

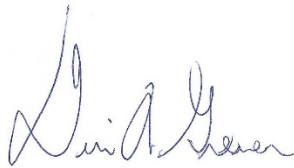
On Duty Competitive Sports: Effects on Firefighter Fitness

Dion Grener

Jefferson Township Fire Department, Blacklick, Ohio

CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

A handwritten signature in blue ink, appearing to read "David A. Green". The signature is fluid and cursive, with the first name "David" being the most prominent.

Signed: _____

Date: 06 FEB 2019

Abstract

Physical fitness is critical to maintaining a firefighter's physical capacity to perform the essential functions of their job while operating in an IDLH environment. Due to multiple on duty sports related injuries in 2017 the Jefferson Township Fire Department (JTFD) began prohibiting its firefighters from playing any competitive sports while on duty. The problem is that the Jefferson Township Fire Department (JTFD) does not know if allowing its personnel to play competitive sports on duty actually improves firefighter physical fitness. The purpose of this applied research paper is to evaluate the effects of competitive sports on firefighter fitness. The descriptive research method was used to answer the following questions:

1. What are the potential benefits of firefighters playing competitive sports on duty?
2. What are the potential risks of firefighters playing competitive sports on duty?
3. What are the nationally recognized fitness requirements for firefighters?
4. What types of injuries have increased from playing competitive sports while on duty?
5. What limitations should be implemented for playing competitive sports on duty?

The procedures include a literary review of various publications and literary resources located at the learning resource center from the national fire academy and local libraries, surveys of outside agencies to gather additional information on competitive sports and the effect on firefighter fitness and injuries and an internal survey sent to JTFD personnel and an external survey of outside agencies to gather additional information on competitive sports and the effect on firefighter fitness and injuries. Recommendations based on the research included prohibiting competitive sports as a means to supplement physical fitness while on duty because of the associated risk of injury and the inability to improve firefighter fitness levels.

On Duty Competitive Sports: Effects on Firefighter Fitness

Table of Contents

Certification Statement.....	2
Abstract.....	3
Table of Contents.....	4
Introduction.....	6
Background and Significance.....	6
Literature Review.....	16
Procedures.....	26
Results.....	32
Discussion.....	65
Recommendations.....	72
References.....	75
Appendices	
Appendix A: Fire Chiefs Email Notice – Stay on Competitive Sports Activity.....	80
Appendix B: Health and Safety Committee Meeting Minutes.....	81
Appendix C: On Duty Competitive Sports Survey Sent to JTFD Members.....	82
Appendix D: On Duty Competitive Sports Survey Request Sent to EFO Classmates.....	83
Appendix E: Internal Survey Questions and Results.....	84
Appendix F: External Survey Questions and Results.....	94
Appendix G: 2018 JTFD Medical & Fitness Testing Results.....	112
Appendix H: Interview with Ms. Anna Sapp.....	124
Appendix I: Interview with Mr. Matthew Sulka.....	127

Appendix J: JTFD Injury Data.....	130
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Figures

Figure 1. JTFD Participation in On Duty Competitive Sports.....	35
Figure 2. Frequency of On Duty Competitive Sports.....	36
Figure 3. Types of Competitive Sports Played on Duty.....	37
Figure 4. Percentage of Fire Service Agencies that Allow on Duty Competitive Sports.....	38
Figure 5. Types of Competitive Sports Allowed.....	39
Figure 6. Benefits of On Duty Competitive Sports (Internal Survey)	41
Figure 7. Benefits of Allowing On Duty Competitive Sports (External Survey).....	42
Figure 8. Amount of Time Spent on Fitness.....	43
Figure 9. Impact of Allowing On-Duty Competitive Sports.....	44
Figure 10. Drawbacks or Potential Problems (Internal Survey).....	47
Figure 11. Impact of Allowing On-Duty Competitive Sports (External Survey)	48
Figure 12. Impact on Injuries from Allowing On-Duty Competitive Sports.....	50
Figure 13. Does Your Fire Department Allow On-Duty Competitive Sports.....	51
Figure 14. Limitations for On-Duty Competitive Sports (Internal Survey)	61
Figure 15. Limitations for On-Duty Competitive Sports (External Survey).....	62

The Jefferson Township Fire Department has recently prohibited its personnel from playing competitive sports on duty in lieu of physical fitness. The JTFD has not conducted any formal research on the risk versus benefit of allowing its firefighters to play competitive sports while on duty as part of the agency's fitness program.

The problem is that the Jefferson Township Fire Department does not know if allowing its personnel to play competitive sports on duty actually improves firefighter physical fitness. The purpose of this applied research paper is to evaluate the effects of competitive sports on firefighter fitness. The descriptive research method was used to answer the following questions:

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Background and Significance

Because of the risk of sports related injuries and the associated injury leave Jefferson Township has banned its firefighters from playing competitive sports on duty. According to the Township, team games such as basketball and volleyball at the Jefferson Township fire station have landed more firefighters in the hospital in recent years than accidents occurring on emergency call-outs. The township has indicated concern that relatively minor injuries from the games, which are supposed to help keep firefighters fit, are leading to lengthy periods of injury leave and even expensive compensation claims. The average length of leave taken after sports-related injuries in Jefferson Township is 120 days. Township officials claim the activity is too dangerous after more than 7 of 25 firefighters were injured over the past four years playing

games like volleyball and basketball. As a result, the agency has banned playing of competitive sports on duty to protect its firefighters.

The Jefferson Township Fire Department is a career agency that provides fire protection and emergency medical services to the residents of Jefferson Township in Franklin County, Ohio. Jefferson Township was formed in 1816 as a political subdivision of the State of Ohio. The unincorporated community of Blacklick was founded in 1852 within the boundaries of Jefferson Township. The Jefferson Township Fire Department was legally established by virtue of a general election held on Tuesday, November 8th, 1966, in Franklin County. Ballot language from the election held in 1966 established the fire department levy of taxes for the purpose of providing township fire protection by acquiring a fire engine, tanker, and emergency rescue vehicle and acquiring real estate to house fire department vehicles. As a result, the Jefferson Township Fire Department was established as a volunteer fire department in 1967. Since its inception the township population continues to increase while the Fire Department continues to evolve and provide services for both the incorporated and unincorporated areas of the township. During this time the boundaries of the township have started to include areas of the City of Reynoldsburg and Gahanna. Today, Jefferson Township remains a political subdivision as granted under Ohio Revised Code § 503.01 corporate powers and duties of civil township. Any annexation by the City of Reynoldsburg or Gahanna into Jefferson Township results in Jefferson Township's boundaries and fire protection and inspection service to remain. Conversely, any annexation by the City of Columbus results in Jefferson Township's boundaries and services to reduce, per cooperative agreement.

JTFD is one of 17 career fire departments in Franklin County, Ohio with 25 sworn personnel operating out of one station. Shift personnel work a 24/48 schedule which means they

work 24 hours on duty followed by 48 hours off duty. The Jefferson Township Fire Department provides the community with advanced life support – emergency medical services, all-hazards emergency response and fire prevention services. The Jefferson Township Fire Department presently staffs one fire station 24 hours per day, seven days a week, 365 days a year. On a typical 24-hour shift, a minimum of four firefighter/paramedics, one Fire Suppression Lieutenant and one Battalion Chief serve on duty. The Fire Chief is available Monday through Friday during business hours. The fire staff responds to calls for assistance in one advanced life support medic unit, one fire engine, and the Battalion Chief's (BC) incident command (IC) vehicle. Responding fire equipment is stocked with advanced life support equipment, and all vehicles are equipped with automatic external defibrillators (AEDs).

JTFD also provides a variety of both emergency and non-emergency services to the residents of the township while responding to roughly 2100+ emergency calls a year which may include but are not limited to: structural fire protection, emergency medical services (advanced life support with transport service), hazardous materials incidents, technical rescue, motor vehicle collisions, and fire investigation (JTFD, 2018). Simultaneously the JTFD provides non-emergency services in the form of: code enforcement, public education, and pre-incident planning (JTFD, 2018).

Located in the eastern part of the county, Jefferson Township is governed by a three-member board of trustees, who are elected in November of odd-numbered years to a four-year term beginning on the following January. Two are elected in the year after the presidential election and one is elected in the year before it. There is also an elected township fiscal officer, who serves a four-year term beginning on April 1 of the year after the election, which is held in

November of the year before the presidential election. Vacancies in the fiscal officer position or on the board of trustees are filled by the remaining trustees.

Once a collection of homesteads and farmland, Jefferson Township is now a growing community that celebrates its agricultural history by striving to preserve its rural roots. Jefferson Township is part of the larger Columbus, Ohio Metropolitan Statistical Area (MSA). As a whole, the MSA has been growing at an overall steady rate since 1990, as evidenced by an overall growth rate of 46.2 percent from the 1990 Census to the 2010 Census (Anderson, 2018). According to data in the Jefferson Township comprehensive plan, Jefferson Township has grown at a significantly higher rate than the MSA, exhibiting a 173.0 percent growth rate over the same time period (Anderson, 2018). Both Jefferson Township and the Columbus MSA have outpaced the growth of Franklin County and Licking County over the same two decades. Between 2000 and 2010, Jefferson Township's population increased by 5,550 individuals, an increase of 104.3 percent. Over the same time period, Jefferson Township issued 2,221 permits for single-family housing, an average of 201 permits annually. However, in 2008, the national recession slowed the residential building industry significantly. According to Jefferson Townships comprehensive plan "From 2011 to 2017, there were 497 Residence permits issued, an average of 71 permits, annually" (Anderson, 2018).

Central Ohio has grown significantly over the past two decades and the cities of Columbus, Gahanna, and New Albany have grown around Jefferson Township. This has increased land values in Jefferson Township by decreasing the area's inventory of large parcels on which to develop. As families grow and move around central Ohio, Jefferson Township will continue to see residential development proposals into the future. One of the features that draw families to Jefferson Township is the open and rural-like appeal of the neighborhoods and large

lots in Jefferson Township. This is a testament to the positive impact of strict zoning regulations that place great importance on the preservation of open space. New residential developments in Jefferson Township must dedicate a significant portion of land as preserved open space for the purposes of beauty, biodiversity, storm water management, and recreation (Anderson, 2018). In other locations in the township, conservation easements have allowed portions of private land to be held in their natural state.

Since 1990, Jefferson Township has experienced both a rapid “boom” in growth, as well as a significant slow growth period, attributable to the 2008 national recession (Anderson, 2018). Between 1990 and 2000, Jefferson Township experienced an average annual population growth of 3.4 percent (Anderson, 2018). From 2000 to 2010, the average annual growth in population was 10.4 percent. Overall, this represents an average annual growth of 8.6 percent over the period 1990 to 2010 (Anderson, 2018). While it is impossible to predict the future, we can use past growth rates to inform growth estimations. As more families move into Central Ohio, Jefferson Township is faced with the challenge of accommodating more families without the ability to “grow more land.” According to the Ohio Revised Code, one way that a municipality can expand its boundaries to absorb more families is to annex land from a neighboring township (JTFD, 2018). Currently if a land owner owns a parcel that is adjacent to a city or village that might be able to offer police and fire protection, centralized water and sewer services, or favorable zoning and development practices, the land owner may be willing to annex land into that municipality in exchange for a municipal income tax (Anderson, 2018).

Jefferson Township has adopted a centralized water and sewer system, a dedicated fire and emergency medical service and township zoning to encourage property owners keep their land in the township; however, past annexations have eroded the portions of the township over time. As

population growth increases development pressure, the potential for annexation must be considered, especially along corporation lines and fringe parcels. Currently when a property is annexed, Jefferson Township loses a portion of property taxes, primarily road district funds. However, even after annexation, property taxes for Jefferson Township Fire and Emergency Medical Services remain, and service continues from Jefferson Water and Sewer District if the parcel has access to those services.

By nature, firefighting is a very dangerous profession and considered by many to be one of the more dangerous professions in the workforce. Due to the occupational exposure's firefighters are constantly at risk of receiving lung and respiratory damage, increased risk of cancer, heart attack, burns, and other work-related injuries. The duties of a firefighter are all encompassing to help protect the public. In general, most firefighters are required to respond to a wide variety of calls to include vehicle crashes, chemical spills, flooding, water rescue, and general rescues as well as fires with a majority of the fire service personnel also being cross trained to provide emergency medical services.

Currently the U.S. Fire Administration (USFA) tracks and collects information about line of duty deaths and work-related injuries using the National Fire Incident Reporting System (NFIRS). In 2017 eighty-seven firefighters died while on-duty (U.S. Fire Administration, 2018). Subsequently the leading cause (27.2%) of fire service injuries were a result of some type of fall, slip, overexertion, and strain (NFPA, 2016). In 2017, 18 firefighters died after the conclusion of their on-duty activities with 15 deaths from heart attacks. According to the U.S. Fire Administration "52 firefighters died as a result of stress or overexertion" (U.S. Fire Administration, 2018). Research continues to demonstrate that firefighting is strenuous and dangerous work with a unique set of stressors (Smith, 2011). In order to meet the physical

demands of firefighting, firefighters must be physically fit. The National Fire Protection Association (NFPA) recognizes the importance of physical fitness and the need for firefighters to maintain the physical capacity to do their jobs. As a result, NFPA code 1582 and 1583 helps to outline the standards to make sure firefighters are performing at their best and outline which aspects of physical performance need to be measured.

Currently the JTFD does not have a fitness policy outlining physical fitness training for its members. However, the agency does provide NFPA compliant physicals annually for each of its members as an opportunity to improve the health of its members. Subsequently the agency has been working with the local health system for the past decade to compare the results from the medical and fitness testing of its firefighters with other surrounding departments. In reviewing the data from the last 10 years of fitness testing and firefighters' medical results, we closely track individuals that have Metabolic Syndrome (MetS). Based on the guidelines from the National Heart, Lung, and Blood Institute (NHLBI) and the American Heart Association (AHA), any three of the following traits in the same individual meet the criteria for the metabolic syndrome:

1. Abdominal obesity: a waist circumference of 102 cm (40 in) or more in men and 88 cm (35 inches) or more in women. For Asian Americans, the cutoff values are ≥ 90 cm (35 in) in men or ≥ 80 cm (32 in) in women
2. Serum triglycerides 150 mg/dl or above.
3. HDL cholesterol 40mg/dl or lower in men and 50mg/dl or lower in women.
4. Blood pressure of 130/85 or more.
5. Fasting blood glucose of 100 mg/dl or above.

The first year we tested JTFD firefighters, 40% of the firefighters had MetS. In 2017 only 26% of JTFD Firefighters had MetS, a decrease of 14% over the past 11 years (Sapp, 2017). This

is also a significant decrease from 2016 when half the department met the criteria for MetS (Sapp, 2017). Taking a closer look, of the firefighters who met the criteria for MetS in 2016, only 5 currently meet the criteria. Additionally, of the 5 firefighters who had MetS in 2016 but not in 2017, 3 individuals had improvements in either one or a combination of the following factors: blood pressure, triglycerides, and fasting blood glucose (Dunn, 2016).

On October 6, 2017, an email was sent from the Fire Chief to all JTFD personnel prohibiting competitive sports activity, specifically basketball (Shull, Personal Communication, 2017). Subsequently on October 23, 2017 an email was sent outlining the recommendations from the Health and Safety Committee meeting prohibiting competitive sports for all personnel on duty (Grener, Personal Communication, 2017). However, personnel are allowed to participate in sports related activities for physical fitness as long as various restrictions are followed. Restriction for these types of activities include the avoidance of full body contact, collisions and no match games are permitted (i.e. 1 on 1, 3 on 3, etc.). However, normal “shooting around”, letter games and activity that does not cause unusual motion and impact are permitted (Shull, Personal Communication, 2017).

Although on duty competitive sports have been previously allowed as a means of physical fitness no one really understands the risk versus benefit of allowing its firefighters to play competitive sports while on duty as part of the agency’s fitness program. Subsequently the agency does not really know if allowing firefighters play competitive sports has had more of a positive or negative impact on the overall wellbeing of its firefighters and if any restrictions need to be placed on these types of activities. Currently the township believes games such as basketball and volleyball at the Jefferson Township fire station have landed more firefighters in the hospital in recent years than accidents occurring on emergency call-outs. As a result, the

township feels if a decision is made to allow firefighters the opportunity to continue playing competitive team sports in lieu of organized physical fitness activities, this will lead to an increase in overall injuries. Additionally, the township questions the overall financial impact on the organization and whether or not the fitness benefit outweighs the increased risk of injuries associated with competitive sports. If the township allows its firefighters to play competitive sports as a means to stay in shape will these types of activities continue to have an associated risk of injury thus leading to an increase in workers compensation claims or an increase in overall firefighter fitness decreasing the effects of MetS. As with any activity performed by firefighters including exercise, there is always an inherent amount of risk associated which must be weighed against the positive benefits of the event. In a nutshell, the future impact of this problem must weigh the risk versus benefit of allowing its firefighters to play competitive sports as part of the agency's fitness program.

As a result, the decision to complete an applied research project (ARP) on competitive sports for firefighters and the effects of firefighter fitness was chosen for a few reasons.

1. The JTFD does not know if allowing its personnel to play competitive sports on duty actually improves firefighter physical fitness.
2. The topic of competitive sports and firefighter fitness is related to the Executive Development (ED) course in that the adaptive challenge is ensuring that all JTFD firefighters possess the physical capacity needed to perform their jobs efficiently and effectively. Particularly part of the EFO program was designed to allow students the opportunity to investigate problem or key issues occurring in their fire service organization while simultaneously looking at information to understand everyday problems that seeks to implement innovative solutions. Currently physical fitness or

the lack there of has been an ongoing issue within the JTFD. While there may be various methods (i.e. jogging, strength training, flexibility, etc.) to improve firefighter fitness the agency has the responsibility of determining which methods are allowed and prohibited when on duty. Therefore, prohibiting competitive team games such as basketball and volleyball the agency needs to know whether or not this was a good or bad decision. Applied research seeks to solve practical problems and develop innovative solutions to this issue.

3. The research conducted in this project directly correlates and supports the strategic framework of the United States Fire Administration Program (United States Fire Administration, 2013).
 - “Goal 1: Reduce Fire and Life Safety Risk Through Preparedness, Prevention and Mitigation” by promoting a culture of fitness in the fire service thus minimizing the number of firefighters who die as a result of overexertion or stress.
 - “Goal 2: Promote Response, Local Planning and Preparedness for All Hazards” because a firefighter is just like a professional athlete who must be properly equipped, skilled, and physically fit for the demands of their jobs.
 - “Goal 3: Enhance the Fire and Emergency Services’ Capability for Response to and Recovery from All Hazards” by promoting a culture of fitness to reduce our chances of having a cardiovascular event while at the same time increasing our career/life longevity and our capability to manage or mitigate any hazardous event we may face.

Literature Review

A literature review was conducted to help gather information from current publications and ensure a thorough understanding of the topic and identify similar work done within the topic of firefighter fitness and competitive sports. Information from various sources were collected and analyzed to help identify knowledge gaps and compare previous findings to help identify current trends, emerging theories, best practices, existing findings, and suggest further studies relevant to this research.

As a result, physical fitness in the fire service has to be clearly defined. During this literature review process several definitions of physical fitness were considered from multiple sources. However, for this research the following definition was used from the U.S. Department of Health and Human Services (HHS):

Physical fitness is a general state of health which refers to one's ability to perform physical tasks, especially as they relate to a sport or occupation generally achieved through proper nutrition, moderate-vigorous physical exercise, and sufficient rest. (U.S. Department of Health and Human Services, 2018)

Additional literature review was conducted to determine if the definition used by the HHS was applicable to the fire service and how its effects firefighters. As a result, the National Fire Protection Association (NFPA) standards were considered as a reference. The NFPA was established in 1896 by a group of insurance firms for the purpose of eliminating death, injury, property loss, and economic death due to fire (National Fire Protection Association, 2018). As an international non-profit organization who conducts research, training, and education in the development of fire protection codes and standards the NFPA is considered as one of the leading

authorities on fire safety and prevention matters. Subsequently the NFPA maintains relevance and currency through routine updates of relevant standards and codes typically every five years.

Although the NFPA does not have a definition of physical fitness it does have several standards affecting firefighter fitness. These standards include: NFPA 1500 Standard on Fire Department Occupational Safety, Health, and Wellness Programs, NFPA 1582 Standard on Comprehensive Occupational Medical Programs for Fire Departments, and NFPA 1583 Standard on Health-Related Fitness Programs for Fire Department Members. All three of which overlap and address components of an overall health related fitness program for fire service agencies while stressing the importance of firefighter physical fitness. As a result, NFPA 1583: Standard on Health-Related Fitness Programs for Fire Department Members has become a valuable resource that details specific minimum requirements for the development, implementation, and management of fire department fitness programs. While NFPA 1582 provides a comprehensive roadmap for fire departments to assess firefighter readiness to perform essential job functions, focusing on strength and aerobic readiness.

Subsequently the next step in the literature review process was to determine the minimum fitness requirements for firefighters. Again, due to its relevance and importance in the fire service the NFPA was the logical choice. Currently the NFPA is known to publish more than 300 codes and standards adopted and written by more than 250 technical committees comprising approximately 8,000 volunteers (NFPA, 2016). All of which are used by fire service agencies worldwide while simultaneously promoting improvements in fire protection and prevention measures and helping fire service agencies become more efficient in establishing the much-needed risk reduction control measures to prevent loss of life and property both on and off the

fireground. Subsequently the NFPA also advocates for consensus standards amongst fire service professionals in the realms of health, safety, and wellness related programs (NFPA, 2016).

NFPA 1500 Standard on Fire Department Occupational Safety, Health, and Wellness Programs specifies the minimum requirements for an occupational safety and health program for fire departments or organizations that provide rescue, fire suppression, emergency medical services, hazardous materials mitigation, special operations, and other emergency services (National Fire Protection Association, 2018). This same standard was developed to provide a consensus standard for an occupational safety and health program for the fire service with the intent to provide the framework for a fire department safety and health program. NFPA 1500 also addresses the need for firefighters to meet the annual medical requirements as outlined in the NFPA 1582 and the fitness requirements outlined in NFPA 1583 (National Fire Protection Association, 2018).

NFPA 1582 outlines the recommended standards associated with a firefighter's pre-employment and annual physical fitness examination while NFPA 1583 can be used to help set the minimum standards/requirements for a fire service agency to establish a health-related fitness program for its members. NFPA 1582 describes in significant detail the required components of a comprehensive medical exam to include a medical history questionnaire, physical exam, estimated VO₂ testing, hearing, vision screening, and necessary lab work to determine the overall health of an individual and their ability to effectively perform the essential functions of their position as a pre-requisite to meeting the mandatory fitness evaluation as outlined in NFPA 1583.

NFPA 1582 also outlines a medical surveillance program developed to reduce risks and provide for the health, safety & effectiveness of firefighters operating to protect life and property

in an immediately dangerous to life or health (IDLH) environment and recommends the program consist of the following (NFPA, 2013):

- Physical Examination
- Blood Analysis
- Urinalysis
- Pulmonary Function Test
- Chest X-Ray
- EKG
- Infectious Disease Screening
- Cancer Screening
- Audiometric Exam
- Vision Test

NFPA 1582 also recommends that firefighters must be able to exercise at 12 METs. A VO₂ of 42.0ml/kg/min, without symptoms or electrocardiogram changes. However, fitness levels or exercise capacity equivalent to 14 METs, a VO₂ of 49.0 ml/kg/min have been recommended for active firefighters. At levels below 12 METs NFPA 1582 recommends a firefighter is counseled on ways to improve aerobic fitness (NFPA, 2013). At or below 8 METs it is recommended the firefighter be removed from essential job activities and placed on a prescribed aerobic fitness program (NFPA, 2013). According to McGraw Hill “the term MET refers to “metabolic equivalent”, a unit used to estimate the metabolic cost of physical activity” (Mcgraw Hill, 2018).

