

# Age-Related Differences in Upper-Body Muscular Endurance amongst male LEO: A comparison to civilian population norms



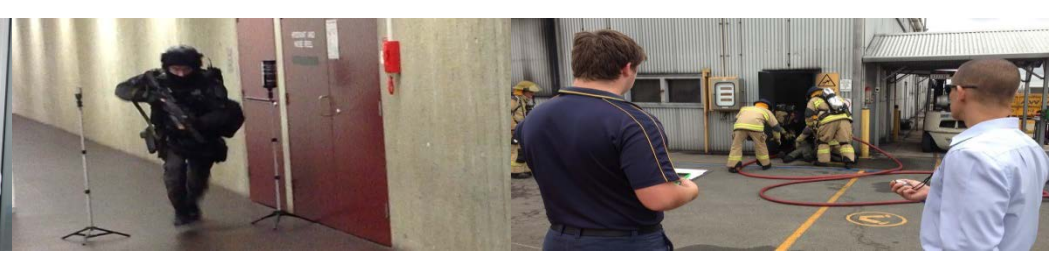
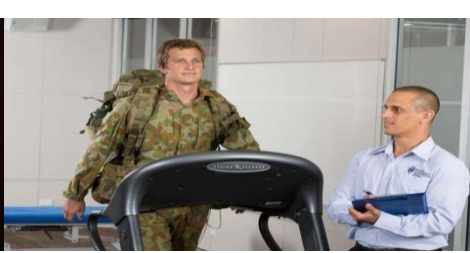
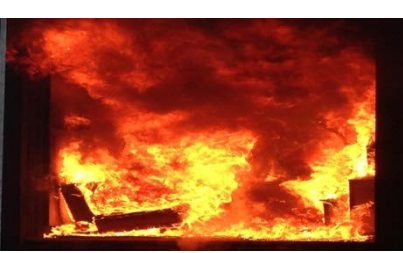
**Orr RM<sup>1</sup>, Pope R<sup>1</sup> & Dawes, J.J<sup>2</sup>**

**1 Bond University, Gold Coast**

**2 University of Colorado: Colorado Springs**



Dawes, J., Orr, R., Brandt, B., Conroy, R. & Pope, R. Age differences in push up performance amongst male Law Enforcement Officers, Journal of Australian Strength and Conditioning – Post review



# Background

- Police officers are required to perform tasks that can include dynamic movements

(Blacker et al., 2013; Carlton et al., 2013)



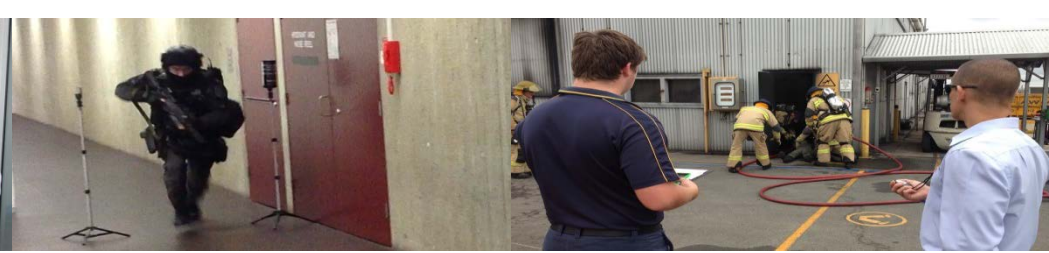
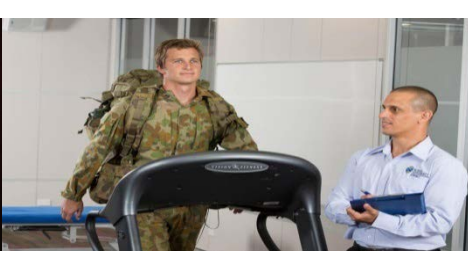


# Background

- The push up is commonly employed in tactical populations as a physical conditioning tool (Knapik et al., 2005) and as an outcome measure to determine if a new or modified physical conditioning program is effective (Heinrich, Spencer, Fehl, & Poston, 2012)





