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Strength requirements of law enforcement officers: A critical review

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INTRODUCTION

METHODS

RESULTS & SYNTHESIS...CONT

- Law enforcement officers (LEOs) are required to complete physically demanding tasks including bouts of maximal exertion as part of their day-to-day duties [1, 2].
- The varied and physical nature of these tasks result in a greater risk of musculoskeletal injuries in LEOs compared to employees in more sedentary professions [1, 3].
- In addition, LEOs may carry up to 25kgs of equipment and body armor during their daily duties further increasing the risk of injury [4].
- LEOs must therefore undergo extensive physical fitness testing, before and during employment, to ensure they can adequately meet their dynamic work requirements with minimal risk of injury. However, the relationship between muscular strength and task performance in LEOs has not yet been examined.
- Thus, the aim of this critical review was to identify and evaluate current literature pertaining to the strength requirements in LEOs.

- Two authors independently performed a comprehensive literature search within three databases (PubMed, CINAHL, Embase) as presented in Figure 1.
- After duplicates were removed, remaining publications were screened for the following inclusion criteria:
 - a) Must involve a law enforcement population, and
 - b) Must report on at least one strength related outcome measure
- Articles were excluded if they encompassed the following criteria:
 - a) Full text was unable to be located, or
 - b) It was a conference paper
- The final included studies were then assessed for quality using a modified Downs and Black critical appraisal tool [5]. Results were evaluated for consistency between assessors using a Cohens kappa coefficient and then converted to a percentage as a Critical appraisal score (CAS).
- Strength related outcome measures used are presented in Table 1 and critical findings were extracted and displayed for all included articles (Figure 2).



- Six articles looked at police cadets/recruits (n = 889)
- Five articles looked at active duty officers (n = 1,499)
- Nine studies utilised a male based demographic (n=1,658)
- Eight studies included a female sample (n = 234)
- One study did not specify any demographic information

Study	Outcome Measures				
	1RM Bench Press	Grip Strength	1RM Leg Press	Maximal Torque	Isometric Strength
Orr (2017)		✓			
Stanish (1999)	✓		✓		
Spitler (1987)	✓	✓		✓	
Beck (2015)	✓	✓	✓		
Boyce (2006)	✓				
Cocke (2016)	✓				
Crawley (2015)	✓	✓			
Dawes (2017)		✓			
Boyce (2009)	✓				
Harrell (1993)	✓				✓

Table 1. Comparison of reported strength related outcome measures.

RESULTS & SYNTHESIS

CONCLUSIONS & IMPLICATIONS

- A total of 10 studies met the inclusion and exclusion criteria for this critical narrative review.
- Substantial agreement was achieved between two raters (kappa = 0.654) for the modified Downs and Black evaluations.
- Methodological quality of the included studies averaged a CAS of 63.94 ± 7.31%, ranging from 50.0% (Harrell 1993) to 76.8% (Crawley 2015).

- This critical review indicates that there is limited breadth in strength measures in the current literature. This makes it difficult to determine the relationship between strength and various task requirements of LEOs.
- Furthermore, caution should be taken when drawing conclusions from the presented research as only one article specifically investigated the relationship between a measure of strength and task performance.
- More extensive profiling of strength measures and their relationship to job performance will benefit future employment standards, training protocols and injury prevention/rehabilitation programs for LEOs.

KEY REFERENCES

1. Bonneau, J. and J. Brown, *Physical ability, fitness and police work*. Journal of Clinical Forensic Medicine, 1995. **2**(3): p. 157-164.
 2. Sörensen, L., et al., *Physical activity, fitness and body composition of Finnish police officers: a 15-year follow-up study*. Occupational Medicine, 2000. **50**(1): p. 3-10.
 3. Achterstraat, P., *Managing Injured Police: NSW Police Force*, A. Auditor-General; Audit Office of New South Wales: Sydney, Editor. 2008.
 4. Blacker, S. D., et al. (2013). *Physiological responses of Police Officers during job simulations wearing chemical, biological, radiological and nuclear personal protective equipment*. Ergonomics **56**(1): 137-147.
 5. Downs, S. H. and N. Black (1998). *The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions*. Journal of Epidemiology and Community Health **52**(6): 377-384.
- *All included articles are available upon request.

