

The Importance of Physical Fitness Programs for Firefighters

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ABSTRACT

Physical fitness is a major factor affecting firefighters' ability to perform under harsh circumstances. This study aimed to investigate the importance of considering a physical fitness program for firefighters and determine whether such a program should be mandated to create a safe and efficient work environment. A survey was conducted to observe the existing fitness program impacts on firefighters' fitness level, their satisfaction with the program, and their opinion upon mandating the program. The study shown that firefighters' fitness levels differed significantly depending on whether the firefighters were subjected to a fitness program or not. The majority (73%) of the respondents support mandating a physical fitness program and encouraged such a program to be included in a school degree plan. However, more than half of the participants (57%), evaluated their fitness program as inaccurate. Hence, fitness program components must be thoroughly structured to enhance the program competency. Recommendations from the respondents were focused on facilitating Civil Defense Centers with gyms, proper gymnastic equipment, and professional trainers.

Keywords: firefighter, physical fitness program, health, competency

المستخلص

أهمية برامج اللياقة البدنية لرجال الإطفاء والدفاع المدني

اللياقة البدنية هي عامل رئيس يؤثر على قدرة وكفاءة رجال الإطفاء؛ خاصة وإنهم يعملون في ظروف وبيئة عمل قاسية. هدفت هذه الدراسة إلى التحقق من أهمية برنامج اللياقة البدنية لرجال الإطفاء والدفاع المدني؛ والتعرف على أهمية تطبيق وإلزامية برامج اللياقة البدنية عليهم لخلق بيئة عمل آمنة وفعالة. تم إجراء مسح لمعرفة تأثيرات برامج اللياقة البدنية على مستوى لياقة وكفاءة رجال الإطفاء، ورضاهم عن البرنامج، وآرائهم حول تطبيق البرنامج. أظهرت نتائج الدراسة أن مستويات اللياقة البدنية لرجال الإطفاء تختلف اختلافاً كبيراً اعتماداً على ما إذا كان رجال الإطفاء قد خضعوا لبرنامج لياقة بدنية أم لا. كما أظهرت نتائج الدراسة أن غالبية المستجيبين (73%) يؤيدون إلزامية برامج اللياقة البدنية؛ وشجعوا مثل هذه البرامج ليتم إدراجها في الخطة الدراسية والتدريبية الخاصة بتأهيل رجال الإطفاء والدفاع المدني. وبالرغم من قناعة المشاركين بالدراسة بأهمية برامج اللياقة البدنية؛ فإن أكثر من نصفهم (57%) قيموا برنامج اللياقة البدنية الخاص بهم بأنه غير مناسب. وعليه، يجب التعرف على مكونات اللياقة البدنية التي يحتاجها رجل الإطفاء لتعزيز كفاءة البرنامج. وركزت توصيات الدراسة على تسهيل وتزويد مراكز الدفاع المدني بالصالة والأدوات الرياضية، ومعدات التمارين المناسبة، مع إشراف مناسب من مدربين متخصصين.

الكلمات المفتاحية: رجال الإطفاء، برنامج اللياقة البدنية، الصحة، الكفاءة.

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Introduction

Firefighters at all times perform physically demanding work in extreme and dangerous environments. Much of the research into firefighter safety and wellbeing over the last two or three decades has identified the importance of physical fitness in these emergency workers (Jamnik, Gumienak, and Gledhill, 2013). Indeed, several studies have identified a link between physical fitness and successful task performance (Bilzon, Scarpello, Smith, Ravenhill and Rayson, 2001; Elsner et al. 2008; Von Heimberg et al. 2007; Siddall et al. 2016). This area of study has also identified components of physical fitness that directly relate to successful firefighting performance including cardio-respiratory fitness (Bilzon, Scarpello, Smith, Ravenhill and Rayson, 2001; Siddall et al. 2016) and muscular strength and endurance (Lindberg et al. 2014; Michaelides et al. 2011; Stevenson et al. 2017) indicating that these aspects of physical fitness are critical to firefighting performance. Some countries worldwide have also identified national minimum cardiorespiratory, strength and muscular endurance fitness standards for firefighters including the UK (Bilzon et al. 2001; Siddall et al. 2016; Stevenson et al. 2017), as well as cardiorespiratory fitness standards in both Canada (Jamnik, Gumienak, and Gledhill, 2013) and the United States (NFPA, 2000).

PHYSICAL FITNESS FOR FIREFIGHTERS

Despite the fact that physical fitness level is important to the firefighter performance and safety, those firefighters that do not have the required levels of physical fitness can negatively affect task performance, thus putting firefighters or the public at risk. It could also mean that firefighters could be exposed to work demands that exceed their capacity. Recently, two firefighters, out of a total of 25 on the scene, were injured as a fire burned through Oman Temple in Flint (Adams, 2018).

