

# Important fitness components for successful pack hike performance

M. Phillips<sup>1</sup>, C.R. Abbiss<sup>1</sup>, W. Payne<sup>2</sup>, D. Nichols<sup>3</sup> and B. Aisbett<sup>1</sup>

<sup>1</sup>School of Exercise and Nutrition Sciences, Deakin University, Victoria

<sup>2</sup>School of Human Movement and Sports Science, University of Ballarat, Victoria

<sup>3</sup>Country Fire Authority, Victoria

## INTRODUCTION

The Pack Hike Test is a physical competency test designed to quantify the capacity of firefighters muscular endurance, strength and cardiovascular fitness. The fitness components that best predict pack hike performance are unclear. Thus the physical training to best prepare recruits is not known. The purpose of this study was to examine the relationship between physiological characteristics, demographics and pack hike performance.

## METHODS

Fifty-nine Western Australian Fire and Emergency Services Authority (FESA) volunteers (n=17), FESA career (n=22) and Department of Environmental Conservation Land Management (n=20) personnel were recruited for this study (mean ± SD; 179 ± 7 cm; 83 ± 10 kg; 40 ± 11 y). Participants performed a series of muscular endurance, muscular strength and cardiovascular fitness tests. All participants also completed the Pack Hike Test which involved a 4.83-km (3-mile) hike over level terrain wearing a 20.4kg vest in 45 min.

## RESULTS

- Pack Hike Test performance time was significantly different between DEC personnel, FESA career and FESA volunteer firefighters (Figure 1)
- 61%, 10% and 0% of FESA volunteers, DEC staff and FESA career personnel failed (>45 min) the pack hike test, respectively
- Measures of cardiovascular fitness, upper body muscular endurance and body composition were good predictors of performance in DEC staff and FESA volunteers but not FESA career personnel (Table 1)
- The pack hike performance of FESA career personnel was most closely related to prone bridge hold (Table 1)

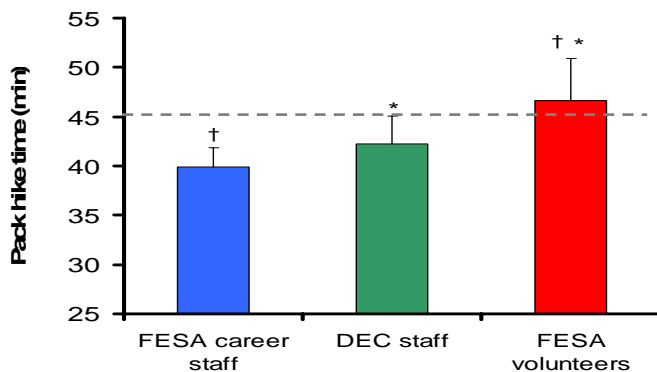


Figure 1. Pack hike performance time of FESA career, FESA volunteer and Department of Environmental Conservation personnel. \*P<0.05 vs FESA career staff; †P<0.05 vs DEC staff



Figure 2. Participants performing pack hike test wearing weighted vests.

	Predictors/variables	$\beta$ weight	R <sup>2</sup>	Standard Error
<i>All</i>	Beep test (stage)	-0.54.219	0.572	171.6
	Static squat (s)	-0.524		
<i>FESA career staff</i>	Prone bridge hold (s)	-1.067	0.246	109.13
<i>DEC staff</i>	Beep test (stage)	-79.387	0.819	80.00
	Body weight (kg)	-10.327		
	No. of shoulder presses	.357		
<i>FESA volunteers</i>	VO <sub>2max</sub> (ml/kg/min)	-34.281	0.889	101.23
	No. of push ups	11.819		
	BMI (kg/m <sup>2</sup> )	-26.112		

Table 1. Multiple regression analysis for predicting pack hike performance (s).

## CONCLUSIONS

The major findings from this study were that:

- pack hike performance differs between DEC staff, FESA volunteers and FESA permanent firefighters,
- the predictors of pack hike performance for DEC staff and FESA volunteer firefighters appear to be cardiovascular fitness, upper body muscular endurance and body composition,
- performance of FESA career personnel was best predicted by prone bridge hold.

**These findings may provide information to assist in the preparation of recruits and/or screen of personnel prior to partaking in the pack hike test.**