NFPA recognized that firefighting is considered to be among the most physically demanding occupations. Long work shifts, heavy EMS call volumes, and the need to ramp up to full speed on a moment’s notice all contribute to the potential for injury. Added to this is the

aging process, which tends to make the workforce slower and less flexible over time. As a result, the NFPA standard recognized that the minimum fitness requirements shall be determined by the agency's physician and will need to be based upon the firefighters assigned duties. Additionally, the NFPA also recognized the need to keep record of the firefighter's initial physical assessment throughout his/her career to compare results with other physicals. However, the NFPA also allows for the use of various fitness protocols to be used as a means to measure firefighter fitness and aerobic capacity. These protocols can include the use of a tread mill, step mill, or a stationary bicycle if needed (NFPA, 2013). As a result, there are other testing methodologies used to evaluate firefighter fitness for both new hires and current members. Initially the International Association of Firefighters (IAFF) and the International Association of Fire Chiefs (IAFC) partnered with 10 leading fire departments and unions across the United States to develop the IAFF/IAFC Candidate Physical Ability Test (CPAT) through the Fire Service Joint Labor Management Wellness/Fitness Initiative (IAFF, 2018). While most recently the National Testing network has also started providing fire service agencies with another convenient, professional administration of its proprietary firefighter physical ability test, the Firefighter Mile (FFM). Of the two tests both are considered to be performance tests fire service agencies can use to measure the critical skills of fire fighter candidates and evaluate entry level firefighters on their ability to meet the physical capabilities required to satisfactorily perform their job duties. Both the CPAT and the FFM are based on years of research in both physical ability testing and extensive job analysis based on facts and figures collected from various fire service agencies.

Currently the JTFD does not have a formal fitness policy in effect but it does have a formal fitness for duty agreement in place through a collective bargaining agreement (CBA) between the union and the township. Within the CBA the union and the township both

understand and agree that all fire personnel assigned to the JTFD shall be fit for duty as described in the current edition of the NFPA 1582 standard. It is further understood through the CBA that the ability of fire personnel to meet the standards as outlined in NFPA 1582 shall be the sole responsibility of the individual to maintain a health status consistent with the essential job tasks as described in NFPA 1582.

The final step in the literature review was to look at relevant information as it pertains to firefighters and the benefits of allowing competitive sports as a means to augment or enhance firefighter fitness. Although there are several exercise programs in existence it was difficult to find literature on the specific topic of competitive sports and its effects on firefighter fitness. However, both the International Association of Fire Fighters and the International Association of Fire Chiefs have continued to work together to collect medical, health and fitness related data while providing an analysis to improve the wellness of all fire service agencies. Some of which are directly related to firefighter fitness programs and the results associated with the significant cost and lost work time.

In 1998 ten fire service agencies were used to form the IAFF/IAFC Wellness-Fitness Initiative (WFI). These ten agencies worked together as a task force dedicated to developing a holistic, positive rehabilitating and educational approach to wellness and fitness programs in the fire service (IAFF, IAFC, 2018). As a result, they developed the fire service joint labor management wellness/fitness initiative, the candidate physical ability test (CPAT), and the fire service peer fitness trainer certification. Understanding the goal of the fire service joint labor management wellness/fitness initiative to improve the quality of life for all fire fighters and the need to track measurable statistical data collected from multiple departments over a multi-year period. The IAFF/IAFC Wellness-Fitness Initiative (WFI) is currently the only program found

specifically looking into firefighter fitness programs and the results associated with the significant cost savings in lost work time, workers compensation and disability claims.

According to the IAFF “The first phase of this comprehensive project on physical fitness and wellness issues involved the creation of a network of selected geographically diverse fire departments with excellent union/management relations” (NFPA, 2016). Departments selected to participate were each represented by the fire chief and the IAFF local union president, with invitations extended to the agency physician, exercise physiologist, and fitness coordinator (NFPA, 2016). The next phase of the wellness/fitness initiative required the development of a complete physical/fitness wellness program with the participating departments using statistical data to create valid baseline data suitable for fire service wide comparisons suitable for distribution to the fire service (IAFF, 2018).

As a result, the WFI provides a comprehensive plan for the implementation of a fire service occupational health-wellness program. However, it provides limited information in regards to competitive sports as a means of keeping firefighters fit. Subsequently the literature review was broadened to include the benefits of competitive sports as a means of general fitness.

In general, the physical benefits of playing sports are numerous. Exercise helps to control weight by burning calories, improves the cardiovascular system, and increases a person’s energy level while improving the quality of rest. It also provides long-term benefits, such as a reduced risk of heart disease, diabetes, and decreased body fat, while simultaneously, and improving blood cholesterol.

Despite the benefits, there are some associated risks with playing competitive sports. The competitive nature of the game can leave people prone to injury through overuse or overtraining. While the sudden start and stop of competitive sports can lead to an increase in musculoskeletal

injuries. According to Science Daily, the intensity of competitive games can lead players to disregard rules, increasing opportunities for torn ligaments, muscle aches and other injuries (Higgins, 2017). Finally, a research study conducted by the Los Angeles County Fire Department (LACFD) found that activities such, as basketball, volleyball, floor hockey, softball, racquetball, tennis, etc., do not provide the comprehensive and specific fitness firefighters need, and more significantly, have been shown to be responsible for an alarmingly high incidence of injury (Karr & Karwasky, 2018).

On duty injuries associated with competitive sports have led to financial impact on many fire service agencies and the governing authority. For example, data from the LACFD study indicates ankle injuries make up approximately 25% of all sports injuries with an estimated injury rate of 1.0 injury per 1000 hours of physical training (Karr & Karwasky, 2018). While a study of high school athletes looking specifically at basketball injuries have shown an injury rate of 3.0 injuries per 1,000 participations and 49.7% of these resulted in inability to compete for 1 week or more, with the average time being 2 weeks (Comstock, Yard, & Knox, 2007). Similar to these results, the LACFD study shows a basketball injury rate of 3.8 injuries per 1,000 participations with 45% of these resulted in inability to compete for 1 week or more, with the average recovery time being 2.2 weeks (Karr & Karwasky, 2018). While employers are covered by workers compensation as a means to help provide benefits to employees who become injured or ill for work related reasons. Fire service agencies are still concerned with keeping firefighters safe and healthy to perform their job when needed. The direct costs of injuries are generally pretty clear and found to be those financial costs claimed under workers compensation insurance. But the indirect cost can be even more costly and difficult to calculate. The American Society of Safety Professionals (ASSP) puts the ratio of indirect costs as high as 20:1 (ASSP, 2018).

Indirect cost can include the injured firefighters lost time, supervisors needed to investigate the occurrence, and any overtime expense to cover the injured firefighter. Therefore, when physical fitness activities are required on duty, firefighters who are injured from playing competitive sports are generally entitled to workers compensation benefits (FindLaw, 2017). While a firefighter who sustains an injury as a result of competitive sports on duty when the activity was prohibited by the employer may not be entitled to workers compensation benefits (FindLaw, 2017).

Another part of the literature review was looking to find information on best practices or the need for limitations on firefighters who may be allowed to play competitive sports on duty. Understanding that NFPA 1582 requires all firefighters to be medically cleared by the agency physician prior to engaging in any type of fitness program regardless of activity (NFPA, 2013). While also understanding that NFPA 1583 requires all firefighters to participate in annual fitness assessments (NFPA, 2015). No literature was specifically found addressing limitations for on duty firefighters playing competitive sports as part of a fitness program. However, there is no question that substantial levels of physical fitness are required for firefighting (Hayford, 1996). Physical fitness training is very specific, and your body will respond to it in very specific ways. Subsequently fitness training will only accomplish its desired goal if you do it correctly. For example, if you want to increase flexibility, you must regularly stretch. Without regular static stretching, muscles will gradually become tighter. Similarly, if you want to improve muscular strength, specific muscle contractions with relatively heavy loads are the only way to become stronger and improve muscular endurance. Otherwise, strength is progressively lost as time goes by (Hayford, 1996). The same can be said for improving cardiovascular fitness, regular aerobic exercise that is sustained for at least 20 minutes is all that will achieve this goal.

Competitive sports like Basketball, volleyball, softball and other sports are designed only for fun and competition and are not useful for increasing or maintaining physical fitness (Hayford, 1996). No static stretching occurs, or any type of muscle contractions against fairly heavy resistance, so they can't improve your flexibility or strength. Subsequently, sports are rather ineffective forms of cardiovascular exercise because your physical activity is not maintained steadily throughout the game (Higgins, 2017). Instead, physical activity fluctuates from brief periods of high intensity down to almost no activity at all in between plays and penalties. To derive the same cardiovascular benefit from 30 minutes of sustained jogging, biking or swimming you'd have to play several hours of these sports (Higgins, 2017). As such competitive sports should not be the only form of exercise to promote a firefighter's ability to stay in shape. Instead firefighters must participate in other forms of exercise (i.e. strength training, regular aerobic exercise, etc.) to become physically fit for the job.

Procedures

The purpose of this research was to evaluate the effects of competitive sports on firefighter fitness. This topic was chosen because prior to October 2017, JTFD allowed its firefighters to play competitive sports on duty as part of its physical fitness program. Beginning on October 6, 2017, an email was sent from the Fire Chief to all JTFD personnel prohibiting on duty competitive sports activities (i.e. basketball, volleyball, etc.). (Shull, Personal Communication, 2017). Currently the JTFD has not conducted any research as to whether or not competitive sports enhanced or diminished firefighter fitness levels, and what limitations should be implemented if needed.

To accomplish the purpose of this paper the descriptive research method was used to answer the five research questions. The procedures used to answer these questions involved three components.

The first components involved the literature review process to obtain background information effecting the fire service and look at current trends as it pertains to on duty competitive sports in the fire service. The topic for this research was identified while attending the Executive Development (ED) course at the National Fire Academy (NFA) in August 2018. Information used in this ARP from the literature review are indicated in the reference section of the paper.

The first step to find literature for this ARP occurred while attending the ED course at the NFA using the Google search engine to find websites, journal articles, scholarly references and other resources related to on duty competitive sports and its effects on firefighter fitness. Simultaneously while still at the NFA the Learning Resource Center (LRC) was also utilized. Although the Google web search revealed several resources pertaining to firefighter fitness and

competitive sports little was received from the LRC. Additionally, a search to find other online ARPs did reveal a few research papers with similar topics related to firefighter fitness.

The library at the Ohio Fire Academy (OFA) and the Columbus Metropolitan Library were both used to find relevant resources which could be used to provide further information for the literature review process. Both libraries proved to be somewhat useful and provided several resources on firefighter fitness and competitive sports as separate issues however, nothing could be found directly relating competitive sports and firefighter fitness. As a result, any information obtained outside of the study conducted by the LACFD was covered as separate topics and would need to be linked together through the formal research process.

The next component used to gather information for this ARP involved the use of online surveys. The survey instrument was SurveyMonkey a free online survey tool used to capture voices and opinions of the people in the fire service industry. The initial survey was an internal survey used to solicit feedback from JTFD members in regards to allowing competitive sports on duty as part of its physical fitness program and was sent via email to all the members of the JTFD (Appendix C). This survey asked JTFD members how often they played competitive sports on duty, the types of competitive sports, changes in fitness levels when playing competitive sports, amount of time spent on fitness activities, benefits, risks, safeguards, and limitations associated with on duty competitive sports, and if members should be allowed to play competitive sports while on duty. Members were given two weeks to respond and all responses were given voluntarily. However, not all questions within the survey were directly related to answering the research question. Questions not directly tied to the research question were asked in an attempt to help improve the validity of the survey and the responses received. The total

amount of surveys sent out were 25 of which 14 were received. Responses to these survey questions will be covered in the results section of this ARP.

The second survey was an external survey used to solicit feedback from members of outside agencies in regards to allowing competitive sports on duty as part of its physical fitness program and was sent via email through the members forum to members of the Ohio Fire Chiefs Association (OFC) while simultaneously soliciting feedback from EFO classmates around the United States through a collaborative Facebook page titled NFA EFO 2014 to present (Appendix D). Although similar to the internal survey this survey asked participants to answer questions in regards to their agency instead of individuals and whether their agencies allowed competitive sports part of their physical fitness program. Specifically, the survey focused on whether or not an agency allowed on duty competitive sports part of their physical fitness program and if so, what was the overall impact on firefighter fitness and injuries. Subsequently the same survey also asked about any limitations or constraints placed on the program.

The external survey was sent to fire chiefs of career or combination fire departments located in various geographic locations throughout the United States. Volunteer agencies were not included since the focus of the ARP was related to career personnel playing competitive sports while on duty in a paid status. Most of the agencies who participated in the survey were considered to be medium to large departments serving a population in excess of 20,000 to 40,000 with more than two stations. The contact information for those who participated was provided in the final question by all who participated in the external survey. It was important to note the researcher originally wanted to solicit feedback from similar agencies located in the same state. However, when contacted the Ohio Fire Chiefs Association (OFCA) originally refused to send any surveys or survey links affiliated with NFA's EFO program to their members. Their

reasoning to not cooperate revolved around the competition of the Ohio Fire Executive Program offered through the OFCA and the NFA's EFO program. However, after reaching out to a few of the OFCA board members and the association president the researcher was allowed to post the external survey link in the members forum. Unfortunately, this only yielded two responses from agencies in the state of Ohio. Subsequently the external survey link was sent to the researchers EFO classmates via email and through the use of a collaborative Facebook page titled NFA EFO 2014 to present. The total number of completed surveys received from this focus group was 42 responses.

The total number of external surveys sent out was 351 of which 42 were completed. The total number of both internal and external surveys was 376 of which 56 were completed. The collective participation rate for both surveys was 15%. The survey questions and collective results can be found in Appendices C & D.

The final component used to gather information included two interviews with feedback from questionnaires. Although the internal and external survey provided a broad perspective of competitive sports and the effects on firefighter fitness, it was necessary to conduct interviews to capture specific and detailed information that could not be obtained through the use of surveys. Personnel selected to be interviewed were certified exercise physiologists affiliated with Mount Carmel Occupational Health (MCOH). The first was Ms. Anna Sapp a Clinical Exercise Physiologist trained to prescribe exercise, basic health behavior interventions and promote physical activity for individuals with chronic diseases or conditions. Ms. Sapp was interviewed because she is one of the primary employees from MCOH who helps to facilitate JTFDs comprehensive annual comprehensive medical and fitness evaluations for department members. Subsequently as an employee of MCOH, Ms. Sapp also holds a Bachelor of Science Degree

from the Ohio State University in Exercise Science/Sports Administration and has been working with the JTFD for the past 4 years to help administer the agencies annual physicals and fit for duty testing as outlined in the CBA. Ms. Sapp also holds numerous other qualifications pertinent to the fitness industry. Questions for Ms. Sapp and her responses can also be found in Appendix H. Subsequently during her interview, Ms. Sapp also provided the overall 2018 fitness results for the JTFD which can be found in Appendix G. The second interview was Mr. Matthew Sulka also a Clinical Exercise Physiologist with MCOH trained to prescribe exercise, basic health behavior interventions and promote physical activity for individuals with chronic diseases or conditions. He holds a Bachelor of Science Degree in Sports Medicine and has also been working with the JTFD to help administer the agencies annual physicals and fit for duty testing as outlined in the CBA. Mr Sulka was selected to be interviewed based upon his role of department coordinator at MCOH who works with a team of exercise physiologists to coordinate fire department physicals for various agencies located in the greater central Ohio metropolitan area. The results of his interview can be found in Appendix I.

The questionnaires and interview questions developed were used to gather opinions and data from subject matter experts in the arena of competitive sports, firefighter fitness and how it effects occupational health in the workplace. Both interviews were comprised of the same questions and were based on the expertise each of them could provide about fitness tests, body fat, blood pressure, oxygen usage, and other key patient health indicators as outlined in NFPA 1582. To be specific both interviews asked whether or not limitations should be implemented for firefighters playing on duty competitive sports and whether or not they should be allowed to resume on duty competitive sports at the JTFD. Additionally, the interviews were specifically used to address all five research questions.

While working on this ARP there were three limitations encountered. The first limitation was the time available to complete the ARP. Currently the National Fire Academy only allows six months to complete the ARP. The second limitation was the limited amount of information available in regards to on duty competitive sports and how it effects firefighter fitness levels. As a result, the surveys and interviews played a significant role in answering the research questions. The third limitation revolved around the external survey and the assumption that only a single participant would answer for each agency. Multiple participants from any single agency could skew the results completely throwing off the results. However, the researcher did try to limit this by asking survey respondents to provide agency contact information as part of the survey to help ensure that only one respondent would participate from each agency.

Results

The results of this research were obtained through an extensive literature review process, an internal survey sent to JTFD members, an external survey sent to fire departments across the U.S., and two interviews. The research conducted was used to address the purpose of the ARP and answer the five research questions. Subsequently the results of the research have provided information for the JTFD to make an informed decision as to allow or continue prohibiting its firefighters from playing any competitive sports while on duty.

The first research question asked what are the potential benefits of firefighters playing competitive sports on duty. Literature review, surveys, and interviews were utilized to answer this question. The literature review for this specific question yielded limited information at best and did not provide enough information of firefighters involved in competitive sports. Subsequently the literature review was expanded to include the benefits of competitive sports activities in general for all participants regardless of whether they were firefighters. As a result, valid literature was revealed on the types of exercise programs which could be used to improve firefighter fitness while also related to competitive sports activities.

High-Intensity Interval training (HIIT) was found to be an excellent form of exercise for fire service personnel because it mimics the job and sports related activities so well (Moore, 2016). HIIT is a training technique in which you give all-out, one hundred percent effort through quick, intense bursts of exercise, followed by short, sometimes active, recovery periods (Schlinger, 2017). Even though HIIT is known to provide several benefits for firefighters and athletes alike, several sources feel HIIT may be superior to other more traditional forms of exercise to include competing in sports related activities (Moore, 2016). According to the American College of Sports Medicine HIIT improved “aerobic and anaerobic fitness, blood

pressure, cardio vascular health, insulin sensitivity, cholesterol profiles, and abdominal fat and body weight while maintaining muscle mass” (The American College of Sports Medicine , 2014, p. 1). Additionally, recent research conducted on the obesity and fitness levels of firefighters proved that firefighters who participated in HIIT were 33% more likely to meet the 12 MET aerobic fitness standard as outlined in NFPA 1592 the standard on comprehensive occupational medical program for fire departments (Jahnke, et al., 2015).

There is no question that firefighting and rescue work require personnel to be in a reasonable amount of shape. According to John Hayford “A recent review of the available scientific literature on firefighting job performance concluded that without a moderately high level of physical fitness, firefighters cannot perform their jobs safely or well” (Hayford, 1996). The end result is that out of shape firefighters jeopardize the safety of not only the individual but also their entire crew. Even though many firefighters follow a regular exercise and conditioning program. There are still personnel who struggle to stay in shape and find creative ways to motivate themselves when it comes to on duty fitness programs.

Generally speaking an effective cardiovascular workout including warm-up and cool-down usually takes anywhere from 20 to 45 minutes. Stretching shouldn’t take much more than 10 or 15 minutes, while a respectable strength conditioning program can be completed in about 45 minutes to an hour. Individuals who dedicate themselves to a regular fitness program will most likely improve their level of fitness while simultaneously decreasing the risk of injury. Flexible, strong muscles protect your joints and are able to withstand high stresses (Hayford, 1996). While a well-conditioned cardiovascular system reduces the chance of experiencing exhaustion during prolonged exertion (Hayford, 1996). This is significant because most injuries usually occur when people are fatigued and tired. Consequently, people who take the time to stay

in shape and are physically active generally have fewer and less injuries than those who adopt a sedentary lifestyle. However, there are a considerable number of firefighters who do not use their allotted time for physical fitness wisely. Some waste it, avoiding exercise whenever possible while others rely on the habits of their co-workers or shift leaders to determine what they do for themselves (Schlinger, 2017). While others spend their entire physical fitness time playing competitive sports such as basketball, and volleyball. According to John Hayford “For people who rely on recreational sports as their training, there is a high rate of injury, and this is no coincidence” (Hayford, 1996). And then as an example there are those who neglect stretching and aerobic activity and only participate in strength training. Again, another population of firefighters who are more susceptible or prone to injury.

Competitive sports like Basketball, volleyball, softball and other sports are designed only for fun and competition and are not useful for increasing or maintaining physical fitness (Hayford, 1996). As a result, static stretching doesn’t occur during competitive sports activities, or any type of muscle contractions against fairly heavy resistance, so it doesn’t improve your flexibility or strength. Although, physical activity does fluctuate from brief periods of high intensity down to almost no activity similar to a HIIT workout. Most competitive sports are still not considered an effective means to get you in shape. Instead competitive sports are generally considered a good way to stay in shape and improve your skills at the particular game being played while also burning a few calories in the process. However, in a profession like the fire service it is vital to keep these points in mind when approaching a fitness program designed to improve individual fitness and reduce overall injury.

Information obtained from both the internal and external surveys were used to help answer the second research question. Both surveys also asked participants about the advantages

and disadvantages of allowing on duty competitive sports for fire service personnel. The results of these surveys are shown below.

Question 1 of the internal survey asked participants if they had participated in competitive sports (i.e. basketball, volleyball, etc.) while on duty? Results of this question can be found in Figure 1.

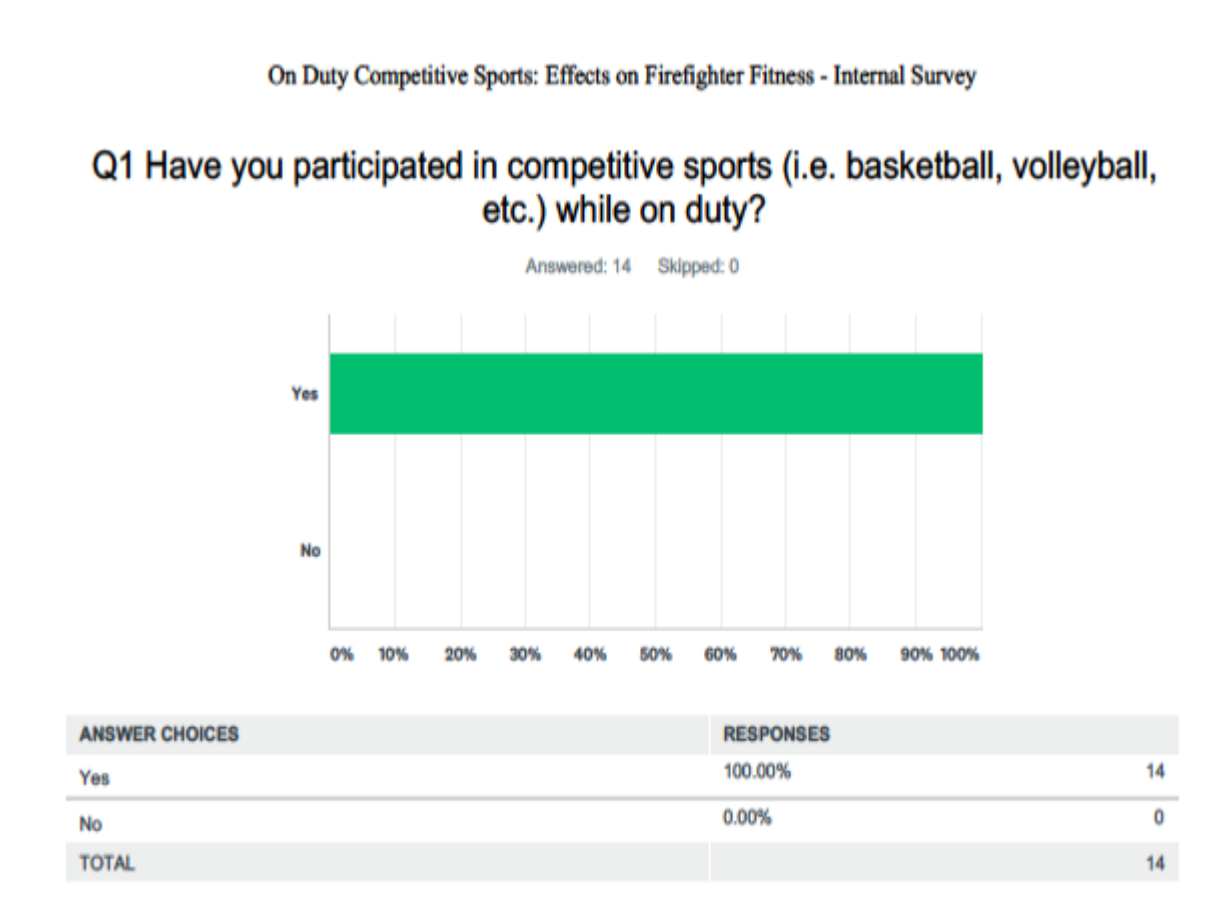


Figure 1. JTFD Participation in On Duty Competitive Sports

All of those who participated in the survey indicated they had participated in competitive sports (i.e. basketball, volleyball, etc.) while on duty. This question was used to help establish a baseline for the survey demonstrating that most if not all firefighters or fire service agencies currently allowed or have allowed their members to participate in competitive sports when on duty. If the results would have indicated otherwise this would have limited the amount of data

collected and become a constraint for other questions asked in the survey. Subsequently the results of question 1 demonstrates the level of acceptance or approval of using competitive sports as a means of fitness for on duty firefighters.

