

Comparison of Occupation Physical Assessment Test Scores Administered at United States Military Academy, Reserve Officers' Training Corps and Initial Entry Training

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Abstract

The ability of soldiers to perform physically demanding tasks associated with their military job requirements is a crucial component of a successful army. To ensure that soldiers can meet the physical demands of their chosen occupation, the U.S. Army, beginning in 2017, required all initial entry sources to administer the Occupational Physical Assessment Test (OPAT) to future soldiers. The OPAT assesses lower-body and upper-body power, lower-body strength, and the aerobic capacity of each soldier. Data were obtained on 6,732 participants from the United States Military Academy (USMA), the Reserve Officers' Training Corps (ROTC), and U.S. Army Initial Entry Training (IET). The results of the test, with a gender-neutral grading scale, indicated that cadets from USMA performed better on the power throw, long jump, and dead lift than ROTC and IET. ROTC cadets performed better than IET participants on the same three events. ROTC and IET participants performed better than USMA cadets on the interval run but equal to each other. Based on the performance, 92.0% of USMA cadets scored in the highest OPAT "heavy" category compared to 84.2% for ROTC cadets and 82.3% for IET participants. The results indicate that USMA cadets performed better than both ROTC and IET participants, and ROTC cadets performed better than IET participants. Several possible explanations for the differences in performances are discussed.

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The ability of an individual to perform physically demanding tasks that are associated with their assigned duty is critical to success in the military (Sharp, Patton, & Vogel, 1998). As such, it is essential that military leaders develop and implement predictive models of battlefield physical performance (Teplitzky, 1991; Williams & Rayson, 2006). Since its adoption in 1980, the Army Physical Fitness Test (APFT) was the only physical assessment performed by soldiers. A semiannual three-battery assessment, the APFT serves to measure the general fitness level of a soldier but does not differentiate between different physical requirements for various military occupations (Department of the Army [DA], 2012). Research over the last 20 years has shown that the three events tested on the APFT (two minutes of push-ups, two minutes of sit-ups, and a timed two-mile run) do not effectively assess a soldier's ability to perform physically demanding tasks often associated with various military specialties (Bilzon, Allsop, & Tipton, 2001; Heinrich, Spencer, Fehl, & Poston, 2012; Jette, Kimick, & Sidney, 1989; Teplitzky, 1991). Furthermore, a national decline in youth physical activity over the last 30 years has resulted in a wide range of entry-level candidate fitness in the military (Dwyer et al., 2009).

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Prior to 2015, no assessments were required before enlistment to screen for a soldier's ability to meet the physical demands of their assigned specialty (Dwyer et al., 2009). Accordingly, to mitigate the increasing number of recruit candidates that were not physically ready to attend initial military training and to determine which recruits were best able to meet the physical demands of a specific job, a more robust group of initial assessments was sought. The U.S. Army Training and Doctrine Command (TRADOC) and the U.S. Army Research Institute of Environmental Medicine (USARIEM) worked to create a physical assessment that would enable personnel managers to direct recruits to occupations that they are best suited for based on their physical fitness. By analyzing the physical requirements of a number of military tasks, USARIEM developed the Occupational Physical Assessment Test (OPAT). The OPAT is a four-event test designed to assess an individual's strength, power, and aerobic capacity. How an individual performs on the OPAT serves as an indicator as to which occupational Army specialties he or she would be able to train for, as well as the individual's ability to successfully meet specific physical demands of those assignments.

In 2017, the U.S. Army required that all initial entry sources administer the OPAT to future soldiers (Fanning, 2016; Soika & Nowels, 2017). Currently, there are three primary organizations that administer the OPAT for individuals who decide to transition from citizens into soldiers: the United States Military Academy (USMA) at West Point, the United States Army Cadet Command Reserve Officers' Training Corps (ROTC), and U.S. Army Initial Entry Training (IET). The USMA is a four-year, government-funded institution in which citizens are placed on active duty and commissioned as officers upon graduation. The ROTC works to develop reserve and active duty officers through military instruction of students attending civilian universities. Lastly, IET comprises recruiting stations and other courses where civilians enlist to serve in the U.S. Army.

