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The Use of Fitness Testing to Predict Occupational Performance In Tactical Personnel: A Critical Review

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Introduction

- Tactical personnel (including military personnel, law enforcement officers and firefighters) are required to undergo various physical occupational tasks [1].
- Tasks involve: Heavy load carriage, enduring harsh environmental conditions and mobilizing through difficult terrain, as well as sustained sprinting, and use of physical force (2, 3).
- Tactical personnel require high levels of cardiovascular fitness as well as muscular strength and endurance (4, 5).
- Debate still exists as to whether various measures of fitness are associated with occupationally specific performance tasks.

Methods

- Following development of search terms, key databases (PubMed, EMBASE and Ebscohost ([CINAHL and SportsDiscuss]]) were searched for relevant studies (Figure 1).
- After removal of duplicates and initial screening, inclusion criteria were applied; these were that the study:
  - Must include an adult, tactical population
  - Must include a physical fitness measure
  - Must include an occupationally specific measure of performance
  - Must be full text
  - Exclusion criteria were then applied to determine final studies (Figure 1).
- Quality of the studies were evaluated by three authors (S.J., T.S. & J.M.) using the Critical Appraisal Skills Programme (CASP) Cohort Study Checklist.
- Krippendorff’s Alpha was used to determine the inter-rater reliability before a final Critical Appraisal Score (CAS) was determined.

Results

Study Characteristics: (see Table 1)

- Seven studies on military personnel, five studies on firefighters and three studies on law enforcement officers.
- Seven studies from the U.S., three from Australia, two from the UK and one from each Finland, Sweden and Norway.
- Seven studies examined male participants while only one study included female participants. Both males and females were reported on in six of the studies and the remaining study did not identify the sex of participants

Research Quality: 

- The mean CAS score for all studies was 8.4 ±1.2 ranging from 6.33 to 10.0.
- Inter-rater reliability = 80% (κ= 0.797).

Table 1. Fitness and Occupational Performance Measures

<table>
<thead>
<tr>
<th>Studies</th>
<th>Pop</th>
<th>Fitness Measures</th>
<th>Occupational Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argelander et al., 2016</td>
<td>NS</td>
<td>M</td>
<td>C</td>
</tr>
<tr>
<td>Beck et al., 2015</td>
<td>LED</td>
<td>M</td>
<td>C</td>
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<tr>
<td>Carrers et al., 2016</td>
<td>M</td>
<td>C</td>
<td>30</td>
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<tr>
<td>Noonan et al., 2015</td>
<td>M</td>
<td>C</td>
<td>F</td>
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<tr>
<td>Lough et al., 2017</td>
<td>M</td>
<td>C</td>
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<tr>
<td>Lindberg et al., 2013</td>
<td>F</td>
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<tr>
<td>Michalek et al., 2014</td>
<td>M</td>
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<td>On et al., 2017</td>
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<td>Filion et al., 2016</td>
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<td>C</td>
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<tr>
<td>Rowe et al., 2004</td>
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<tr>
<td>Long et al., 2014</td>
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<tr>
<td>Schedlo et al., 2010</td>
<td>F</td>
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<tr>
<td>Smith et al., 2016</td>
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</table>

- There were no standardized fitness tests across the studies to determine occupational performance.
- The findings of this review suggest that multifaceted fitness elements, encompassing a variety of fitness measures, is necessary to optimise performance in occupational tasks of tactical personnel.
- Some occupational measures were used more frequently in one population than others and may therefore be indicative of task-specific occupational performance. (e.g. Victim drugs during OTSCC, were examined more frequently in firefighter populations than police or military).
- Occupational tasks included the OTSCC, DOST, SFR, CT, SC, and HP. These tasks involved sustained sprints, lifting and/or carrying loads, pushing, pulling, crawling, obstacle avoidance, stair climbs, and use of physical force for entry. As such, performance in these duties heavily relied on a variety of fitness requirements including aerobic capacity, anaerobic capacity, muscular endurance, muscular strength, and muscular power.
- The fitness tests that strongly correlated with OTSCC and DOST were
  - The 400m sprint, the MSFT (shuttle run), medicine ball put, squat lift, standing long jump, arm ergometer, 30lbs dumbbell overhead press (reps per 2 mins), box lift and place, timed 500m rowing, abdominal strength (kg), and vertical jump.
- This multitude of tests further indicates the variety of fitness measures occupational performance is affected by.

Conclusion

- Presented research indicates that a wide range of fitness tests are required to predict occupational performance in tactical populations.
- Aerobic capacity was the most correlated fitness attribute with various occupational measures. Other appropriate fitness measures included; muscular strength, endurance, and power; agility; and anaerobic capacity.
- Further research of standardized fitness tests and their relationship to specific occupational performance will assist with employment standard and training protocols for tactical populations.

Summary

- Presented research indicates that a wide range of fitness tests are required to predict occupational performance in tactical populations.
- Aerobic capacity was the most correlated fitness attribute with various occupational measures. Other appropriate fitness measures included; muscular strength, endurance, and power; agility; and anaerobic capacity.
- Further research of standardized fitness tests and their relationship to specific occupational performance will assist with employment standard and training protocols for tactical populations.

References


Additional references are available upon request.