

Bond University
Research Repository



Relationships between the 1.5-mile Run and Multi-stage Fitness Test in Deputy Sheriff Recruits Post-Academy Training

Hernandez, Javier; Moreno, Matthew R. ; Balfany, Katherine ; Dulla, Joseph; Dawes, Jay J.; Orr, Rob Marc; Lockie, Robert G.

Published: 01/10/2018

Document Version:
Peer reviewed version

[Link to publication in Bond University research repository.](#)

Recommended citation(APA):
Hernandez, J., Moreno, M. R., Balfany, K., Dulla, J., Dawes, J. J., Orr, R. M., & Lockie, R. G. (2018). *Relationships between the 1.5-mile Run and Multi-stage Fitness Test in Deputy Sheriff Recruits Post-Academy Training*. Poster session presented at The 38th Annual Meeting of the Southwest Regional Chapter of the American College of Sports Medicine, Costa Mesa, United States.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

For more information, or if you believe that this document breaches copyright, please contact the Bond University research repository coordinator.



Relationships between the 1.5-mile Run and Multi-stage Fitness Test in Deputy Sheriff Recruits Post-Academy Training

Javier A. Hernandez¹ ♦ Matthew R. Moreno¹ ♦ Katherine Balfany¹ ♦ Joseph M. Dulla² ♦ J. Jay Dawes³ ♦ Robin M. Orr⁴ ♦ Robert G. Lockie¹

¹Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA, USA. ²Recruit Training Unit, Training Bureau, Los Angeles County Sheriff's Department, Los Angeles, CA, USA.

³Department of Health Sciences, University of Colorado-Colorado Springs, Colorado Springs, CO, USA.

⁴Tactical Research Unit, Bond University, Robina, Qld, Australia.



University of Colorado Colorado Springs



Los Angeles County Sheriff's Department

ABSTRACT

The most popular method for measuring aerobic fitness within US law enforcement agencies (LEA) is the 1.5 mile run (1.5 MI run). A limitation of the 1.5 MI run is that it relies on the recruits' internal pacing. In contrast, the 20m multi-stage fitness test (MSFT) is more popular globally in tests of LEA recruits and officers, and is externally paced which does not allow the individual to perform at a pace they are comfortable with. Academy training is used to prepare recruits for the rigors of duty and to enhance physical fitness. If training approaches are successful during academy, aerobic fitness as measured by the 1.5 MI run and the MSFT should be relatively similar, in that recruits should be aerobically fit and have the high-intensity running capacity to perform well in both tests. The purpose of this study was to analyze the relationship between the 1.5 MI run and the MSFT of deputy sheriff recruits at the end of academy. Retrospective analysis on 5 academy classes from one LEA was conducted (227 males, 34 females). The 1.5 MI run and MSFT were conducted in the last few weeks of the recruits' 22-week academy. Time was recorded for the 1.5 MI run while total shuttles were recorded for the MSFT; estimated maximal aerobic capacity ($\dot{V}O_{2max}$) was calculated from both tests. Estimated $\dot{V}O_{2max}$ from the aforementioned tests was compared with paired samples t-tests. Pearson's correlations and linear regression scatter plots calculated relationships between the 1.5 MI run and MSFT. Each sex was analyzed separately, with $p < 0.05$ set for all analyses. The $\dot{V}O_{2max}$ calculated from the 1.5 MI run were significantly greater than those for the MSFT for both males (47.04 vs. 40.88 ml/kg/min), and females (43.16 vs. 37.02 ml/kg/min). The $\dot{V}O_{2max}$ of the 1.5 MI run significantly correlated with the MSFT for males ($r = -0.49$) but not females ($r = -0.31$). The r^2 values from the regression equations for males (0.24), and females (0.10) were both low. The results suggest that recruits performed relatively better in the 1.5 MI run compared to the MSFT. The physical training program tended to emphasize calisthenics, interval running circuits that lacked evidence-based work: rest ratios, and distance running; this could have impacted these results. Given the weak relationships between the tests, especially for females, this would suggest recruits still have limitations in high-intensity, externally paced running. Since the job demands of a deputy sheriff are externally paced by nature, this outcome is not ideal. Academy training programs should explore the use of evidence-based high-intensity running programs.