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After administering the OPAT at USMA for two years, the question was posed as to how performance on the test differed among commissioning and initial entry sources. Therefore, the purpose of this study is to determine if there is a difference in performance across the four events of the OPAT between USMA, ROTC, and IET. A better understanding of group performance relative to each other may provide insight into the success of each source's physical training program, as well as assess the ability of each source to produce soldiers capable of meeting the highest physical standards of the OPAT.

Methods

Prior to collecting data, the USMA Institutional Review Board approved the study. Data were collected from the various initial entry sources. USMA cadets were tested and the data recorded in the official academy database maintained at West Point, New York. Data from ROTC and IET soldiers were provided by TRADOC Center for Initial Military Training (CIMT), Fort Eustis, Virginia. The data were combined into an Excel spreadsheet and identified by source and gender. All other identifying characteristics were removed.

Procedures

The OPAT is assessed on the same scale for both men and women, with the goal of performing as well as possible. Results provide measurements of upper- and lower-body power, lower-body strength, and aerobic endurance. The OPAT events are the standing long jump (lower-body power), seated power throw (upper-body power), strength dead lift (lower-body strength), and the interval aerobic run (aerobic endurance). The standing long jump, seated power throw, and strength dead lift are the first three test events and can be performed in any order. The interval aerobic run must be the last event performed. Individuals are authorized to take up to five minutes of recovery time between events but may elect to proceed sooner (DA, 2016b).

The execution of the OPAT at USMA occurs in the spring of the junior year. In accordance with published OPAT standards, cadets receive a briefing and demonstration of the OPAT and each of the four test events (DA, 2016b). Once completed, cadets are split into three groups of 20 to 30 to start one of the three events. During testing, cadets carry their OPAT scorecard (DA, 2016a) from event to event, where trained graders record their performance. Upon completion of the OPAT, cadets turn their scorecards into a designated grader who records the scores in an online database. While data storage methods may differ, execution of the OPAT itself is the same across the three sources in this study. ROTC cadets take the OPAT at their universities or assigned advanced camp, which generally occurs during the summer between their junior and senior years of

Table 1*Occupational Physical Assessment Test Standards*

OPAT categories	Standing long jump	Seated power throw	Strength dead lift	Interval aerobic run
Category A Black (Heavy)	160 cm 5'03"	450 cm 14'09"	160 lbs	43 Shuttles 6-2
Category B Gray (Significant)	140 cm 4'07"	400 cm 13'01"	140 lbs	40 Shuttles 5-8
Category C Gold (Moderate)	120 cm 3'11"	350 cm 11'06"	120 lbs	36 Shuttles 5-4
Category D White (Unqualified)	Any event score below Category C Gold (Moderate) level			

*Minimum scores in each category

Note: OPAT = Occupational Physical Assessment Test. Table by Maj. Julia Lensing.

Table 2*Demographics for the Population of Occupational Physical Assessment Test Participants*

	USMA	ROTC	IET
Total population	1,782	4,352	598
Mean age	22.0 years	21.8 years	19.9 years
Men	1,467 (82.3%)	3,349 (77%)	444 (74.2%)
Women	315 (17.7%)	1,003 (23%)	154 (25.8%)

Note: OPAT = Occupational Physical Assessment Test; IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Table by Maj. Julia Lensing.

college. IET candidates take the OPAT during the recruitment phase and prior to attending initial entry training. Though initial entry recruits do not take the OPAT at the same stage in their military careers, the administration of the test is identical.

The execution of each of the four events, specified in detail in the OPAT instructions, serves to ensure that all performances are equal despite location or administration source (DA, 2016c). Instructions for each of the events follow.

1. Standing long jump. The standing long jump is considered a test of lower-body power but, more specifically, is an excellent indica-

tor of explosive horizontal displacement. Participants stand on a designated line and, from a two-footed takeoff, jump upward and forward as far as possible. Scores are measured by the forward distance traveled from the start line to the back of the heel closest to the start line. If participants stumble, fall forward or backward, or move after landing, their jump is not counted, and they must repeat that attempt. Three graded attempts must be completed, with the distance measured in centimeters and the best or furthest score counted.