Question 2 built upon the first question and asked participants how often they used competitive sports as a formal fitness activity when on duty. Results of this question can be found in Figure 2.

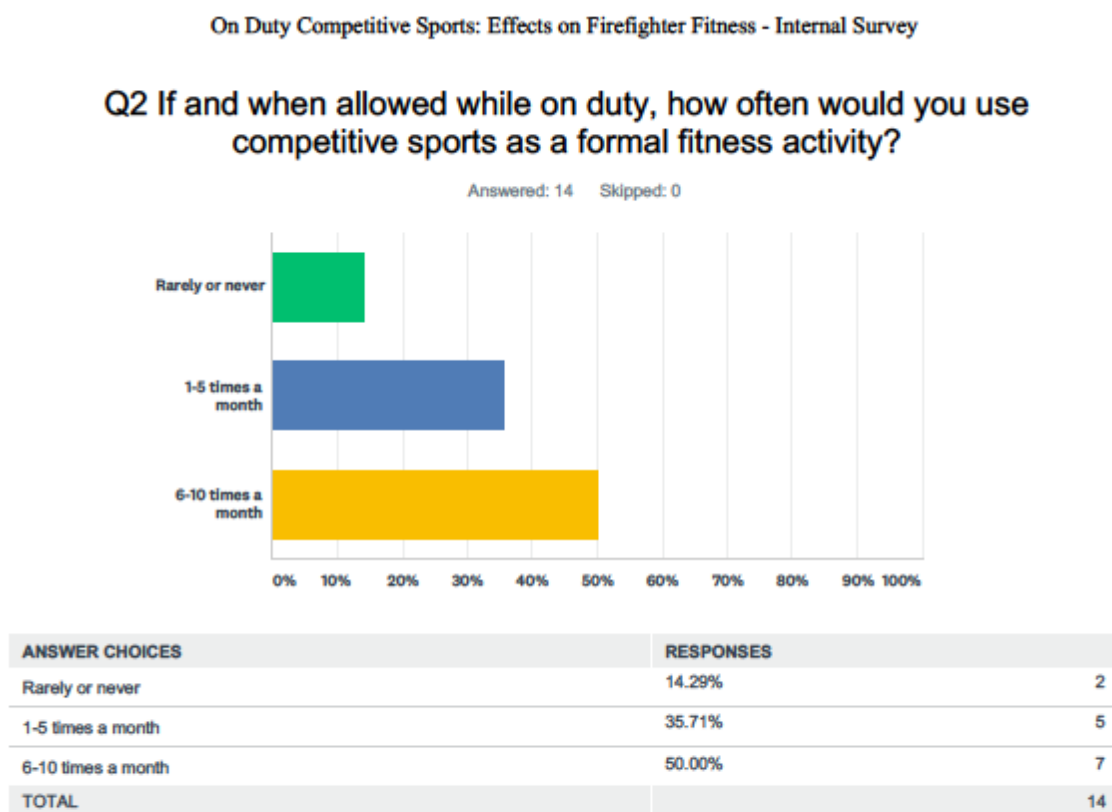


Figure 2. Frequency of On Duty Competitive Sports

Results from question 2 of the internal survey showed that 50% of the JTFD members used competitive sports as a form of physical fitness 6-10 times a month before the agency prohibited its firefighters from playing any competitive sports while on duty. Additionally, almost 36% of JTFD's firefighters used competitive sports as a form of physical fitness 1-5 times a month while

the remaining 14% said rarely or never. The results of this question were used to help determine the frequency JTFDs firefighters used competitive sports as a formal fitness activity while also supporting the results of the first survey question demonstrating the amount of involvement in on duty competitive sports before being prohibited.

The third survey question asked JTFD firefighters which types of competitive sports they played on when duty. Results of this question can be found in Figure 3.

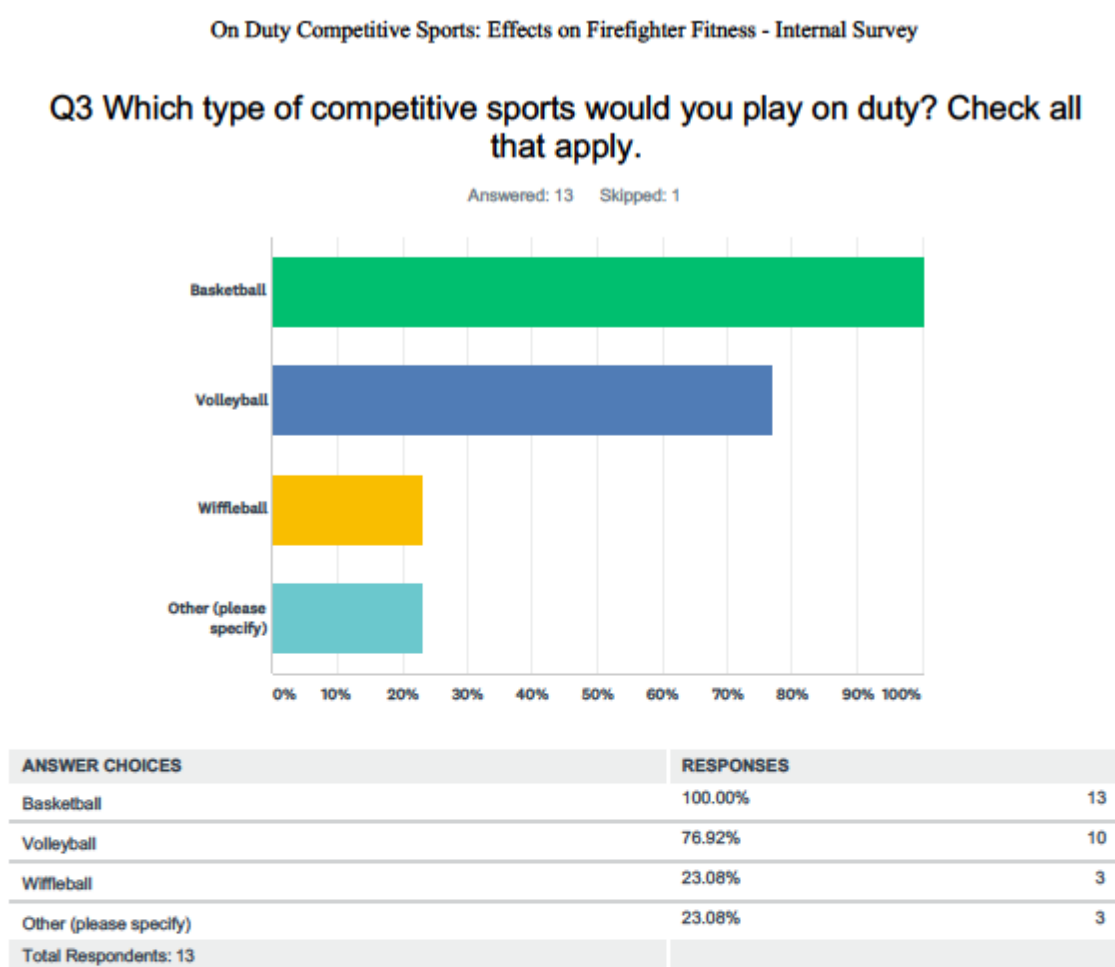


Figure 3. Types of Competitive Sports Played on Duty

For question 3 participants were allowed the option of selecting multiple sports activities with the opportunity to identify other sports activities not listed. The results from question 3 indicated

that basketball was the most common with 100% participation from on duty personnel.

Volleyball was found to be next most popular amongst the personnel with wiffleball ranking the third most common competitive sports activity. Other on duty competitive sports activities indicated included soccer, pickleball, and firefighter combat challenge preparation. The results of this question were used to help determine the types of competitive sports JTFD personnel were participating in before on duty competitive sports were prohibited. Subsequently the results were used to determine if on duty competitive sports being played could be considered a form of high intensity interval training (HIIT) which many consider a legitimate form of exercise. Even though volleyball ranked as the second most frequent competitive sports activity amongst JTFD personnel it would not be considered a form of HIIT to stay physically fit. However, based on the literature review, the competitive sports activities amongst JTFD personnel would still only have limited potential to increase firefighter fitness levels.

Along with the internal survey the external survey asked similar questions to establish the validity of participants responses. The first question asked participants if their agency allowed its personnel to play competitive sports on duty? Results can be found in Figure 4.

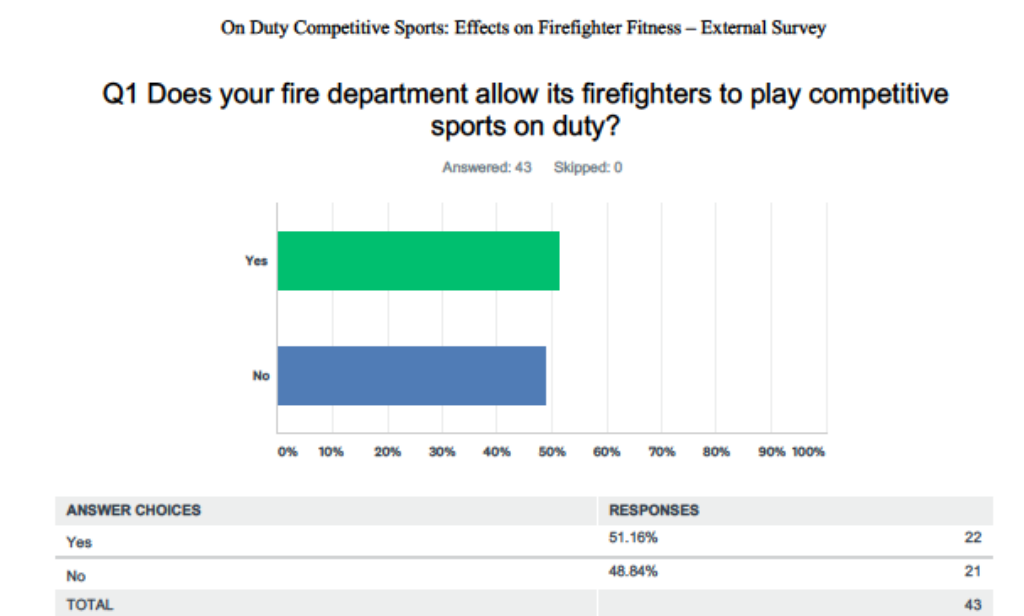


Figure 4. Percentage of Fire Service Agencies that Allow on Duty Competitive Sports

At 51% just over half of the respondents indicated their organizations currently allowed its firefighters to play competitive sports when on duty. Subsequently the results of this question were used to determine the number of agencies who allowed competitive sports when on duty. The second question from the external survey asked participants to indicate the types of competitive sports that were allowed on duty. Results can be found in Figure 5.

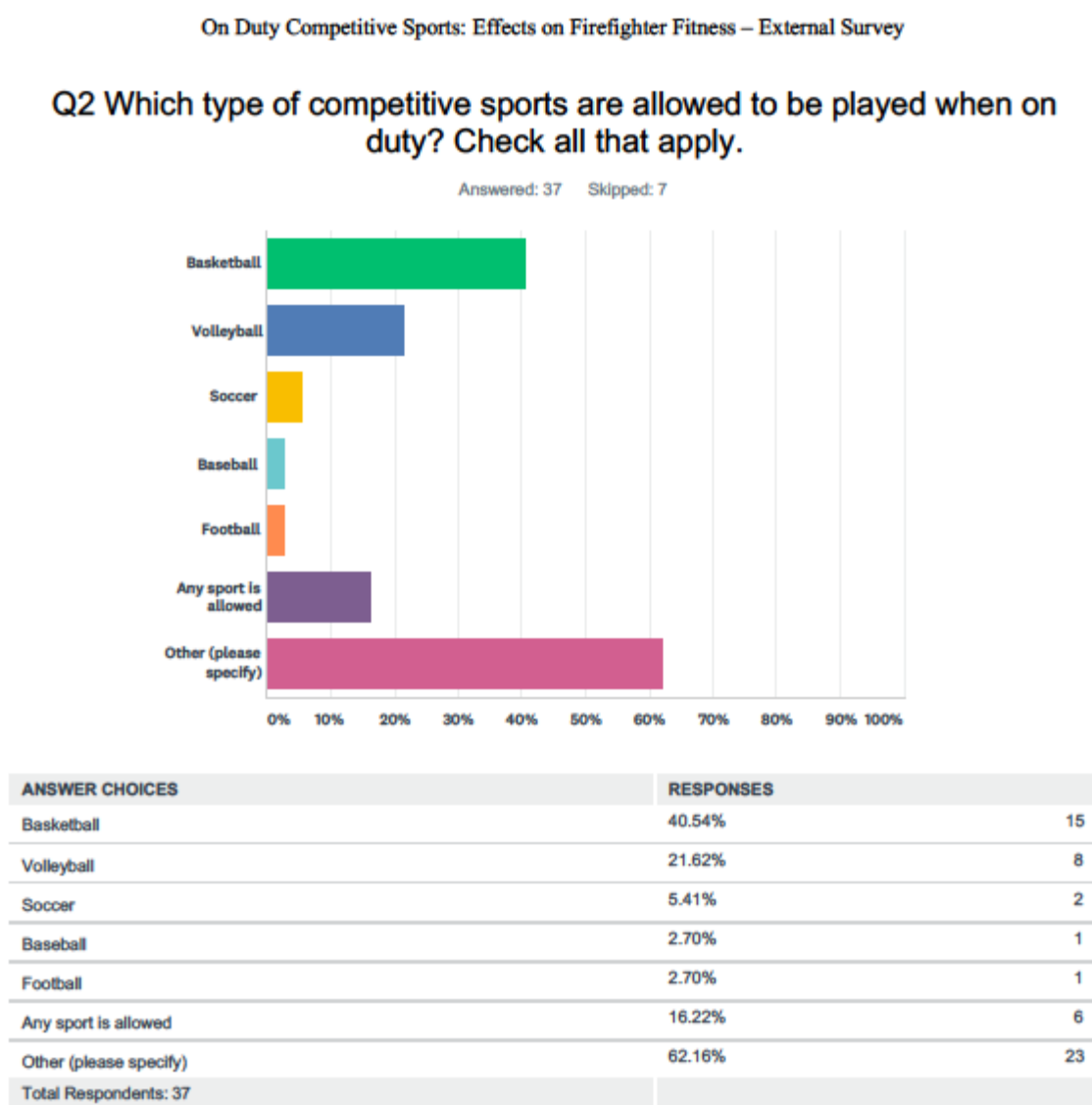


Figure 5. Types of Competitive Sports Allowed

Similar to the internal survey basketball was the most popular on duty competitive sport amongst fire service personnel. Twenty-three responses received additional feedback in the other or please specify category. Of these 23 responses 4 respondents indicated sports activities such as tennis, water ball, pickleball, and softball while the remaining 19 respondents clearly indicated that their agencies did not allow competitive sports activities for on duty crews. However, it is important to note that 16% of the respondents indicated that any competitive sport is allowed. Subsequently similar to the internal survey these results were also used to determine if the on duty competitive sports allowed could also be considered a form of high intensity interval training (HIIT) to improve firefighter fitness.

Both surveys asked participants to elaborate on the benefits of allowing firefighters to participate in competitive sports while on duty. Question seven of the internal survey asked participants to elaborate on the benefits for firefighters being allowed to play competitive sports while on duty. For this question participants were allowed the option of selecting multiple reasons with the opportunity to identify other reasons not listed. All survey participants felt that on duty competitive sports were a fun form of exercise and promoted teamwork. Other results with a high selection rate included: encourages personnel to become more active (92%), improves fitness (85%), promotes a culture of fitness (78%), and reduces stress (78%). However, only 50% of the participants felt on duty competitive sports promoted a positive image of fire service personnel. In the “other please specify” category one respondent felt on duty competitive sports took the shenanigans of the fire house outside away from the admin. Results from this question can be found in Figure 6.

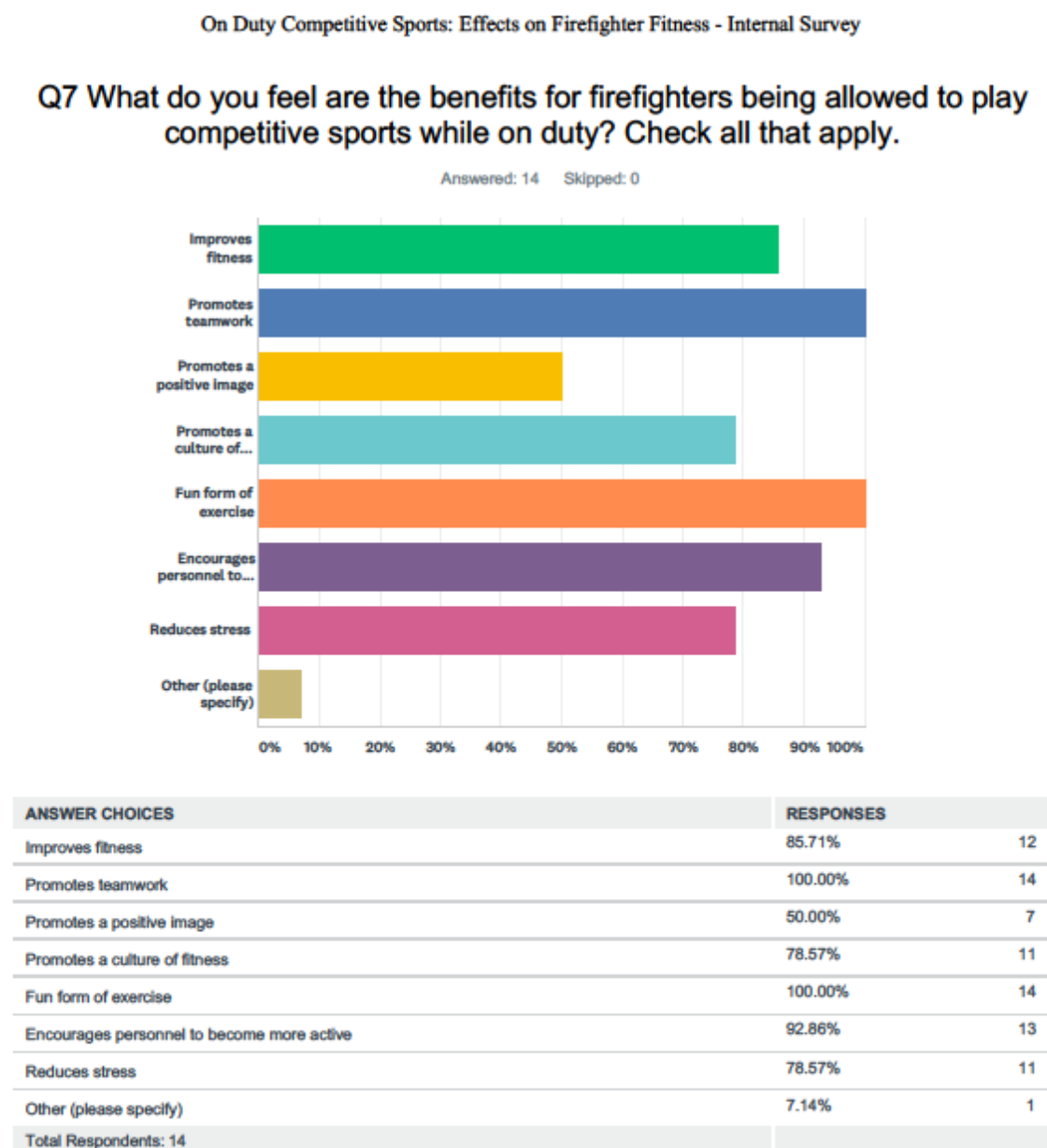


Figure 6. Benefits of On Duty Competitive Sports (Internal Survey)

Question 6 of the external survey also asked about the benefits of allowing firefighters to participate in competitive sports while on duty. The results can be found in Figure 7.

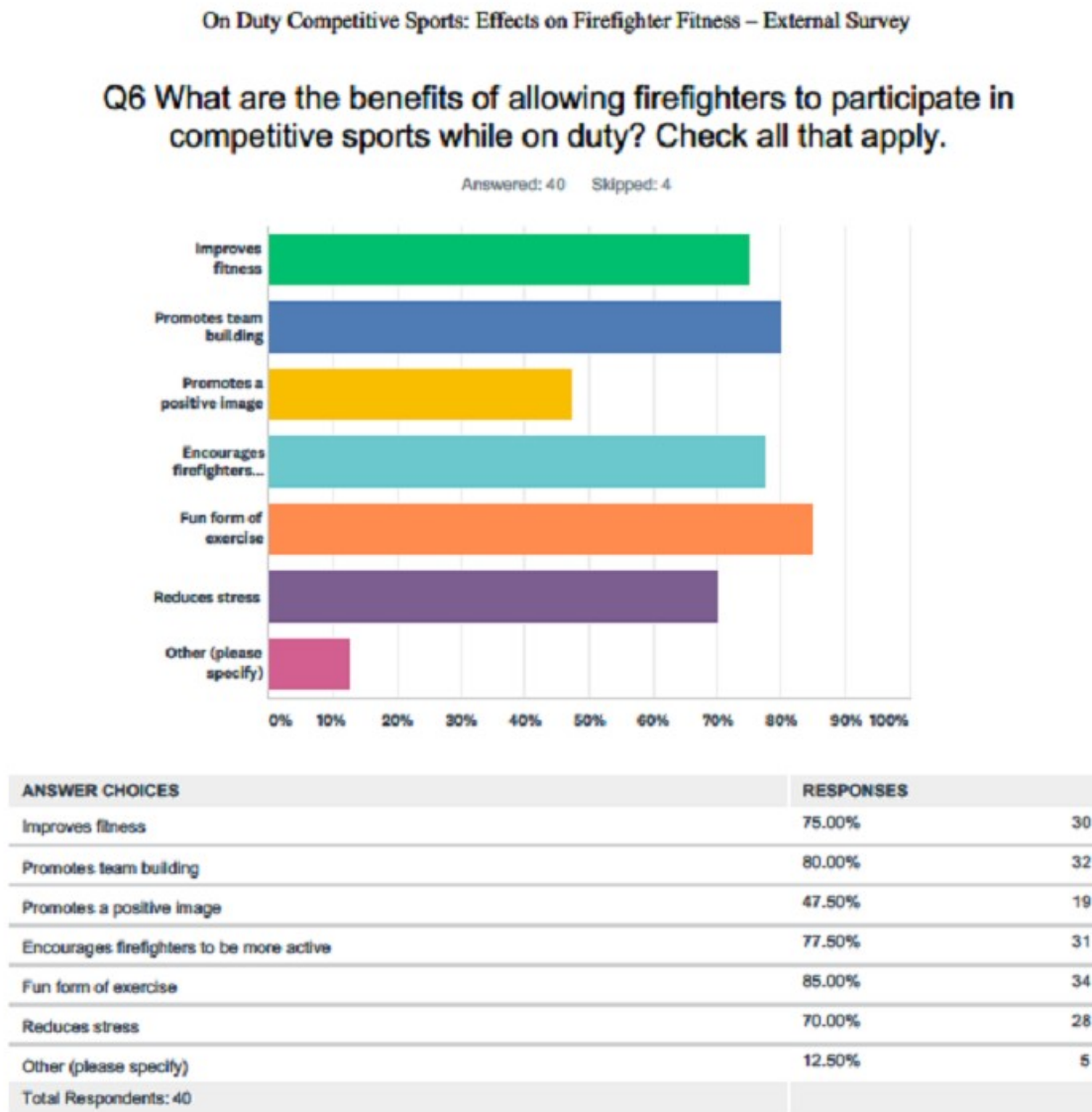


Figure 7. Benefits of Allowing On Duty Competitive Sports (External Survey)

As with the internal survey participants were also allowed to select multiple answers. The majority of respondents (85%) felt competitive sports were a fun form of exercise. Other results with a high selection rate included: promotes team building (80%), encourages firefighters to be more active (77%), improves fitness (75%), and reduces stress (70%). However, similar to the internal survey only 47% felt on duty competitive sports promoted a positive image. Responses

in the “other please specify” category either didn’t allow on duty competitive sports or felt they were a natural fit for a team-based organization.