A lack of physical fitness has been proposed as one of the contributing factors in the large numbers of cardiac death seen in both the USA (Kales et al. 2007) and UK Firefighters (Labour Research Department 2008). In the USA over a 10-year period 45% of all on-duty fatalities were attributed to sudden cardiac death from coronary heart disease (CHD) (Kales et al. 2007). It was identified that the majority of these deaths (32%) occurred while undertaking fire suppression activities, with 17.4% responding to an alarm. The most likely explanation of the fatalities in this situation led researchers to conclude that the increased cardiovascular stimulation was associated with the alarm response, coupled with the cardiovascular demands of fire suppression and triggering the cardiovascular event. In the UK, the evidence also suggests that deaths from CHD may be an issue also. In a review of firefighter fatalities spanning 30 years between 1978 and 2008, 36 deaths (30% of the total) were attributed to natural causes, which were later identified as being 'heart attacks, which took place either at operational incidents or shortly afterwards the incident had finished (Labour Research Department, 2008).

The importance of physical fitness has been identified as being critical to all, and especially to firefighter safety. However, although minimum fitness standards have been developed and regular fitness assessments are conducted on firefighters throughout their career, less has been undertaken in the way of structured physical training programs for firefighters. In 2015, the National Fire Protection Association conducted the Fire Service Needs Assessment survey, involving a total of 5,106 fire departments, to identify the major needs of the US fire service. The survey showed that only a quarter (27%) of the departments provided a program to maintain basic firefighters' fitness and health, and the majority of the departments conducted fitness assessments on a semiannual or an annual basis (National Fire Protection Association, 2016).

The International Association of Fire Chiefs worked jointly with the International Association of Fire Fighters to develop a comprehensive wellness-fitness program, to improve the health and fitness of firefighters. It emphasized that any physical fitness program must require mandatory participation by all uniformed personnel; allow for on-duty-time

participation and using facilities provided by the department; be positive and not punitive in design; allow for age, gender, and position in the department; provide rehabilitation and remedial support for those in need; and contain training and educational components (Rossetti, 2009).

The Dallas Fire-Rescue Department (DFRD) developed and implemented an annual wellness-fitness program (N=1437), to assess and improve health, fitness, and wellness among firefighters. Baylor Health Care provided a medical evaluation and fitness assessment, which consists of two major components; a medical/physical examination and a fitness assessment. The fitness program provides a potential model for other organizations to follow, to improve the health and wellness of firefighters and help to prevent death and injuries in the line of duty. Of the participating firefighters, 69% obtained a superior fitness score, and 25% achieved an excellent score (Winter, Seals, Martin, & Russell, 2010).

A study by Rhea et al. (2004) reported a high correlation between performance times and muscular strength, muscle endurance, and anaerobic performance. They recommended switching traditional firefighter exercise programs, which focus mainly on cardiovascular fitness, with physical conditioning programs that address all of the fitness components. Muscular strength and endurance are necessary to perform common firefighting activities, such as carrying ladders, advancing charged hose lines, and using heavy equipment. Firefighters rely on upper- and lower-body strength to perform their activities. Further, core muscular strength may serve to reduce the incidence of injuries as well (Wilson, Dougherty, Ireland, Davis, 2005).

Regardless of the physically demanding aspects of the job, several studies have reported that firefighters do not possess above-average aerobic capacity (Smith, 2011). A study by Saupe et al. (1991), involved 150 firefighters, found that aerobic capacity significantly decreased as age increased. Though, the firefighters' aerobic capacity shown to be similar to that predicted for sedentary individuals (Saupek, 1991). The results of a survey by Douglas (1998) indicated that personnel would like to see some changes made in the fitness evaluations, specifically regarding the use of the step test in determining aerobic capacity (Lautner & Mercury, 1998).

The health-related fitness component should address cardiovascular fitness, muscular strength and endurance, flexibility, and body composition. Kilani, Al-kitani & Shaheen, (2014), found in a study of adult Omani, that increasing physical activity (PA) will result in increasing the level of physical fitness (PF) and thus reducing fatness and occupation has an impact on the level of PF. The fitness component could begin with a simple encouragement to increase moderate-intensity activities; such as walking the dog, swimming laps, and playing basketball. Over time, the department should provide opportunities for volunteer firefighters and emergency medical system (EMS) personnel to participate in more intense workouts, whether at the department or at a gym (NFPA,2007, 2010).

There are some Civil Defense Centers across the Sultanate that mandate physical fitness program for firefighters, while others do not. Therefore, it is important to investigate how a physical fitness program is activated and how it is affecting firefighter's fitness level, to reveal the importance of mandating this program to create a safe and efficient work environment.