2. Seated power throw. The seated power throw test is intended to measure upper-body power. Participants sit on a flat surface, with their backs against a

Table 3
Mean and Standard Deviation of Event Scores by Commissioning Source

Event	Source	Mean ± SD
Power throw	IET	590.8 ± 121.3 (cm)
	ROTC	608.2 ± 116.9 (cm)
	USMA	665.8 ± 119.2 (cm)
Long jump	IET	211.3 ± 32.6 (cm)
	ROTC	210.1 ± 31.8 (cm)
	USMA	221.1 ± 31.6 (cm)
Dead lift	IET	209.7 ± 21.7 (lbs)
	ROTC	211.8 ± 19.8 (lbs)
	USMA	214.8 ± 15.4 (lbs)
Interval run	IET	76.2 ± 20.8 (Shuttles)
	ROTC	78.2 ± 21.4 (Shuttles)
	USMA	74.5 ± 21.1 (Shuttles)

Note: IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Table by Maj. Julia Lensing.

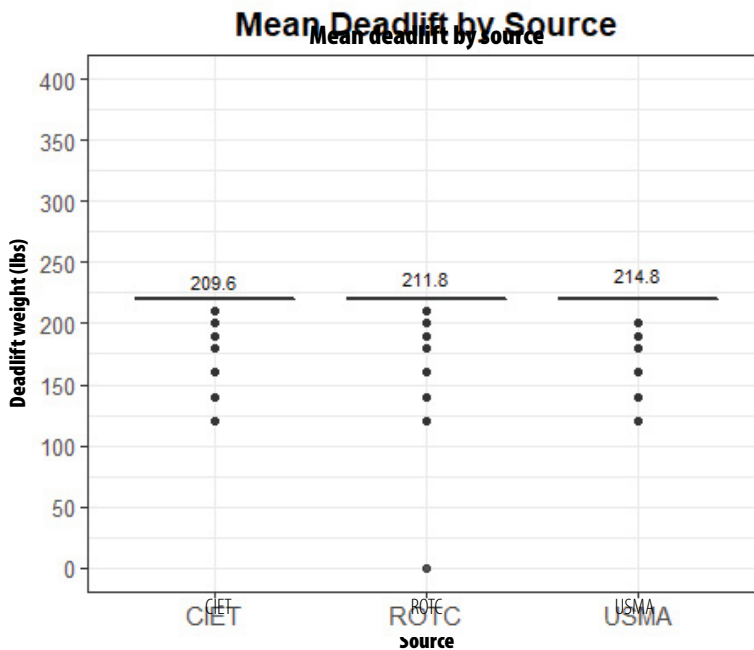
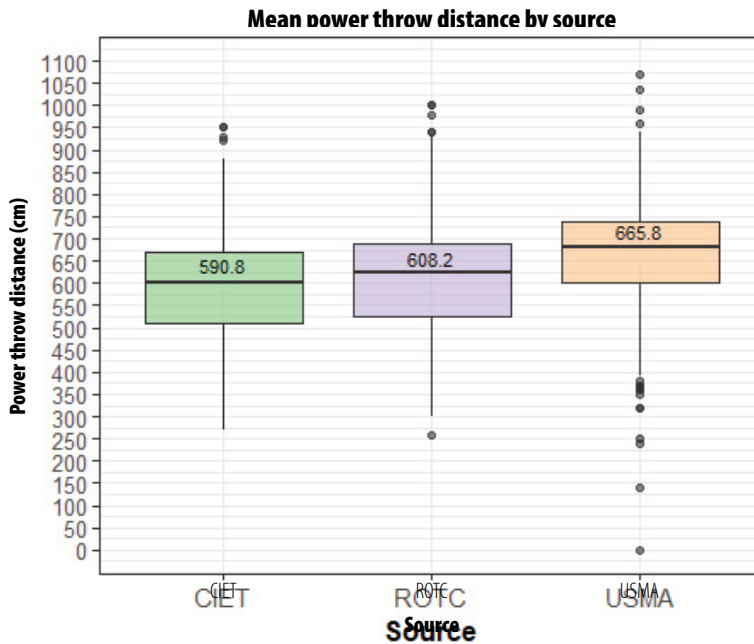


Figure 1. Boxplots comparing combined male and female mean scores by commissioning/initial entry source, by event. *Note:* IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Figure by Maj. Julia Lensing.