METHODS

- Retrospective analysis was conducted on five academy classes from one LEA.
- This sample was comprised of 261 recruits (age: 26.59 ± 5.06 years; height: 1.74 ± 0.08 m; body mass: 81.38 ± 14.77 kg), which included 227 males (age: 26.63 ± 5.19 years; height: 1.76 ± 0.07 m; body mass: 83.40 ± 13.34 kg) and 34 females (age: 26.26 ± 4.12 years; height: 1.63 ± 0.07 m; body mass: 67.94 ± 16.90 kg).
- The 1.5 MI run and MSFT were conducted in the last few weeks of the recruits' 22-week academy. Time was recorded for the 1.5 MI run while total shuttles were recorded for the MSFT; estimated maximal aerobic capacity ($\dot{V}O_{2max}$) was calculated from both tests.^{3,6}
- Estimated $\dot{V}O_{2max}$ from the aforementioned tests was compared with paired samples t-tests. Pearson's correlations and linear regression scatter plots calculated relationships between the 1.5 MI run and MSFT. Each sex was analyzed separately, with $p < 0.05$ set for all analyses.

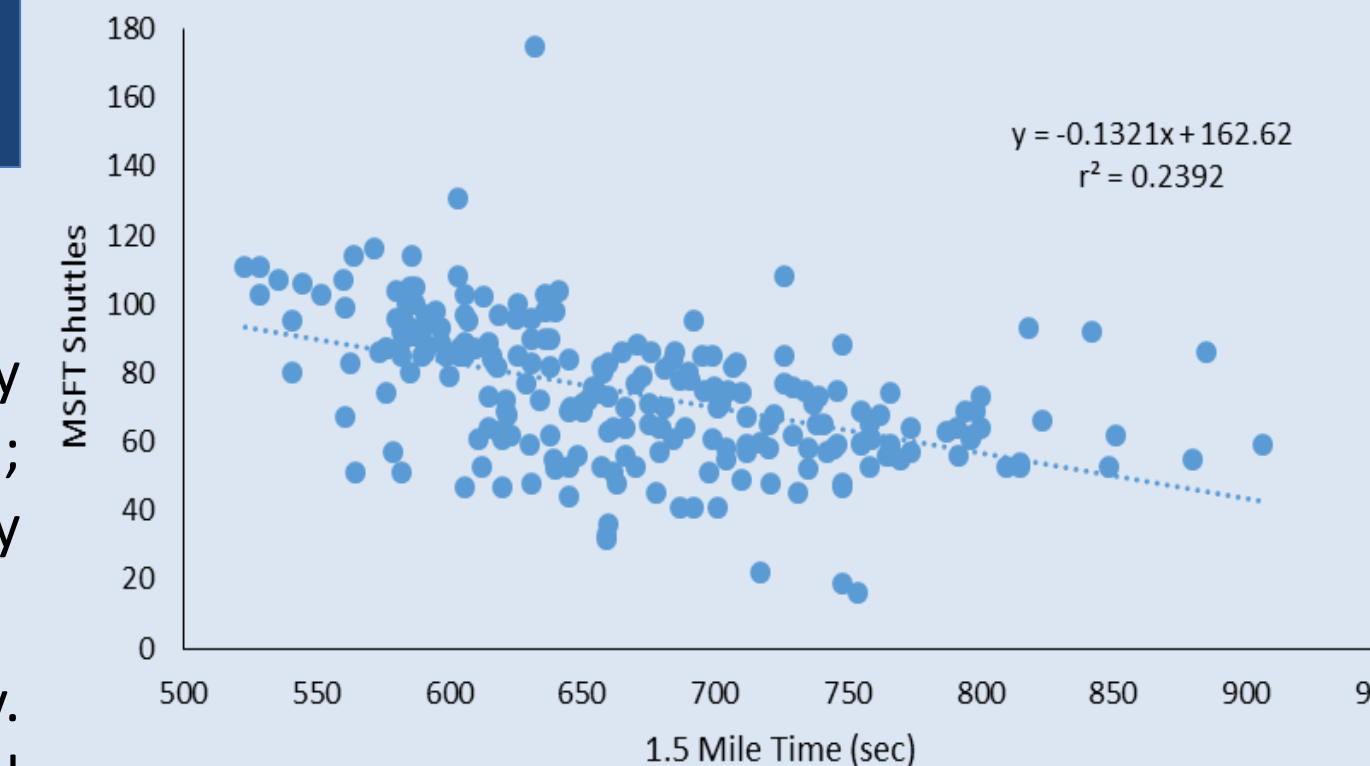


Figure 1. Correlation between men's 1.5 mile time and MSFT shuttles.