Both surveys had some similar responses from personnel both inside and outside the agency. In both surveys the majority of participants felt the top three benefits of allowing firefighters to participate in competitive sports were based upon a fun form of exercise, that promoted teamwork, while encouraging firefighters to be more active. All three were commonly viewed as benefits of allowing on duty competitive sports activities. Subsequently both surveys did not feel that allowing on duty competitive sports promoted a positive image of firefighters. However, 60% of the participants felt it did improve firefighter fitness levels.

Additional survey questions from both surveys helped to provide further information on the benefits and disadvantages of allowing on duty competitive sports. Question 5 of the internal survey asked participants to describe the amount of time they spent on fitness since competitive sports were banned. The results from this survey question can be found in Figure 8.

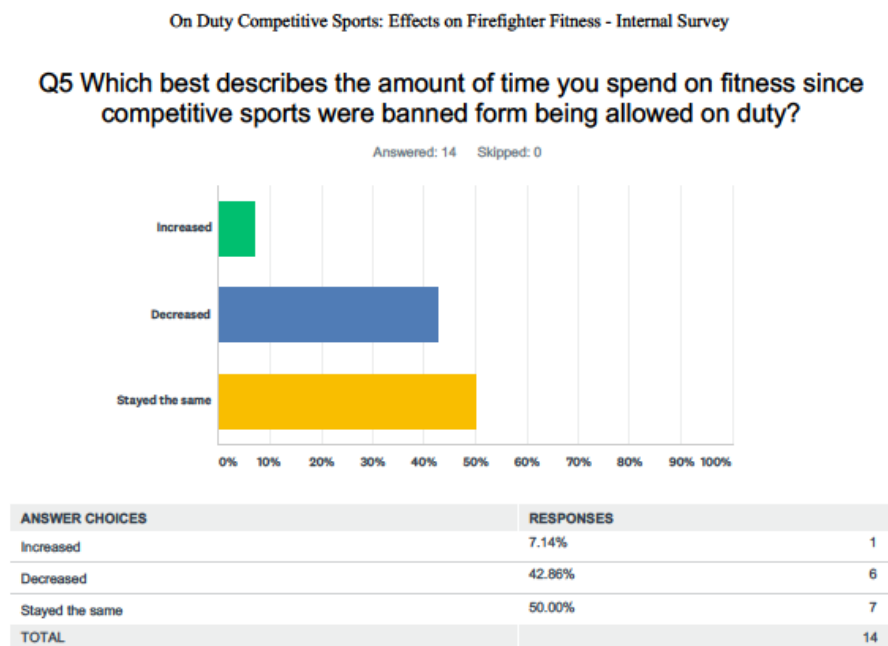


Figure 8. Amount of Time Spent on Fitness

Results from this survey question showed that 42% of the participants stated that the amount of time they spend on fitness since competitive sports were banned from being allowed on duty had decreased. While only 7% indicated that time spent on fitness had improved while 50% felt the amount of time spent on fitness had remained the same. Results from this question demonstrates a decrease in overall amount of time spent on fitness related activities from a significant portion of the JTFD population.

Question three from the external survey asked participants about the impact of allowing on duty competitive sports have on firefighter fitness levels. The results from this survey question can be found in Figure 9.

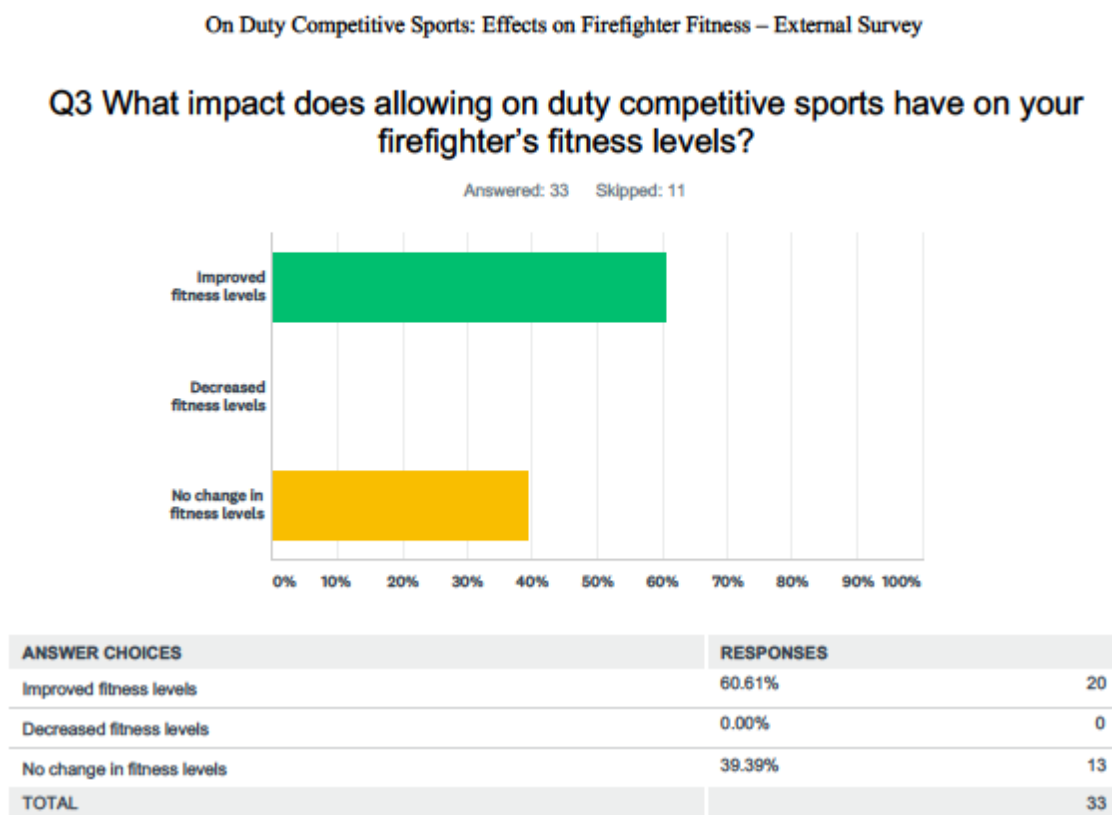


Figure 9. Impact of Allowing On-Duty Competitive Sports

60% of the participants felt allowing on duty competitive sports improved the level of their firefighter's fitness levels. While no participants felt it decreased firefighter fitness, 39% stated that fitness levels did not change with on duty competitive sports activities.

The second research question asked what were the potential risks of firefighters playing competitive sports on duty. Again, literature review, surveys, and interviews were used to help answer this question. Initially information used from the literature review process was used to help answer this question. Information found from one source indicated that little risk is involved in participating in moderate-intensity sports such as swimming or cycling at a moderate pace, however the risk of musculoskeletal injury increases with the amount of intense physical activity (Cohen, 2018). Subsequently according to a study found in the US National Library of Medicine National Institute of Health "people who participate in team ball sports, injuries can unfortunately be a common occurrence" (Fortington, 2016).

Other issues associated with competitive sports such as basketball, volleyball, and other competitive sports activities are that they were really only designed as a fun form of competition. They really are not considered useful for increasing or maintaining physical fitness (Hayford, 1996). Furthermore, allowing on duty competitive sports may not be the most effective use of a firefighter's time to help improve fitness while simultaneously increasing the risk or potential for injury. However, there is also literature which disagrees with these findings and promotes the use of competitive sports to help motivate people who would normally not work out at all. According to the Department of Health and Human Services Physical Activity Guidelines for Americans "Playing sports like basketball, volleyball, and soccer are also great ways get in your 150 minutes of physical activity during the week" (Department of Health and Human Services, 2018).

Another issue associated with allowing competitive sports on duty is the financial impact associated with the high risk of injury. Injuries related to on duty competitive sports can lead to significant workers compensation claims. Subsequently when an on-duty injury occurs as a result of on duty competitive sports related activities, it's easy to perceive the immediate and direct costs, but there are a multitude of indirect costs and tertiary effects that should be taken into consideration. Although not immediately evident indirect costs have the potential to be costlier than the direct cost. Consequently, eliminating on-duty competitive sports and preventing workplace injuries not only keeps your employees safe, it also helps to minimize these potentially unwanted costs. Indirect costs associated with an on-duty injury can present themselves in the form of legal expenses, overtime pay for workers, BWC premium increases, fines, injury investigation, and other administrative costs.

Both the internal and external survey provided information which could be used to answer the second research question. Subsequently participants were asked in both surveys about the drawbacks (potential or real) of allowing firefighters to play competitive sports while on duty. Figure 10 will show the results of the internal survey and Figure 11 will show the results of the external survey.

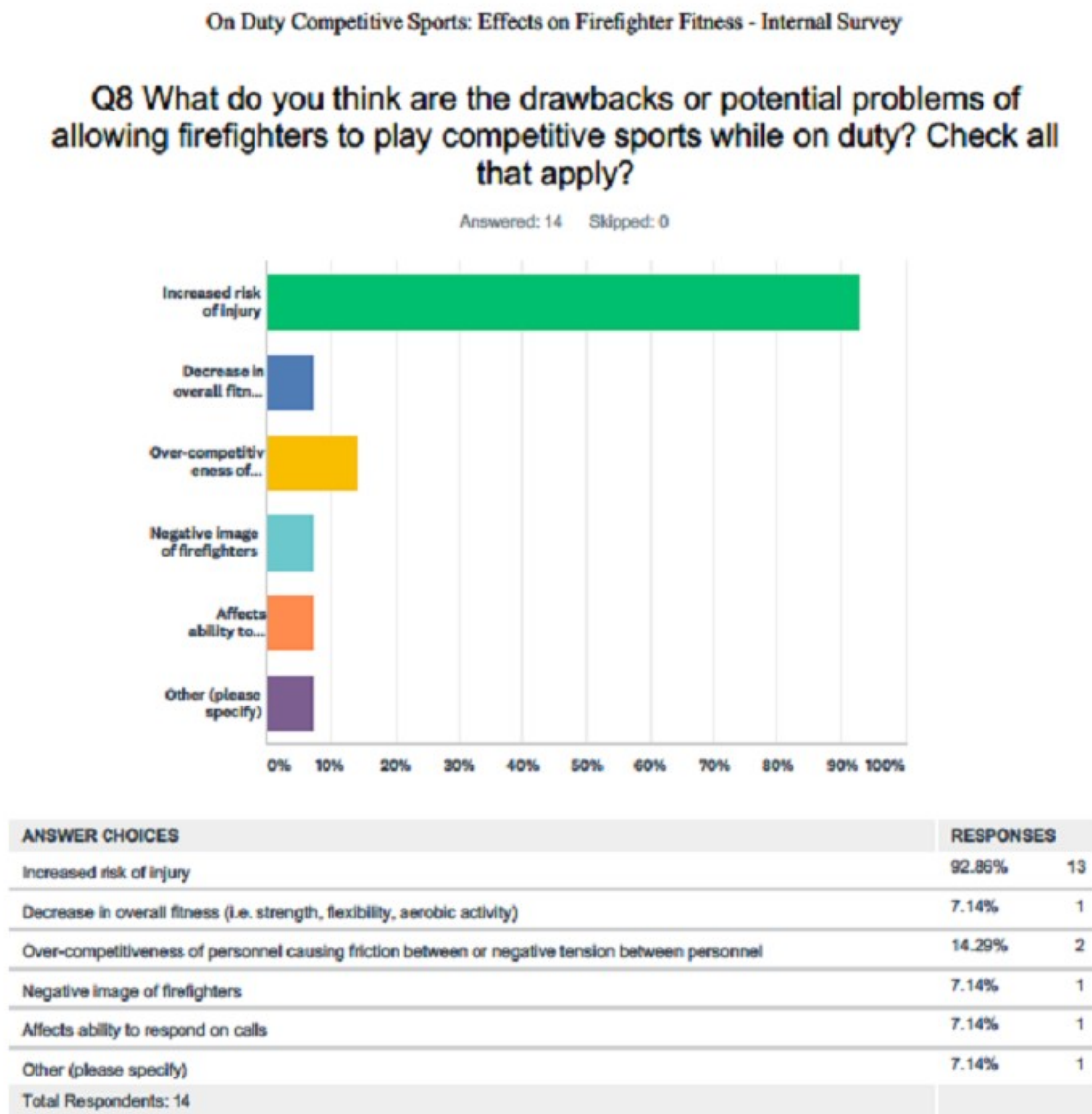


Figure 10. Drawbacks or Potential Problems (Internal Survey)

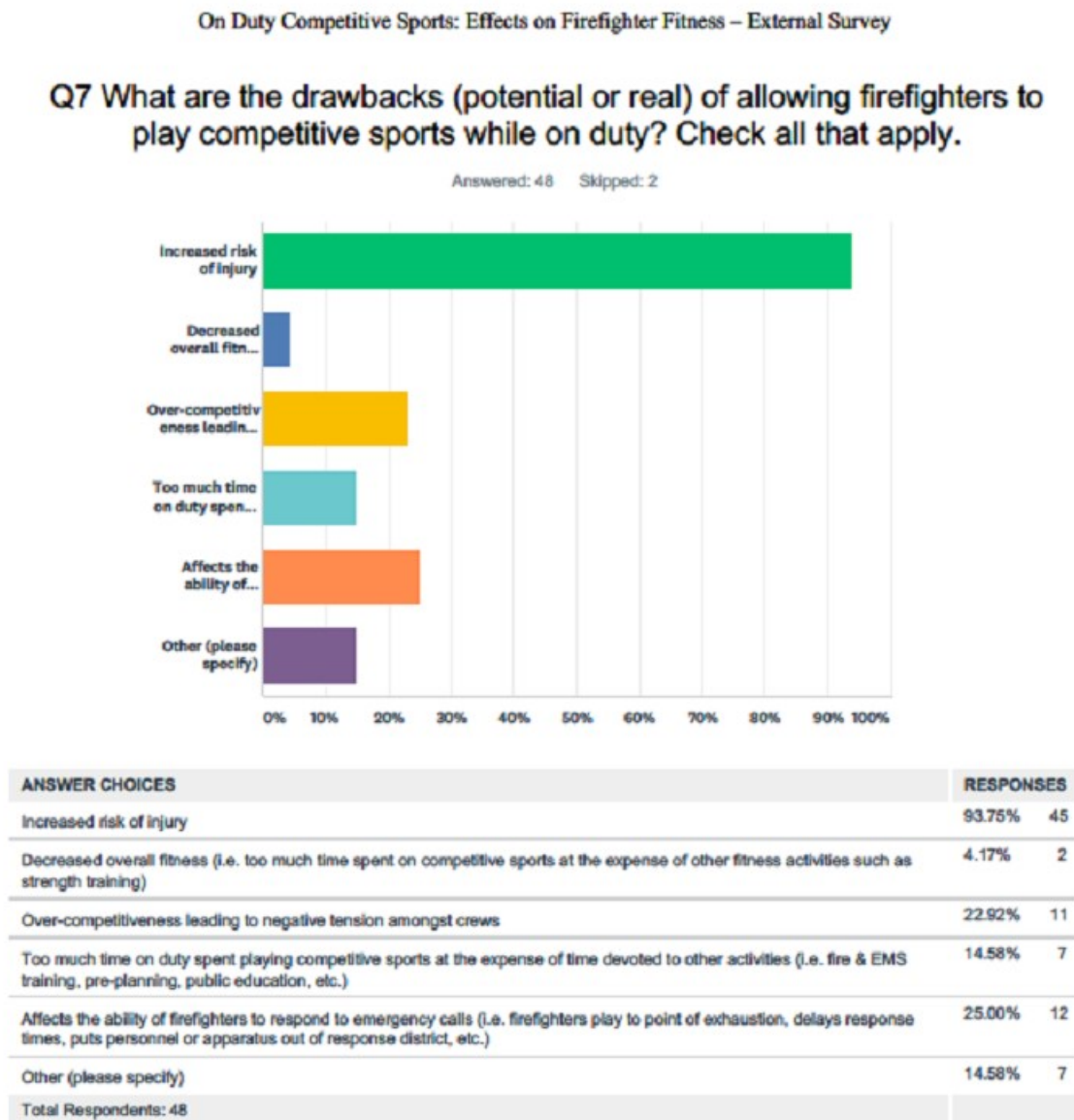


Figure 11. Impact of Allowing On-Duty Competitive Sports (External Survey)

In both surveys the most frequently selected drawback (potential or real) of allowing firefighters to play competitive sports while on duty was the increased risk of injury. 92% of the members affiliated with the JTFD recognized and selected this choice as the biggest drawback associated with allowing on duty competitive sports. While 93% of non-JTFD personnel also agreed with increased risk of injury as the biggest drawback to allowing on duty competitive sports. The

second highest drawback according to JTFD personnel at 14% was a result of over competitiveness of personnel and the friction or negative tension amongst personnel.

Subsequently the non-JTFD personnel indicated a similar response in the external survey with over competitiveness coming in at 22%. However, there was also a concern with competitive sports affecting the ability of firefighters to respond to emergency calls at 25% by non-JTFD personnel. While internal participants felt this would only affect their ability to respond on calls 7% of the time. External survey participants stated in the “other” category that other drawbacks included public perception, negative public image, and a potential for a delayed response. Internal respondents stated in the “other” category that they did not think there was any negative impact with allowing on duty competitive sports activities.

The External survey asked participants from outside agencies about the impact on injuries to firefighters from allowing on duty competitive sports. Results from this survey question can be found in Figure 12.

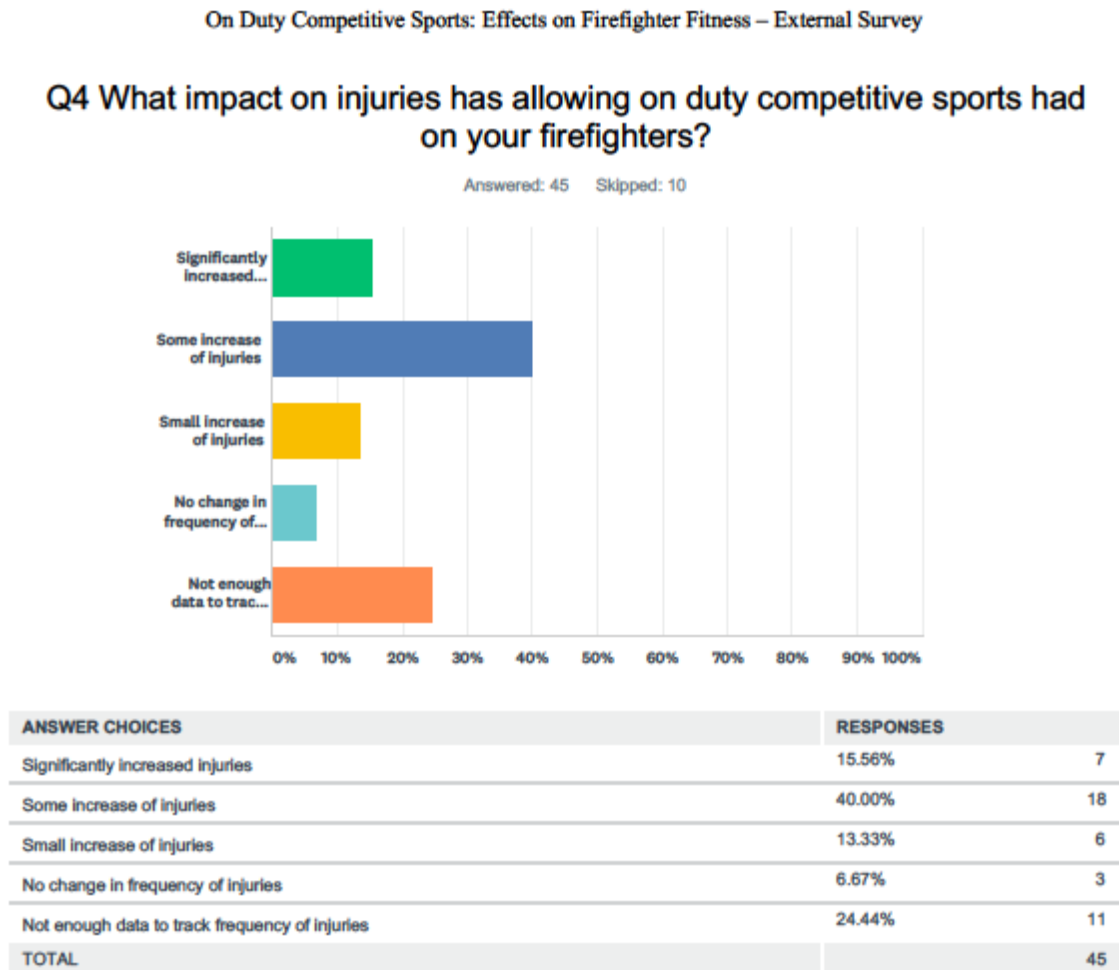


Figure 12. Impact on Injuries from Allowing On-Duty Competitive Sports

The combined results showed that 68% of respondents had some type of increase of injuries directly related to allowing on duty competitive sports activities with 15% of those responses indicating a significant increase in injuries associated with on duty competitive sports activities. These same results show a direct correlation or consequence of an increased risk of injury associated with allowing firefighters to participate in on duty competitive sports activities. However, it was interesting to see that almost 25% of those who participated did not have enough data to track the frequency of injuries accurately. As a result, one would have to wonder

how an organization can effectively work to reduce risk if there is no tracking mechanism to account for on duty related injuries.

The external survey also asked participants why their fire departments did not allow competitive sports activities on duty. The results from this survey question can be found in Figure 13.

