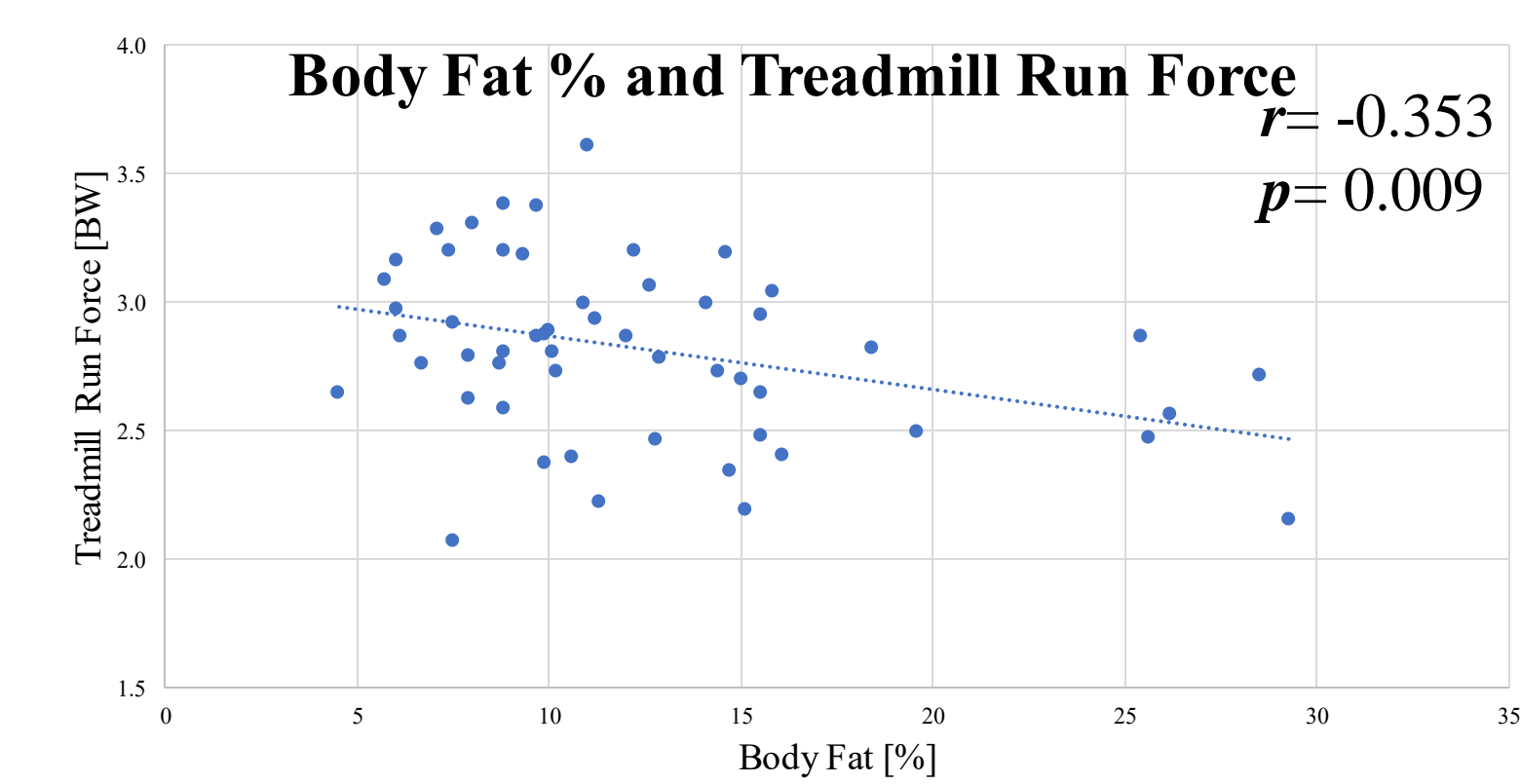
We assessed BF%, LBM, BMI, and total mass using the InBody 270 Body Composition Analyzer