Materials and Methods

The study covered a cross-sectional subject of (172) firefighters from different Civil Defense Centers, through an online survey. The survey sought to gain an insight into their perspectives of the currently used program, how it is affecting firefighters' fitness, whether the program should be mandated, the program accurateness, and the proposed suggestions. Data were analyzed using version 23 of the IBM SPSS Statistical software, depending on the distribution of the variable of interest. Categorical data were presented as frequencies and percentages, and the Chi-square test was used to investigate possible correlations between categorical variables. Differences with p-values (< 0.05) were considered significant.

Results and Discussion

The study showed that only (40%) of the firefighters had a physical fitness program. The majority (79%) who were undergoing a physical fitness program said that they benefited from the program. However, of those with a fitness program, only (34%) of the participants were mandated to follow a fitness program, compared to (66%) with a voluntary program. Despite this, 71% of firefighters participated in the program even though it was not mandated. Moreover, (73%) of the participants agreed with mandating the fitness program. Ortiz (2014) reported that some firefighters were more cautious, and conditional in their support of the implementation of the Physical Abilities Testing (PAT), whereas others were skeptical about the program and whether it would be used in a punitive manner. Raising awareness and educating firefighters about the program before implementing it is important to increase positive attitudes and therefore increase the success factors for the program.

Half of the respondents had no fitness evaluations, while 23% underwent an annual evaluation, 16% were evaluated quarterly and 6% on a semiannual basis. The result of the program evaluation was not included in the department evaluation for almost half of the respondents (45%). In addition, 54% of respondents indicated that age was not a factor in the evaluation. However, there was no significant difference between the fitness levels of the participants based on the frequency of evaluation or whether program evolution was included or not in the department evaluation.

Most of the respondents described their fitness level as "Very Good" and "Fair" (43%, 40% respectively), and (10%) as "Weak", though only (8%) said that they had an "Excellent" fitness level. Accurateness of the perception of fitness is essential for making behavioral changes to improve fitness. Nearly (90%) agree with giving incentives to those who maintained acceptable fitness standards. Firefighters perceived the establishment of exercise targets as a strategy to motivate firefighters' engagement in physical fitness.

Surprisingly, more than half of the participants (57%) evaluated their fitness program as inaccurate. The fire department's physical fitness program was generally negatively perceived by the firefighters. Ortiz (2014) noticed that: even though the firefighters had a positive perspective of the efforts to address the recruits' needs, the inadequate allocation of resources for incumbent firefighters, and the lack of support to assist them, where the origin of the negative perception. However, regardless of the respondents' view of the program's accurateness, they still preferred it to be mandated.

There was a significant correlation between having a fitness program and fitness level ($p < 0.005$). As figure (1) illustrates, firefighters who were under a physical fitness program were more likely to maintain a better fitness level than those without a program.

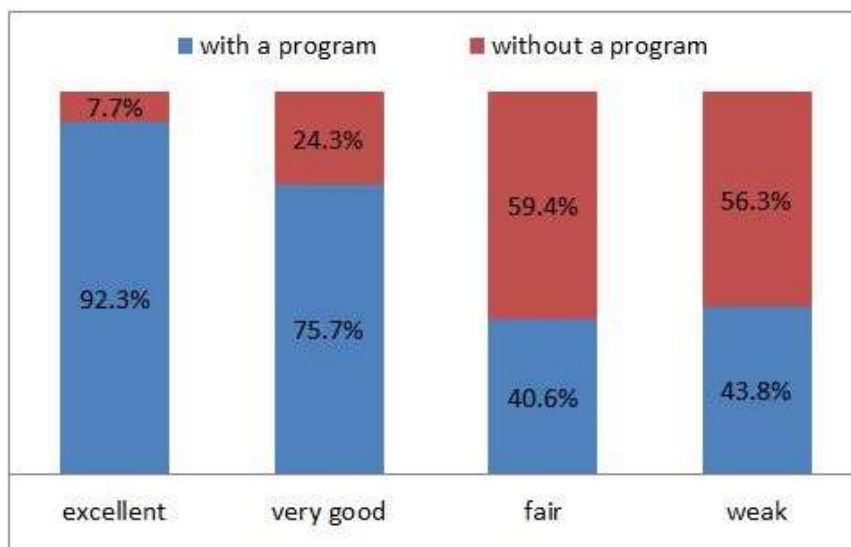


Figure 1: The difference in fitness levels of firefighters with and without a fitness program

Respondents made many suggestions to improve their fitness: 57% highlighted the need for a well-equipped gym with professional trainers, and 16% recommended on-duty time to exercise. Ortiz (2014) found that, while participants expressed an appetite for action to address their physical fitness, the absence of exercise professionals, lack of exercise prescription, and constant interruptions to exercise during their shifts were the most common programmatic barriers identified. The Fire Service Joint Labor-Management Wellness-Fitness Initiative recommends dedicating on-duty time for exercising to assist in promoting physical fitness. To efficiently use allotted exercise time, adequate equipment, and facilities for a total and balanced exercise program should be made available. A peer fitness trainer can work at the fitness center to encourage safety and participation through professional guidance and supervision of uniformed personnel regarding fitness issues (International Association of Fire Fighters, 2021). A vast majority supported involving the physical fitness program in a school degree plan. Branscombe (2015) suggested that a physical training instructor curriculum could be a valuable tool in shifting the culture of physical fitness to all environments of the Canadian Armed Force.

