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

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Presentation Outline

- Introduction
 - Brief overview of literature
- Methods
 - Study design, data, analyses
- Results
 - Main findings
- Practical Application



Introduction

- **Occupational Profile**

- Dynamic physically demanding tasks²
- Unpredictable environment³
- Resilience to span a career

- **Fitness Standards**

- Ensuring physical readiness for police work⁴

- **Training injuries**

- Sudden change in physical activity level⁵

- **Reducing attrition**

- Cost⁶
- Shrinking application pool⁷



Literature Overview

- Largest systematic review and analysis of its kind¹
 - 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

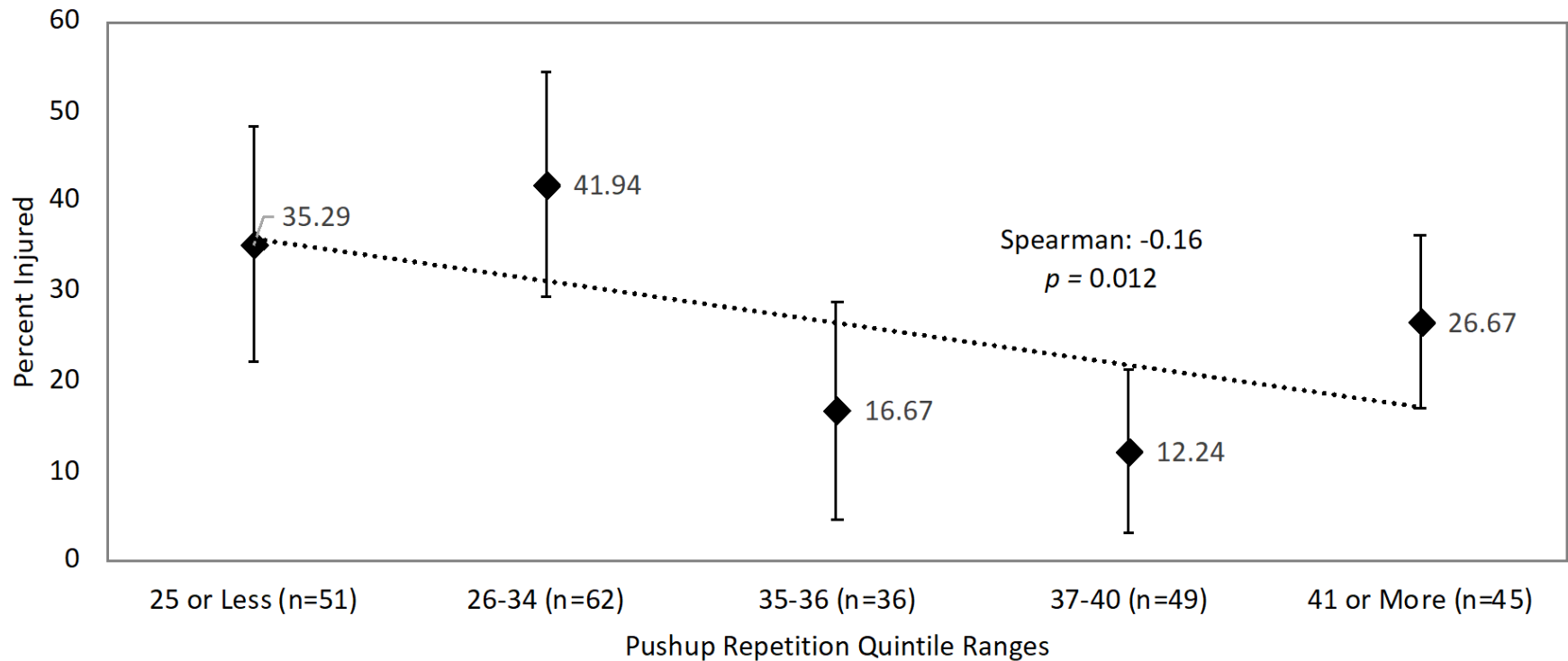
- Significant predictor of lower limb injury only
- $P = 0.03$, $Rho = -0.15$