GRF and GCT Measurement

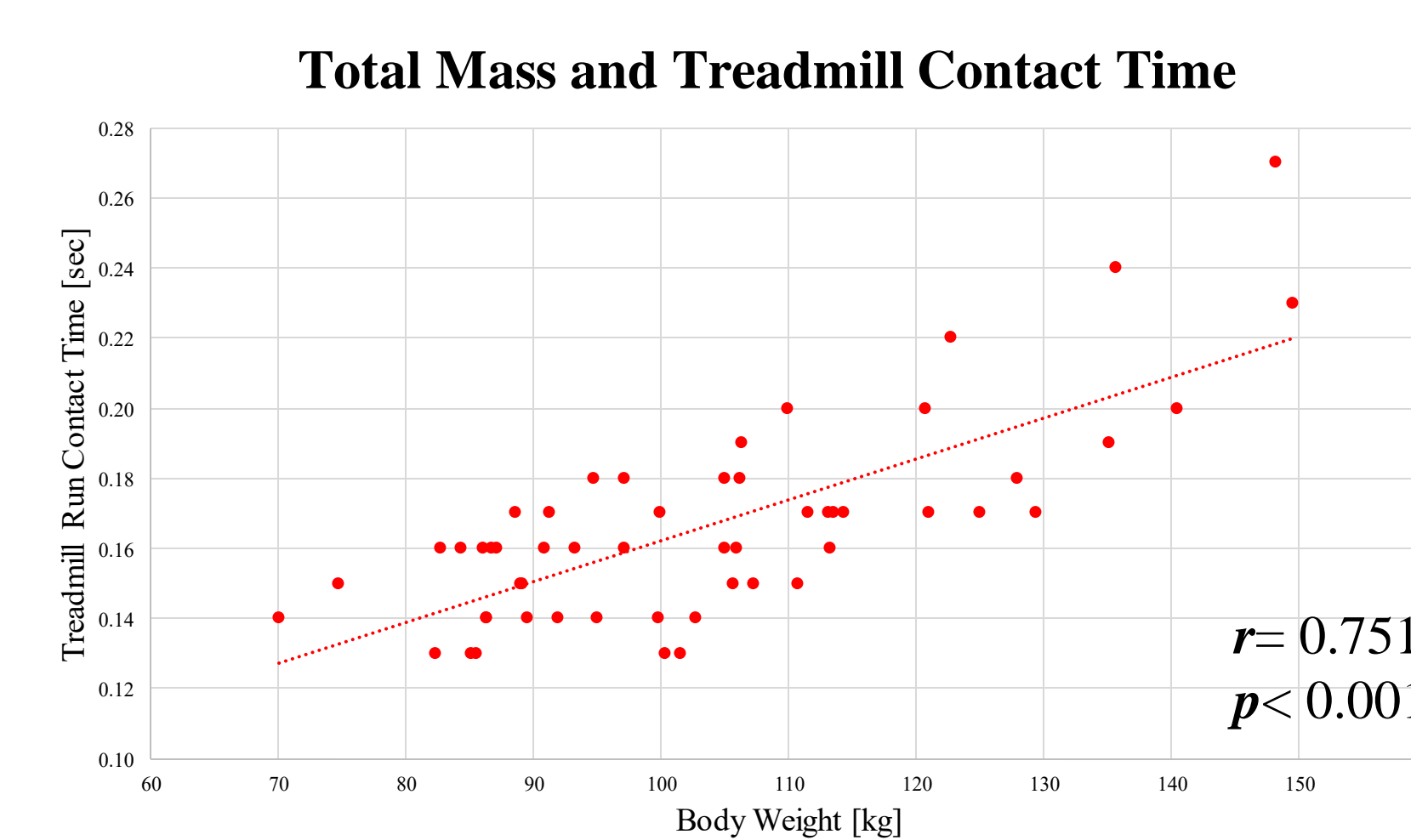
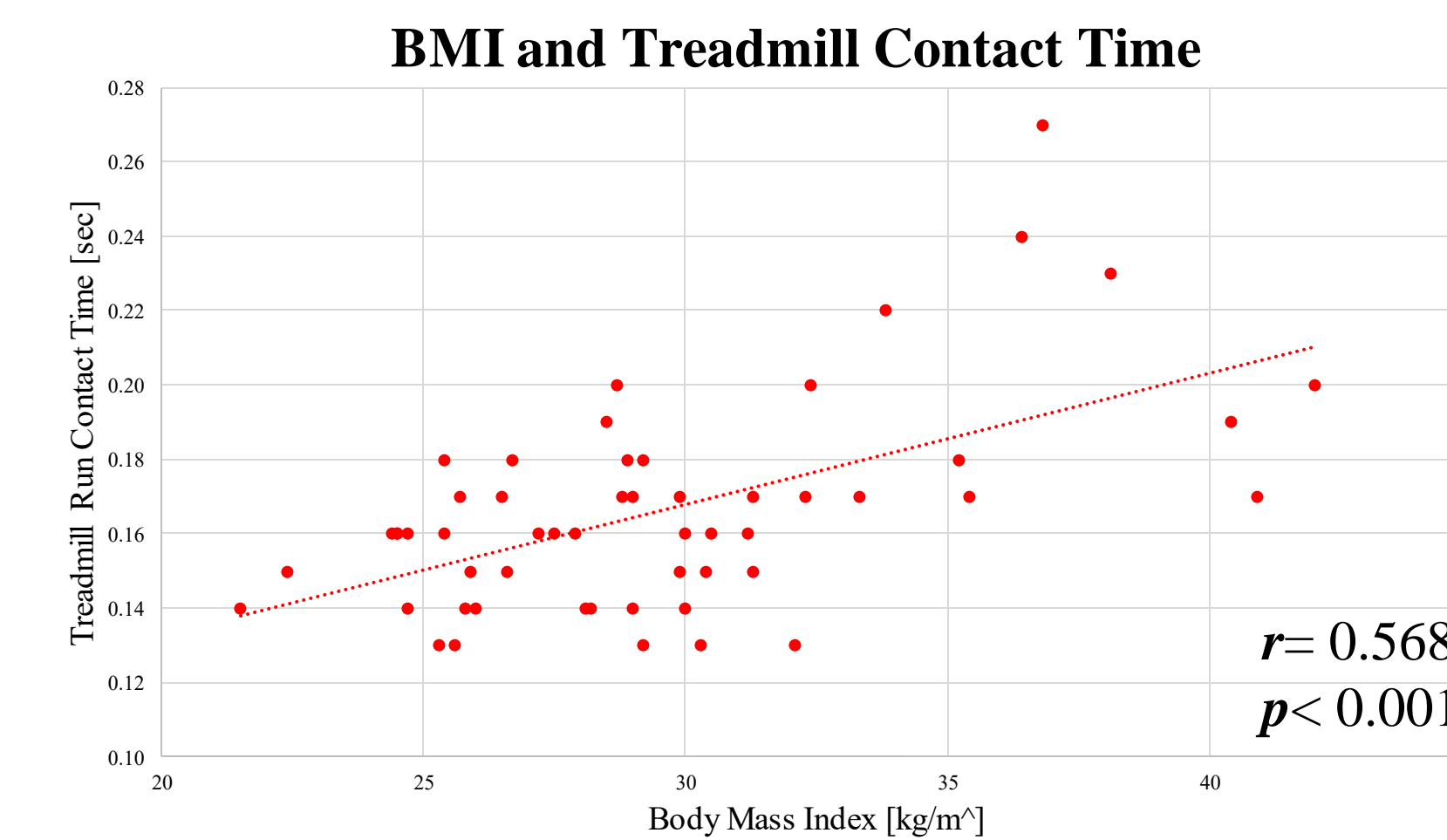
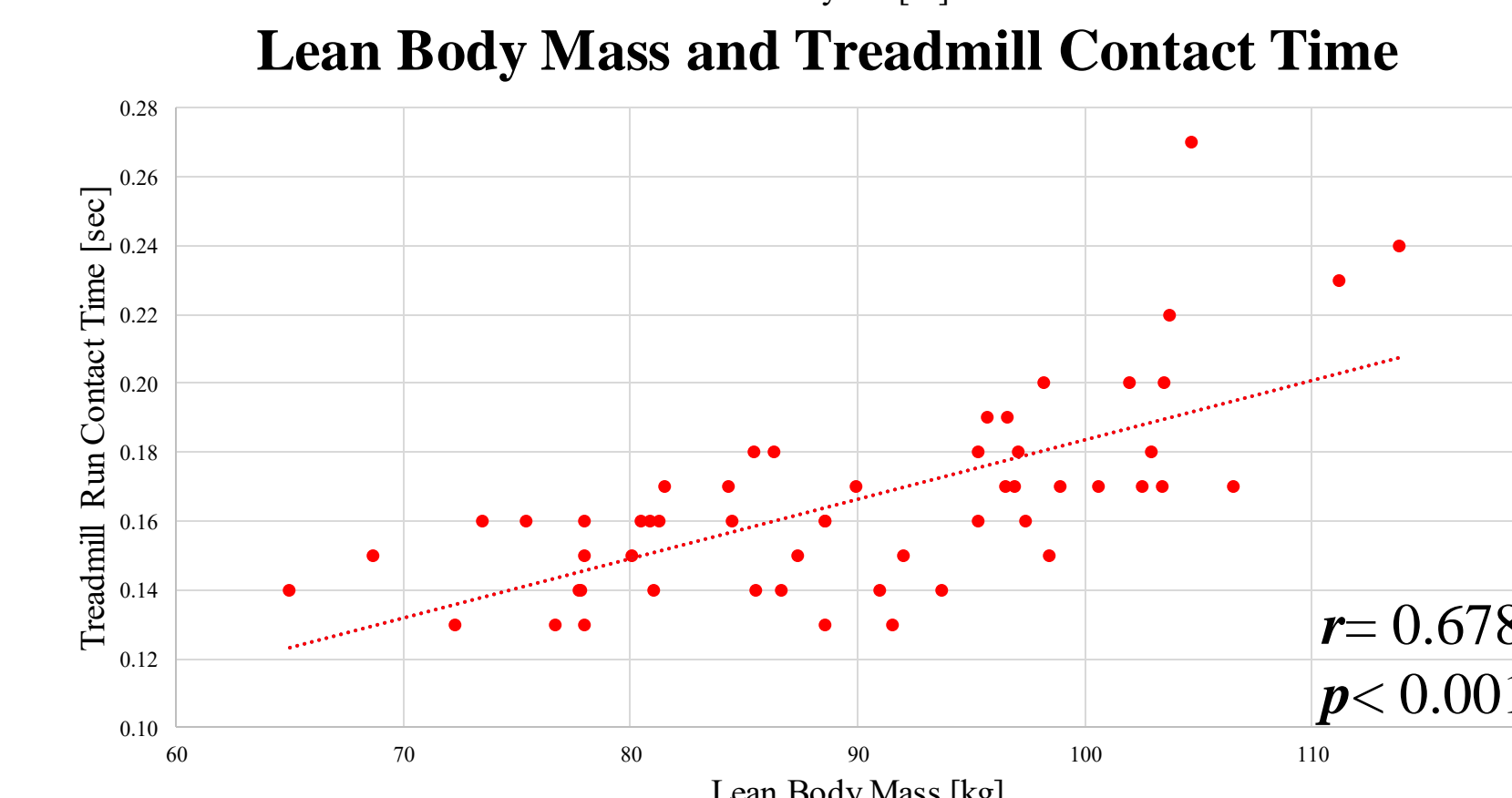
