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## Army Combat Fitness Test performance by sex in ROTC cadets

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## INTRODUCTION

- The U.S. Department of Defense recently opened to women all remaining combat jobs in all the military services (1). U.S. Army women are now serving in the combat arms branches of infantry, armor and special forces.
- The Army Combat Fitness Test (ACFT) is the U.S. Army's new occupational assessment for measuring a soldier's ability to perform combat tasks. It was developed out of the need for a test that will better connect fitness with combat readiness in soldiers. The scoring standards are gender neutral and are based on the level of physical demands of a soldier's job field (2).
- Issues have been raised at a national level relative to the impacts of the ACFT on female personnel. The ACFT includes tasks that place a greater emphasis on maximal strength, and this could impact females to a greater extent than males. Accordingly, there are concerns over the implications that low score will have on female soldiers' careers (3).
- As the Reserve Officers Training Corps (ROTC) is the initial entry point for many future U.S. Army officers, it is important to analyze how male and female cadets compare in their physical abilities.
- The purpose of this study was to investigate the between-sex differences in ACFT performance by ROTC cadets in one program.

## METHODS

- A retrospective analysis of ACFT data for 101 cadets (76 men and 25 women) from one Midwestern college was conducted.
- The ACFT was conducted according to established procedures. Data included total score and the score in each of the six events: three-repetition maximum deadlift (MDL), standing power throw (SPT), hand release push-ups (HRP), sprint-drag-carry (SDC), leg tuck (LTK) and 2-mile run (2MR). The ACFT standards are shown in Table 1.
- Total scores and scores for each of the six events were stratified by sex. Independent samples *t*-tests calculated differences between the sexes. Significance was set at  $p < 0.05$ .
- Cohen's *d* calculated effect sizes between the sexes. Thresholds for *d* strength were 0.20, 0.60, 1.20, 2.0 and 4.0 for small, moderate, large, very large and extremely large (4).

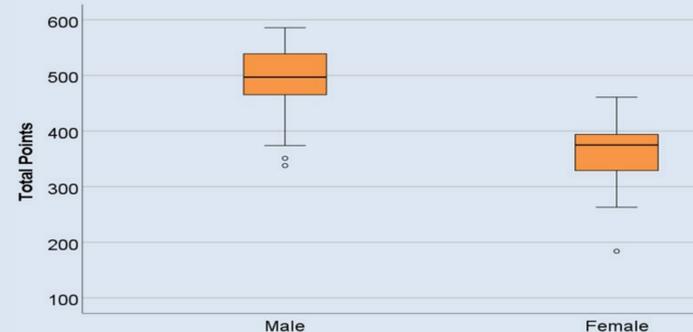
**Table 1.** ACFT scoring standards by event for minimum passing (60 points) and maximum (100 points) (1).

	Minimum	Maximum
MDL	140 lbs	340 lbs
SPT	4.5 m	12.5 m
HRP	10	60
SDC	3:00	1:33
LTK	1	20
2MR	21:00	13:30

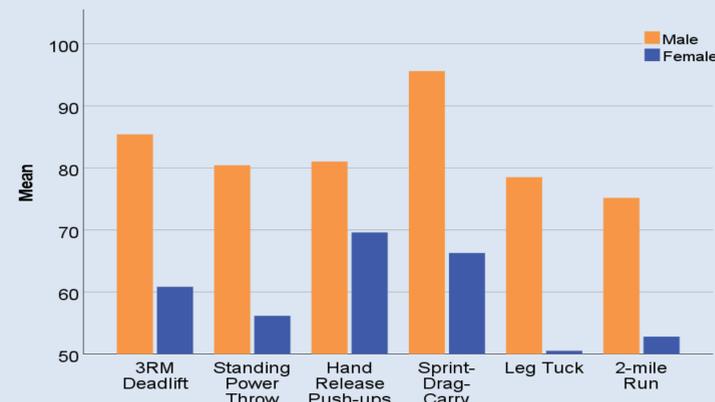
## RESULTS

- The total ACFT score (mean and spread) is shown in Figure 1. Mean data for each event is shown in Figure 2 (points) and Table 2 (raw metrics). Male cadets scored significantly ( $p < 0.001$ ) higher than female cadets in ACFT total points and all six events.
- Effect sizes for the difference in total points, SDC and SPT were very large. For the 3RM deadlift and LTK, the effect sizes were large; for the HRP and 2MR, the effect sizes were moderate (Table 2).
- Female cadets failed to achieve a minimum passing score for the overall ACFT (360 points) and the SPT, LTK and 2MR events (60 points each) (Figures 1 and 2).
- Male cadets scored highest in the SDC and lowest in the 2MR. Female cadets scored highest in the HRP and lowest in the LTK (Table 2).

**Figure 1.** Distribution of ACFT total scores by sex.



**Figure 2.** Mean scores by sex for the six ACFT events.



**Table 2.** Descriptive data (mean  $\pm$  SD) for males and females for ACFT total and six event scores (raw metrics).

	Males	Females	<i>d</i>	<i>d</i> strength
Total Points	496 $\pm$ 55	356 $\pm$ 60 *	2.44	Very Large
3RM Deadlift	85 $\pm$ 15	61 $\pm$ 14 *	1.69	Large
Standing Power Throw	80 $\pm$ 10	56 $\pm$ 14 *	2.06	Very Large
Hand Release Push-ups	81 $\pm$ 13	70 $\pm$ 7 *	1.08	Moderate
Sprint-Drag-Carry	96 $\pm$ 6	66 $\pm$ 16 *	2.48	Very Large
Leg Tuck	79 $\pm$ 17	51 $\pm$ 27 *	1.24	Large
2-Mile Run	75 $\pm$ 22	53 $\pm$ 25 *	0.94	Moderate

\*Significantly ( $p < 0.001$ ) different from the males

## CONCLUSIONS

- At a micro-level, this ROTC program reflected the challenges present on a national-scale for the U.S. Army.
- Female cadets were not as physically capable as male cadets in the ACFT, which simulated combat-related tasks. This has major implications for combat readiness in women entering combat arms jobs as to whether they can adequately perform the job tasks.
- The ACFT events where sex had the largest impact were tests in which strength was a major factor (SDC, SPT, 3RM deadlift, and LTK). This is not unexpected, given the between-sex differences that exist in factors such as body size and muscle mass.
- It must be emphasized that these data do not suggest that females should not be serving in the armed forces. Rather, they highlight the need for specific training for female cadets. To close the gap in performance between the sexes, training plans for female cadets should ideally prioritize developing strength, in addition to other fitness qualities (i.e., anaerobic and aerobic capacity) important for army personnel.
- The data from this study also suggested that training plans for male cadets should include more aerobic fitness, as the 2MR was their weakest event.

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