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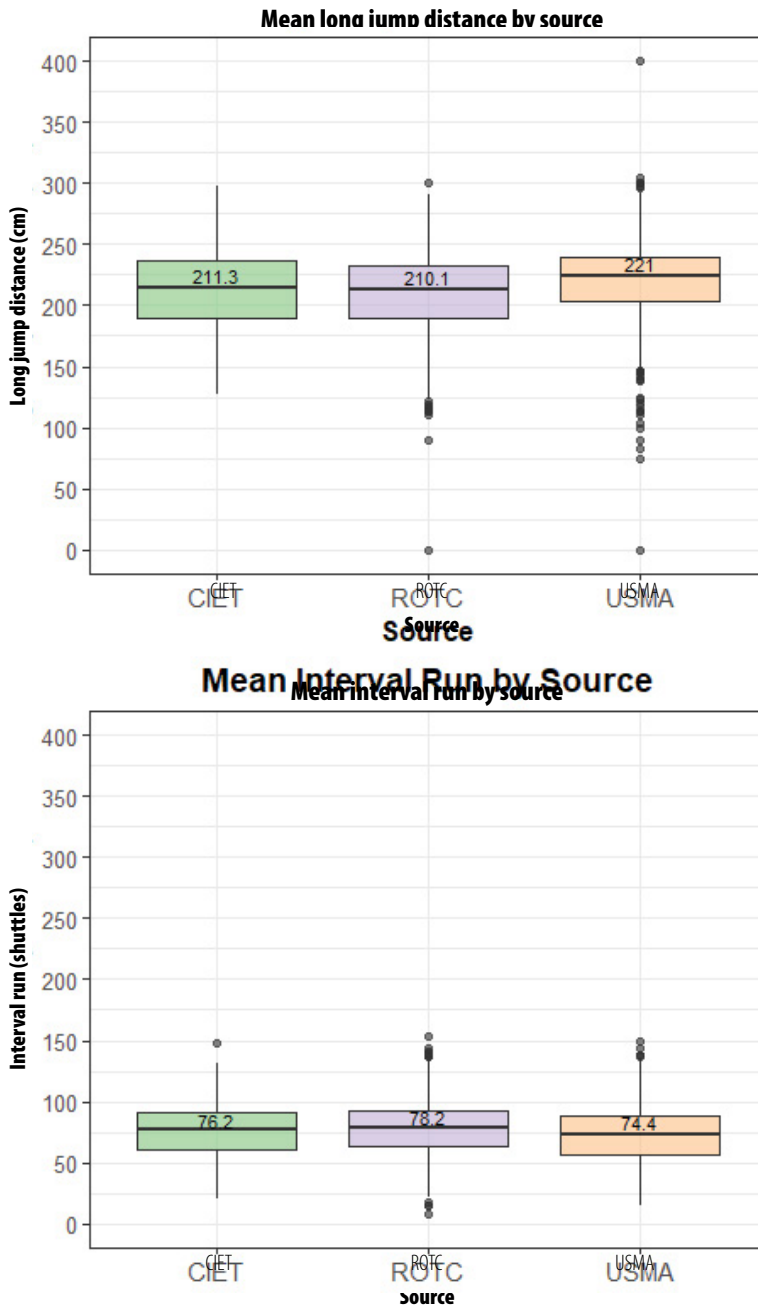


Figure 1 (continued). Boxplots comparing combined male and female mean scores by commissioning/initial entry source, by event. Note: IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Figure by Maj. Julia Lensing.

Table 4*Comparison of Each Source's Performance on the Four Occupational Physical Assessment Test Events*

Dependent variable	Source	Comparison source	Mean difference
Power throw	USMA	ROTC	57.5 cm*
		IET	75.0 cm*
	ROTC	IET	17.4 cm*
Long jump	USMA	ROTC	10.9 cm*
		IET	9.7 cm*
	ROTC	IET	1.2 cm*
Dead lift	USMA	ROTC	3.0 lbs*
		IET	5.2 lbs*
	ROTC	IET	2.2 lbs
Interval run	USMA	ROTC	3.7 shuttles*
		IET	1.7 shuttles
	ROTC	IET	2.0 shuttles

Note: OPAT = Occupational Physical Assessment Test; IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Table by Maj. Julia Lensing.