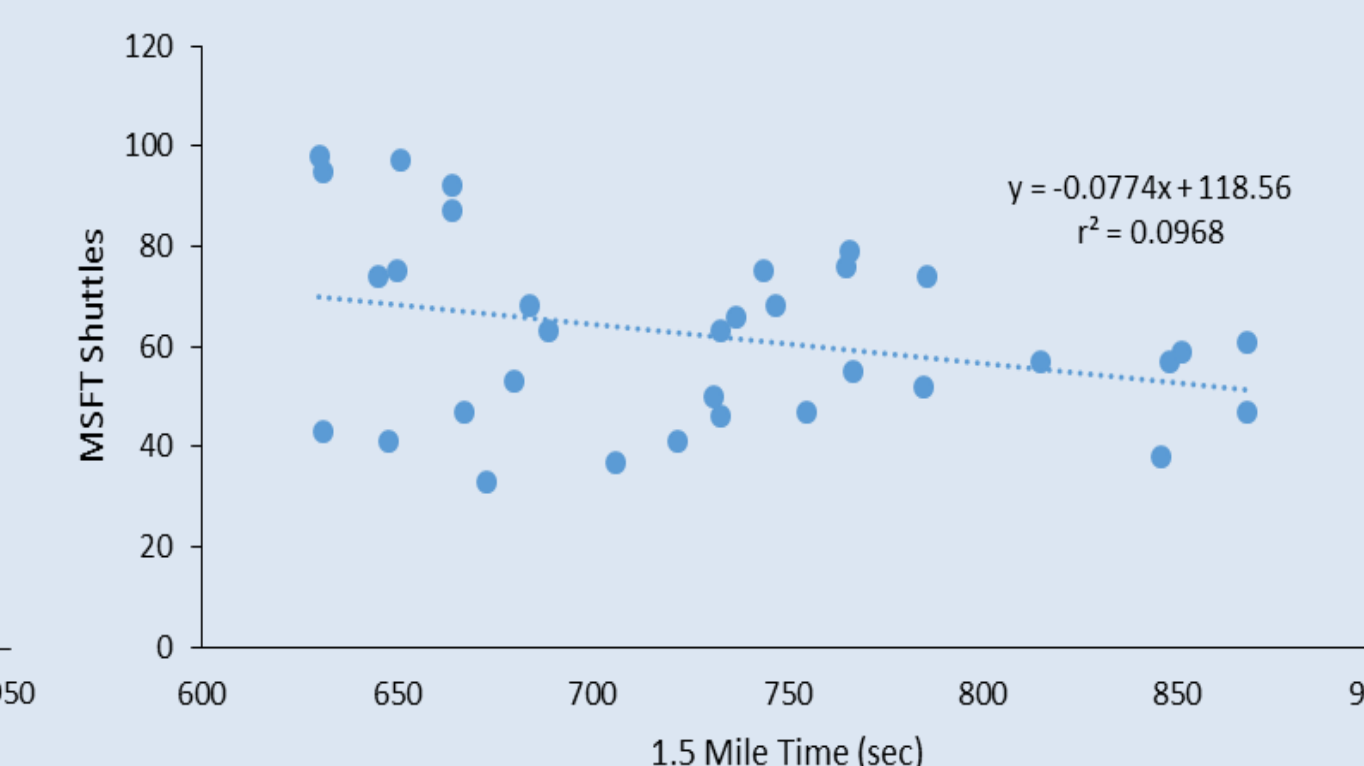


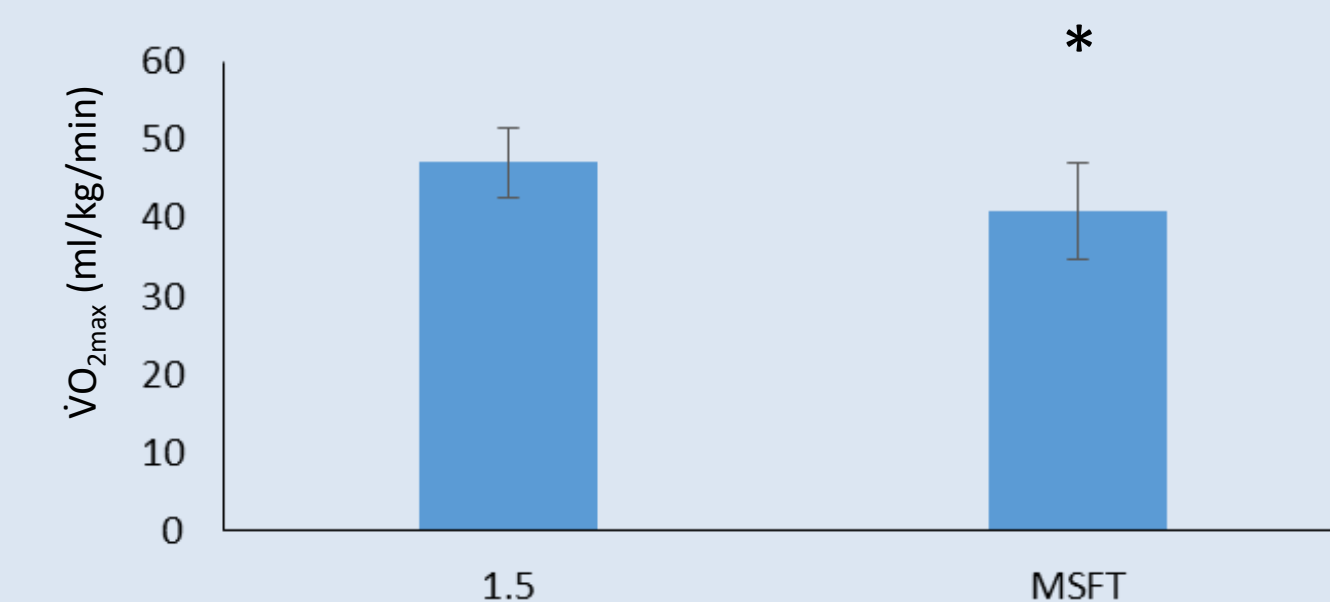
Figure 2. Correlation between women's 1.5 mile time and MSFT shuttles.

INTRODUCTION

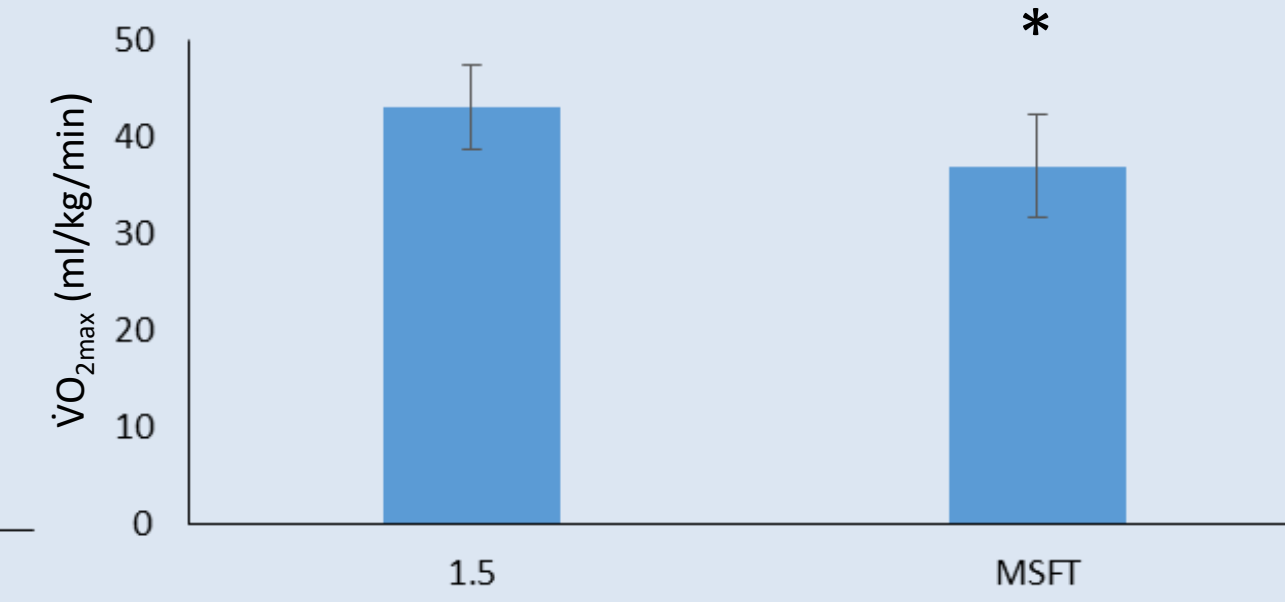
- The most popular method for measuring aerobic fitness within US law enforcement agencies (LEA) is the 1.5 mile run (1.5 MI run).⁴ The fact that the 1.5 MI run relies on recruits' internal pacing is a limitation. Concerning tests of LEA recruits and officers, the more popular 20-m multi-stage fitness test (MSFT) is externally paced which does not allow the individual to perform at a pace they are comfortable with. Additionally, the MSFT has a high intensity running component that the 1.5 Mile run does not.¹
- While in the line of duty, the primary job tasks for a deputy sheriff are primarily sedentary (e.g. sitting in a patrol vehicle, office work). However, increases in movement intensity can be required during patrol that could ensure a deputies' safety, or the safety of the general population.⁵ Since the MSFT is externally paced, it more closely matches the demands of a deputy, as opposed to the 1.5 MI run. As a result, the MSFT could present itself as a more appropriate test of aerobic fitness.
- Academy training is used to prepare recruits for the rigors of duty and to enhance physical fitness. If training approaches are successful during academy, aerobic fitness as measured by the 1.5 MI run and the MSFT should be relatively similar, in that recruits should be aerobically fit and have the high-intensity running capacity to perform well in both tests.^{1,2}
- The purpose of this study was to analyze the relationship between the 1.5 MI run and the MSFT of deputy sheriff recruits at the end of academy.