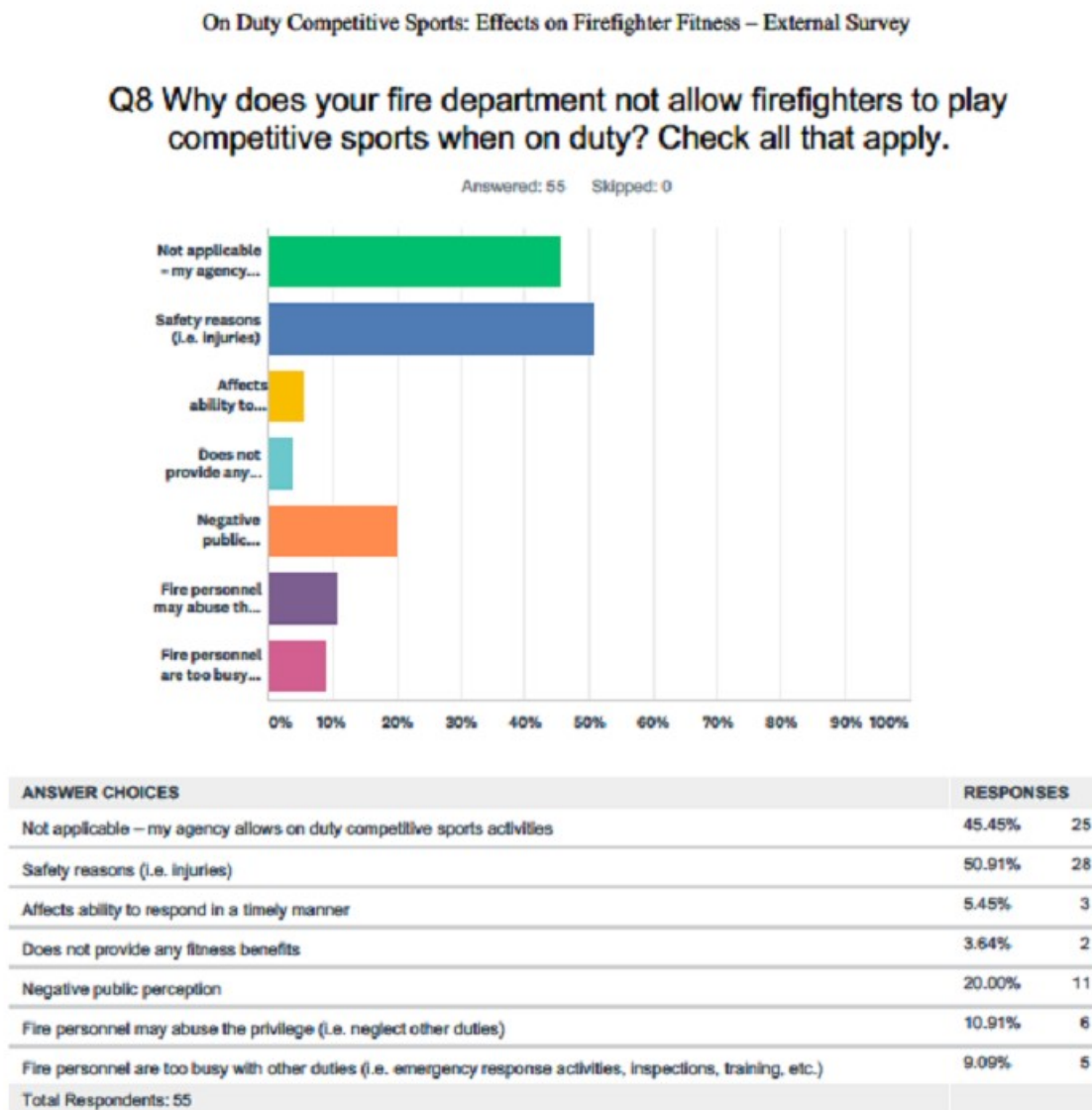


Figure 13. Does Your Fire Department Allow On-Duty Competitive Sports

Even though 45% percent of the respondents indicated that this question was not applicable since their agencies currently allow firefighters to participate in on duty competitive sports activities. The results indicated that almost 51% of those agencies who do not allow on duty competitive sports as a fitness activity have done so due to safety reasons (i.e. injuries). Subsequently the results also showed that in addition to safety concerns other reasons included a negative public perception (20%), fire personnel abusing the privilege (10%), fire personnel are too busy with other duties (9%), affect ability to respond in a timely manner (5%), and does not provide any fitness benefit (3%).

Additionally, both interviews were also found to be useful to help answer the second research question. Even though both interviewees were not asked this specific research question, their responses to other questions provided some useful insight to help provide insight and information about the associated risk of allowing on duty competitive sports activities.

For example, Mr. Sulka stated that he had seen several injuries directly related to competitive sports. He also explained that many of these injuries have been a direct result of basketball but he had also seen a few from volleyball. Finally, when asked how firefighters could minimize the risk of injury associated with on duty competitive sports Mr Sulka stated by not allowing competitive sports activities. He also indicated that competitive sports activities are the highest risk of injury in fitness. In summary, there is an increased risk of injuries associated with allowing on duty competitive sports activities for firefighters.

Ms. Sapps interview responses also provided insightful information to help answer the second research question. Ms. Sapp stated she routinely worked with injured firefighters from other agencies who have been injured due to sports related activities with injuries taking anywhere from several weeks to months to heal properly. She also stated that involvement in any

type of physical activity is better than none. However, she also indicated that after working with large populations of firefighters I would recommend fitness activities in a controlled gym setting to minimize the risk of injury when conducting fitness. Again, as a result it becomes apparent that there is an increased associated risk of injury with allowing on duty competitive sports activities for firefighters.

The results of the research conducted to answer the second research question show a clear relationship with an increased risk of injury and allowing firefighters the opportunity to play competitive sports on duty. Subsequently the survey participants clearly indicate safety reasons (i.e. injuries) as the greatest risk associated with the allowing of firefighters playing competitive sports on duty. Subsequently, another consequence of allowing competitive sports on duty is the financial impact associated with the high risk of injury and potentially leading to significant workers compensation claims. With other consequences including a negative public perception a negative impact on firefighters' ability to respond on calls for service.

The third research question asked what the nationally recognized fitness requirements for firefighters were. Both the literature review and interviews were used provide answers and feedback for this question. Initially information was used from the literature review process to help answer this question. In this case standards recognized by the NFPA were used as a reliable source of information. These standards included NFPA 1500 Standard on Fire Department Occupational Safety, Health, and Wellness Program, NFPA 1582 Standard on Comprehensive Occupational Medical Program for Fire Departments, and NFPA 1583 Standard on Health-Related Fitness Programs for Fire Department Members. All three of which overlap and address components of an overall health related fitness program (HRFP) for fire service agencies while stressing the importance of firefighter physical fitness. Nested together all of these requirements

outline the minimum physical fitness requirements for firefighters. Neglecting any part of these requirements in any of the three referenced standards would disqualify any individual from meeting the minimum fitness requirements to be a firefighter according to the NFPA. For example, NFPA 1582 helps to outline the standards to validate firefighters are performing at their best (NFPA, 2013). Part of this standard is the initial entry and annual physical fitness examination. Subsequently NFPA 1582 provides a comprehensive roadmap for fire departments to assess firefighter readiness and their ability to perform essential job functions, focusing on strength and aerobic readiness for full-duty status (LeDuc, 2012).

Firefighters working within the guidelines of NFPA 1582 should have a baseline physical examination, followed by an annual medical evaluation that provides for specific measurement parameters for a physician to determine individual readiness (NFPA, 2013). Even though the specific exercises are up to each agency to determine, NFPA 1582 and NFPA 1583 outline which aspects of performance which need to be measured. Specifically, NFPA 1582 outlines the 12 MET standard for aerobic capacity. A MET is a unit of measurement useful for describing the energy expenditure of a specific activity (ODPHP, 2019). A MET is the ratio of the rate of energy expended during an activity to the rate of energy expended at rest. For example, 1 MET is the rate of energy expenditure while at rest (ODPHP, 2019). Consequently, the higher the MET the higher the level of physical activity. NFPA 1582 requires firefighter perform to a minimum level of 12 METS when measuring aerobic capacity (NFPA, 2013). Additionally, these same NFPA standards outline the requirements for fire departments to establish minimum fitness requirements determined by the agencies physician and based upon the duties and activities of the firefighters. Furthermore, these standards demonstrate the need for pre-employment physicals to establish a baseline assessment of a firefighter's physical fitness and the need for subsequent

annual fitness assessments throughout a firefighter's career (NFPA, 2015). Accordingly, these same NFPA standards allow an agency the opportunity to use a variety of fitness assessment protocols to evaluate fitness based upon the needs of the organization and any financial constraints.

The literature review process also revealed other means or methods to evaluate firefighter fitness. One of these methods included the Candidate Physical Ability Test (CPAT) which was developed through a joint labor management initiative between the IAFC and the IAFF after discovering fire service agencies were hiring people who would not be physically capable of a successful career in the fire service. Subsequently the IAFF/IAFC established the Wellness-Fitness Initiative (WFI) task force in 1998 as a holistic and non-punitive approach to wellness and fitness in the fire service (IAFF, IAFC, 2018). As a result, the task force developed and validated the CPAT, resulting in a consistent fitness evaluation test for hiring firefighter candidates (IAFF, IAFC, 2018). The goal of CPAT was to develop a fair and valid evaluation tool to validate a firefighter candidates' physical capacity to complete critical tasks effectively and safely (IAFF, IAFC, 2018).

Additionally, in 1998, the Los Angeles County Fire Department (LACFD) joined the WFI to evaluate firefighter fitness and dedicate itself to developing a educational approach to wellness and fitness programs for the fire service while simultaneously helping to establish the CPAT (Karr & Karwasky, 2018). Initially the program started with mandatory physical fitness for on duty crews in 1999 (Karr & Karwasky, 2018). Subsequently the LACFD invested time and financial resources in the fitness equipment for the stations and annual medical evaluations of its members. The goals of the program were to improve the health and physical performance of firefighters and to reduce the risk of on-duty injury by improving physical fitness (Karr &

Karwasky, 2018). Justification for the program centered around a substantial reduction in time lost due to preventable injuries and early discovery of treatable health problems (IAFF, IAFC, 2018). While the resulting savings affiliated with the direct and indirect costs (i.e. worker compensation, salary backfill, and medical costs), would surpass the cost of the program (Karr & Karwasky, 2018).

As part of this program the LACFD initiated a formal study to track measurable data related to the incidence of injury as it relates to on duty fitness activities. They recognized while there will be injuries when performing any fitness routine, the goal must be to identify and eliminate or minimize those activities most likely to cause firefighter injury, while allowing the activities that afford the most benefit (Karr & Karwasky, 2018). As part of this same study the LACFD recognized, “participation in competitive team sports has become a common substitute for firefighter conditioning” (Karr & Karwasky, 2018). LACFD feels competitive sports activities such, as basketball, volleyball, tennis, etc., do not provide the comprehensive and specific fitness firefighters need, and more significantly, have been shown to be responsible for an alarmingly high incidence of injury (Karr & Karwasky, 2018). To be specific the LACFD found the total incidence of injury incurred by participation in physical training has remained fairly consistent from 2000-2007 and comprise approximately 13-16% of all injury claims (Karr & Karwasky, 2018). Additionally, they found a steady increase in sports related injuries responsible for 30% of all physicals training injuries and basketball alone responsible for 25% of all physical training injuries (Karr & Karwasky, 2018). As a result, the LACFD now has a fitness program that advocates only the most effective and safest methods of physical fitness training and requiring members to participate in approved stretching, cardiovascular conditioning, and strength conditioning in a controlled gym environment.

Similar to the second research question both interviews were also found to be useful to help answer the third research question. Both interviewees were asked about the minimum fitness requirements for firefighters. Ms. Sapp stated MCOH follows NFPA 1582 standard on comprehensive occupational medical program for fire departments. She also discussed how NFPA 1582 is used to establish the requirements for medical testing and physical examinations outlining specific requirements for firefighter's cardiac aerobic capacity. While Mr. Sulka also referenced NFPA 1582 and how firefighters need to be able to achieve a minimum workload of 10 METS as outlined in the NFPA standard. When asked to elaborate on how firefighter fitness levels were measured both interviewees again referenced NFPA 1582. Ms. Sapp stated in part of her response to this question that when following NFPA 1582 firefighter fitness levels are measured and evaluated by testing aerobic capacity, muscular strength, and endurance during their physicals annually. Mr. Sulka stated that firefighter fitness levels are measured using a metabolic cart with a 12-lead stress test and direct measurement VO₂. He also indicated using stress tests and other evaluation tools, he was able to evaluate a firefighter's cardiovascular function and metabolism and then help design a fitness program to help them meet their individual and professional fitness goals. The information obtained in these interviews was important information for this ARP to demonstrate the adoption of minimum fitness requirements for the members of JTFD and the need to demonstrate the agency is using an outside medical testing facility to provide annual physical and fitness testing in compliance with recognized NFPA standards.

The results of the research conducted to answer this research question have demonstrated the need for each fire department to establish minimum physical fitness standards. Even though no state or federal rules or regulations were found establishing minimum firefighter fitness

standards or requirements there were various nationally recognized NFPA standards found addressing firefighter fitness requirements to include a minimum aerobic capacity of 12 METS. Furthermore, these same NFPA standards also outlined the recommended health and safety programs to help fire departments establish minimum medical and fitness testing requirements through the implementation of annual physicals and fitness evaluations like the CPAT. Subsequently research conducted by the LACFD shows a direct correlation associated with the rate of injury and on duty competitive sports activities. In summary all firefighters need to meet NFPA standards in regards to physical fitness in addition to achieving a minimum of 12 METS when assessing their aerobic capacity to meet the minimum fitness requirements to be a active firefighter.

The fourth research question asked what types of injuries have increased from playing competitive sports while on duty. Both the literature review and the actual JTFD injury data were used to help answer this question. Similar to the previous research question initially information was used from the literature review process to help answer this question.

The most detailed report found in the literature review process was a research study published as a resource on the IAFFs wellness fitness initiative webpage conducted by the Los Angeles County Fire Department (LACFD). Research from this study found that activities such, as basketball, volleyball, floor hockey, softball, racquetball, tennis, etc., do not provide the comprehensive and specific fitness firefighters need, and more significantly, have been shown to be responsible for an alarmingly high incidence of injury (Karr & Karwasky, 2018). The results of this research have led to the formal adoption of mandatory physical fitness guidelines designed to encourage an optimal level of fitness, while simultaneously improving the level of service provided to the public, and reduce those accidents or injuries caused by poor

conditioning (Karr & Karwasky, 2018). Specifically, the results of this research have led to the adoption of a fitness policy which states “Station personnel shall not participate in team sports in lieu of, or in addition to, the Department’s Exercise Program of stretching, strength and cardiovascular conditioning. Team sports includes, but is not limited to, basketball, football, volleyball, softball, baseball, racquet ball, tennis, paddle tennis and any other game or sport that could possibly cause an injury to occur” (LACFD, 2008, p. 3). The implementation of this policy is the direct result of a compelling amount of data showing participation in competitive sports has led to significant injury rates not in line with the agency’s fitness program goals (LACFD, 2008). As a result, the LACFD modified its current policy to abolish participation in competitive team sports while on duty (LACFD, 2008).

Information obtained from the actual JTFD injury data was also found to help support the findings of the literature review in regard to the frequency and types of injuries. The literature review found that 30% of all physical training injuries on the LACFD were due to participation in team sports with basketball accounting for 25% of all physical training injuries (Karr & Karwasky, 2018). JTFD had similar injury data due to firefighters playing competitive sports on duty with three ankle injuries and one knee injury all directly related to basketball alone. Currently the four injuries from basketball alone account for 16% of the injuries with a total of 28% percent of the injuries directly attributed to on duty competitive sports related activities. As a result, township officials claim the activity is too dangerous after more than 7 of 25 firefighters were injured over the past four years playing games like volleyball and basketball. Subsequently the results clearly indicate a direct relationship in the associated risk of allowing on duty competitive sports and reinforces the findings of the LACFD study.

The fifth and last research question asked what limitations should be implemented for playing competitive sports on duty. Information from both surveys, and the interviews were used to answer this research question. Both surveys asked participants about the limitations or control measures which should be implemented when playing competitive sports on duty. Figure 14 shows the results to this question for the internal survey while figure 15 shows the result with the external survey.

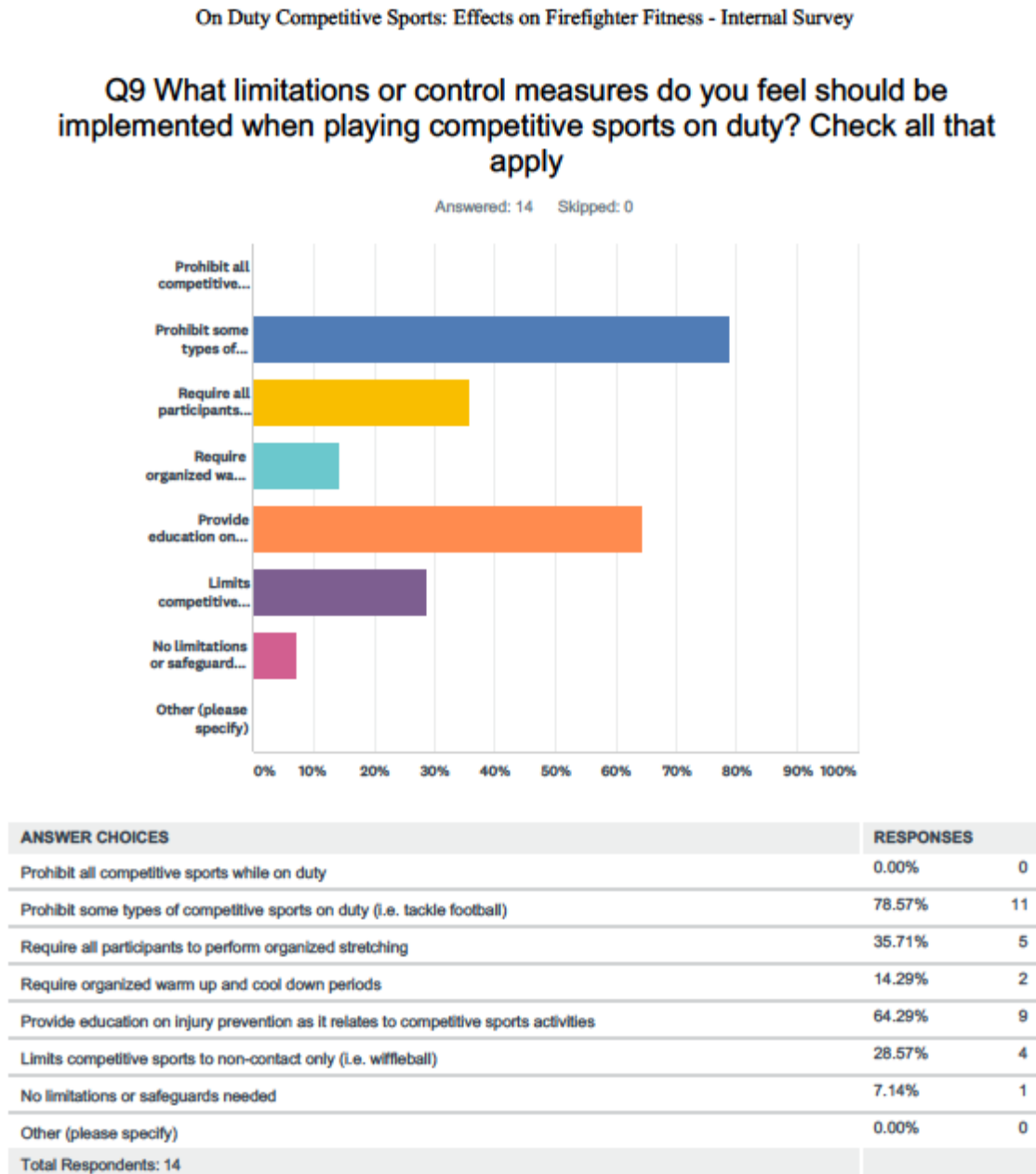


Figure 14. Limitations for On-Duty Competitive Sports (Internal Survey)

Results from the internal survey showed that 78% of the participants recognized prohibiting competitive sports on duty was the best way to limit or reduce the amount of risk associated with allowing on duty competitive sports activities. While 64% of the participants felt providing education on injury prevention would also be an effective control measure to help limit or reduce

the amount of risk associated with competitive sports. Whereas other limitations or control measures to help minimize risk included requiring all participants to perform organized stretching (35%), limit competitive sports to non-contact only (28%), require organized warm up and cool down periods (14%), no limitations or safeguards needed (7%).

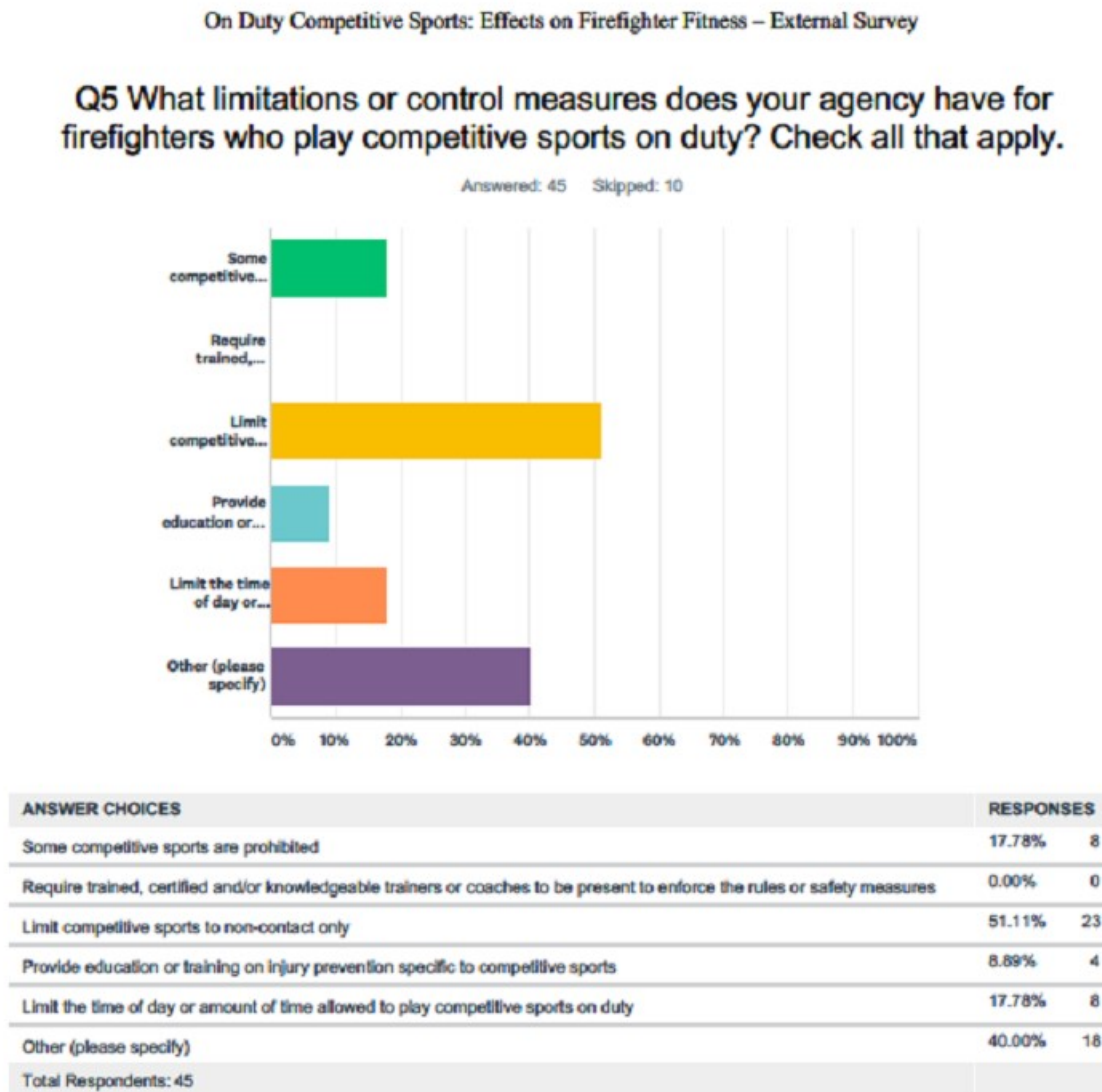


Figure 15. Limitations for On-Duty Competitive Sports (External Survey)

Results from the external survey showed that 51% of the participants recognized limiting competitive sports to non-contact only was the best option to minimize or reduce the amount of

risk associated with allowing on duty competitive sports activities. While 17% of the participants felt prohibiting some competitive sports along with limiting the amount of time to play competitive sports would also be an effective control measure to help limit or reduce the amount of risk associated with competitive sports. While another limitation or control measure agencies could use to help minimize risk included providing public education or training on injury prevention (8%). In the “other please specify” category fifteen of the eighteen respondents stated their agencies did not currently allow on duty competitive sports while the remaining three respondents felt on duty competitive sports should either have no restrictions or their agencies did not have the athletic equipment (i.e. basketball hoops, volleyball nets, etc.) to support on duty competitive sports activities. Results from this question can be found in Figure 15.

Both interviews again helped to provide information to help answer this research question. When asked how firefighters could minimize the risk of injury associated with on duty competitive sports Mr. Sulka stated not allowing competitive sports activities while also stating competitive sports activities are the highest risk of injury in fitness. Furthermore Ms. Sapp in her interview also discussed restrictions on the type or length of activity and the importance of education on injury prevention and how it relates to sports activities as another risk reduction control measure. Mr Sulka went further into his response when discussing how competitive sports could be used to increase firefighter fitness levels and stated looking at it from an exercise aspect there is an extreme amount of risk assumed with on duty competitive esports and the potential for injury is greatly increased.