* $p < .05$

wall. The performer executes a forward throw similar to a chest pass and attempts to throw a 2 kg medicine ball as far as possible. During the execution of the seated power throw, the thrower's back must always remain in contact with the wall to ensure that the event is measuring upper-body power and not influenced by the lower body. To ensure consistent standards across all participants, a judge sits to the side of the participant and invalidates throws where standards are not maintained. Like the standing long jump, participants will be tasked to repeat improv-

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Table 5

Comparison of the Event Scores of Only Females from Each Commissioning/Initial Entry Source

Dependent variable	Source	Comparison source	Mean difference
Throw	USMA	ROTC	43.7 cm*
		IET	53.8 cm*
	ROTC	IET	10.1 cm
Long jump	USMA	ROTC	11.1 cm*
		IET	10.7 cm*
	ROTC	IET	-0.3 cm
Dead lift	USMA	ROTC	6.1 lbs*
		IET	9.8 lbs*
	ROTC	IET	3.7 lbs
Interval run	USMA	ROTC	3.6 shuttles*
		IET	4.1 shuttles*
	ROTC	IET	0.5 shuttles

Note: IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Table by Maj. Julia Lensing.

* $p < .05$

er throws. Each participant must complete three graded throws, with distance calculated to the nearest 10 cm. The best of the three graded scores is used for determination of event performance.

3. Strength dead lift. The strength dead lift utilizes a hexagonal bar with increasingly heavier weights. The test measures lower-body strength. Participants are required to perform an initial “check dead lift,” where judges check for proper lifting form and make corrections. Once the judge is satisfied with the performer’s ability to perform a proper and safe lift, they are allowed to proceed

Table 6*Comparison of the Event Scores of Males from Each Commissioning/Initial Entry Source*

Dependent variable	Source	Comparison source	Mean difference
Throw	USMA	ROTC	46.8 cm*
		IET	59.0 cm*
	ROTC	IET	12.2 cm*
Long jump	USMA	ROTC	7.6 cm*
		IET	4.3 cm*
	ROTC	IET	-3.3 cm*
Dead lift	USMA	ROTC	0.2 lbs.
		IET	0.5 lbs.
	ROTC	IET	3.7 lbs.
Interval run	USMA	ROTC	7.2 shuttles*
		IET	5.8 shuttles*
	ROTC	IET	1.5 shuttles

Note: IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Table by Maj. Julia Lensing.

* $p < .05$

to the first of eight graded lifts. The total weight on each bar is 120, 140, 160, 180, 190, 200, 210, and 220 pounds, respectively. Participants must start at the first bar and, on the command "lift," successfully perform a proper dead lift. Once complete, the participant is afforded up to one minute of rest between each weight. The final score is the last successfully lifted weight. If the performer is unable to lift a weight successfully or demonstrates poor lifting form, they are allowed one additional lift.

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Table 7

Percentage of Participants Who Placed in Each Category on the Occupational Physical Assessment Test. Numbers in Parentheses Indicate the Percentage of the Total Population to Score in a Category of Above

Category	USMA		ROTC		IET	
	N	% of population	N	% of population	N	% of population
Category A (Black)	1639	92.0%	3664	84.2%	492	82.3%
Category B (Gray)	88	4.9% (96.9%)	367	8.5% (92.7%)	48	8.0% (90.3%)
Category C (Gold)	26	1.5% (98.4%)	193	4.4% (97.0%)	34	5.7% (96.0%)
Category D (White)	29	1.6% (100.0%)	128	2.9% (100.0%)	24	4.0% (100.0%)

Note: OPAT = Occupational Physical Assessment Test; IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Table by Maj. Julia Lensing.

4. Interval aerobic run. The interval aerobic run is a 20-m progressive shuttle run or “beep test.” This test is designed to measure the aerobic capacity of the participant. The test is performed by starting on a designated line and running to another line 20 m away. Loud “beeps” signal when the runner can start moving to the far line and when they need to reach the far line. Speed intensifies each level as the time allocated to run between lines decreases. Judges stand on each side of the line and signal when a participant fails to make it to the line within the allocated time. Runners are afforded up to two faults, or “misses,” to be able to make up the distance and get back on track. If they receive three consecutive faults, the participant is stopped and the last successfully completed level/shuttle is denoted as their score.

