



Investigating The Effect of Body Composition on Army Combat Fitness Test Scores in ROTC Cadets: What Separates Top Performers

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Introduction

- The ACFT was implemented in 2020 to assess soldiers' physical fitness and combat readiness
- Specific portions of physical fitness such as fat-free mass (FFM) and body fat percentage (BF%) influence ACFT scores
- Limited research exists on how body composition (BC) metrics relate to top performing ROTC cadets in the ACFT

Methods

- A total of 179 ROTC cadets (male=134, female=45, age=21.5±3.8yrs, mass=75.9±13.2kg, BF% =20.6±6.9) completed bioelectrical impedance analysis (BIA) to collect BC data.
- The ACFT testing was conducted within 72 hours of BIA testing.
- Independent samples t-tests were performed to compare BC metrics between top performers (ACFT ≥ 570) and other ROTC cadets.

Key Findings

Top performers on the ACFT seem to differentiate themselves by having more muscle mass and being leaner

MEASURE	TOP PERFORMERS (N=21, 18 MALES, 3 FEMALES)				NON-TOP PERFORMERS (N=158, 116 MALE, 42 FEMALES)				p-value	Effect Size (d)
	Mean	SD	Min	Max	Mean	SD	Min	Max		
HEIGHT (CM)	176.0	7.9	162.0	189.0	172.0	8.9	152.0	191.0	0.081	0.407
MASS (KG)	80.7	11.3	54.0	103.0	75.3	13.3	45.8	116.0	0.079	0.410
BMI (KG/M ²)	26.0	2.3	20.5	29.4	25.3	3.7	17.6	35.0	0.420	0.188
FFMI (KG/M ²)	21.4	1.6	17.0	23.4	19.9	2.3	14.8	25.3	0.004**	0.670
FM (KG)	14.3	5.2	3.8	22.9	16.1	6.5	3.7	31.9	0.233	-0.278
FFM (KG)	66.3	9.1	44.9	79.6	59.2	10.1	36.0	84.5	0.002**	0.719
BF (%)	17.6	5.7	5.6	29.3	21	6.9	6.7	37.0	0.029*	-0.511

Notes: *p < .05, ** p < .01, *** p < .001

Abbreviations: body mass index = BMI, body fat percentage = BF%, fat mass = FM, fat-free mass = FFM, and fat-free mass index = FFMI.

Results

- The mean ACFT score of top performers (580±7.7) was significantly different (p< 0.001) from the mean score for non-top performers (498±52.1)
- Top performers on the ACFT had significantly greater FFM (p=0.002,d=0.72), FFMI (p=0.004, d=0.67) and lower BF% (p=0.029, d=-0.51). There was no significant difference in FM or BMI.

Conclusion

- Although FFM, FFMI, and BF% were significantly different between top-performing and non-top-performing ROTC cadets, the moderate effect sizes suggest that BC alone does not fully explain superior ACFT performance.
- The lack of significant differences in FM and BMI may not be the most reliable indicators of combat fitness readiness.

Practical Applications

- ROTC training should prioritize training to increase FFM due to its larger effect size followed by a reduction in BF%.
- Subsequently, for training intended to reduce BF% it should not be done at the cost of large amounts of FFM.