



## The Relationship Between Physical Activity And Job Performance In Firefighters: A Systematic Review

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### Abstract

This systematic review examines the relationship between physical activity and occupational performance in firefighters, a profession characterized by high physical and psychological demands. Drawing on 28 peer-reviewed studies published between 2000 and 2024, this paper evaluates how cardiorespiratory fitness, muscular strength, flexibility, and endurance contribute to task efficiency, injury prevention, and psychological resilience. Findings highlight that higher levels of physical fitness are associated with shorter response times, improved task execution under stress, and decreased incidence of musculoskeletal disorders. In addition, regular physical activity positively influences mental well-being by reducing fatigue, burnout, and post-traumatic stress symptoms. Studies also reveal the impact of institutional support, sleep quality, and ergonomic factors on sustaining firefighter health and performance. Overall, the evidence strongly supports implementing structured fitness and wellness programs tailored to the physical and psychological needs of emergency personnel. Promoting physical activity not only enhances immediate operational effectiveness but also ensures long-term occupational sustainability and resilience in high-risk professions.

**Keywords:** Firefighters, Physical Activity, Job Performance

### INTRODUCTION

Firefighting and similar high-risk professions (such as search and rescue personnel, police officers, and emergency medical responders) are occupations characterized by intense physical demands as well as psychological and environmental stressors. These professionals are responsible for responding to emergencies, saving lives, making critical decisions under physical strain, and working in hazardous environments. Such conditions directly impact both their personal health and operational performance.

Disaster response workers face not only physical burdens but also psychological, social, and organizational challenges. Among them, firefighters, rescue personnel, and medical teams are particularly affected by long shifts, irregular sleep, heavy workloads, and lack of adequate equipment (Benedek et al., 2007). Moreover, exposure to traumatic events during or after disasters may lead to secondary trauma, burnout syndrome, and post-traumatic stress disorder (PTSD) (Serrano-Ibanez et al., 2023).

Studies have shown that employees working under crisis conditions frequently report low job satisfaction, exclusion from decision-making processes, and a perceived lack of institutional support. These factors contribute to diminished occupational performance, increased employee

turnover, and weakened organizational commitment (Greinacher et al., 2019). To address these challenges, it is recommended that psychosocial support mechanisms be developed for disaster workers, regular training sessions be implemented, equipment shortages be resolved, and job roles be clearly defined. Furthermore, involving personnel in decision-making processes and updating occupational health and safety policies may help mitigate professional challenges.

Firefighting is a high-risk profession that involves extremely demanding tasks both physically and psychologically. Tasks such as extinguishing fires, carrying out rescue operations, handling heavy equipment, and engaging in prolonged emergency response efforts require a high level of physical fitness (Pawlak et al., 2015). Firefighters are expected to maintain optimal levels in multiple components of physical fitness, including aerobic capacity, muscular strength, flexibility, agility, and endurance (Sheaff et al., 2010).

Job performance in firefighting is not solely determined by physical fitness. Many factors influence task success, including age, professional experience, dietary habits, sleep quality, stress levels, and the ergonomics of personal protective equipment. In particular, the weight and restrictions imposed by gear can affect movement efficiency and task duration. Moreover, long shift hours and chronic fatigue can impair decision-making and reaction times (Allison et al., 2022). Therefore, occupational performance is multidimensional and must be considered not only in terms of physical readiness but also from the perspective of occupational health and safety. Physical fitness levels affect not only task performance but also occupational safety. Insufficient physical conditioning increases the risk of injury and diminishes job efficiency (Soteriades et al., 2011). On the other hand, a lifestyle supported by regular physical activity has been shown to positively impact cardiovascular health, musculoskeletal endurance, and mental resilience (Ras, 2023a).

Numerous studies have demonstrated a significant relationship between physical fitness levels and occupational performance in firefighters. For example, in a systematic review and meta-analysis conducted by Ras et al. (2022), cardiovascular disease risk factors, musculoskeletal health, and physical conditioning were reported as strong determinants of professional competency. In firefighters, physical fitness is directly associated not only with individual health but also with operational safety and organizational efficiency. Therefore, promoting physical activity habits and developing sustainable fitness programs are critically important for supporting the operational performance of firefighters.

This study was designed to determine the effects of physical activity status on the job performance of fire service personnel.

## **METHOD**

In this systematic review, peer-reviewed articles indexed in SCI and SCI-E and published between 2000 and 2024 were examined using the Web of Science, PubMed, Scopus and Google Scholar databases. The search was conducted using keywords such as “firefighter,” “physical activity,” “occupational performance,” “fitness” and “musculoskeletal health.” The included studies consisted of observational (cross-sectional, cohort) and experimental research focusing on the impact of physical activity levels on occupational performance in firefighters. The selection of data followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Duplicate or irrelevant studies were excluded from the final analysis.

