

Bond University
Research Repository



The Functional Movement Screen as a Predictor of Tactical Athlete Performance

Bock, Claire; Orr, Rob Marc; Stierli, Michael

Licence:
CC BY-NC-ND

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

Recommended citation(APA):
Bock, C., Orr, R. M., & Stierli, M. (2014). *The Functional Movement Screen as a Predictor of Tactical Athlete Performance*. 43rd Annual Sports Medicine Association Queensland State Conference, Queensland, Australia.

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.

The Functional Movement Screen as a Predictor of Tactical Athlete Performance



¹Claire Bock, ²Michael Stierli, ²Ben Hinton, ¹Rob Orr

¹Bond University ²NSW Police Force

Introduction

“The Functional Movement Screen as a Predictor of Police Occupational Task Performance”

Aim

Investigate the relationship between movement quality and occupational task performance

Question

Can the Functional Movement Screen predict occupational performance in police recruits?



Image: Approved by NSW Police

Methods

Procedures

- As part of their training process, 173 police recruits completed 4 occupational measures
- Police recruits were then divided into tutor groups by College staff who were blinded to the study
- The research team then randomly selected two tutor groups, to complete the FMS
- n= 53 police recruits

Exclusion criteria

- Any recruit who did not give informed consent
- Suffering from a current injury

Methods

Functional Movement Screen (Cook et, al. 2006)

- Evaluation tool used to assess the fundamental movement patterns of an individual in a dynamic and functional capacity
- Movement patterns require elements of muscle strength, flexibility, range of motion, coordination, balance, and proprioception for successful completion
- Identifies an individual's functional limitations and / or asymmetries

Methods

Functional Movement Screen (Cook et, al. 2006)

- 7 movement patterns include:
 - Overhead squat, hurdle step, inline lunge, shoulder mobility, active straight leg raise, push-up, and rotary stability
- Each movement pattern is scored on a 0-3 ordinal scale
- Overall scores can range from 0 to 21
- Previous studies have suggested that low FMS scores of ≤ 14 have an association with musculoskeletal injuries in athletic (Chorba, et al. & Kiesel, et al.), general (Schneiders, et al. & Perry, et al.) and tactical (O'Conner, et al. & Lisman, et al.) populations

Methods

Occupational Measures

- Marksmanship

- Standard police Z-4 target with a 9mm Glock pistol firing a total of 30 scoring rounds over several serials

- Defense Tactics

- Restraining belligerent assailants and handcuffing

- Baton Strikes

- Baton strikes to precise areas of designated static targets

- Tactical Options

- Choose correct application of force to control a situation



Image: Approved by NSW Police

Results

- FMS scores ranged from 8 to 18 points (mean=13.9 ± 1.9 points)
- 11% (n=6) Failed the Marksmanship & Baton Strike assessments
- 21% (n=11) Failed Defensive Tactics
- 36% (n=19) Failed Tactical Options

Table 1: Descriptive statistics for occupational measures

Variables	n = Participants		FMS Mean	
	Pass Occupational Measure	(Points)	Fail Occupational Measure	(Points)
Marksmanship	47	14.02 ± 1.994	6	13.50 ± 2.074
Defensive tactics	42	14.07 ± 2.005	11	13.55 ± 1.968
Baton strikes	47	13.96 ± 2.048	6	13.83 ± 1.602
Tactical Options	34	14.32 ± 1.718	19	13.32 ± 2.311

