

## ABSTRACT

Police recruit capability to complete job tasks may be measured via a physical ability test (PAT). A PAT can be novel to a police department, but often includes a succession of job-specific tasks (e.g., running, obstacle courses, body drags, etc.) that must be completed as quickly as possible. Fitness could contribute to efficient task performance within a PAT, which characteristics are important may be dependent on the PAT structure. **PURPOSE:** To determine relationships between performance in a department-specific PAT and fitness test battery among police recruits. **METHODS:** Retrospective analysis was conducted on data (1069 men, 404 women) recorded during 2005-2009 and 2016-2020 from recruits from one southeastern police department. The gap in years occurred because of a department hiring freeze. The following were recorded for all recruits within the first 2 weeks of their training academy: grip strength; sit-and-reach; 60-s push-ups; 60-s sit-ups; 2.4-km run; and a PAT. The PAT involved exiting a vehicle and opening the trunk; running ~201 m; completing an obstacle course; dragging a 68-kg dummy 31 m; again completing an obstacle course and running ~201 m; dry firing a weapon 6 times with each hand; and trunk item placement and vehicle entry. Relationships between the PAT and fitness tests were measured by partial correlations and stepwise linear regression, both controlling for sex. **RESULTS:** The PAT was completed in a mean time of 4:16±1:07 min:s by recruits. The PAT significantly ( $p < 0.001$ ) related to all fitness tests. Moderate relationships were found for push-ups ( $r = -0.35$ ), sit-ups ( $r = -0.41$ ), and the 2.4-km run ( $r = -0.43$ ). Small relationships were found with grip strength ( $r = -0.19$ ) and the sit-and-reach ( $r = -0.17$ ). Table 1 shows the stepwise regression data. The final model, which included sex and all fitness tests except the sit-and-reach, explained ~53% of the variance. **CONCLUSIONS:** PAT performance related to, and was predicted by, multiple fitness tests. Aerobic fitness measured by the 2.4-km run appeared to have the greatest impact, which may have related to the PAT design. Tasks completed in succession rather than isolation (resulting in a mean PAT time of ~4 min) and use of a relatively light dummy (~68 kg vs. 90 kg [average US adult man] and ~77 kg [average US adult woman]) may stress aerobic fitness and muscular endurance to a greater extent. These results, and how they could be used for training program design, should be considered within the context of job tasks that may emphasize other fitness qualities (e.g., heavier body drags needing maximal strength and power). **PRACTICAL APPLICATIONS:** Multiple fitness components should be developed to help police personnel perform job tasks assessed by a PAT. Consideration should also be given to the design of a PAT and how this may place more importance on certain fitness qualities (e.g., aerobic and muscular endurance) and how this information should then be used for training program design.

## INTRODUCTION

- The capability of police recruits to complete job tasks can be measured via a physical ability test (PAT). A PAT often includes a succession of job-specific tasks (e.g., running, obstacle courses, body drags, etc.) that typically must be completed as quickly as possible.
- Physical fitness can contribute to efficient task performance within a PAT. Several studies have shown that qualities such as aerobic capacity and muscular endurance (measured by push-ups and sit-ups) relate to police-specific task simulations such as stair ascents, obstacle courses, and fence climbs (1,5,8). Moreover, faster police officers in a PAT that features multiple police-specific tasks completed in succession were fitter than slower performers (2).
- It should be noted, however, that the fitness characteristics that are important may be dependent on the PAT structure. Accordingly, police departments that utilize a PAT should analyze their test specific to their recruits, as this can assist with physical training program design to best prepare their personnel for the job.
- The purpose of this study was to determine relationships between performance in a department-specific PAT and fitness test battery among recruits from a police department in southeastern USA.

## METHODS

- Retrospective analysis was conducted on data (1069 men, 404 women) recorded during 2005-2009 and 2016-2020 from recruits from one southeastern police department in the USA.