When the OPAT is completed, and participants' scores are entered, their best scores are calculated and assigned to different levels in accordance with one of the four OPAT categories:

- ◆ Category A (Black): Able to perform heavy physical demand tasks
- ◆ Category B (Gray): Able to perform significant physical demand tasks
- ◆ Category C (Gold): Able to perform moderate physical demand tasks
- ◆ Category D (White): Unqualified

To score in a particular category, the candidate must score in that category across all four events. A candidate's lowest score on a single event is their overall categorical label (see Table 1, page 110).

Participants

Data were obtained from 6,732 participants across USMA, ROTC, and IET. The average age of participants was 21.0 years. Women comprised 21.9% of the total population (1,472), with men comprising 78.1% (5,260) of the population (see Table 2, page 110).

Data Analysis

Data obtained included testing source, gender, age, APFT, score on each OPAT event, overall OPAT category, and, in the case of USMA cadets, graduating class year. Data were analyzed for initial outliers, and those identified data entry faults were removed. SPSS statistics software was used to conduct a one-way ANOVA to compare different populations. Statistical significance was set at $p \leq .05$.

To answer the initial research question of how performance on the OPAT compared amid USMA, ROTC, and IET, the following populations were compared:

1. Combined (all data points) performance on each of the four OPAT events.
2. Performance on each event based on gender.
3. Combined (all data points) categorical performance on the OPAT.

Results

The mean and standard deviations for the combined male and female scores of each commissioning/initial entry source, by event, are shown in Table 3 (on page 111). Visual representation of the data is displayed in Figure 1 (on page 112–113).

Table 4 (on page 114) compares the mean scores for each event by the commissioning/initial entry source.

Tables 5 (on page 115) and 6 (on page 116) compares the mean scores for each event by gender and by commissioning/initial entry source.

Table 7 (on page 117) indicates the percentage of each commissioning/initial entry source that achieved each category of performance.

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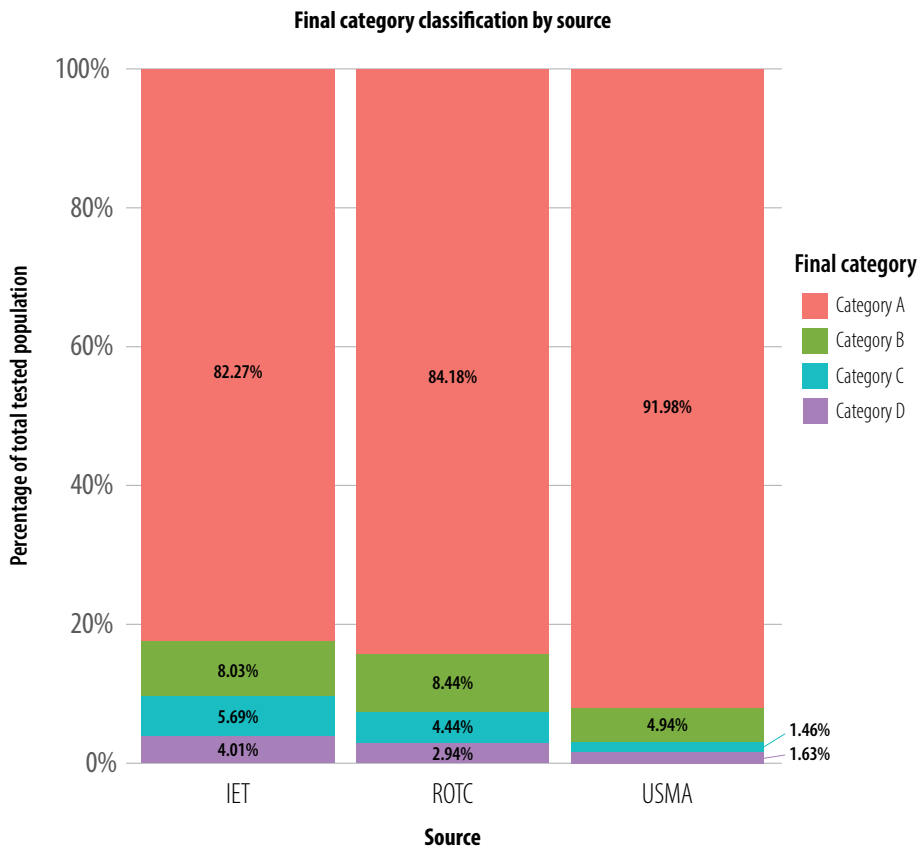


Figure 2. Final category by commissioning/initial entry source with percentage of participants who placed in each category on the Occupational Physical Assessment Test. *Note:* IET = Initial Entry Training; USMA = United States Military Academy; ROTC = Reserve Officers' Training Corps. Figure by Maj. Julia Lensing.