The results of the research conducted to answer the fifth and final research question have shown that competitive sports should either be prohibited or limited to non-contact only as the best option to minimize or reduce the amount of risk associated with on duty fitness activities.

This is especially true for agencies who currently allow on duty competitive sports to help minimize the amount of risk associated with on duty injuries and workers compensation claims. First, the results show the best way to minimize injury is to prohibit on duty competitive sports all together. While another technique to help minimize risk for agencies who continue to allow these types of activities could be limiting competitive sports to non-contact only thus allowing for sports related activities to be played in a safer environment and more appropriate setting. Subsequently based upon the interviews the research also demonstrates a need for firefighters to remain medically and physically capable to participate in sports related activities while also providing appropriate warm up and cool down activities along with education on injury prevention. Lastly, firefighters should always ensure their ability to respond on calls for service is never compromised when participating in on duty competitive sports related activities.

Discussion

The results of this applied research project (ARP) has allowed the researcher to evaluate the effects of competitive sports on firefighter fitness. The results of the research conducted for this ARP supported several of the views found during the literature review. Additionally, this research has discovered additional supporting information that could not be found during the literature review process to help answer the five research questions. While many of the results were expected, other results were found to be unexpected. Finally, there were a few results discovered in the literature review, surveys, and interviews which contradicted each other.

Research for this ARP was conducted to evaluate the effects of competitive sports on firefighter fitness. While the answer to this question may appear to be somewhat simple the research shows the true difficulty with answering this question. Furthermore, if allowing firefighters, the opportunity to play competitive sports on duty in lieu of organized physical fitness do we know if these activities actually enhance or improve firefighter fitness? If so to what degree does it enhance fitness and at what cost to the agency and the individual? As a result, the research provides valuable insight as to the tangible and intangible advantages and disadvantages of allowing on duty competitive sports activities in lieu of other fitness related activities.

Firefighting is strenuous and dangerous work with a unique set of stressors (Smith, 2011) Even though the NFPA reports the fire service has experienced a 5% decrease in firefighter injuries in 2017 (Evarts, 2018). 52 of the firefighter fatalities in 2017 were attributed to stress or overexertion of which 50 died due to heart attacks with the remaining two firefighters' fatalities suffering from stroke (FEMA , 2018). Considering the physical nature of the job and the hazardous work environments firefighters operate in, it becomes apparent there is considerable

risk of further injury, disability or even death when prematurely placing fire service personnel into work environments in which they are not physically prepared to function (LeDuc, 2012). NFPA 1582 outlines specific guidelines, to reduce risks and improve the health, safety and effectiveness of firefighters (NFPA, 2013). Additionally, the IAFF/IAFC Wellness-Fitness Initiative (WFI) was established in 1998 as a holistic, positive rehabilitating and educational approach to wellness and fitness programs in the fire service (IAFF, IAFC, 2018). While research continues to reveal the need for high levels of physical fitness to safely perform the necessary duties associated with firefighting. Thus, a fire departments commitment to wellness serves both personal and professional interests. As a result, leaders in the fire service must actively work to establish or develop an overall wellness/fitness system designed to maintain both the physical and mental capabilities of its firefighting personnel. JTFD has recognized the importance of keeping its firefighters fit for duty and has continued to promote a culture of fitness encouraging firefighters to remain physically fit while also providing annual medical exams and physical fitness screenings to screen its employees.

As a firefighter, various forms of exercise can be used to help strengthen your muscles, increase your endurance, and prepare someone for the rigorous activities required. Many firefighters assume they are physically fit simply because they are on the job. However, often the exercise you get from day to day training and other fire service activities is not enough to maintain an adequate level of fitness. Additionally, there are many fire departments who do not require their personnel to stay physically active and maintain a minimum level of fitness. Consequently, it is not uncommon for firefighters to have significant amounts of sedentary time in between calls. As a result, it is an individual's responsibility to make sure they possess the physical capacity to meet the demands of the next call. While it becomes the agencies

responsibility to provide the opportunity for on duty fitness related activities and test firefighters annually validating, they meet minimum health requirements and possess the physical capacity to meet the demands of firefighting. The results of both the internal and external surveys provide valuable insight as to the importance of physical fitness and how it relates to competitive sports activities and the impact on firefighter fitness. For example, all of the JTFD personnel who participated in this survey stated they have participated in on duty competitive sports as a fitness activity. Additionally, half of those stated they used competitive sports activities as a formal fitness activity 6-10 times a month while an additional 35% of those who responded used competitive sports as fitness 1-5 times a month. This demonstrated the popularity of competitive sports activities in the agency. All of the JTFD firefighters who responded to the survey acknowledged they played basketball on duty making basketball the most popular competitive sports activity for on duty crews. Additionally, when asked what impact allowing competitive sports on duty had on the firefighters, 75% of the participants agreed there was an increase in overall injuries as a result. Finally, 93% of those who responded to the internal survey also recognized an increased risk of injury as a drawback or potential problem associated with allowing on duty competitive sports activities while on duty.

The external survey also helped to provide useful feedback on competitive sports and the effects on firefighter fitness. Less than half the agencies surveyed currently allowed its firefighters to play competitive sports on duty. Of the external agencies who participated 94% reported increased risk of injury as a drawback of allowing firefighters to play competitive sports while on duty.

The collective results of the literature review, along with both the internal and external surveys have also shown by allowing on duty competitive sports an agency assumes an increased

risk of associated injury for its firefighters. Additionally, injury data associated with on duty competitive sports activities from the LACFD study and the JTFD workers compensation claims (Appendix J) helped to support these findings. Consequently, information from the interviews was also used to help determine if on duty competitive sports actually enhanced firefighter fitness. Mr Sulka stated during his interview that firefighters should not be allowed to participate in on duty competitive sports because of the associated risk for injury. Additionally, he stated that competitive sports activities are the highest risk of injury in fitness. While he also recognized the most effective way to minimize the risk of injury associated with on duty competitive sports was not allowing competitive sports activities. Additionally, Ms. Sapp supported these statements based upon her experience of working with large populations of firefighters and stated she had seen firefighters suffering from sports related injuries. As a result, she also stated she would recommend fitness activities in a controlled gym setting to minimize the risk of injury when conducting fitness related activities.

Every fire incident or response within a community is unique. The ability of firefighters to effectively respond to a call for assistance is enhanced by their level of physical fitness and mental resilience. A properly managed and implemented wellness program is a cost-effective tool to reduce injury rates and sick leave usage (IAFF, IAFC, 2018). Additionally, fire departments with members who are medically, physically, and mentally fit provide better service to their communities while simultaneously reducing the risk of injury and disability retirements. The collective results of the information found relative in the literature review directly supports the findings from both surveys and the interviews. As a result, it becomes apparent the fire service's greatest assets are not the apparatus or stations, but rather its personnel. It is through personnel that fire departments are able to serve the public, accomplish their missions, and make

a difference in the community (IAFF, IAFC, 2018). Consequently, information obtained from the literature review becomes relevant as it pertains to firefighter's fitness and the association of allowing competitive sports as a means to improve firefighter fitness. Overall, the physical benefits of playing sports are considered numerous. Again exercise in general helps to control weight, improve the cardiovascular system, and increases a person's energy level. It also has been proven to provide long-term benefits, such as a reduced risk of heart disease, diabetes, and lower body fat, while improving cholesterol and making the body stronger.

Despite the benefits, there are several associated risks with playing competitive sports. The competitiveness of the game alone creates a higher risk of associated injury. While the sudden start and stop of competitive sports can lead to an increase in injuries. The intensity of competitive games or sports related activities can cause players to neglect rules, increasing opportunities for torn ligaments, muscle sprains or tears and other injuries (Higgins, 2017). Subsequently, data from the LACFD study indicates ankle injuries make up approximately 25% of all sports injuries with an estimated injury rate of 1.0 injury per 1000 hours of physical training (Karr & Karwasky, 2018).

When promoting fitness related programs, it becomes necessary to provide dedicated time for on duty crews to exercise. While scheduling on-duty time may vary due to emergency calls, training, and other duties, it is recommended that 60-90 minutes be allotted during every shift (IAFF, IAFC, 2018). To achieve a desired result physical fitness training will only accomplish a desired goal if done correctly. Therefore, physical fitness training is very specific, and the body will respond in very specific ways. For example, in order to improve to increase flexibility, you need to stretch regularly. Similarly, if you want to become stronger, specific muscle groups need to be exercised with relatively heavy weights. Otherwise, strength is

progressively lost as time goes by (Hayford, 1996). The same can be said for improving aerobic capacity, regular sustained aerobic exercise is the only means to achieve this goal. Competitive sports are really only designed only for fun and competition and are not considered useful for increasing or maintaining physical fitness (Hayford, 1996). No static stretching occurs, or any type of muscle contractions against fairly heavy resistance, so they can't improve your flexibility or strength. Subsequently, sports are rather ineffective forms of cardiovascular exercise because your physical activity is not maintained steadily throughout the game (Higgins, 2017).

Consequently, there is no coincidence that those who rely only on recreational sports as their physical fitness training, there is a high rate of injury (Hayford, 1996). And then there are those who neglect stretching and aerobic activity and only participate in strength training. Again, another population of firefighters who are more susceptible or prone to injury. In summary Mr. Sulka agreed and supported these finding during his interview when he stated there is an extreme amount of risk assumed when allowing on duty competitive sports and the potential for injury is greatly increased.

The results of the surveys, interviews, literature review and injury data demonstrate a need to implement limitations for on duty competitive sports related activities. The most apparent is the need to prohibit any on duty competitive sports related activity based on the associated risk of injury and inability of these types of sports related activity's to actually enhance firefighter fitness levels. Instead firefighters need to focus on training in a controlled gym environment where they have the opportunity to enhance their level of fitness in a safe setting thus minimizing the associated risk of injury.

Based on the research conducted and what has been discussed so far, the researcher is able to provide an overall analysis of the results. First, the research shows that physical fitness is

critical to maintaining a firefighter's physical capacity to perform the essential functions of their job while operating in a hazardous environment. Regular exercise was found to be a critical component of physical fitness and helping firefighters achieve the physical capacity to perform the tasks associated with their job.

Second, firefighters have several forms of exercise to choose from when trying to improve or maintain a desired level of fitness. Competitive sports activities (i.e. basketball, volleyball, etc.) were found to not help or improve overall fitness. Instead competitive sports activities were found to be too risky and more than likely to result in injury for firefighters. Other types of exercise in a controlled gym setting are considered more beneficial for firefighters needing to maintain or improve fitness levels.

Third, allowing on duty competitive sports does not provide benefits for firefighters beyond the sole purpose of having fun or improving comradery. Instead allowing on duty competitive sports encourages firefighters who do not routinely work out to participate in a game of competition when they are more susceptible or prone to injury from a lack of being in shape resulting in significant workers compensation claims.

Finally, fire departments should prohibit on duty competitive sports activities in lieu of organized physical fitness. Additionally, fire departments should take steps to educate their personnel on the benefits of physical fitness and the risk of injury associated with allowing on duty competitive sports related activities. Subsequently fire departments should work on following the guidelines established in NFPA 1582, 1853, while simultaneously promoting the IAFF/IAFC Joint Labor Management Wellness-Fitness Initiative.

The research conducted for this ARP has provided some organizational implications for the Jefferson Township Fire Department. The research has clearly shown the need to enforce the

fire chiefs stay on allowing competitive sports while simultaneously evaluating its fitness related policies and begin looking at mandatory fitness in a controlled gym setting for all members. The agency should consider the risk versus benefit when deciding which types of fitness activities are approved for on-duty crews in the future. Based on the research, JTFD needs to reinforce the townships position on not allowing competitive sports activities in lieu of fitness. Based on the research the agency needs to promotes a culture of fitness by allowing adequate time to achieve the desired results in a controlled environment minimizing the associated risk of injury and improving the overall health of the organization.

Recommendations

The research conducted for this ARP has provided information to make recommendations pertaining to allowing on duty competitive sports related activities in lieu of fitness. The research focused primarily on the physical fitness benefit of allowing on duty competitive sports activities. This included determining minimum firefighter fitness requirements and whether or not competitive sports activities improved these fitness levels. The research also provided valuable information in other areas such as consequences of allowing competitive sports and whether or not limitations should be put in place. Specific recommendations are as follows:

- JTFD needs to continue to uphold the townships decision prohibiting on duty competitive sports activities in lieu of physical fitness. This decision is based on information and objective data found as a result of this ARP.
- If the primary reason for allowing firefighters the opportunity to use on duty competitive sports was to improve fitness, then competitive sports should be prohibited. This decision is based on information and objective data found in the literature review, internal and external surveys, and the interviews. While some of the survey results showed firefighters

felt allowing competitive sports activities were fun activities and promoted teamwork and comradery, the results from these same surveys showed an increased associated risk with allowing these types of activities. Subsequently previous research from the LACFD found in the literature review along with information obtained in the IAFF/IAFC Wellness-Fitness Initiative (WFI) supported these findings showing significant injury data associated with allowing on duty competitive sports activities and other sports related activities outside of a controlled gym setting. Additionally, the JTFD had similar injury data due to firefighters playing competitive sports on duty with three ankle injuries and one knee injury all directly related to basketball alone. Currently the four injuries from basketball alone account for 16% of the injuries with a total of 28% percent of the injuries directly attributed to on duty competitive sports related activities.

- The researcher recommends the JTFD continue to prohibit its firefighters from participating in competitive sports related activities when on duty. This recommendation is based upon the increased risk of injury associated with allowing on duty competitive sports activities. Research shows that allowing activities such, as basketball, volleyball, softball, racquetball, etc., do not provide the comprehensive and specific fitness firefighters need, and more pointedly, have been shown to be responsible for a disturbingly high incidence of injury. Additionally, no stretching occurs or any type of muscle contractions against weighted resistance, so it will not improve your flexibility or strength. Subsequently, sports activities have been found to be an ineffective form of cardiovascular exercise since your physical activity is not maintained consistently throughout a game. Therefore, the literature review, survey results, and surveys support the argument of prohibiting on duty competitive sports due to the increased risk of

associated injury and minimal fitness values in lieu of organized fitness in a controlled gym environment.

- Finally, the JTFD needs to develop and implement a formal fitness policy requiring on duty mandatory fitness in accordance with the recommendations outlined in the IAFF/IAFC Wellness-Fitness Initiative (WFI) and NFPA 1582, and 1583. This policy should specify the types of fitness activities allowed and any limitations or risk reduction control measures that need to be followed when participating in daily fitness routines. All personnel should be expected to follow this policy with the supervisor held accountable for enforcing the policy.

The results of this ARP have allowed the researcher the opportunity to provide recommendations for other fire service agencies to follow who allow firefighters the ability to participate in on duty competitive sports activities. As with firefighting there is an inherent amount of risk assumed in everything we do. The research conducted demonstrates a substantial risk when allowing on duty competitive sports. Subsequently a comprehensive risk analysis should be incorporated when considering risk vs benefit and whether an agency allows or prohibits on duty competitive sports activities. Additionally, fire service agencies need to look at previous injury data within their own organizations to help determine the associated risk along with the financial impact of allowing competitive sports activities. These same agencies should also utilize or incorporate data from annual fitness assessments to help determine if there is any value to allowing these types of activities.

References

- American Heart Association. (2018, November). *Metabolic Syndrome*. Retrieved from Heart Insight Magazine : <https://www.heart.org/en/health-topics/metabolic-syndrome>
- Anderson, M. (2018, October 24). *Jefferson Township 2050 A Vision for the Future*. Retrieved from Jefferson Township:
<https://www.jeffersontownship.org/Portals/0/Documents/CompPlan/Jefferson%20Township%202050%20-%20Comprehensive%20Plan%20-%20Web.pdf?ver=2018-09-19-113655-233>
- ASSP. (2018). *American Society of Safety Professionals*. Retrieved from Return on Investment in Safety: <https://www.assp.org/advocacy/roi-of-safety>
- Cohen, B. (2018). *How Does Playing Sports Affect Your Health?* Retrieved from Livestrong.com: <https://www.livestrong.com/article/245944-how-does-playing-sports-affect-your-health/>
- Comstock, R. D., Yard, E. E., & Knox, C. L. (2007). *Internet-Based Surveillance of Injuries Sustained by US High School Athletes 2005-2006*. Columbus: Columbus Children's Research Institute.
- Department of Health and Human Services. (2018). *Life is full of choices, yet there seems to be one that will never let you down: choosing to be physically active. This decision will always be in your favor**. Retrieved from Federal Occupational Health:
<https://foh.psc.gov/calendar/fitness.html>
- Dunn, S. (2016). *Jeferson TWP Fire 2016 Medical and Fitness testing Results*. Columbus: Mount Carmel occupational Health.

- Evarts, B. (2018, November 1). *U.S. Firefighter Injuries in 2017*. Retrieved from NFPA Journal:
<https://www.nfpa.org/News-and-Research/Publications/NFPA-Journal/2018/November-December-2018/Features/US-Firefighter-Injuries-2017>
- FEMA . (2018, September). *Firefighter Fatalities in the United States in 2017*. Retrieved from U.S. Fire Administration:
https://www.usfa.fema.gov/downloads/pdf/publications/ff_fat17.pdf
- FindLaw. (2017). Retrieved from http://www.findlaw.com/?DCMP=GOO-FLAW_Brand-Name&HBX_PK=find+law
- Fortington, L. V. (2016, October 26). *Reporting Multiple Individual Injuries in Studies of Team Ball Sports: A Systematic Review of Current Practice*. Retrieved from US National Library of Medicine National Institutes of Health:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5432578/>
- Grener, D. (Personal Communication, 2017, October 23). Email Correspondence. *Safety & Health Committe Meeting Minutes*. Blacklick, Ohio.
- Hayford, J. (1996, May 1). *Firehouse*. Retrieved from Firefighter Fitness:
<https://www.firehouse.com/safety-health/article/10544291/firefighter-fitness>
- Higgins, T. M. (2017, September 11). *Livestrong.com*. Retrieved from Negatives of Competitive Sports : <https://www.livestrong.com/article/523284-negatives-of-competitive-sports/>
- IAFF. (2018, November). *IAFF*. Retrieved from Fire Service Joint Labor Management Wellness-Fitness Task Force Candidate Physical Ability Test Program Summary:
http://www.iaff.org/HS/CPAT/cpat_index.html
- IAFF, IAFC. (2018). *The Fire Service Joint Labor Management Wellness-Fitness Initiative*. Washington D.C.: IAFF, IAFC.

Jahnke, S. A., Hyder, M. L., Haddock, C. L., Jitnarin, N., Day, R. S., & Walker, S. C. (2015).

High-Intensity Fitness training Among a National Sample of Career Firefighters.

Retrieved from Occupational Safety and health Research Institute:

<http://www.fstaresearch.org/resource/?FstarId=11405>

JTFD. (2018, October 24). *Jefferson Township*. Retrieved from Your jefferson Township Fire

Department: [https://www.jeffersontownship.org/Departments/Fire-and-EMS/About-](https://www.jeffersontownship.org/Departments/Fire-and-EMS/About-JTFD)

JTFD

Karr, K., & Karwasky, B. (2018). *IAFF Wellness Fitness Initiative*. Retrieved from Fitness

Policy Background: <http://www.iaff.org/HS/wfiresource/Departments/losangeles.html>

LACFD. (2008). *Physical Fitness Guidleines*. Retrieved from IAFF Wellness Fintess Initiaitives:

<http://www.iaff.org/hs/wfiresource/Departments/losangeles.html>

LeDuc, T. (2012, October 17). *Firefighter Fitness for Duty: Understanding NFPA 1582*.

Retrieved from Fire Rescue: <https://www.firerescuemagazine.com/articles/print/volume-7/issue-12/firefighter-safety-and-health/firefighter-fitness-for-duty-understanding-nfpa-1582.html>

McGraw Hill. (2018, November). *what is a MET?* Retrieved from What is a MET? - McGraw Hill Higher Education:

<http://www.mhhe.com/hper/physed/clw/webreview/web07/tsld002.htm>

Moore, K. (2016, October 06). *The 3 best types of workouts for firefighters - part 1*. Retrieved

from Firefighter Toolbox.com: <http://firefightertoolbox.com/the-3-best-types-of-workouts-for-firefighters-part-1/>

National Fire Protection Association. (2018, November). *About NFPA*. Retrieved from

<https://www.nfpa.org/About-NFPA>

- NFPA. (2013). NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments.
- NFPA. (2015). NFPA 1583 . *Standard on Health-Related Fitness Programs for Fire Department Members*. Retrieved from Standard on Health-Related Fitness Programs for Fire Department Members.
- NFPA. (2016, October). *NFPA Research*. Retrieved from U.S. Firefighter Injuries - 2015: <file:///D:/EFOP/ARP%20Year%201/US%20Firefighter%20Injuries%20-%202015.pdf>
- ODPHP. (2019, January 16). *Translating Scientific Evidence About Total Amount and Intesity of Physical Activity Into Guidelines*. Retrieved from Health.gov: <https://health.gov/paguidelines/2008/appendix1.aspx>
- Sapp, A. (2017). *Jefferson Township Fire 2017 Medical & Fitness Testing Results*. Columbus: Mount Carmel Occupational Health.
- Schlenger, A. (2017, October 24). *Daily Burn Life*. Retrieved from The Do-It-Anywhere HIIT Workout You Need to Try: <https://dailyburn.com/life/fitness/high-intensity-hiit-workout/>
- Shull, B. (Personal Communication, 2017, October 6). Personal Communication. *NOTICE - Stay on Competitive Sports Activity*. Blacklick, Ohio, United States.
- Smith, D. L. (2011). *Firefighter Fitness: Improving Performance and Preventing Injuries and Fatalities*. Retrieved from American College of Sports Medicine, 10(3): <https://www.everyonegoeshome.com/wp-content/uploads/sites/2/2015/12/Firefighterfitnessimprovingandpreventing.pdf>
- The American College of Sports Medicine . (2014). *acsm.org*. Retrieved from ACSM Information on High Intensity Interval Tarining: https://www.acsm.org/docs/default-source/files-for-resource-library/high-intensity-interval-training.pdf?sfvrsn=b0f72be6_2

The American College of Sports Medicine . (2014, May). *acsm.org*. Retrieved from High

Intensity Interval Training: https://www.acsm.org/docs/default-source/files-for-resource-library/high-intensity-interval-training.pdf?sfvrsn=b0f72be6_2

U.S Department of Health & Human Services. (2018, October). *Metabolic Syndrome*. Retrieved from National Heart, Lung, and Blood Institute: <https://www.nhlbi.nih.gov/health-topics/metabolic-syndrome>

U.S. Department of Health and Human Services. (2018, November). *President's Council on Sports, Fitness, and Nutrition*. Retrieved from <https://www.hhs.gov/fitness/index.html>

U.S. Fire Administration. (2018, September). *United States Fire Administration*. Retrieved from Firefighter Fatalities in the United States in 2017: https://www.usfa.fema.gov/data/statistics/ff_fatality_reports.html

United States Fire Administration. (2013, April 9). *U.S. Fire Administration Strategic Plan Fiscal Years 2014-2018*. Retrieved from https://www.usfa.fema.gov/downloads/pdf/publications/strategic_plan_2014-2018.pdf

Appendix A

Fire Chiefs Email Notice – Stay on Competitive Sports Activity

Dion Grener

From: Bradford Shull
Sent: Friday, October 6, 2017 3:12 PM
To: JTFD 01 Full-time
Subject: NOTICE - Stay on Competitive Sports Activity

All,

In light of the ongoing BWC history of moderate to major injuries related to competitive sports activity, specifically basketball, the following shall be limited. No match games will be permitted, i.e. 1 on 1, 3 on 3, etc. until further notice. Normal "shooting around", letter games and activity that does not cause unusual motion and impact are permitted. At this point, this does not mean this activity will permanently be prohibited. The health and safety committee is meeting this month to discuss the issue as these injuries have a major impact on operations, employee lives at work and home, and personal and township finances. A risk benefit analysis may be necessary to help determine a long term decision.