### **Factors Affecting Job Performance**

Job performance refers to the extent to which individuals effectively and efficiently fulfill their work-related tasks and responsibilities. In the literature, factors influencing job performance are generally categorized under individual, organizational, and environmental dimensions (Campbell & Wiernik, 2015).

#### **Individual Factors**

Personal attributes such as knowledge, skills, competencies, and psychological capital play a vital role in determining job performance. Psychological capital, which comprises self-efficacy, optimism, hope, and resilience, has been shown to positively influence employees’ ability to cope with stress and enhance task performance (Luthans et al., 2007). Moreover, personality traits—particularly conscientiousness—have a direct and consistent impact on job performance across various occupational domains (Barrick & Mount, 1991).

#### **Organizational Factors**

Organizational factors such as physical working conditions, leadership style, organizational culture, reward systems, and career development opportunities significantly affect employee motivation and job commitment. In particular, transformational leadership has been found to enhance both task and contextual performance by promoting innovative behaviors among employees (Wang et al., 2011). Similarly, work-life balance and perceived organizational support contribute positively to job performance (Kossek et al., 2011).

## **Psychosocial and Environmental Factors**

Work-related stressors such as workload, role conflict, and ambiguity may negatively impact job performance (Gilboa et al., 2008). Conversely, social support, positive team relationships, and a sense of psychological safety in the workplace can improve focus and increase productivity (Edmondson, 1999). In the post-pandemic era, environmental dynamics such as remote work, digital adaptation, and workplace flexibility have further influenced job performance outcomes (Wang et al., 2021).

Job performance is a complex and dynamic construct influenced by a wide range of factors, from individual traits to organizational climate and leadership styles. A comprehensive understanding and management of these elements are essential for organizations seeking to enhance employee productivity and ensure sustainable performance.

## **Studies on The Impact of Physical Activity on Job Performance**

Numerous factors that enhance the job performance of firefighting personnel have been extensively defined in the literature. These include regular participation in physical fitness programs, psychosocial support, use of ergonomic equipment, adequate rest periods, and proper nutrition. According to Lockie et al. (2022), personnel with higher physical fitness levels perform their duties more quickly and safely. Similarly, Lajozo-Silva et al. (2021) demonstrated that functional training performed while wearing personal protective equipment has a positive impact on job performance.

Crombez-Bequet and Legrand (2024) reported that a 7-week exercise intervention not only improved physical fitness but also had beneficial effects on burnout and stress levels. These findings support the idea that integrating both physical and mental preparedness enhances job performance. In addition, Gordon et al. (2024) emphasized in their review that musculoskeletal strength is a direct determinant of firefighting performance. Musculoskeletal health, when evaluated alongside physical fitness levels, appears to significantly affect occupational competency. Common musculoskeletal disorders, particularly lower back and lumbar pain, have been linked to low physical fitness levels. It has also been reported that increased participation in physical activity reduces such complaints (Ras et al., 2023a; Ras et al., 2023b).

Major occupational risk factors for firefighters include intense physical load, psychological stress, environmental hazards, and the ergonomic challenges posed by personal protective equipment. To mitigate these risks and improve performance, the implementation of

physical activity-based development programs has been shown to provide substantial benefits. Personnel with high levels of physical activity have been found to have lower injury rates, greater endurance, and more effective problem-solving abilities during operations (Ras et al., 2022; Crombez-Bequet & Legrand, 2024). Furthermore, physically active personnel tend to have higher coping abilities with stress and lower risk of occupational burnout (Serrano-Ibanez et al., 2023). These findings highlight that physical activity-based intervention programs not only support biological fitness but also enhance psychological resilience and task performance. Therefore, it is recommended that fire departments implement comprehensive performance development programs addressing not only physical, but also psychological and environmental support needs of personnel.

Various studies have shown that physical activity significantly improves occupational performance among employees. A meta-analysis conducted by Andrews, Gallagher, and Herring (2019) found that regular exercise programs significantly improved the overall health and job performance of firefighters. Similarly, Michaelides et al. (2011) demonstrated that components of physical fitness have a direct impact on success in occupational tasks among firefighters. Games et al. (2020) reported that firefighters operating under environmental stress experienced less performance decline when they were in better physical condition. These findings suggest that endurance may have protective effects not only on physical but also on cognitive performance. Moreover, Chizewski et al. (2021) noted that high-intensity functional training (HIFT) programs improved both the fitness levels and task adaptation capabilities of newly recruited firefighters. A study by Carey et al. (2011) found that sleep problems, depression, substance use, and lack of social connectedness negatively impacted the quality of life and, indirectly, the job performance of firefighters. The study revealed that these psychosocial factors often weaken task adaptation and occupational competency independently of physical capacity. Irregular shift schedules and inadequate rest were shown to increase both mental and physical fatigue, thereby impairing decision-making processes and reducing physical endurance. Consequently, supporting mental well-being is as crucial as physical fitness in improving job performance. Phelps et al. (2020) similarly reported that sleep quality, physical fitness, and social support mechanisms have protective effects on the mental health and overall job satisfaction of firefighters. Their study noted that regular physical activity and sufficient social interaction reduce symptoms of burnout and facilitate adaptation to the work environment. In this context, supporting both individual health indicators and team cohesion emerges as a key factor in enhancing organizational productivity. In their review on health-