Figure 2 is a visual representation of the percentage of participants who placed in each category by commissioning/initial entry source.

Discussion

The results provide several interesting findings. Examining the combined scores, the participants at USMA performed statistically better than ROTC and IET participants in the standing long jump, seated power throw, and the strength dead lift. ROTC cadets performed statistically better than USMA cadets on the interval aerobic run but equivalent to IET participants.

A possible explanation for lower performance of USMA cadets on the interval aerobic run was that the scoring standards to achieve the Category A classification were known prior to the event. Many USMA cadets, knowing they achieved a Category A classification, may have terminated the event through their own volition rather than continuing until unable to maintain the prescribed pace. With ROTC and IET, the scores were not known, and candidates were simply told to perform their best. This point is supported with the percentage of participants who placed in Category A. Overall, 92.0% of USMA cadets placed in Category A, compared to 84.2% of ROTC cadets and 82.3% of IET participants.

An additional explanation for performance on the interval aerobic run could be that ROTC cadets conduct more unit physical training on a weekly basis. ROTC units typically have mandatory physical training three to five times per week.

Another factor that may have impacted interval aerobic run performance might have been the influence of peers. The interval aerobic run was the final event and conducted as a large group in front of peers. Peer influence could have improved or hindered performance. Participants who wanted to impress peers might have been influenced to perform better, while others might attempted to complete the test as soon as possible.

When performance was separated by gender, female USMA cadets performed statistically better than ROTC cadets and IET participants in all four components of the OPAT. There was no statistical difference between the female performance of ROTC cadets and IET participants.

There are a number of possible reasons for the difference in performance between female USMA cadets and candidates of other sources. First, female USMA cadets make up a smaller percent of the overall population (USMA [17.7%] compared to ROTC [23.0%] and IET [25.8%]). Additionally, the percent of female USMA cadets who are members of Division I intercollegiate athletic teams is significantly higher, leading to the possibility that females at USMA have more experience, not only conducting physical training but also specifically training for strength and power activities. During mandatory physical education coursework, USMA cadets are also exposed to events such as leg squats that could improve performance on the OPAT.

On a similar note, male participants at USMA performed statistically better than those in the ROTC and IET on the standing long jump and the seated power throw events. Male ROTC cadets performed statistically better than IET male participants on the same two events. ROTC cadets conduct mandatory physical training as part of their college experience, which could possibly explain their performance on these events. For males, there was no statistical difference between any of the commissioning/initial entry sources on the strength dead lift. On the interval aerobic run, there was no statistical difference between ROTC and IET males but both performed statistically better than USMA cadets. Possible explanations for the performance on the interval aerobic run were discussed in a previous paragraph.

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In comparing combined overall categorical performance by source, USMA outperformed ROTC and IET with respect to scoring in the highest physical demand category (92.0% compared to 84.2% [ROTC] and 82.3% [IET], see Table 7, page 117). When performance in either of the top two categories (Category A or Category B) is considered, USMA (96.9%) outperformed ROTC (92.7%) and IET (90.3%). The results of this study indicated that a higher percentage of USMA cadets were able to meet the higher physical demands tested on the OPAT compared to that of either ROTC or IET participants. Ultimately, the OPAT performance demonstrated that USMA cadets were able to meet the physical demands of all branches at a greater rate than other commissioning/initial entry sources.

Conclusions

The current data from the OPAT may indicate that USMA cadets are better prepared to meet the most rigorous physical demands of Army occupations. USMA experience delivers cadets an intense and rigorous physical education curriculum, in addition to multiple evaluations of various physical assessments, prior to assessing on the OPAT. ROTC cadets, who also endure varying degrees of physical and military fitness training prior to taking the OPAT during their junior year, outperformed IET candidates who are typically recent high school graduates and, compared to USMA and ROTC cadets, may have less physical training experience. Future research should examine the long-term impact of the OPAT and its ability to correctly identify the right soldier for the appropriate military occupational specialty. ❧

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