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Tomes, Colin; Schram, Ben; Orr, Rob Marc

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If They Are Not Fit, They Risk Injury: The Use of Fitness Testing Results to Predict Injury in Police Recruits

Colin Tomes¹ Ben Schram¹,², & Robin Orr¹,²

¹Faculty of Health Sciences & Medicine, Bond Institute of Health and Sport, Bond University, Gold Coast QLD 4229, Australia
²Tactical Research Unit, Bond University, Gold Coast QLD 4229, Australia
Presentation Outline

• Introduction
  • Brief overview of literature

• Methods
  • Study design, data, analyses

• Results
  • Main findings

• Practical Application
Introduction

• **Occupational Profile**
  • Dynamic physically demanding tasks
  • Unpredictable environment
  • Resilience to span a career

• **Fitness Standards**
  • Ensuring physical readiness for police work

• **Training injuries**
  • Sudden change in physical activity level

• **Reducing attrition**
  • Cost
  • Shrinking application pool
Literature Overview

• Largest systematic review and analysis of its kind\(^1\)
  • 27 studies from seven countries
  • Military, LEO, and FBI populations represented

• Main Findings
  • Organization training practices, local conditions and mission profile all dictate different physical fitness needs for success
  • Fitness will usually predict injury
Methods

Design

- Retrospective cohort
- Population: NZ Police College recruits classes from 2014-2017
- PAT: 2.4km run, vertical jump, push-up, grip strength
- Incomplete training records were excluded
- Near misses were not considered
- Injury definition
  - Musculoskeletal or peripheral nervous system injuries only
Methods

The Physical Ability Test (PAT)

- Performed at least twice for all trainees: once for selection, and again before traveling to the RNZ Police College for training
- 2.4km run
  - Self paced event with time given every 200m
  - Level, outdoor track
- Vertical Jump
  - Standing reach height recorded first
  - 3 trials, best of three with either hand recorded
- Push-ups to Exhaustion
  - No time limitation to allow for complete muscle failure
- Grip Strength
  - Right, Left and summed measurements
Methods

Statistical Analysis

- Data were distributed non-normally
  - Mann-Whitney U tests

- Performance quintile testing
  - Spearman’s correlation
  - Cliff’s delta
Results

2.4km Run
• Not a statistically significant predictor of injury

Pushups
• Significant predictor of any injury, but not of a specific injury type
• $P = 0.01$, $\rho = -0.166$

Vertical Jump
• Significant predictor of lower limb injury only
• $P = 0.03$, $\rho = -0.15$

Grip Strength
• Predictive of trunk injury and of any injury
• $P = 0.04-0.007$, $\rho = -0.195-0.131$
Results: Spearman’s Correlation

Percentage of injured cadets within each performance quintile, push-up test

Spearman: -0.16
p = 0.012

Percentage of injured cadets:
- 25 or Less (n=51): 35.29%
- 26-34 (n=62): 41.94%
- 35-36 (n=36): 16.67%
- 37-40 (n=49): 12.24%
- 41 or More (n=45): 26.67%

Pushup Repetition Quintile Ranges
Results: Spearman’s Correlation

Percentage of injured cadets within each performance quintile, combined grip strength
Results: Spearman’s Correlation

Percentage of injured cadets within each performance quintile, right hand grip strength
Discussion

2.4km Run
- May be an ineffective estimator of metabolic fitness in this population
- ceiling effect
- The injury profile of our cohort may differ from that of military trainees

Pushups
- Agrees with previous research in military trainees\(^8\)
- May be a better global muscular fitness assessment than specific for upper body

Vertical Jump
- Agrees with previous police trainee research\(^9\)
- May effectively measure police-specific tasks; short duration, maximal exertion

Grip Strength
- Mixed results between R), L) and combined
- Generally agrees with other tactical research\(^10\)
- May be a key component of police-specific tasks
Conclusion

Practical Applications

• Overuse injuries are especially common
  • Training load, especially with respect to the upper limb should be monitored and graded across the training timeline

• Injuries of the upper limb are especially common in police recruits
  • Specific assessment of the upper limb, such as a pull-up may be useful

• Physical fitness testing should reflect occupational tasks
  • Distance run events may not be useful in a police context
  • Police work is often externally paced
References


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rorr@bond.edu.au