Conclusion

Firefighting is a strenuous occupation requiring great levels of physical fitness. Insufficient levels of physical ability can put firefighters at risk of overexertion and injury and could increase the risk to the public. This study showed a relationship between conducting a fitness program and firefighters' fitness level. Therefore, improving the health and the fitness of firefighters through programs designed specifically to address the job-related hazards they face is a priority for firefighters' departments.

References

- National Fire Protection Association (2016). Fourth Needs Assessment of the U.S. Fire Service. Quincy, MA.
- International Association of Fire Fighters (2021). Fire Service Joint Labor Management Wellness-Fitness Initiative Available at <http://www.iaff.org/HS/Well/wellness.html> (accessed 6 Jun 2021).
- Winter, F. D., Seals, N., Martin, J., & Russell, B. (2010). Implementation of the first wellness-fitness evaluation for the Dallas Fire-Rescue Department. *Proceedings (Baylor University. Medical Center)*, 23(3), 235.
- Rhea MR, Alvar BA, Gray R (2004). Physical fitness and job performance of firefighters. *J. Strength Cond. Res*; 18:348Y52.
- Wilson JD, Dougherty CP, Ireland ML, Davis IM (2005). Core stability and its relationship to lower extremity function and injury. *J. Am. Acad. Orthop. Surg*; 13:316Y25.
- Smith, D. L. (2011). Firefighter fitness: improving performance and preventing injuries and fatalities. *Current Sports Medicine Reports*, 10(3), 167-172.
- SaupeK, Sothmann M, Jasenof D (1991). Aging and the fitness offire fighters: the complex issues involved in abolishing mandatory retirement ages. *Am. J. Public Health*; 81:1192Y4.
- Lautner, D., & Mercury, N. (1998). Firefighter Physical Fitness Programs: Looking for a Standard. National Fire Academy.
- NFPA 1582 Standard on Comprehensive Occupational Medical Program for Fire Departments (2007). Quincy, MA: National Fire Protection Association. Technical Committee on Fire Service Occupational Safety and Health.
- Rossetti, M. Q. (2009). Actual and perceived physical fitness in a sample of Washington, DC firefighters, ProQuest Dissertations Publishing, 3387930.

- Ortiz, G. (2014). Enablers and barriers perceived by professional firefighters in the implementation of a mandatory physical fitness program (Doctoral dissertation, The University of Texas School of Public Health, ProQuest Dissertations Publishing.
- The Fire Service Joint Labor Management Wellness-Fitness Initiative, (2008), International Association of Fire Fighters.
- Branscombe, J. (2015). Curriculum development issues and opportunities in the Canadian military physical fitness program (Doctoral dissertation, Nipissing University (Canada)).
- Bilzon, J. L., Scarpello, E. G., Smith, C. V., Ravenhill, N. A., & Rayson, M. P. (2001). Characterization of the metabolic demands of simulated shipboard Royal Navy fire-fighting tasks. *Ergonomics*, 44(8), 766-780.
- Elsner, K. L., Kolkhorst, F. W. (2008). Metabolic demands of simulated firefighting tasks. *Ergonomics*, 51(9), 1418-1425.
- Jamnik, V.K., Gumienak, R., & Gledhill, N. (2013). Developing legally defensible physiological employment standards for prominent physically demanding public safety occupations: a Canadian perspective. *Eur J Appl Physiol*.
- Von Heimburg, E. D., Rasmussen, A. K., & Medbo, J. I. (2006). Physiological responses of firefighters and performance predictors during a simulated rescue of hospital patients. *Ergonomics*, 49(2), 111-126.
- Siddall, A. G., Stevenson, R. D., Turner, P. F., Stokes, K. A., & Bilzon, J. L. (2016). Development of role-related minimum cardiorespiratory fitness standards for firefighters and commanders. *Ergonomics*, 59(10), 1335-1343.
- NFPA 1583 Standard of Health-Related Fitness Programs for Fire Department Members (2000). Quincy, MA: National Fire Protection Association. Technical Committee on Fire Service Occupational Safety and Health.