Leg power as an indicator for risk of injury or illness in police recruits

Rob Orr  
*Bond University, rorr@bond.edu.au*

Rodney Pope  
*Bond University, Rodney_Pope@bond.edu.au*

Samantha Peterson  
*Bond University*

Michael Stierli  
*New South Wales Police*

Ben Hinton  
*New South Wales Police*

Follow this and additional works at: [http://epublications.bond.edu.au/tru_conf](http://epublications.bond.edu.au/tru_conf)


This work is licensed under a [Creative Commons Attribution-No Derivative Works 4.0 License](http://epublications.bond.edu.au/tru_conf/11).

Recommended Citation

Leg power as a predictor of injury & illness risk in police recruits

Rob Orr¹, Rod Pope¹, Samantha Peterson², SGT Michael Stierli³, Ben Hinton³

¹Tactical Research Unit, Bond University  ²Bond University  ³NSW Police
Introduction

• **“Emergency preparedness”:** capacity of tactical operators to complete required tasks, repeatedly, without experiencing excessive, undue stress (Peterson *et al.* 2008)

• Police officers:
  – difficulty maintaining adequate physical fitness for job demands
  – typically sit 40-50% of shift hours (McKinnon *et al.* 2011; Birzer & Craig, 1996)

• Inadequate fitness, when combined with strenuous physical activity, may result in:
  – temporary reduction in immune function (Gleeson 2007) => illness
  – injury (Pope *et al.* 2000)
Introduction

• Leg power is important to police officers for job tasks requiring, for example, sprinting, jumping, negotiating stairs, scaling structures, & conducting a resisted arrest

• Leg power is also likely to be a good indicator of exercise history & physical fitness

• On this basis, a vertical jump (VJ) test may be a useful & occupationally-relevant predictor of injury and illness risk in Police officers
Aim

To investigate the associations between *leg power*, measured by a vertical jump (VJ) test, and the incidence rates of *injury & illness* in new enlistees undertaking police recruit training.
Methods

- Retrospective cohort study
- Non-identifiable data from prior cohort of 1021 NSW Police recruits meeting study inclusion criteria:
  - Age >18 years
  - Attending police training for first time
  - Able to complete fitness testing on first attempt
  - Full medical clearance & no injury at time of initial fitness testing
- Ethics approved by Bond University HREC, Protocol Number RO1898, with compliant consent waiver
Methods

• Fitness testing:
  – Entry fitness tests conducted prior to training, as per current Police College policy, under supervision of a NSW Police PTI
  – Included VJ assessed by countermovement jump

• Injuries & illness recorded prospectively over 12 weeks for each recruit, IAW College policy

• PTI, medical staff & data entry operators unaware of research (planned later)
Results

Over 12 weeks of recruit training, of the 1021 Police recruits:

• 15% (n=158) injured
• 30% (n=296) reported illness
• 38 % (n=390) presented with injury &/or illness

VJ scores ranged 30 to 68cm, Mean(SD) = 43.7 (7.6) cm
Results: *injury* vs VJ height

Percentage of Recruits *injured*, by VJ height, with 95% CI

Spearman’s rank-order correlation between *injury* status & VJ score:

$$r_s = -0.093, p = 0.003$$

* Pooled results (small cell counts)
Results: *illness* vs VJ height

Percentage of Recruits reporting *illness*, by VJ height, with 95% CI

Spearman’s rank-order correlation between *illness* status & VJ score:

\[ r_s = -.157, p < .001 \]

* Pooled results (small cell counts)
Results: *illness &/or injury* vs VJ height

Percentage of Recruits reporting *illness &/or injury*, by VJ height, with 95% CI

Spearman’s rank-order correlation between illness/injury status & VJ score:

$r_s = -.170$, $p < .001$

* Pooled results (small cell counts)
Discussion

• VJ height was significantly associated with injury & illness risk

• Leg strength/ power is a known occupational requirement for Police officers, & so the link to injury risk is unsurprising

• Such an association was not observed in a military recruit cohort, where muscular endurance instead was a significant predictor (Knapik et al. 2001)
Discussion

• The link to illness risk is novel, but consistent with Gleeson’s (2006) suggestion that a prolonged bout of strenuous physical activity may depress immune function temporarily.

• The degree to which exercise is ‘strenuous’ will always be dependent on level of physical conditioning, & VJ height is one indicator of that level.
Discussion

• Though the associations between VJ height & both injury & illness risk were weak, the cumulative increases in risks for those with lower VJ heights, over many repeated exposures to occupational tasks, are likely to be substantial (Pope 2002)

• There appeared to be a threshold VJ height (45cm) after which injury & illness risks did not continue to increase
Discussion

• These associations do not necessarily represent cause-and-effect relationships, although this may be more likely for injury than illness.

• VJ height likely indicates exercise history & physical fitness of police officers.
  – Lower fitness will cause demanding occupational tasks to be experienced as strenuous, with temporary immune suppression then perhaps more likely (Gleeson 2006).
  – Lower fitness leads to earlier fatigue & increased risk of injury (Pope 2002).
Concluding Remarks

- Interesting findings but require further research to validate & elucidate

- The study setting (Police recruit training) & contrasting findings in military basic training mean caution is required in extrapolating results
Concluding Remarks

- VJ height may be a useful addition to fitness tests for tactical populations with a strong reliance on leg power, but further research is required to assess this in a multi-factor analysis.

- Predictive power of VJ height may be greater in operational Police officers & other tactical populations with a high reliance on leg power, but this possibility needs to be tested empirically.
References


Questions