* $p = 0.077$

Results

Post hoc analysis

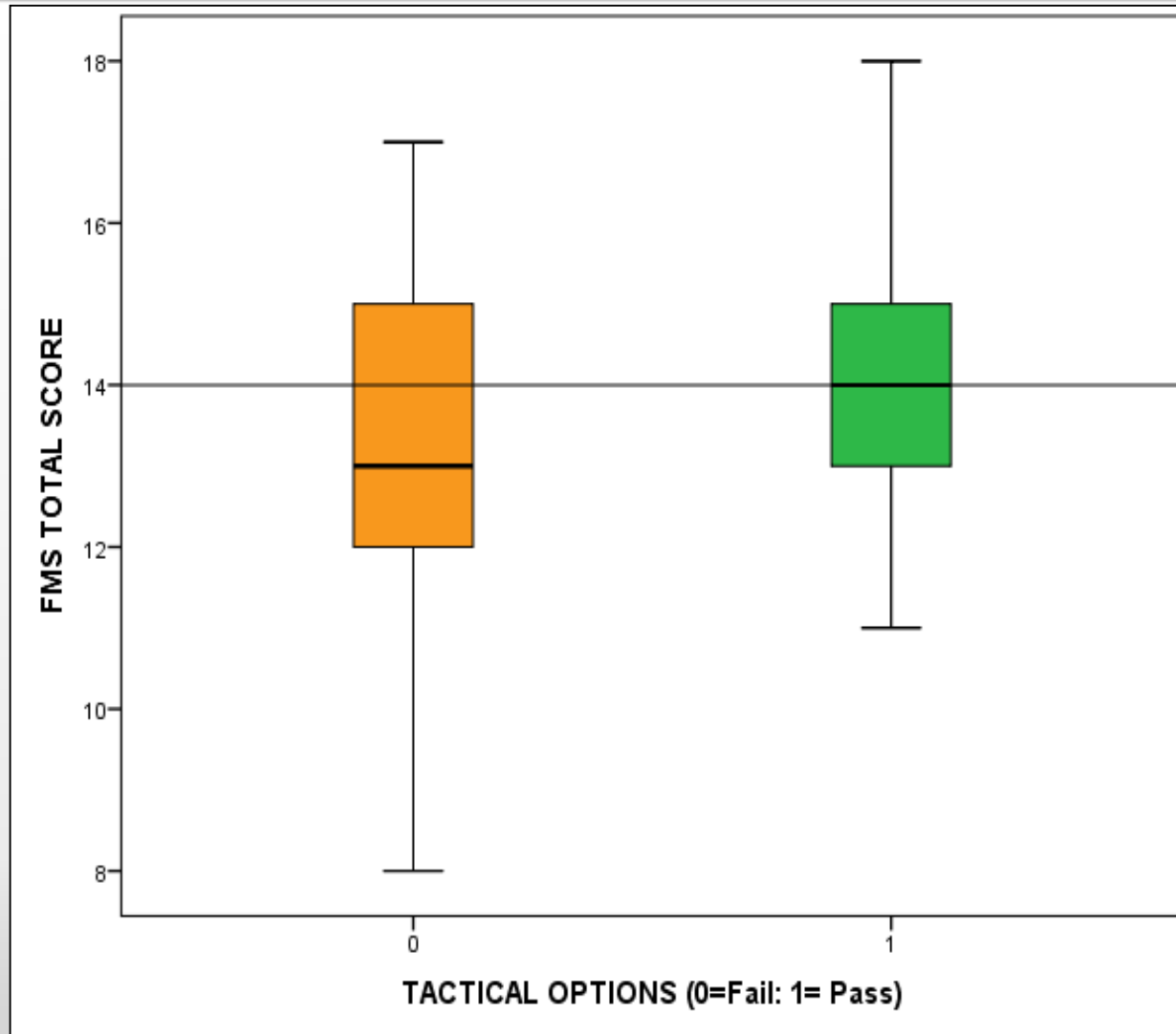
- Scaled FMS scores were converted to categorical pass (14+) or fail (<14) using scoring system associated with injury prediction

Table 2: Chi Square grouped by FMS <14 (Fail) and 14+ (Pass)

Variables	n = Participants Pass FMS	n = Participants Fail FMS	Chi Square tests		
			χ^2	df	<i>P</i>
Marksmanship	47	6	-0.589	1	0.443
Defensive tactics	42	11	-0.444	1	0.505
Baton strikes	47	6	-0.019	1	0.891
Tactical Options	34	19	-3.627	1	0.057

- No significant relationship was found between the FMS scores and the Marksmanship performance, Defensive tactics assessment or Baton Strikes assessment
- Tactical Options assessment approached a significant relationship

Results



Discussion

The results of our study indicate a relationship was found between FMS scores and an occupational measure (Tactical Options assessment) of police recruits

Findings are supported by 3 studies

- Chapman, et al. 2013
- Lisman, et al. 2012
- Petersen, et al. 2007

Conclusion and Take Home Message

- Police occupation requires completion of dynamic tasks in which poor movements may lead to decreased performance and injury
- The current study suggests that the FMS may predict performance of the Tactical Options assessment
- Further research is required to advance the findings of this study within a larger cohort of police recruits



Images: Approved by NSW Police

References

- Blacker, S. D., Carter, J. M., Wilkinson, D. M., Richmond, V. L., Rayson, M. P., & Peattie, M. (2013). Physiological responses of Police Officers during job simulations wearing chemical, biological, radiological and nuclear personal protective equipment. *Ergonomics*, 56(1), 137-147.
- Bock, C. & Orr, R. (submitted). Use of the Functional Movement Screen in a Tactical Population: A Review, *Journal Of Military and Veteran's Health*.
- Chapman, R. F., Laymon, A. S., & Arnold, T. (2013). Functional Movement Scores and Longitudinal Performance Outcomes in Elite Track and Field Athletes. *International journal of sports physiology and performance*.
- Chorba, R. S., Chorba, D. J., Bouillon, L. E., Overmyer, C. A., & Landis, J. A. (2010). Use of a functional movement screening tool to determine injury risk in female collegiate athletes. *North American journal of sports physical therapy: NAJSPT*, 5(2), 47-54.
- Cook, G., Burton, L., & Hoogenboom, B. (2006). Pre-participation screening: The use of fundamental movements as an assessment of function - Part 1. *North American journal of sports physical therapy: NAJSPT*, 1(2), 62-72.
- Dempsey, P. C., Handcock, P. J., & Rehrer, N. J. (2013). Impact of police body armour and equipment on mobility. *Applied ergonomics*, 44(6), 957-961.
- Downs, S., & Black, N. (1998). The Feasibility of creating a checklist for the assessment of the methodological quality both randomized and non-randomized studies of health care Interventions. *Journal Epidemiology and Community Health*, 52(6), 337-384.
- Frost, D. M., Beach, T. A., Callaghan, J. P., & McGill, S. M. (2012). Using the Functional Movement ScreenTM to evaluate the effectiveness of training. *The Journal of Strength & Conditioning Research*, 26(6): 1620-1630.
- Goss, D. L., Christopher, G. E., Faulk, R. T., & Moore, J. (2008). Functional training program bridges rehabilitation and return to duty. *Journal of special operations medicine: a peer reviewed journal for SOF medical professionals*, 9(2), 29-48.