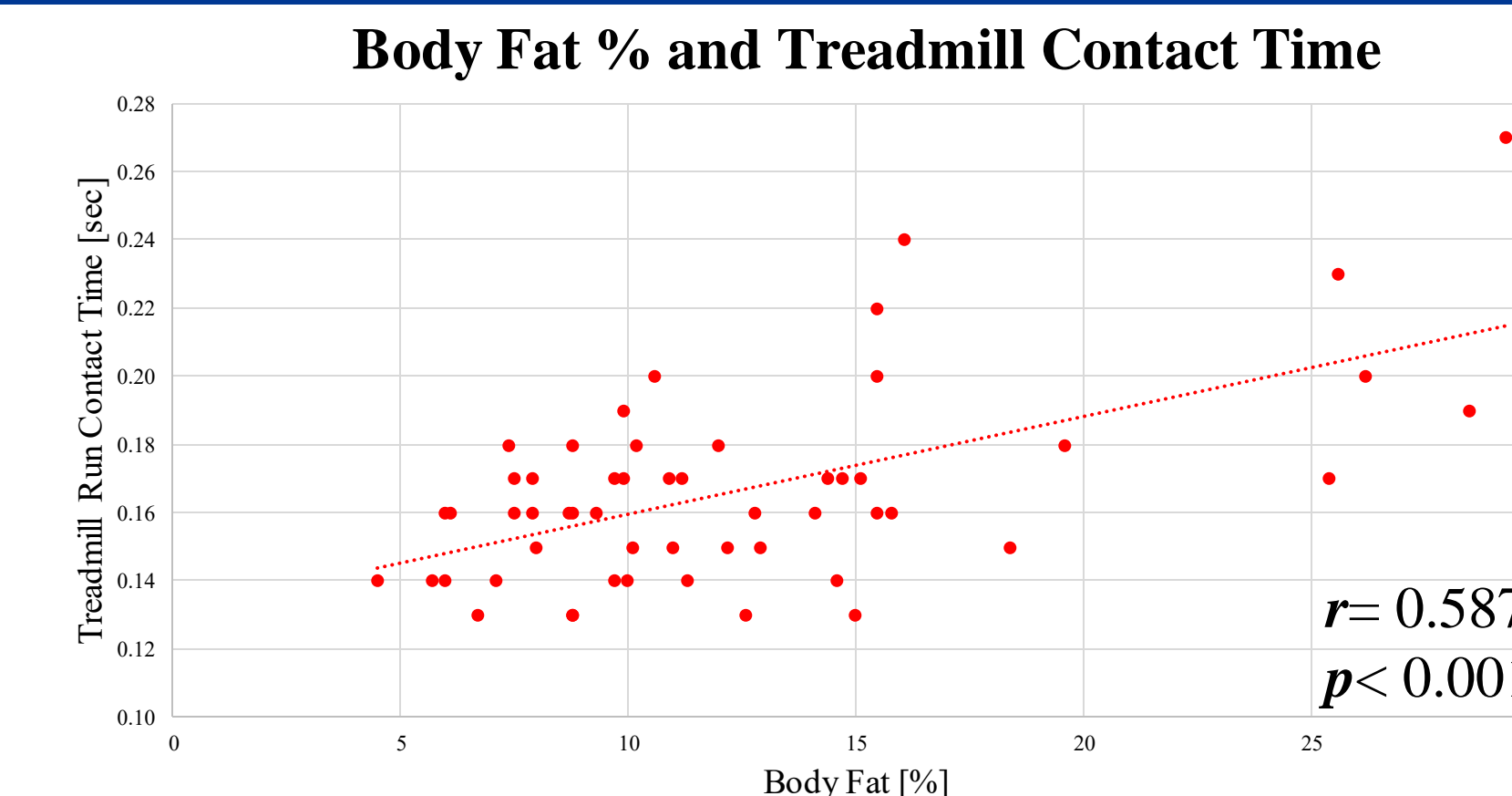
After a standardized warm-up, subjects completed a 5-second run between 6.0-6.5 m/s (13.5-14.5 mph) on the treadmill while GRF (expressed in body weights, BW) and GRT (sec) was being recorded, on an instrumented treadmill synchronized with a 3D 10-camera motion capture system.