RESULTS

- The $\dot{V}O_{2max}$ calculated from the 1.5 MI run were significantly greater than those for the MSFT for both males (47.04 ml/kg/min vs. 40.88 ml/kg/min; Figure 1), and females (43.16 ml/kg/min vs. 37.02 ml/kg/min; Figure 2).
- The $\dot{V}O_{2max}$ of the 1.5 MI run significantly correlated with the MSFT for males ($r = -0.49$) but not females ($r = -0.31$).
- The r^2 values from the regression equations for males (0.24), and females (0.10) were both low.



* Significantly ($p < 0.05$) lower than the 1.5 MI $\dot{V}O_{2max}$.
Figure 1. Men's $\dot{V}O_{2max}$ scores between the 1.5 MI run and MSFT.



* Significantly ($p < 0.05$) lower than the 1.5 MI $\dot{V}O_{2max}$.
Figure 2. Women's $\dot{V}O_{2max}$ scores between the 1.5 MI run and MSFT.

CONCLUSIONS

- The results suggest that recruits performed relatively better in the 1.5 MI run compared to the MSFT. Their physical training program tended to emphasize calisthenics, interval running circuits that lacked evidence-based work: rest ratios, and distance running; this could have impacted these results.^{1,2,4,5} This could indicate that even with any aerobic fitness improvements, high-intensity running capabilities, which are particularly stressed in the MSFT, could be limited. Indeed, the weak relationships between the tests, especially for females, would suggest recruits still have limitations in high-intensity, externally paced running.
- As previously mentioned, the 1.5 MI run may not accurately match the job demands of a deputy sheriff. The 1.5 MI run allows the recruit to set their own pace, and has limited high-intensity components.⁴ Considering the fact that the MSFT has external pacing and a more pronounced high-intensity component,¹ this test may be a better fit to indicate career preparations for a deputy sheriff recruit.
- Since the job demands of a deputy sheriff are externally paced by nature, the outcomes shown from the data in this study is not ideal. Academy training programs should explore the use of evidence-based high-intensity running programs.

References

- Cocke, C., Dawes, J., & Orr, R. M. (2016). The use of 2 conditioning programs and the fitness characteristics of police academy cadets. *Journal of Athletic Training*, 51(11), 887-896. doi:10.4085/1062-6050-51.8.06
- Dawes, J. J., Orr, R. M., Flores, R. R., Lockie, R. G., Kornhauser, C., & Holmes, R. (2017). A physical fitness profile of state highway patrol officers by gender and age. *Annals of Occupational and Environmental Medicine*, 29(1). doi:10.1186/s40557-017-0173-0.
- George, J.D., Vehrs, P.R., Allsen, P.E., Fellingham, G.W., and Fisher, A.G. (1993). $\dot{V}O_{2max}$ estimation from a submaximal 1-mile track jog for fit college-age individuals. *Medicine and Science in Sports and Exercise*, 25(3), 401-406.
- Lockie R.G., Orr, R.M., Dawes, J.J., Moreno, M.R., Cesario, K.A., Stierli, M., & Dulla, J.M. (2018). Aerobic fitness assessments in deputy sheriff recruits: The 20-metre multistage fitness test and 1.5-mile run. *The Third International Conference on Physical Employment Standards*, Portsmouth, UK, July 17-19.
- Plat, M. J., Frings-Dresen, M. H., & Sluiter, J. K. (2011). A systematic review of job-specific workers' health surveillance activities for fire-fighting, ambulance, police and military personnel. *International Archives of Occupational and Environmental Health*, 84(8), 839-857. doi:10.1007/s00420-011-0614-y
- Ramsbottom, R, Brewer, J, and Williams, C. (1988). A progressive shuttle run test to estimate maximal oxygen uptake. *British Journal of Sports Medicine* 22: 141-144.