Please be patient as we work through this issue. Be mindful of your activity on station, non-emergent and emergent situations. You have to be sure to only take risks that pay dividends greater than the risk being taken. If you are not as "in shape" as you want or should be you must take it upon yourself to make the life choices needed to facilitate a change. These statements are not to be taken detrimentally. It is just the opposite. This is encouragement to make your life better for yourself, your family and your coworkers. If you need assistance talk to your supervisor so we can see what is available to us as resources above and beyond what we have. Personal initiative is essential where your body and health are concerned. No one else can do that for you.

Line of duty deaths, near misses and on the job injuries are unacceptable. All instances must be analyzed in order to make a difference. Please be patient as this will not be a painless process.

In Safety,

Bradford L. Shull, OFE
Fire Chief

Jefferson Township Fire Department
6767 Havens Corners Rd
Blacklick, Ohio 43004
(W) (614) 861-3757
(C) (740) 808-2254

Appendix B

Health and Safety Committee Meeting Minutes

Dion Grener

From: Dion Grener
Sent: Monday, October 23, 2017 5:13 PM
To: jtfdfull-time@jeffersontownship.org
Subject: Safety & Health Committee Meeting Minutes

Gentlemen,

Below is a copy of the notes from today's Health & Safety Committee Meeting.

In attendance: Chief Shull, BN Chief Grener, LT Bailey, Back, Bryan

Topics:

BWC Claims due to competitive sports: No competitive sports (i.e. basketball) – however, FFs are allowed to shoot hoops – If anyone caught playing competitive basketball then hoop will be removed.

Accident Injury Prevention Program: Received guidance from the Fire Chief – Initial draft due by January 1, 2018 – Effort is prevention – Program is not meant to be punitive unless injury is the result of an intentional act (i.e. not wearing seat belt)

Exhaust System Upgrade: BC Safety Grant is at the board of Trustees pending approval

Physical Training: If budget is approved by the board the recommendation is to use the trainers from MCHS for 2018 – Decline sit up will be ordered – Bands will be ordered – cardio equipment will be serviced.

Next meeting will be scheduled for January 2018

If you have any questions or concerns feel free to reach out to anyone who was in attendance.

Thank you,

Dion A. Grener
Battalion Chief
Jefferson Township Fire Department
6767 Havens Corners Road
Blacklick, Ohio 43004
Office: (614) 861-3757
Mobile: (614) 581-7190
Fax: (614) 861-0968
"Our family, caring for yours"

Appendix C

On Duty Competitive Sports Survey Sent to JTFD Members

Dion Grener

From: Dion Grener
Sent: Saturday, December 8, 2018 9:00 PM
To: JTFD 01 Full-time; JTFD 02 Part-time
Subject: Survey Request

All,

I am working on an Applied Research Project (ARP) for the Executive Fire Officer Program. The purpose of my research is to evaluate the effects of competitive sports on firefighter fitness. As part of this research, I am conducting a short ten question survey of all JTFD members to determine their opinions on playing competitive sports on duty as a means of physical fitness. For the purpose of this survey a competitive sport will be defined as any sport that is played and considered competitive in nature (i.e. basketball, volleyball, kickball, football, baseball, etc.). Although the overall results of this survey will be incorporated into my ARP, your individual responses will be kept confidential. Participation is optional but highly encouraged. If you choose to participate please complete this survey by December 23, 2018.

To take the survey, please click on the link below. It should only take 5-10 minutes to complete.

<https://www.surveymonkey.com/r/5N632TW>

Thank you,

Dion A. Grener
Battalion Chief
Jefferson Township Fire Department
6767 Havens Corners Road
Blacklick, Ohio 43004
Office: (614) 861-3757
Mobile: (614) 581-7190
Fax: (614) 861-0968
"Our family, caring for yours"

Appendix D

On Duty Competitive Sports Survey Request Sent to EFO Classmates

Dion Grener

From: Dion Grener
Sent: Friday, December 14, 2018 4:42 PM
To: Powers, Joe; cangermuller@cityofkingman.gov; bschenking@summitfire.org; dmcglynn@pbcgov.com; jmoore@gvfire.org; dunderwood@shawneeok.org; nfr5052@yahoo.com; chris.coates@costamesaca.gov; rpflmi1@asu.edu; todds@coj.net; jleeper@friscofire.com; dawilliams@chofire.org; allen.peltz@cityofthornton.net; bmolloy@lakesidefire.com; scott.lessard@gmail.com; macarpen@largo.com; elizabeth.bednarcik@gallatintrn.gov; grener01@gmail.com; bphillip@vbgov.com; rob.lowjr@gmail.com
Subject: EFO Survey

EFO Classmates,

Hope everyone is enjoying their ARP's.

If you have time I would like to have your feedback for my ARP. The purpose of my research paper is to evaluate the effects of competitive sports on firefighter fitness. I've created a short ten question survey on this topic and would be thankful if each of you were willing to help me out by taking this survey.

To take the survey, please click on the link below. It should only take 5-10 minutes to complete.

<https://www.surveymonkey.com/r/L5XCL3J>

Thank you,

Dion A. Grener
Battalion Chief
Jefferson Township Fire Department
6767 Havens Corners Road
Blacklick, Ohio 43004
Office: (614) 861-3757
Mobile: (614) 581-7190
Fax: (614) 861-0968
"Our family, caring for yours"

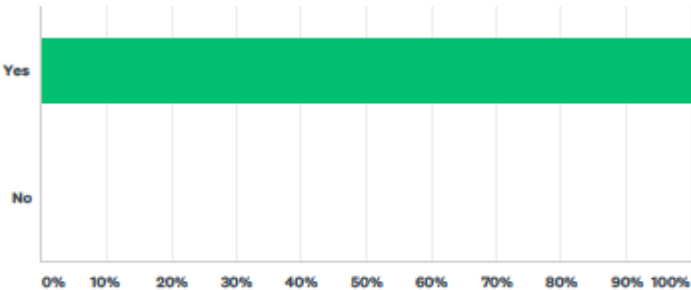
Appendix E

Internal Survey Questions and Results

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q1 Have you participated in competitive sports (i.e. basketball, volleyball, etc.) while on duty?

Answered: 14 Skipped: 0

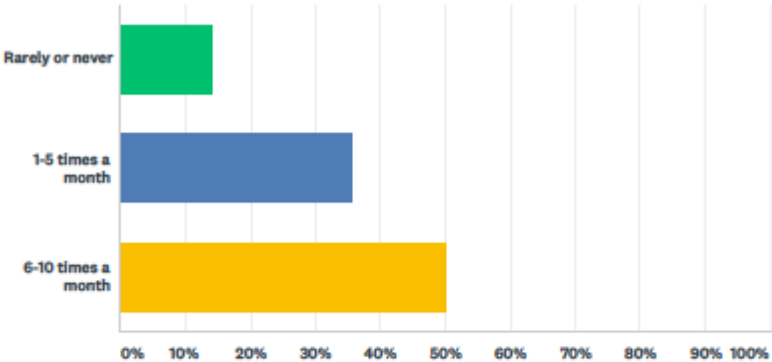


ANSWER CHOICES	RESPONSES	
Yes	100.00%	14
No	0.00%	0
TOTAL		14

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q2 If and when allowed while on duty, how often would you use competitive sports as a formal fitness activity?

Answered: 14 Skipped: 0

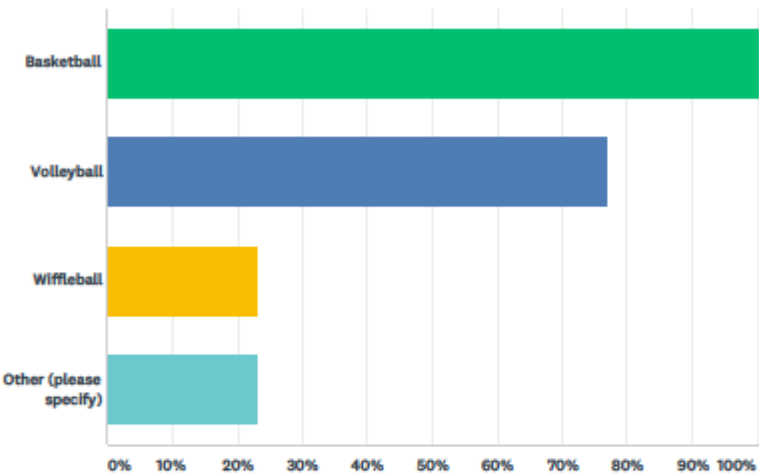


ANSWER CHOICES	RESPONSES	
Rarely or never	14.29%	2
1-5 times a month	35.71%	5
6-10 times a month	50.00%	7
TOTAL		14

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q3 Which type of competitive sports would you play on duty? Check all that apply.

Answered: 13 Skipped: 1

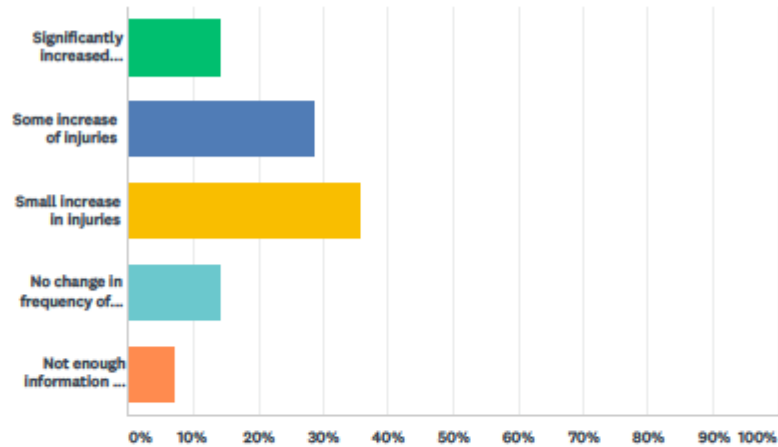


ANSWER CHOICES	RESPONSES	
Basketball	100.00%	13
Volleyball	76.92%	10
Wiffleball	23.08%	3
Other (please specify)	23.08%	3
Total Respondents: 13		

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q4 What impact has allowing competitive sports on duty had on your firefighters and the agency (i.e. injuries sustained)?

Answered: 14 Skipped: 0

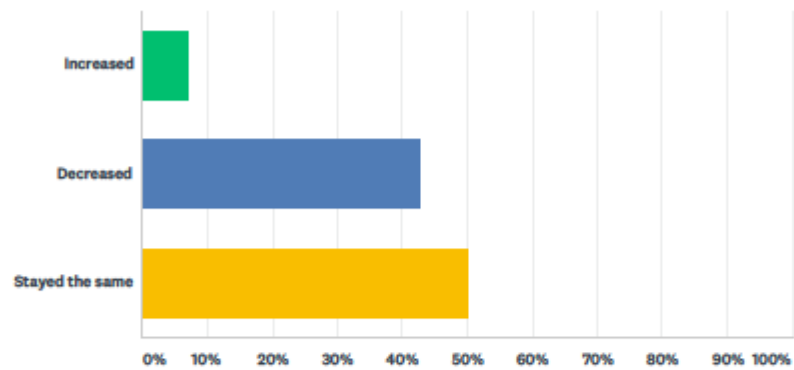


ANSWER CHOICES	RESPONSES	
Significantly increased inquiries	14.29%	2
Some increase of injuries	28.57%	4
Small increase in injuries	35.71%	5
No change in frequency of injuries	14.29%	2
Not enough information to determine	7.14%	1
TOTAL		14

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q5 Which best describes the amount of time you spend on fitness since competitive sports were banned form being allowed on duty?

Answered: 14 Skipped: 0

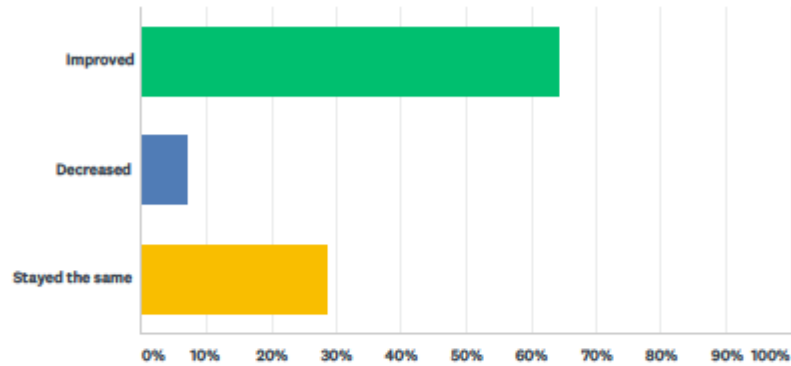


ANSWER CHOICES	RESPONSES	
Increased	7.14%	1
Decreased	42.86%	6
Stayed the same	50.00%	7
TOTAL		14

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q6 When allowed how did on duty competitive sports effect your level of fitness?

Answered: 14 Skipped: 0

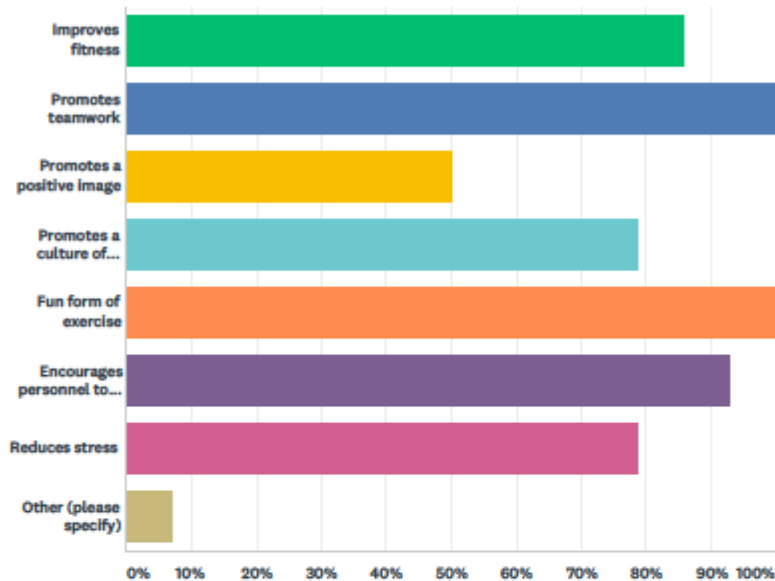


ANSWER CHOICES	RESPONSES	
Improved	64.29%	9
Decreased	7.14%	1
Stayed the same	28.57%	4
TOTAL		14

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q7 What do you feel are the benefits for firefighters being allowed to play competitive sports while on duty? Check all that apply.

Answered: 14 Skipped: 0

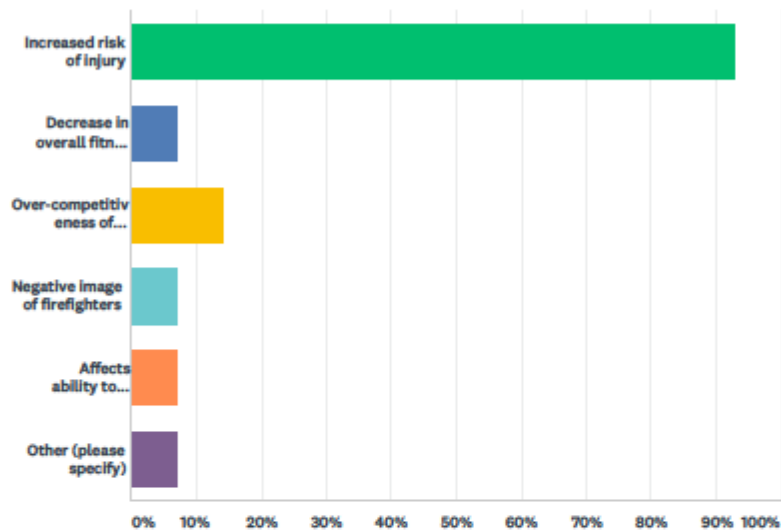


ANSWER CHOICES	RESPONSES	
Improves fitness	85.71%	12
Promotes teamwork	100.00%	14
Promotes a positive image	50.00%	7
Promotes a culture of fitness	78.57%	11
Fun form of exercise	100.00%	14
Encourages personnel to become more active	92.86%	13
Reduces stress	78.57%	11
Other (please specify)	7.14%	1
Total Respondents: 14		

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q8 What do you think are the drawbacks or potential problems of allowing firefighters to play competitive sports while on duty? Check all that apply?

Answered: 14 Skipped: 0

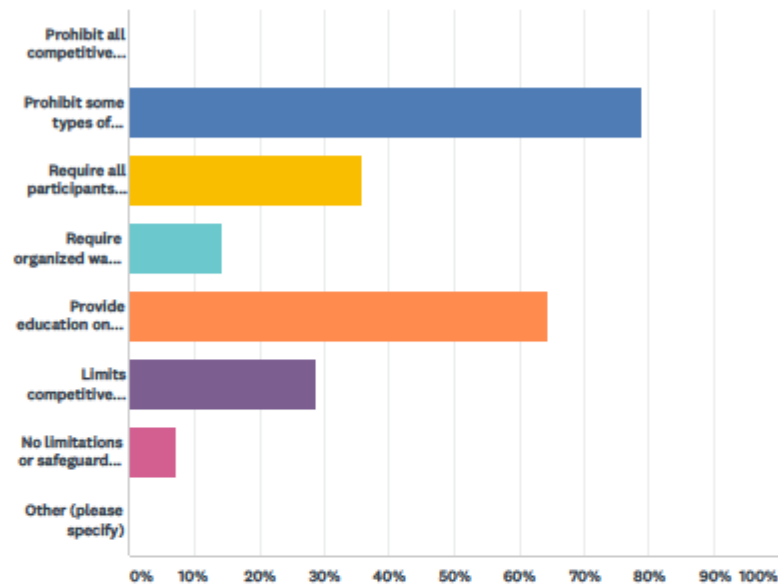


ANSWER CHOICES	RESPONSES	
Increased risk of injury	92.86%	13
Decrease in overall fitness (i.e. strength, flexibility, aerobic activity)	7.14%	1
Over-competitiveness of personnel causing friction between or negative tension between personnel	14.29%	2
Negative image of firefighters	7.14%	1
Affects ability to respond on calls	7.14%	1
Other (please specify)	7.14%	1
Total Respondents: 14		

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q9 What limitations or control measures do you feel should be implemented when playing competitive sports on duty? Check all that apply

Answered: 14 Skipped: 0

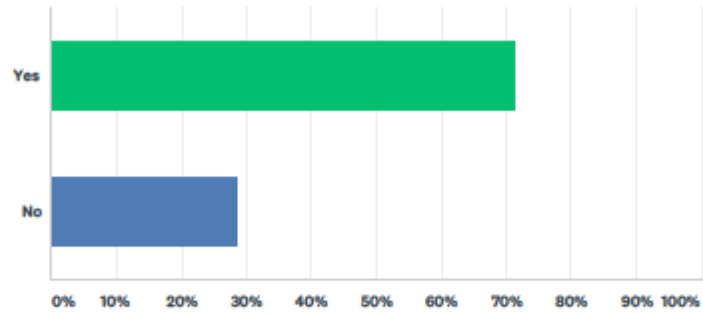


ANSWER CHOICES	RESPONSES	
Prohibit all competitive sports while on duty	0.00%	0
Prohibit some types of competitive sports on duty (i.e. tackle football)	78.57%	11
Require all participants to perform organized stretching	35.71%	5
Require organized warm up and cool down periods	14.29%	2
Provide education on injury prevention as it relates to competitive sports activities	64.29%	9
Limits competitive sports to non-contact only (i.e. wiffleball)	28.57%	4
No limitations or safeguards needed	7.14%	1
Other (please specify)	0.00%	0
Total Respondents: 14		

On Duty Competitive Sports: Effects on Firefighter Fitness - Internal Survey

Q10 Do you feel the JTFD should allow its firefighters to play competitive sports on duty?

Answered: 14 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	71.43%	10
No	28.57%	4
TOTAL		14

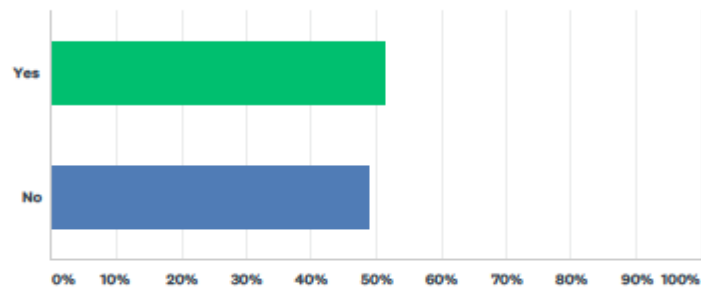
Appendix F

External Survey Questions and Results

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q1 Does your fire department allow its firefighters to play competitive sports on duty?

Answered: 43 Skipped: 0

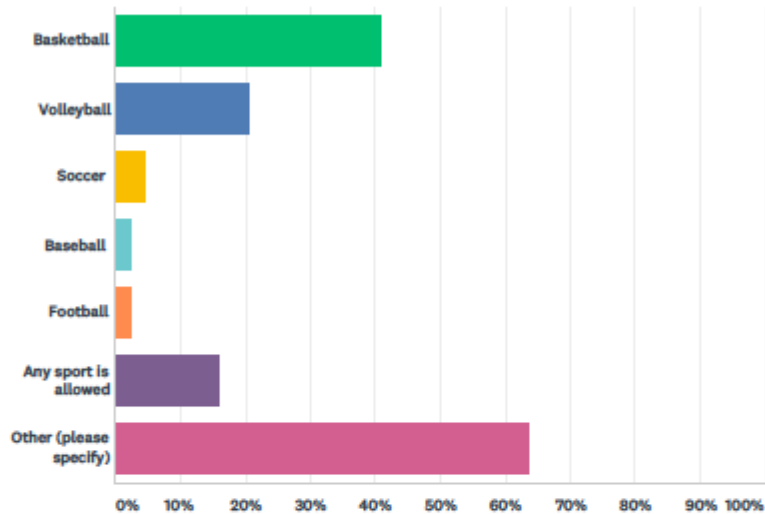


ANSWER CHOICES	RESPONSES	
Yes	51.16%	22
No	48.84%	21
TOTAL		43

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q2 Which type of competitive sports are allowed to be played when on duty? Check all that apply.

Answered: 44 Skipped: 11

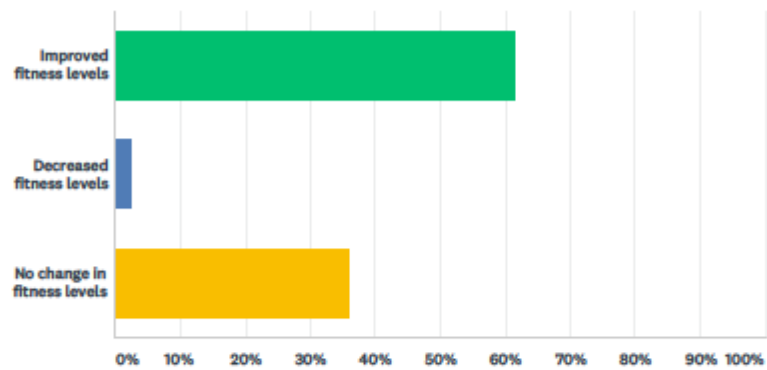


ANSWER CHOICES	RESPONSES	
Basketball	40.91%	18
Volleyball	20.45%	9
Soccer	4.55%	2
Baseball	2.27%	1
Football	2.27%	1
Any sport is allowed	15.91%	7
Other (please specify)	63.64%	28
Total Respondents: 44		

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q3 What impact does allowing on duty competitive sports have on your firefighter's fitness levels?