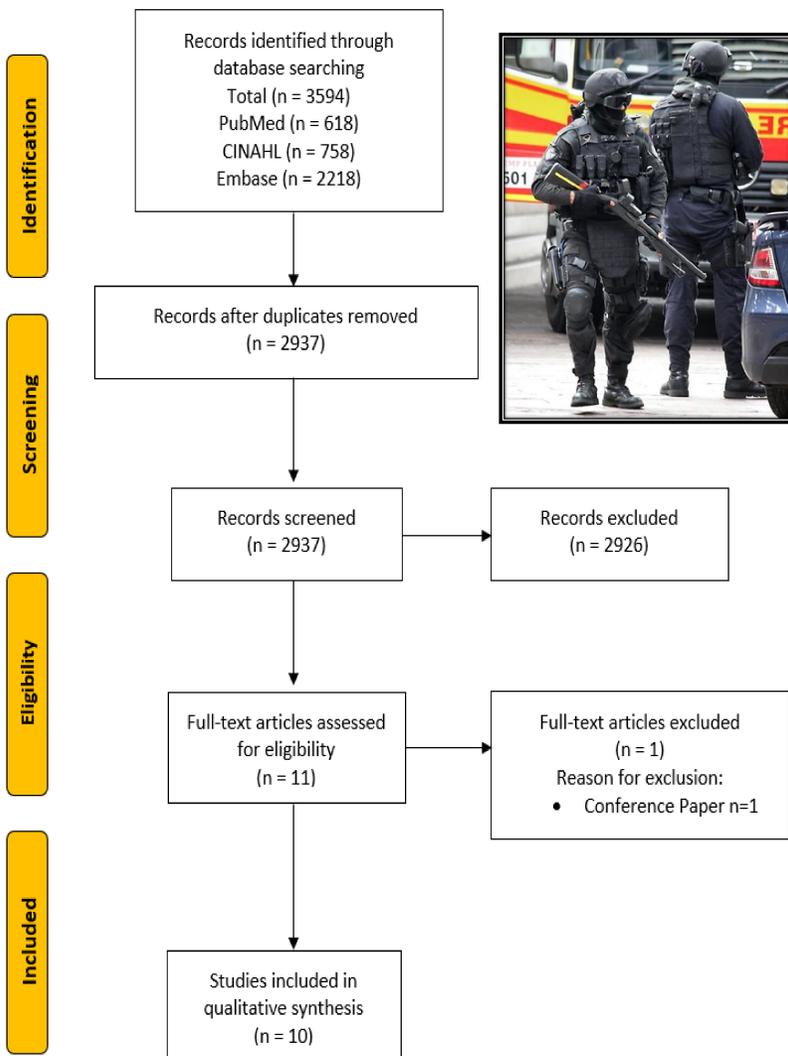


Figure 1. PRISMA process of literature search and selection.

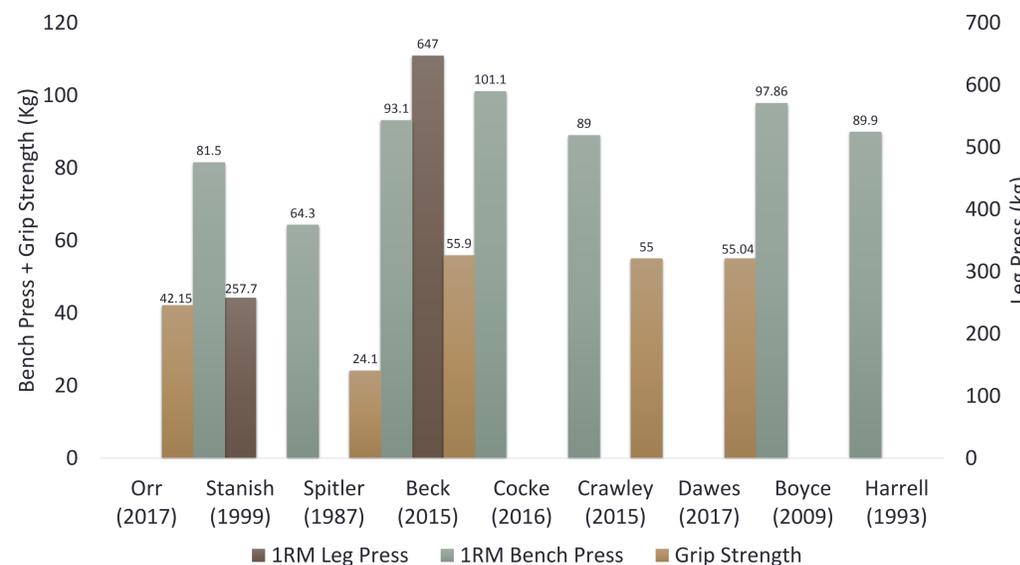


Figure 2. Most common strength measures and averaged findings
*Results have been synthesized and tabulated as an average of reported values. Where multiple variables were assessed in several cohorts, only the largest group was reported. Two remaining methods of strength measures (Maximal Torque & Isometric Strength) have not been reported on due to their novelty (as per Table 1).