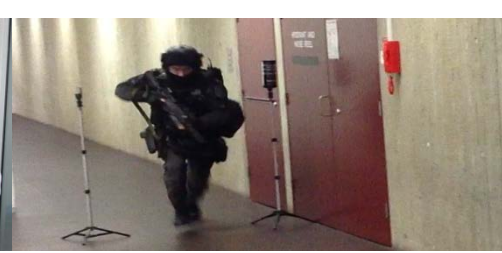
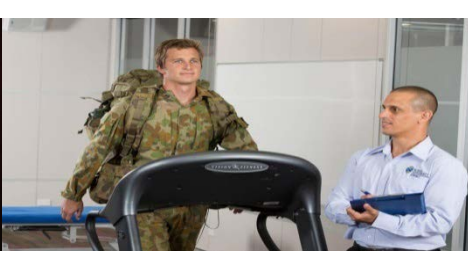


# Background

- When used as a health measure standards are often based on age norms / historical contexts of reductions in performance associated with aging.

Age (years)	Male (Reps)	Female (Reps)
25 and under	40	21
26-30	35	18
31-35	30	15
36-40	25	10
41-45	20	7
46-50	10	3
51 and over	6	3

Australian Army Basic Fitness Assessment  
Push up pass standards



# Aims

- Aim:
  - To investigate age-related differences in push-up performance in a physically-active, male law enforcement population and determine whether they mirrored general population norms.



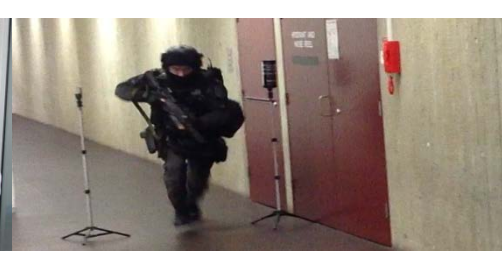
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# Participants

- N=518 ♂ LEO (2 Different LEO US agencies)
  - mean age =  $38.99 \pm 7.50$  yrs / mean weight =  $91.36 \pm 13.89$  kg / mean body fat percentage =  $21.74 \pm 6.0\%$
- Grouped according to age
  - Group 1: 20-29 yrs [n=66];
  - Group 2: 30-39 yrs [n=177];
  - Group 3: 40-49 yrs [n=234];
  - Group 4: 50-59 yrs [n=41]).



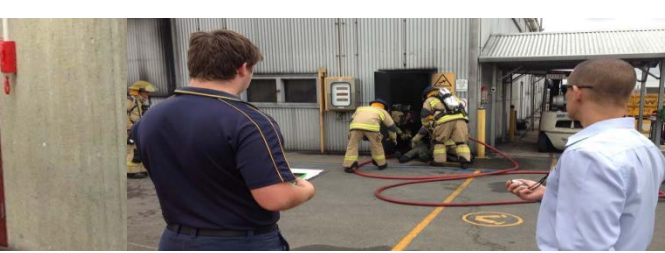
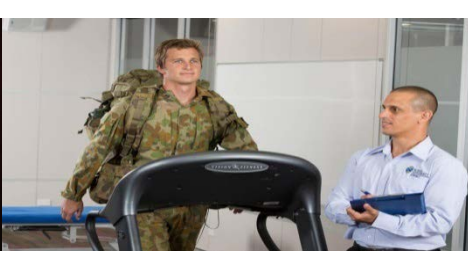


# Methods

- **Measures:**
  - Body weight (lbs) converted to kg
  - Body Composition (Bioelectric impedance)
  - Push ups in 1 minute
- **Statistical analysis**
  - Pearson's product-moment correlation
  - Forward stepwise linear regression analysis
  - Comparison to published norms (Ratamess, 2012)
  - Alpha set at 0.05 a priori







# Methods

- *Ethical approval*
  - *University of Colorado Colorado Springs Institutional Review Board for human subjects*
  - *Bond University Human Research Ethics Committee*



