SEX AND BODY COMPOSITION CAN INFLUENCE PLANK PERFORMANCE IN RESERVE OFFICERS' TRAINING CORPS (ROTC) CADETS

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Introduction

- The U.S. Army implemented a maximum plank assessment to replace the leg tuck on their Army Combat Fitness Test (ACFT).
- The plank is the only ACFT component graded on a gender neutral scale. Previous literature has indicated that males and females may not differ on assessments of core performance.
- However, males and females do differ on anthropometric and body composition measurements. These variables are well known to effect physical performance.
- Currently, there is conflicting literature identifying sex differences and body composition correlations with plank performance in a tactical population.

Purpose

The purpose of this study was to analyze differences in plank performance between the sexes and the relationship between body composition and plank performance in Army Reserve Officers' Training Corps (ROTC) cadets.

Methods

- Demographics: 77 ROTC cadets (58 males, 19 females, age=21.5±2.8 years) participated
- Anthropometrics & Body Composition
  - Height recorded via stadiometer
  - Total body mass (TBM) recorded via digital scale
  - Body fat percent (BF%) recorded via handheld bioelectrical impedance analysis
  - Plank: conducted for maximum time per ACFT standards
- Statistical analysis
  - Independent t-test assessed differences in body composition (TBM; fat mass (FM); fat free mass (FFM); BF%) and plank performance between sexes.
  - Pearson's correlations assessed relationships between TBM, body composition variables, and plank performance.
  - A sequential linear regression for plank performance was conducted with BF% and BF% + sex.
  - An independent samples t-test assessed differences in plank performance between 10 male and 10 female cadets who were FM case-matched.
  - α = 0.05.

Key Findings

Males outperformed females in the plank by approximately forty seconds

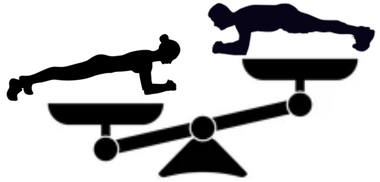
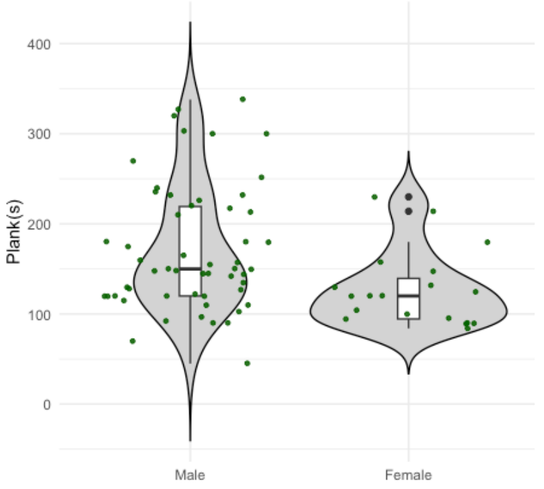
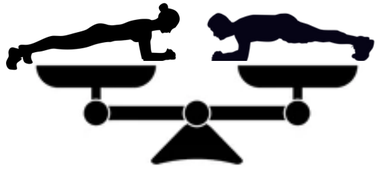


Figure 1: Violin & boxplot comparison of plank performance between male and female cadets

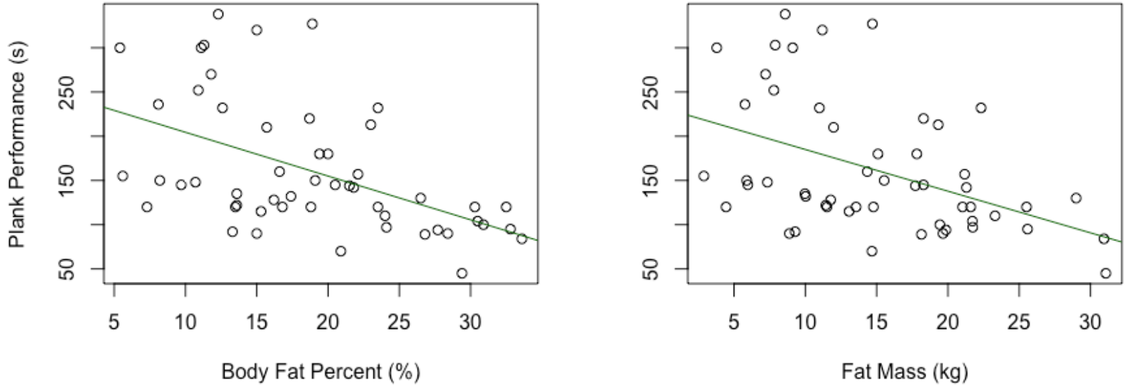


No difference in plank performance between sexes when case-matched for fat mass



There was a significant correlation between body fat % and fat mass with plank performance

Figure 2: Correlations between BF% and Fat Mass with Plank Performance



Results

	Males (n=58)	Females (n=19)	p-value
TBM (kg)	78.56 ± 15.34	67.04 ± 10.28	0.001
BF%	16.63 ± 5.87	28.72 ± 4.49	<0.001
FFM (kg)	65.74 ±7.77	50.07 ± 4.71	<0.001
FM (kg)	13.76 ± 6.66	20.55 ± 5.33	0.003
Plank (s)	170.36 ± 70.57	129.28 ± 42.58	0.023

There was a significant, negative correlation between BF% (R=-0.51, p<0.01) and FM (R=-0.45, p<0.01) with plank performance. There were no significant correlations with FFM (R=-0.18, p=0.13) or TBM (R=0.22, p=0.12) and plank performance. In the first linear model (R^2 = 0.242, p<0.001), BF% was a significant predictor of plank performance (p<0.001). The addition of sex in the second model did not explain any more variance (R^2=0.231, p<0.001; delta R^2=-0.011, p=0.605) nor was sex a significant predictor (p=0.605). When case-matched, there was no significant difference in plank performance (p=0.057).

Conclusion

- Contrary to previous research, there was a significant difference in core endurance, as assessed by a maximum plank, between males and females in this sample.
- The difference in plank performance between the sexes could be due to females having greater BF% and FM.
- When added to the regression equation, sex did not explain any more variance than BF% alone. This is further supported by there being no difference between the sexes when case-matching for FM.
- A limitation of the current study was the large sample size difference between males and females but it is similar to that of active duty military populations.

Practical Applications

- For ROTC cadets to perform well on the plank, regardless of sex, practitioners should emphasize both core endurance training and decreasing body fat.
- Additionally, commanders should be aware that because the ACFT scoring scale for the plank is gender neutral, females may score fewer points than their male counterparts.