- The gap in years from this dataset occurred in part because of a department hiring freeze. The following data were recorded for all recruits within the first 2 weeks of their respective training academy: grip strength; sit-and-reach; 60-s push-ups; 60-s sit-ups; 2.4-km run; and a PAT.
- Independent samples t-tests compared the male and female recruits, with significance set as  $p < 0.05$ . Relationships between the PAT and fitness tests were measured by partial correlations and stepwise linear regression, both controlling for sex ( $p < 0.05$ ). The correlation ( $r$ ) strength was: between 0 to  $\pm 0.3$ , small;  $\pm 0.31$  to  $\pm 0.49$ , moderate;  $\pm 0.5$  to  $\pm 0.69$ , large;  $\pm 0.7$  to  $\pm 0.89$ , very large; and  $\pm 0.9$  to  $\pm 1$  near perfect (4).

## RESULTS

- Descriptive data is shown in Table 1. Male recruits were taller and heavier, and outperformed the female recruits in all fitness tests except the sit-and-reach. Female recruits outperformed the male recruits in the sit-and-reach.
- Correlation data is shown in Table 2. The PAT significantly related to all tests. Moderate relationships were found for push-ups, sit-ups, and the 2.4-km run. Small relationships were found with grip strength and the sit-and-reach. The final stepwise regression model, which included sex and all fitness tests except the sit-and-reach, explained ~53% of the variance (Table 3).

**Table 1.** Descriptive data (mean  $\pm$  SD) for all, male, and female police recruits for age, height, body mass, combined grip strength, sit-and-reach, 60-s push-ups, 60-s sit-ups, 2.4-km run, and the PAT.

	All ( $N = 1473$ )	Males ( $n = 1069$ )	Females ( $n = 404$ )
Age (years)	29.02 $\pm$ 6.71	28.82 $\pm$ 6.74	29.56 $\pm$ 6.62
Height (m)	1.73 $\pm$ 0.10	1.77 $\pm$ 0.07	1.63 $\pm$ 0.07*
Body Mass (kg)	83.20 $\pm$ 16.34	88.16 $\pm$ 14.88	70.08 $\pm$ 12.31*
Grip Strength (kg)	97.68 $\pm$ 23.57	108.21 $\pm$ 17.29	69.82 $\pm$ 12.87*
Sit-and-Reach (cm)	33.52 $\pm$ 7.63	32.23 $\pm$ 7.49	36.95 $\pm$ 6.88*
Push-ups (repetitions)	47.68 $\pm$ 21.12	54.83 $\pm$ 18.86	28.76 $\pm$ 13.89*
Sit-ups (repetitions)	40.21 $\pm$ 11.10	42.25 $\pm$ 10.76	34.82 $\pm$ 10.16*
2.4-km Run (min:s)	13:37 $\pm$ 2:43	12:58 $\pm$ 2:27	15:22 $\pm$ 2:36*
PAT (min:s)	4:16 $\pm$ 1:07	3:52 $\pm$ 0:35	5:21 $\pm$ 1:27*

\* Significantly ( $p < 0.001$ ) different from the male recruits.

**Table 2.** Partial correlations controlling for sex for police recruits ( $N = 1473$ ) between the PAT and combined grip strength, sit-and-reach, 60-s push-ups, 60-s sit-ups, and the 2.4-km run. All variables significantly correlated with the PAT.

	PAT		
	$p$	$r$	$r$ Strength
Grip Strength	<0.001	-0.186	Small
Sit-and-Reach	<0.001	-0.167	Small
Push-ups	<0.001	-0.352	Moderate
Sit-ups	<0.001	-0.410	Moderate
2.4-km Run	<0.001	0.434	Moderate

**Table 3.** Stepwise linear regression analysis between the PAT and fitness tests (grip strength, sit-and-reach, push-ups, sit-ups, 2.4-km run) performed by police recruits ( $N = 1473$ ).