References

- Gribble, P. A., Bridge, J., Pietrosimone, B. G., Pfile, K. R., Webster, K. A. (2013). Intrarater reliability of the functional movement screen. *The Journal of Strength & Conditioning Research*, 27(4), 978-81.
- Hasselquist, L., Bensel, C. K., Corner, B., Gregorczyk, K. N., & Schiffman, J. M. (2008). Understanding the Physiological, Biomechanical, and Performance Effects of Body Armor Use. *Army Natick Solder Research, Development and Engineering Centre, MA*
- Kennelly, J. (2011). Methodological Approach to Assessing the Evidence. In Handler, A., Kennelly, J. & Peacock, N. (Eds.), *Reducing Racial/Ethnic Disparities in Reproductive and Perinatal Outcomes: The Evidence from Population-Based Interventions*. (p7-19). Springer, US.
- Kiesel, K., Plisky, P. J., & Voight, M. L. (2007). Can serious injury in professional football be predicted by a preseason functional movement screen?. *North American journal of sports physical therapy: NAJSPT*, 2(3), 147.
- Kiesel, K., Plisky, P., & Butler, R. (2011). Functional movement test scores improve following a standardized off-season intervention program in professional football players. *Scandinavian journal of medicine & science in sports*, 21(2), 287-292.
- Knapik, J. G., Harman, E., & Reynolds, K. L. (1996). Load carriage using packs: A review of physiological, biomechanical and medical aspects. *Appl Ergon*, 27(3), 207-216.
- Larsen, B., Netto, K., & Aisbett, B. (2011). The effect of body armor on performance, thermal stress, and exertion: a critical review. *Military Medicine*, 176 (11), 1265-73.
- Lisman, P., O'Connor, F. G., Deuster, P. A., & Knapik, J. J. (2012). Functional movement screen and aerobic fitness predict injuries in military training. *Medicine and Science in Sports and Exercise*, 45(4), 636-643.
- Minick, K. I., Kiesel, K. B., Burton, L., Taylor, A., Plisky, P., & Butler, R. J. (2010). Interrater reliability of the functional movement screen. *The Journal of Strength & Conditioning Research*, 24(2), 479-486.
- O'Connor, F. G., Deuster, P. A., Davis, J., Pappas, C. G., & Knapik, J. J. (2011). Functional movement screening: predicting injuries in officer candidates. *Med Sci Sports Exerc*, 43(12), 2224-30.

References

- Orr R. The Royal Military College of Duntroon. Physical Conditioning Optimisation Review Canberra: ACT: Department of Defence;2007.
- Park, H., Branson, D., Kim, S., Warren, A., Jacobson, B., Petrova, A., Peksoz, S., & Kamenidis, P. (2013). Effect of armor and carrying load on body balance and leg muscle function. *Gait Posture*, [Epub ahead of print].
- Perry, F. T., & Koehle, M. S. (2013). Normative data for the functional movement screen in middle-aged adults. *The Journal of Strength & Conditioning Research*, 27(2), 458-462.
- Petersen, E. J., & Smith, K. C. (2007). Benefits of a musculoskeletal screening examination for initial entry training soldiers. *Military medicine*, 172(1).
- Sell, T. C., Pederson, J. J., Abt, J. P., Nagai, T., Deluzio, J., Wirt, M. D., McCord, L., & Lephart. S. M. (2013). The addition of body armor diminishes dynamic postural stability in Military Soldiers. *Military Medicine*, 178(1), 76-81.
- Schneiders, A. G., Davidsson, Å., Hörman, E., & Sullivan, S. J. (2011). Functional movement screen^(TM) normative values in a young, active population. *International journal of sports physical therapy*, 6(2), 75.
- Sharkey, B. J., & Davis, P. O. (2008). *Hard work: defining physical work performance requirements*. Human Kinetics.
- SPSS Inc.: Statistical Package for the Social Sciences (Version 19.0) [computer software]. IBM Corporation; 2010.
- Tyhen, D. S., Shaffer, S. W., Lorensen, C. L., Halfpap, J. P., Donofry, D. F., Walker, M. J., Dugan, J. D., & Childs, J. D. (2012). The Functional Movement Screen: a reliability study. *J Orthopaedic Sports Physical Therapy*, 42(6), 530-40.
- Images: Approved by NSW police for media release