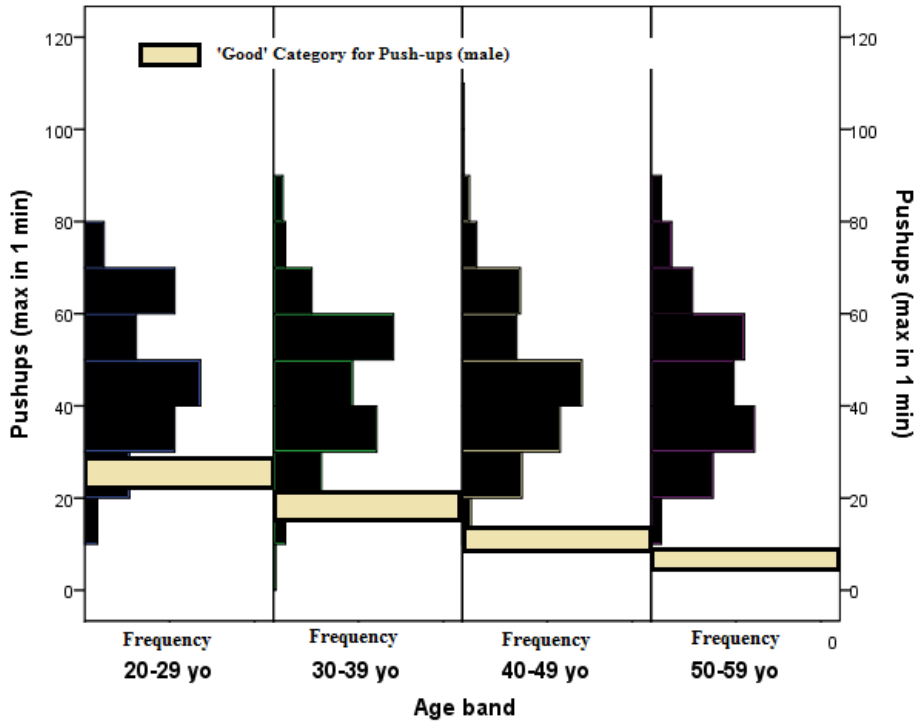


# Results

Age Group	All mean±SD	20-29 mean±SD	30-39 mean±SD	40-49 mean±SD	50-59 mean±SD
AGE (yrs)	38.99±7.51	26.59±1.79	34.66±2.90	43.36±2.55	52.76±2.39
WEIGHT (kg)	91.45 ±13.9	87.9 ± 12.86	91.27 ±14.56	93.15±15,26	88.26±11.09
BF (%)	21.78±6.01	17.94±5.94	20.99±6.15	23.32±5.39	24.42±4.42
Push-ups (reps)	44.48±15.47	46.47±14.62	44.66±15.57	43.92±15.74	43.71±15.09



# Results

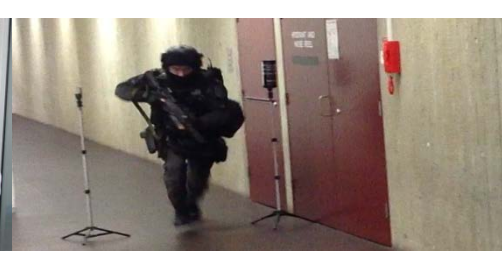




# Results

Final predictive model for push-up performance derived from the forward stepwise linear regression analysis entering %BF, age and body weight.

	Unstandardized		Standardized			95.0% Confidence		Correlations	
	Coefficients		Coefficients			Interval for B		Zero-	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	order	Partial
(Constant)	66.64	3.46		19.23	.000	59.83	73.45		
%BF	-1.45	.11	-.57	-13.66	.000	-1.66	-1.24	-.53	-.54
Age	.23	.09	.11	2.72	.007	.07	.40	-.06	.13



# Discussion

- Contrary to normative data push up performance did not decrease with age in this population of LEO

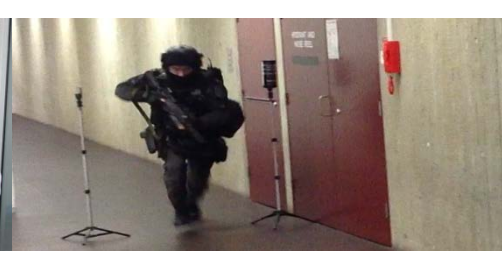
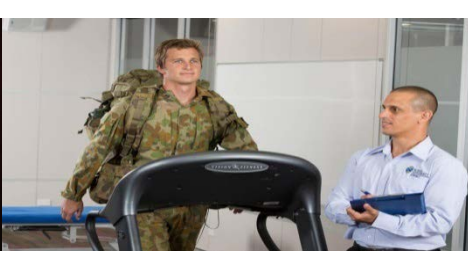