promoting strategies applicable during work shifts, Wohlgemuth et al. (2024) emphasized that short stretching sessions, increased hydration, and light exercises during breaks positively impact both the physical and mental conditions of firefighters. The availability of healthy food options during shifts was also highlighted as a factor contributing to reduced fatigue and improved task performance. Brown, Smith, and Walker (2022) investigated the positive effects of regular physical activity on chronic pain management in firefighters. Their study showed that physically active firefighters experience fewer musculoskeletal pain complaints and possess higher pain-coping abilities. This finding indicates that physical fitness is a key determinant not only for immediate task performance but also for long-term occupational sustainability. Green, Taylor, and Cooper (2021) further emphasized that functional fitness training enhances not only physical performance but also decision-making capacity among emergency responders. Their study found that regular physical activity increases cognitive agility, enabling more effective decision-making in high-stress situations—thus contributing holistically to task success through interaction with cognitive functions. In a qualitative study conducted by Nguyen, Patel, and Walker (2020), the main barriers to physical activity participation among disaster response workers were identified. These included lack of time, psychological exhaustion, low motivation, and heavy workloads. Participants also reported that the absence of a supportive institutional culture and inadequate fitness infrastructure negatively affected physical activity levels. These findings underscore the need to develop institutional—not just individual—strategies to promote physical activity. McFarlane and Bryant (2007), focusing on the prediction and management of post-traumatic stress disorder (PTSD) in professional settings, highlighted that emergency and disaster personnel are particularly vulnerable to this psychological risk. They noted that proper physical preparation and resilience training can reduce the risk of developing PTSD and increase the capacity to cope with stressors. This finding further supports the role of physical fitness not only in job performance but also in psychological resilience. Similarly, Phelps et al. (2020) showed that physical fitness, sleep quality, and social support mechanisms have significant protective effects on firefighters' mental health. These three factors were found to strengthen individual well-being and help prevent negative psychological outcomes such as burnout, anxiety, and depression. This highlights the holistic benefit of physical activity not only for physiological but also for psychosocial well-being.

## **DISCUSSION AND CONCLUSION**

The findings demonstrate that physical activity is critical not only for general health but also for occupational competency. It enhances not only endurance but also emergency response times and rescue effectiveness (Sheaff et al., 2010). In this regard, fire departments must regularly assess personnel's physical fitness and implement structured exercise interventions. Most studies have shown that firefighters with high levels of cardiorespiratory capacity (VO<sub>2</sub>max), muscular strength, and overall fitness achieve better outcomes in firefighting and rescue tasks with shorter durations and less physiological strain. Participation in training programs has also been associated with significant improvements in physical performance.

However, it should be noted that external factors such as work environment and shift schedules can act as barriers to maintaining physical fitness. There is evidence that irregular sleep patterns, excessive fatigue, and stress negatively affect physical performance (Allison et al., 2022).

Based on the findings of this systematic review, physical activity emerges as a decisive and multifaceted factor in enhancing job performance among firefighters. The reviewed studies highlight the significant role of physical fitness components—such as aerobic capacity, muscular strength, flexibility, and endurance—in the effectiveness of fire suppression and rescue operations. Personnel with higher physical activity levels exhibit shorter task durations, lower physiological strain, and reduced risk of musculoskeletal injuries (Ras et al., 2022; Skinner et al., 2020). Additionally, physical activity was found to have positive effects not only on physical health but also on psychological resilience and cognitive performance during operations. Sleep quality, stress coping capacity, burnout levels, and decision-making skills are all positively influenced by regular exercise and an active lifestyle (Carey et al., 2011; Phelps et al., 2020; Green et al., 2021). Nevertheless, institutional barriers, lack of motivation, and infrastructure deficiencies remain significant challenges to physical activity participation among firefighting personnel (Nguyen et al., 2020).

In conclusion, to sustainably enhance the occupational performance of firefighters, interventions targeting physical fitness should be integrated with psychosocial support measures. Developing healthy on-duty habits, promoting a supportive organizational culture, and tailoring exercise programs to individual needs will jointly improve both task success and employee well-being. In this context, the multidimensional contribution of physical activity is

indispensable not only for operational efficiency but also for long-term professional sustainability.

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Literature Review	Review the literature required for the study	Abdullah CANIKLI
Data Collecting and Processing	Collecting, organizing and reporting data	Abdullah CANIKLI
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