Grip strength is associated with marksmanship and defensive tactics, but not injuries, in police recruits

Mike Steele, Bond University
Grip strength is associated with marksmanship and defensive tactics, but not injuries, in police recruits

Orr RM\textsuperscript{1}, Stierli, M\textsuperscript{2}, Hinton, B\textsuperscript{2}. Steele, M\textsuperscript{1}

\textsuperscript{1}Bond University, Gold Coast, Australia.

\textsuperscript{2}New South Wales Police Force, Sydney, Australia.
• **Question:** How important is grip strength in police?

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Male</td>
<td>40 nd:</td>
<td>30*</td>
<td>30*</td>
<td>N/A</td>
<td>N/A</td>
<td>45*</td>
<td>96 (L+R)</td>
<td>36*</td>
<td>N/A</td>
<td>N/A</td>
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<td></td>
<td>45 d:</td>
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<tr>
<td>Female</td>
<td>30 nd:</td>
<td>30*</td>
<td>30*</td>
<td>N/A</td>
<td>N/A</td>
<td>25*#</td>
<td>52 (L+R)</td>
<td>32*~</td>
<td>36*</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>35kg d</td>
<td>30*</td>
<td>30*</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
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</tbody>
</table>

nd = non-dominant hand; d = dominant hand
* each hand
~ removed from assessment protocol-No longer used.
# 39 years and younger. 40 and over = 24 kg
• **Question**: How important is grip strength in police?
  - For marksmanship?
• **Question**: How important is grip strength in police?
  - For defensive tactics?

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INTRODUCTION

• **Question**: How important is grip strength in police?
  - As a predictor of injury?
METHODOLOGY

• Outcome Measures - Grip Strength:
  
  * Grip Strength taken in conjunction with other fitness measures by NSW Police PTI within Week 1
  * Protocols described by Dortkamph (1987) with grip dynamometer
• **Outcome Measures - Injury:**

  *Injury results as recorded on the police injury database using a standard issue form were collected 4 weeks after course completion.*
  *Only injured / not injured status was recorded*
  * Serious enough for the recruit to have sought treatment*
METHODOLOGY

• Outcome Measures - DefTac:
  *Defensive tactics performance as determined by training instructors (Pass/Fail)
• Outcome Measures - Marksmanship:

*Marksmanship performance (static) with 9 mm Glock pistol fired from dominant hand on a Z4 target.*

*Scores as allocated on the target*
• Descriptive data

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
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<tbody>
<tr>
<td>Session 1</td>
<td>50</td>
<td>43.64 ± 9.8 kg*</td>
</tr>
<tr>
<td>Session 2</td>
<td>169</td>
<td>42.15 ± 8.3 kg* **</td>
</tr>
</tbody>
</table>

*Injury data
*Deftac and Marksmanship data

No significant difference between groups (p=0.287).
RESULTS

• Grip Strength and Injury
  • 26% (n=56) sustained an injury

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43.18 ± 8.73 kg (26-69)

40.48 ± 8.15 kg (25-59)
RESULTS

• Grip Strength and Deftac
  • 41% (n=70) failed

43.68 ± 8.36 kg (25-67)
40.00 ± 7.73 kg (28-62)

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(rs[169]=-.227, p=0.03)
RESULTS

• **Grip Strength and Marksmanship**
  • 12% (n=21) failed

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• Grip Strength and Marksmanship

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Injury Findings

-Supports previously unpublished research findings in this population

- This research as a predictor of acute injury and does not take into account long term health and mortality (Bohannon, 2008; Rantanen et al., 1999; Sasaki, Kasagi, Yamada, & Fujita, 2007; Sayer et al., 2006)

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Deftac findings

-Supports subjective reports by officers

-Influenced by technique?
Marksmanship findings
- Supports findings of majority of research
  - (Anderson & Plecas, 2000; Copay & Charles, 2001; Vercrnyssen, Christina, Muller, & Grose, 1988)
- Influenced by technique
  - (Copay & Charles, 2001)
- Use in safety and capability?

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CONCLUSIONS

• Grip strength **may not** predict injury risk in police officers undergoing recruit training.

• Grip strength may play a role in the marksmanship and defensive tactics performance of police recruits, however its relationship with these tasks is not strong enough to provide a predictive value.
• Grip strength may influence a police recruit’s marksmanship and defensive tactics performance.

• Optimising grip strength following injuries that affect a police recruit’s grip strength is important.

• Grip strength may be a useful outcome measure in return-to-training planning for police officer recruits undergoing treatment for upper limb injuries.
• Injury data depth
  ➔ Need to investigate with greater depth, ie type, area, mechanism
• Gender (limited data)
  ➔ Potential benefit of reviewing by gender as opposed to gender neutral performance only
• Glock 17
  ➔ Variations? (M4, Beretta 92, etc)
• Grip strength measures

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LIMITATIONS & FUTURE RESEARCH

Greater synergy than current protocol

Different length-tension relationships of forearm musculature
LIMITATIONS & FUTURE RESEARCH

- Marksmanship measures points based on DCOT, Xd, Yd.

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The men and women of the NSW Police Force for their service and their assistance in this research.
REFERENCES


• Vercrnyssen, M., Christina, R. W., Muller, E., & Grose, E. M. (1988). Relationship of strength and precision in shooting activities.

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