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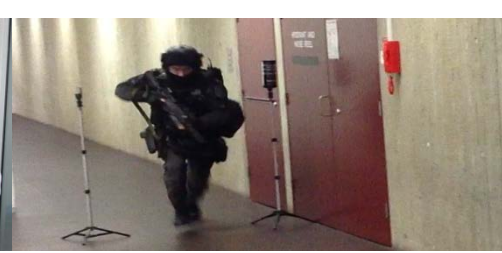
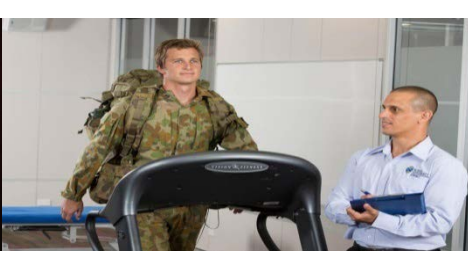




# Discussion

- When compared to general population norms, male LEO in each age category demonstrate substantially better push-up performance and do not demonstrate the decline in push up performance with age observed in the general population

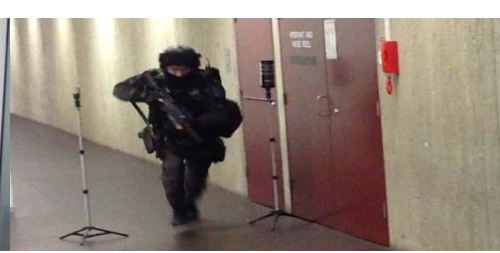




## Conclusion / Take Home Message

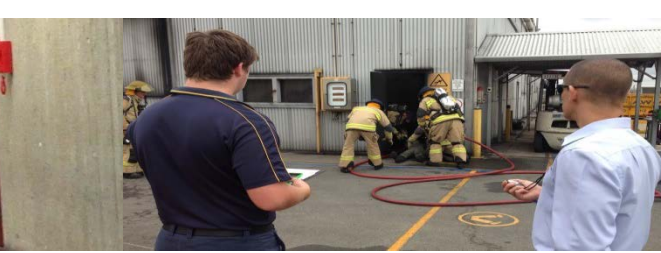
- Upper-body muscular endurance does not have to decrease with age, within the current age range, if the population is physically active and regularly performs upper body strength exercises
- Population based normative data may not be a suitable comparative sample for tactical populations like law enforcement (rehab/RTW protocols as an e.g)





# References

- Blacker, S. D., Carter, J. M., Wilkinson, D. M., Richmond, V. L., Rayson, M. P., & Peattie, M. (2013). Physiological responses of Police Officers during job simulations wearing chemical, biological, radiological and nuclear personal protective equipment. *Ergonomics*, 56(1), 137-147.
- Carlton, S. D., Orr, R., Stierli, M., & Carbone, P. D. (2013). The impact of load carriage on mobility and marksmanship of the tactical response officer. *Journal of Australian Strength and Conditioning*, 22(1), 23-27.
- Cook, G., Burton, L., & Hoogenboom, B. (2006). Pre-participation screening: The use of fundamental movements as an assessment of function—Part 1. *North American journal of sports physical therapy: NAJSPT*, 1(2), 62.



# References

- Heinrich, K. M., Spencer, V., Fehl, N., & Poston, W. S. (2012). Mission essential fitness: comparison of functional circuit training to traditional Army physical training for active duty military. *Mil Med*, 177(10), 1125-1130.
- Knapik, J., Darakjy, S., Scott, S. J., Hauret, K. G., Canada, S., Marin, R., . . . Jones, B. H. (2005). Evaluation of a standardized physical training program for basic combat training. *J Strength Cond Res*, 19(2), 246-253. doi: 10.1519/16324.1
- Ratamess, N. (2012). Assessment and Evaluation ACSM's Foundations of Strength and Conditioning (pp. 451-488). Philadelphia: Lippincott Williams & Wilkins



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