Variables	$r$	$r^2$	Adjusted $r^2$
Sex	0.592	0.351	0.350
Sex, 2.4-km Run	0.688	0.473	0.472
Sex, 2.4-km Run, Sit-ups	0.716	0.513	0.512
Sex, 2.4-km Run, Sit-ups, Grip Strength	0.725	0.525	0.524
Sex, 2.4-km Run, Sit-ups, Grip Strength, Push-ups	0.727	0.528	0.526

## CONCLUSIONS

- PAT performance related to, and was predicted by, multiple fitness tests. Aerobic fitness measured by the 2.4-km run appeared to have the greatest impact, which may have related to the PAT design. Tasks completed in succession rather than isolation (resulting in a mean PAT time of ~4 min), and the use of a relatively light dummy compared to the actual body mass of the general population in the USA (~68 kg vs. 90 kg [average US adult man] and ~77 kg [average US adult woman]) (3), may stress aerobic fitness and muscular endurance to a greater extent. This information could be used by police training staff to assist with their physical training program design for the recruits.
- However, the current data should be considered within the context of job tasks that may emphasize other fitness qualities. For example, a heavier body drag may place greater importance on absolute maximal strength and power (6,7). Although grip strength provided a measure of strength in this study, greater lower-body strength and power contribute to a faster drag with a heavier mass (7,10). Police recruit straining staff should ensure the development of these qualities in their personnel as well.

## PRACTICAL APPLICATIONS

- Multiple fitness components should be developed to help police personnel perform job tasks assessed by a PAT. Similar to other research in first responders (9), police officers need to be 'all-rounders' with sufficient capacity in different fitness qualities (e.g., muscular strength, endurance, and power, anaerobic and aerobic capacity).
- Consideration should also be given to the design of a PAT and how this may place more importance on certain fitness qualities (e.g., aerobic and muscular endurance) and how this information should then be used for training program design.

### References

- Beck, AC, Clacey, JL, Yates, JW, et al. Relationship of physical fitness measures vs. occupational physical ability in campus law enforcement officers. *J Strength Cond Res* 29: 2340-2350, 2015.
- Dawes, JJ, Lindsay, K, Bero, J, et al. Physical fitness characteristics of high vs. low performers on an occupationally specific physical agility test for patrol officers. *J Strength Cond Res* 31: 2808-2815, 2017.
- Fryar, CD, Gu, Q, Ogden, CL, and Flegal, KM. Anthropometric reference data for children and adults: United States, 2011-2014. *Vital Health Stat* 3: 1-46, 2016.
- Hopkins, WG. A Scale of Magnitudes for Effect Statistics. Available at: <http://www.sports-science.org/resource/stats/EffectMag.html>. Retrieved May 5, 2023.
- Lockie, RG, Dawes, JJ, Ballamy, K, et al. Physical fitness characteristics that relate to Work Sample Test Battery performance in law enforcement recruits. *Int J Environ Res Public Health* 15: 2477, 2018.
- Lockie, RG, Moreno, MR, Dawes, JJ, et al. An analysis of the body drag test in law enforcement recruits with consideration to current population demographics. *Int J Exerc Sci* 15: 276-288, 2022.
- Lockie, RG, Moreno, MR, McGuire, MB, et al. Relationships between isometric strength and the 74.84-kg (165-lb) body drag test in law enforcement recruits. *J Hum Kinet* 74: 5-13, 2020.
- Lockie, RG, Orr, RM, Montes, F, Ruvalcaba, TJ, and Dawes, JJ. Exploring predictive ability of fitness test data relative to fire academy graduation in trainees: Practical applications for physical training. *Int J Exerc Sci* 15: 1274-1294, 2022.
- Moreno, MR, Dulla, JM, Dawes, JJ, et al. Lower-body power and its relationship with body drag velocity in law enforcement recruits. *Int J Exerc Sci* 12: 847-858, 2019.