Data Analysis

Vicon Nexus software (ver. 2.24) was used to process the data and Polygon (ver. 4.4.6) to extract the data. We then used SPSS to calculate Pearson Correlation Coefficients and assessed the significance and strength of the associations, $p < 0.05$.



Results



	Mean	SD	Range
Body Fat (%)	11.8	5.2	4.5-29.3
LBM (kg)	89.9	11.1	65-113.8
BMI (kg/m²)	29.2	4.1	21.5- 42.0
Total mass (kg)	102.7	17.7	70-149.9
GRF (BW)	2.8	0.3	2.1-3.6
GCT (sec)	0.16	0.03	0.13-0.17

*36% of players were obese according to their BMI (≥ 30) while only 4% were obese according to their BF% ($\geq 25\%$).

Discussion and Conclusion

Increased BMI is an intrinsic risk factor for lower limb injuries.⁴ In this study, the higher BMI individuals displayed higher absolute GRF. Over time, these microtraumas can summate, leading to degenerative pathologies like arthritis.⁵ Interestingly, when the GRF was normalized, the Treadmill Run Force was lower in these heavier athletes, dampening forces to the joints, and potentially protecting against injury.



Conclusion: Heavier and fatter football players appear to run softer than their lighter and leaner counterparts. This force modulation may occur to preserve tissues, especially at the knee and hip.

Research Team

- NSU Patel College of Health Care Sciences
 - Professor of Exercise Sport Science
 - Master's and Undergraduate Students in Exercise and Sport Science
- NSU Patel College of Osteopathic Medicine
 - Doctor of Osteopathic Medicine Students
- Bommarito Performance Systems
 - High performance coach
- Team approach allowed for rich conclusions incorporating general health and wellness with performance in highly trained athletes.

References

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