

RELATIONSHIP BETWEEN BODY FAT PERCENTAGE AND MEASUREMENTS OF FITNESS AMONG MALE FIREFIGHTERS FROM A RURAL SOUTH CENTRAL FIRE DEPARTMENT



Rosie I. Perez^{1,2}, Megan B. Thompson^{1,2}, Robert, G. Lockie³, Taylor Dinyer-McNeely^{1,2}, J. Jay Dawes^{1,2}

¹Oklahoma State University, School of Kinesiology Applied Health and Recreation, Stillwater, OK. ²OSU Tactical Fitness and Nutrition Lab, Stillwater, OK. ³Department of Kinesiology, California State University, Fullerton, Fullerton, CA.



Introduction

- Firefighting is a physically arduous occupation that requires a wide range of physical capabilities (1,2).
- Numerous factors may affect performance when performing firefighting tasks, including body composition. The impact of body composition, specifically body fat percentage (BF%), on movement and physical ability in firefighters has not been fully investigated (1).
- Further, it is important to investigate the relationships between BF% and fitness specific to each department, as the strength of these relationships may vary depending on location (e.g., city vs. rural fire departments.). Rural fire departments in particular are often under-investigated in the scientific literature.

Purpose

The purpose of this investigation was to determine the relationships between BF% and measurements of fitness among male firefighters from a rural fire departments.

Methods

- Twenty (n=20) male firefighters (height : 177.88 ± 5.94 cm; mass: 97.09 ± 13.9 kg; BF%: 23.95 ± 6.91%) from a single South Central US fire department volunteered to participate in this study.
- Height was recorded using a portable stadiometer. Mass and BF% were measured using bioelectrical impedance analysis.
- Participants then completed a Functional Movement Screen (FMS) followed by a series of physical fitness tests including: one-minute push-up (PU) and sit-up (SU) assessments, a sandbag carry (SBC) for time and distance and 12-minute treadmill test to estimate metabolic equivalents (METs) and aerobic capacity (VO₂). The SBC event was self-paced and was terminated at volitional failure by the participants.
- Pearson's correlation were used to calculate relationships between BF% and the fitness performance tests.

References

1. Michaelides, MA, Parpa, KM, Henry, LJ, Thompson, GB, and Brown, BS. Assessment of physical fitness aspects and their relationship to firefighters' job abilities. *J Strength Cond Res* 25(4): 956-965, 2011
2. Rhea, M.R, Alvar, B.A, and Gray, R. Physical Fitness and Job Performance of Firefighters. *J Strength Cond Res* 18(2): 348-352, 2004.

Body Fat percentage shows strong significant correlations with measures of fitness in male firefighters.



Rural fire departments should focus on providing wellness resources to maintain lower body fat percentage and health.

Results

- Correlation results can be found in Tables 1 and 2.
- Strong to very strong negative correlations were found between BF% and SU, SBC distance, and SBC time. There were moderate, negative significant correlations between BF% and PU, METs, and VO₂. No significant correlations between BF% and FMS score were observed.

	SBC Distance		SBC Time		METs		VO ₂	
	r	p	r	p	r	p	r	p
BF%	-0.863	<0.001**	-0.801	<0.001**	-0.531	0.019*	-0.568	0.011*

Table 1. Pearson's Correlations and statistical significance between BF% and SBC distance, SBC time, METs, and VO₂
 * Denotes significance at p < 0.05
 ** Denotes significance at p < 0.01

	FMS (total score)		PU		SU	
	r	p	r	p	r	p
BF%	-0.406	0.085	-0.565	0.012*	-0.601	0.006**

Table 2. Pearson's Correlations and statistical significance between BF% and FMS (total score), PU, and SU performance
 * Denotes significance at p < 0.05
 ** Denotes significance at p < 0.01

Conclusion

- The results from this study indicated that there were significant relationships between BF% and the different measures of fitness, except for the FMS.
- Given that the fitness tests used in this study measured physical qualities important for firefighters (e.g., PU and SU: muscular endurance; SBC: muscular strength and endurance; METs, VO₂ : aerobic fitness), excess body fat could impair a firefighter's ability to perform job tasks that stress these qualities (1,2).

Practical Applications

- The results from this study suggest that fire departments should focus on wellness interventions aimed at attaining and maintaining healthy body composition (i.e., BF%) levels for the maintenance of health, fitness and performance.
- Another focus should be on providing rural fire departments with the resources needed for their firefighters to maintain a lower BF% that could be beneficial to their fitness and job task performance.



TACTICAL FITNESS AND NUTRITION LAB

Cal State Fullerton