Grip Strength

- Predictive of trunk injury and of any injury
- $P = 0.04-0.007$, $Rho = -0.195-0.131$



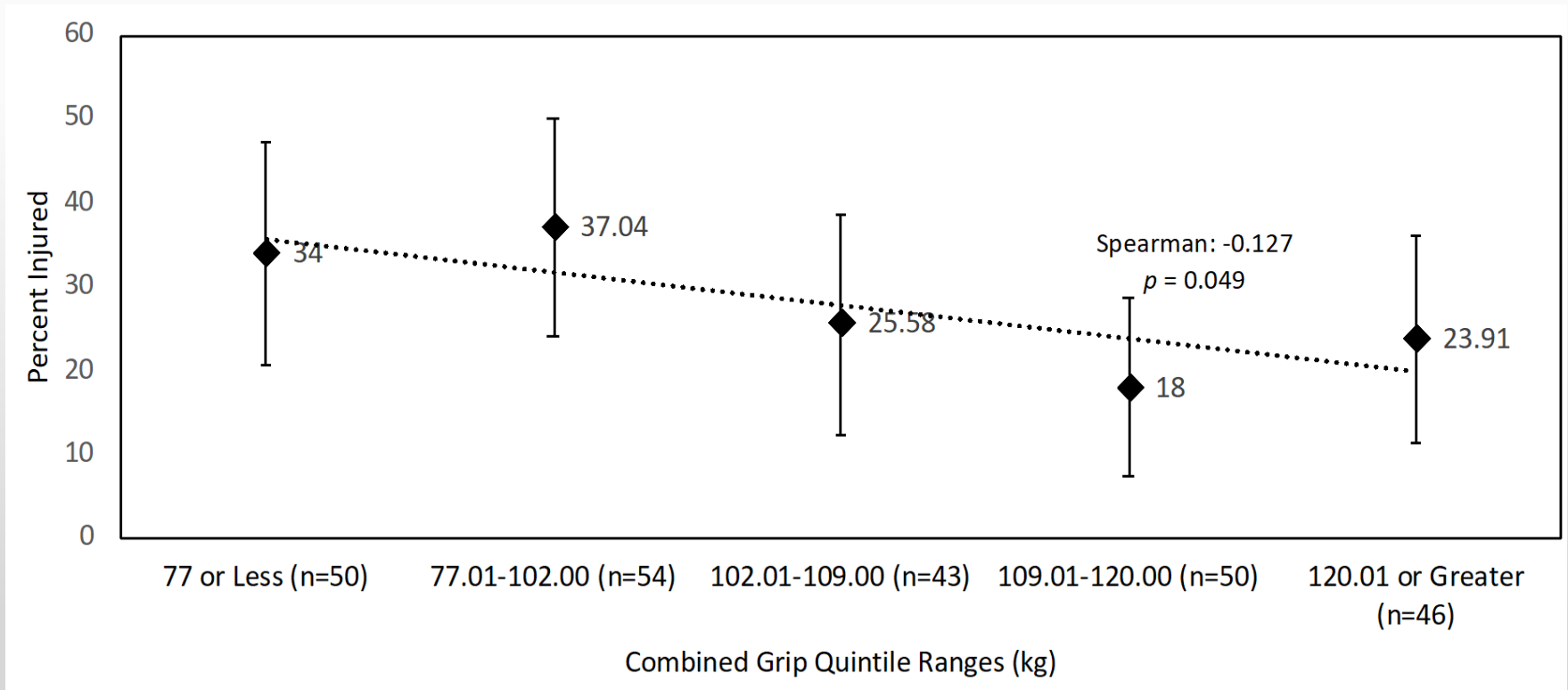
Results: Spearman's Correlation



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



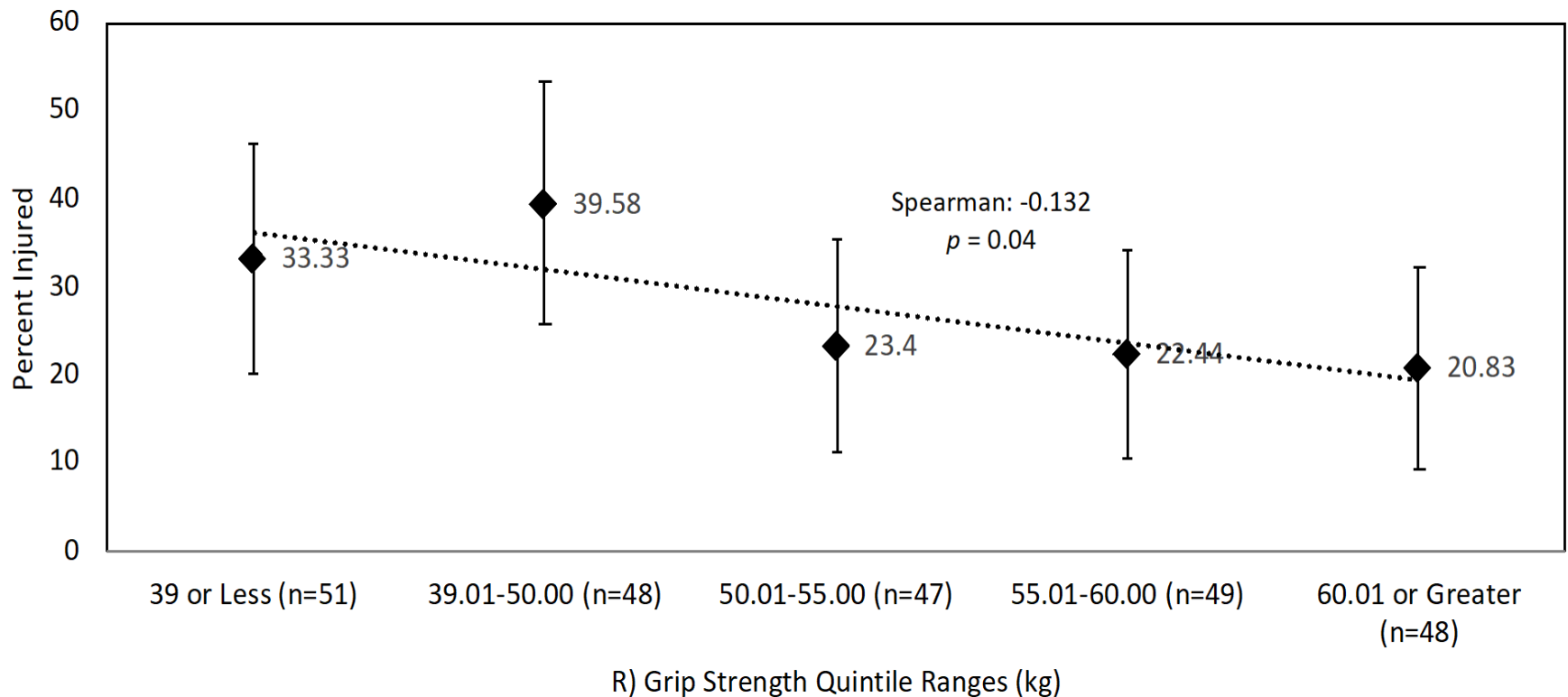
Results: Spearman's Correlation



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 trainees⁸
- May be a better global muscular fitness assessment than specific for upper body

Vertical Jump

- Agrees with previous police trainee research⁹
- May effectively measure police-specific tasks; short duration, maximal exertion

Grip Strength

- Mixed results between R), L) and combined
- Generally agrees with other tactical research¹⁰
- 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



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