Answered: 39 Skipped: 16

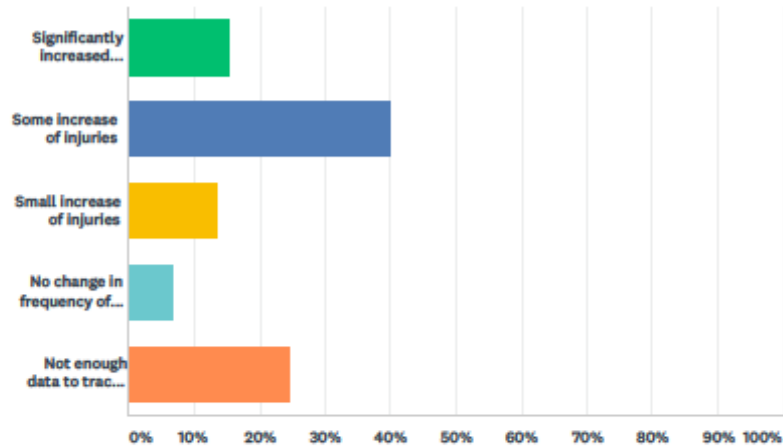


ANSWER CHOICES	RESPONSES	
Improved fitness levels	61.54%	24
Decreased fitness levels	2.56%	1
No change in fitness levels	35.90%	14
TOTAL		39

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q4 What impact on injuries has allowing on duty competitive sports had on your firefighters?

Answered: 45 Skipped: 10

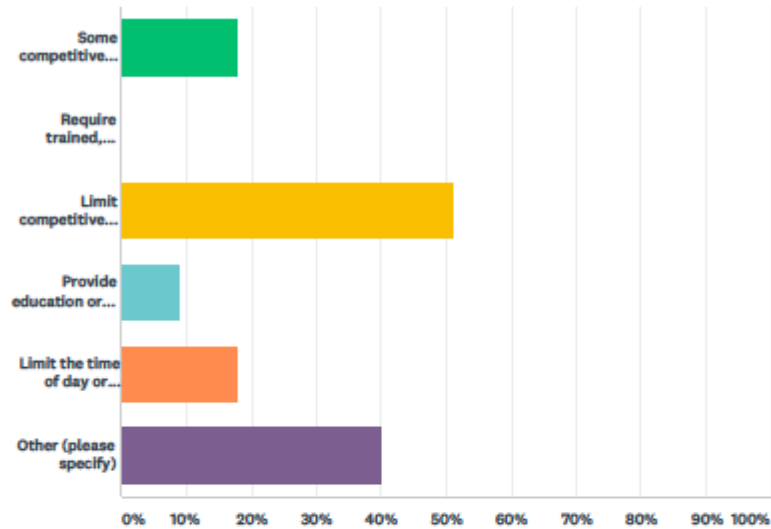


ANSWER CHOICES	RESPONSES	
Significantly increased injuries	15.56%	7
Some increase of injuries	40.00%	18
Small increase of injuries	13.33%	6
No change in frequency of injuries	6.67%	3
Not enough data to track frequency of injuries	24.44%	11
TOTAL		45

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q5 What limitations or control measures does your agency have for firefighters who play competitive sports on duty? Check all that apply.

Answered: 45 Skipped: 10

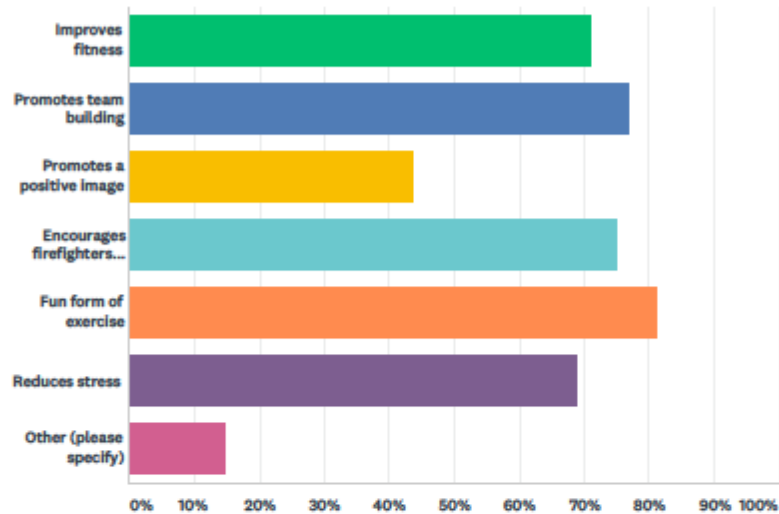


ANSWER CHOICES	RESPONSES	
Some competitive sports are prohibited	17.78%	8
Require trained, certified and/or knowledgeable trainers or coaches to be present to enforce the rules or safety measures	0.00%	0
Limit competitive sports to non-contact only	51.11%	23
Provide education or training on injury prevention specific to competitive sports	8.89%	4
Limit the time of day or amount of time allowed to play competitive sports on duty	17.78%	8
Other (please specify)	40.00%	18
Total Respondents: 45		

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q6 What are the benefits of allowing firefighters to participate in competitive sports while on duty? Check all that apply.

Answered: 48 Skipped: 7

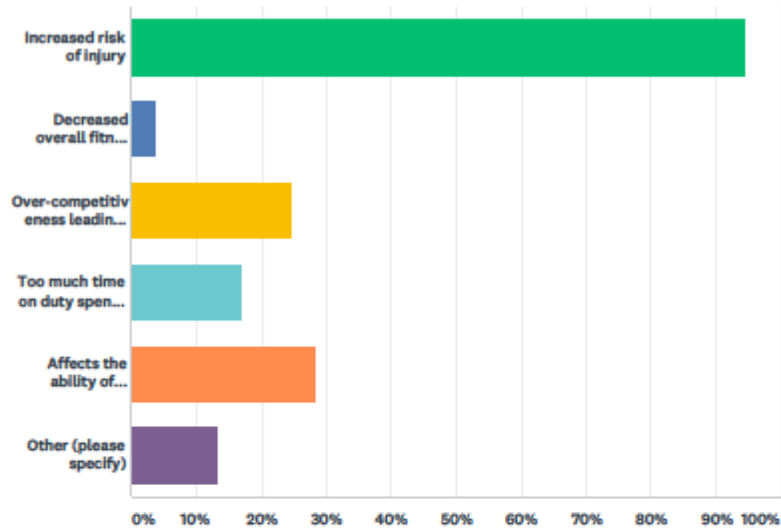


ANSWER CHOICES	RESPONSES	
Improves fitness	70.83%	34
Promotes team building	77.08%	37
Promotes a positive image	43.75%	21
Encourages firefighters to be more active	75.00%	36
Fun form of exercise	81.25%	39
Reduces stress	68.75%	33
Other (please specify)	14.58%	7
Total Respondents: 48		

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q7 What are the drawbacks (potential or real) of allowing firefighters to play competitive sports while on duty? Check all that apply.

Answered: 53 Skipped: 2

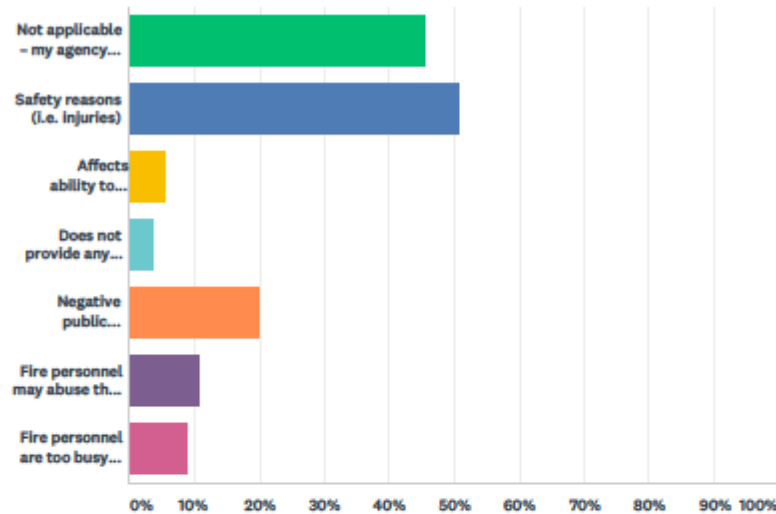


ANSWER CHOICES	RESPONSES	
Increased risk of injury	94.34%	50
Decreased overall fitness (i.e. too much time spent on competitive sports at the expense of other fitness activities such as strength training)	3.77%	2
Over-competitiveness leading to negative tension amongst crews	24.53%	13
Too much time on duty spent playing competitive sports at the expense of time devoted to other activities (i.e. fire & EMS training, pre-planning, public education, etc.)	16.98%	9
Affects the ability of firefighters to respond to emergency calls (i.e. firefighters play to point of exhaustion, delays response times, puts personnel or apparatus out of response district, etc.)	28.30%	15
Other (please specify)	13.21%	7
Total Respondents: 53		

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q8 Why does your fire department not allow firefighters to play competitive sports when on duty? Check all that apply.

Answered: 55 Skipped: 0

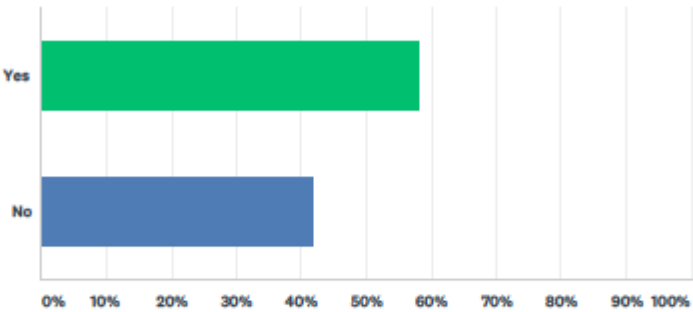


ANSWER CHOICES	RESPONSES	
Not applicable – my agency allows on duty competitive sports activities	45.45%	25
Safety reasons (i.e. injuries)	50.91%	28
Affects ability to respond in a timely manner	5.45%	3
Does not provide any fitness benefits	3.64%	2
Negative public perception	20.00%	11
Fire personnel may abuse the privilege (i.e. neglect other duties)	10.91%	6
Fire personnel are too busy with other duties (i.e. emergency response activities, inspections, training, etc.)	9.09%	5
Total Respondents: 55		

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q9 Do you feel fire personnel should be allowed to play competitive sports when on duty?

Answered: 55 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	58.18%	32
No	41.82%	23
TOTAL		55

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

Q10 Agency Info

Answered: 40 Skipped: 15

ANSWER CHOICES	RESPONSES	
Name	95.00%	38
Agency	87.50%	35
Address	90.00%	36
Address 2	2.50%	1
City/Town	90.00%	36
State/Province	97.50%	39
ZIP/Postal Code	90.00%	36
Country	77.50%	31
Email Address	85.00%	34
Phone Number	75.00%	30

#	NAME	DATE
1	J.P. Steelman	1/14/2019 10:40 AM
2	Kenneth CHadwick	1/12/2019 9:38 AM
3	Drew Smith	1/10/2019 10:33 PM
4	Mark Forster	1/10/2019 7:51 PM
5	Gilbert Caldwell	1/10/2019 5:49 PM
6	Scott A Metzler	1/10/2019 5:19 PM
7	John Bennett	1/10/2019 4:35 PM
8	Chuck Ryan	1/10/2019 3:51 PM
9	Eilizabeth Bednarcik	12/27/2018 9:38 AM
10	Joe Powers	12/25/2018 5:17 PM
11	Ray Green	12/21/2018 10:20 AM
12	Jeff Deeks	12/19/2018 8:15 AM
13	George B. Snyder	12/18/2018 9:40 PM
14	Douglas Wolters	12/18/2018 5:45 PM
15	Rick	12/18/2018 4:18 PM
16	Brian Taylor	12/18/2018 3:12 PM
17	Chris Coates	12/18/2018 12:56 PM
18	Brian Phillips	12/18/2018 8:29 AM
19	Dave Williams	12/17/2018 11:40 AM
20	JAMES KIRK	12/16/2018 11:50 AM
21	Okeechobee County Fire Rescue	12/15/2018 5:09 PM
22	Joey Presley	12/15/2018 3:25 PM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

23	Andy Kovacs	12/15/2018 1:20 PM
24	Scott Lessard	12/15/2018 1:08 PM
25	Kevin Dove	12/15/2018 7:00 AM
26	William warren	12/14/2018 7:50 PM
27	Brian Schenking	12/14/2018 6:58 PM
28	Bernie Molloy	12/14/2018 6:50 PM
29	Steven Shaumeyer	12/14/2018 6:26 PM
30	Chris Dymond	12/14/2018 6:03 PM
31	Troy Jellison	12/14/2018 5:47 PM
32	Douglas McGlynn	12/14/2018 5:35 PM
33	Brian Monaham	12/14/2018 5:28 PM
34	Allen Peltz	12/14/2018 5:22 PM
35	Will Seeley	12/14/2018 5:22 PM
36	Paul Radford	12/14/2018 5:20 PM
37	Frisco Fire Dept	12/14/2018 5:08 PM
38	Jason Moore	12/14/2018 4:47 PM
#	AGENCY	DATE
1	Longview FD	1/14/2019 10:40 AM
2	Gwinnett County Fire and Emergency Services	1/12/2019 9:38 AM
3	Prospect Heights Fire District	1/10/2019 10:33 PM
4	King of Prussia Fire Co	1/10/2019 7:51 PM
5	Roanoke Fire Dept	1/10/2019 5:49 PM
6	Newton Fire/EMS Department	1/10/2019 5:19 PM
7	Telluride Fire Protection District	1/10/2019 4:35 PM
8	Fairfax County Fire & Rescue Department	1/10/2019 3:51 PM
9	Gallatin Fire Department	12/27/2018 9:38 AM
10	Henrico Fire	12/25/2018 5:17 PM
11	Canal Fulton Fire Dept.	12/21/2018 10:20 AM
12	Cambridge Fire Department	12/19/2018 8:15 AM
13	Burghill Vernon Fire Department	12/18/2018 9:40 PM
14	Celina Fire Department	12/18/2018 5:45 PM
15	Akron fire department	12/18/2018 4:18 PM
16	Costa Mesa Fire & Rescue	12/18/2018 12:56 PM
17	Virginia Beach Fire Department	12/18/2018 8:29 AM
18	Chino Valley Fire District	12/17/2018 11:40 AM
19	Nashua Fire Rescue	12/16/2018 11:50 AM
20	Shreveport Fire Dept	12/15/2018 3:25 PM
21	Orange County Fire	12/15/2018 1:20 PM
22	North Kingstown Fire Department	12/15/2018 1:08 PM
23	Fayetteville Fire Department	12/15/2018 7:00 AM
24	Gastonia	12/14/2018 7:50 PM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

25	Summit Fire EMS Authority	12/14/2018 6:58 PM
26	Lakeside Fire Protection District	12/14/2018 6:50 PM
27	Kansas City Fire Department	12/14/2018 6:26 PM
28	New Smyrna Beach Fire Department	12/14/2018 6:03 PM
29	El Dorado Fire Department	12/14/2018 5:47 PM
30	Palm Beach County Fire Rescue	12/14/2018 5:35 PM
31	Duxbury Fire	12/14/2018 5:28 PM
32	Thornton Fire	12/14/2018 5:22 PM
33	Golder Ranch Fire	12/14/2018 5:22 PM
34	Idaho Falls fire department	12/14/2018 5:20 PM
35	Green valley fire district	12/14/2018 4:47 PM
#	ADDRESS	DATE
1	100 E. Cotton St.	1/14/2019 10:40 AM
2	408 Hurricane Shoals Road	1/12/2019 9:38 AM
3	10 E Camp McDonald Rd	1/10/2019 10:33 PM
4	170 allendale rd	1/10/2019 7:51 PM
5	201 Fairway Dr.	1/10/2019 5:49 PM
6	200 E 3rd St	1/10/2019 5:19 PM
7	PO Box 1645	1/10/2019 4:35 PM
8	12099 Government Center Parkway	1/10/2019 3:51 PM
9	119 Chief Billy Crook Blvd	12/27/2018 9:38 AM
10	1165 South Locust Street	12/21/2018 10:20 AM
11	902 Gaston Ave	12/19/2018 8:15 AM
12	6915 State Route 88	12/18/2018 9:40 PM
13	202 Main St.	12/18/2018 5:45 PM
14	161 south high	12/18/2018 4:18 PM
15	5373 Norton Rd	12/18/2018 3:12 PM
16	77 Fair Dr.	12/18/2018 12:56 PM
17	4817 Columbus St	12/18/2018 8:29 AM
18	14011 City Center Drive	12/17/2018 11:40 AM
19	70 East Hollis St	12/16/2018 11:50 AM
20	706 NW 6th Street	12/15/2018 5:09 PM
21	262 north common	12/15/2018 3:25 PM
22	1 Authority Way	12/15/2018 1:20 PM
23	8150 Post RD	12/15/2018 1:08 PM
24	632 Langdon St.	12/15/2018 7:00 AM
25	PO Box 4428	12/14/2018 6:58 PM
26	12216 Lakeside Ave	12/14/2018 6:50 PM
27	635 woodland	12/14/2018 6:26 PM
28	1400 State Road 44	12/14/2018 6:03 PM
29	220 E. First Ave	12/14/2018 5:47 PM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

30	405 Pike Road	12/14/2018 5:35 PM
31	668 Tremont st	12/14/2018 5:28 PM
32	9500 Civic Center Drive	12/14/2018 5:22 PM
33	3885 E Golder Ranch Dr	12/14/2018 5:22 PM
34	343 E St.	12/14/2018 5:20 PM
35	8601 Gary Burns Dr	12/14/2018 5:08 PM
36	1285 w. Camino encanto	12/14/2018 4:47 PM
#	ADDRESS 2	DATE
1	131 West Columbia Avenue	1/10/2019 4:35 PM
#	CITY/TOWN	DATE
1	Longview	1/14/2019 10:40 AM
2	Lawrenceville	1/12/2019 9:38 AM
3	Prospect Heights	1/10/2019 10:33 PM
4	King of Prussia	1/10/2019 7:51 PM
5	Roanoke	1/10/2019 5:49 PM
6	Newton	1/10/2019 5:19 PM
7	Telluride	1/10/2019 4:35 PM
8	Fairfax	1/10/2019 3:51 PM
9	Gallatin	12/27/2018 9:38 AM
10	Canal Fulton	12/21/2018 10:20 AM
11	Cambridge	12/19/2018 8:15 AM
12	Kinsman	12/18/2018 9:40 PM
13	Celina	12/18/2018 5:45 PM
14	Akron	12/18/2018 4:18 PM
15	Grove City	12/18/2018 3:12 PM
16	Costa Mesa	12/18/2018 12:56 PM
17	Virginia Beach	12/18/2018 8:29 AM
18	Chino Hills	12/17/2018 11:40 AM
19	Nashua	12/16/2018 11:50 AM
20	Okeechobee	12/15/2018 5:09 PM
21	Shreveport	12/15/2018 3:25 PM
22	Irvine	12/15/2018 1:20 PM
23	North Kingstown	12/15/2018 1:08 PM
24	Fayetteville	12/15/2018 7:00 AM
25	Dillon	12/14/2018 6:58 PM
26	Lakeside	12/14/2018 6:50 PM
27	Kansas City	12/14/2018 6:26 PM
28	New Smyrna Beach	12/14/2018 6:03 PM
29	El Dorado	12/14/2018 5:47 PM
30	West Palm Beach	12/14/2018 5:35 PM
31	Duxbury	12/14/2018 5:28 PM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

32	Thornton	12/14/2018 5:22 PM
33	Tucson	12/14/2018 5:22 PM
34	Idaho Falls	12/14/2018 5:20 PM
35	Frisco	12/14/2018 5:08 PM
36	Green valley	12/14/2018 4:47 PM
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2	GA	1/12/2019 9:38 AM
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4	PA	1/10/2019 7:51 PM
5	TX	1/10/2019 5:49 PM
6	KS	1/10/2019 5:19 PM
7	CO	1/10/2019 4:35 PM
8	VA	1/10/2019 3:51 PM
9	TN	12/27/2018 9:38 AM
10	OH	12/21/2018 10:20 AM
11	OH	12/19/2018 8:15 AM
12	OH	12/18/2018 9:40 PM
13	OH	12/18/2018 5:45 PM
14	OH	12/18/2018 4:18 PM
15	OH	12/18/2018 3:12 PM
16	OH	12/18/2018 1:07 PM
17	CA	12/18/2018 12:56 PM
18	VA	12/18/2018 8:29 AM
19	CA	12/17/2018 11:40 AM
20	NH	12/16/2018 11:50 AM
21	MA	12/15/2018 11:25 PM
22	FL	12/15/2018 5:09 PM
23	LA	12/15/2018 3:25 PM
24	CA	12/15/2018 1:20 PM
25	RI	12/15/2018 1:08 PM
26	NC	12/15/2018 7:00 AM
27	NC	12/14/2018 7:50 PM
28	CO	12/14/2018 6:58 PM
29	CA	12/14/2018 6:50 PM
30	MO	12/14/2018 6:26 PM
31	FL	12/14/2018 6:03 PM
32	KS	12/14/2018 5:47 PM
33	FL	12/14/2018 5:35 PM
34	MA	12/14/2018 5:28 PM
35	CO	12/14/2018 5:22 PM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

36	AZ	12/14/2018 5:22 PM
37	ID	12/14/2018 5:20 PM
38	TX	12/14/2018 5:08 PM
39	AZ	12/14/2018 4:47 PM
#	ZIP/POSTAL CODE	DATE
1	75601	1/14/2019 10:40 AM
2	30045	1/12/2019 9:38 AM
3	60070	1/10/2019 10:33 PM
4	19406	1/10/2019 7:51 PM
5	76262	1/10/2019 5:49 PM
6	67114	1/10/2019 5:19 PM
7	81435	1/10/2019 4:35 PM
8	22035	1/10/2019 3:51 PM
9	37066	12/27/2018 9:38 AM
10	44614	12/21/2018 10:20 AM
11	43725	12/19/2018 8:15 AM
12	44428	12/18/2018 9:40 PM
13	45822	12/18/2018 5:45 PM
14	44308	12/18/2018 4:18 PM
15	43123	12/18/2018 3:12 PM
16	92626	12/18/2018 12:56 PM
17	23462	12/18/2018 8:29 AM
18	91709	12/17/2018 11:40 AM
19	03060	12/16/2018 11:50 AM
20	34972	12/15/2018 5:09 PM
21	71101	12/15/2018 3:25 PM
22	92602	12/15/2018 1:20 PM
23	02852	12/15/2018 1:08 PM
24	28348	12/15/2018 7:00 AM
25	80435-4428	12/14/2018 6:58 PM
26	92040	12/14/2018 6:50 PM
27	64157	12/14/2018 6:26 PM
28	32168	12/14/2018 6:03 PM
29	67042	12/14/2018 5:47 PM
30	33411	12/14/2018 5:35 PM
31	02360	12/14/2018 5:28 PM
32	80692	12/14/2018 5:22 PM
33	85739	12/14/2018 5:22 PM
34	83402	12/14/2018 5:20 PM
35	75034	12/14/2018 5:08 PM
36	85614	12/14/2018 4:47 PM

On Duty Competitive Sports: Effects on Firefighter Fitness -- External Survey

#	COUNTRY	DATE
1	USA	1/14/2019 10:40 AM
2	USA	1/12/2019 9:38 AM
3	USA	1/10/2019 10:33 PM
4	Us	1/10/2019 7:51 PM
5	United States	1/10/2019 5:19 PM
6	United States	1/10/2019 4:35 PM
7	United States	1/10/2019 3:51 PM
8	United States	12/27/2018 9:38 AM
9	USA	12/21/2018 10:20 AM
10	United States	12/19/2018 8:15 AM
11	US	12/18/2018 9:40 PM
12	United States	12/18/2018 5:45 PM
13	USA	12/18/2018 4:18 PM
14	USA	12/18/2018 12:56 PM
15	United States of America	12/18/2018 8:29 AM
16	U.S.	12/17/2018 11:40 AM
17	USA	12/16/2018 11:50 AM
18	United States	12/15/2018 5:09 PM
19	USA	12/15/2018 1:20 PM
20	USA	12/15/2018 1:08 PM
21	usa	12/15/2018 7:00 AM
22	United States	12/14/2018 6:58 PM
23	USA	12/14/2018 6:50 PM
24	USA	12/14/2018 6:26 PM
25	US	12/14/2018 6:03 PM
26	USA	12/14/2018 5:47 PM
27	US	12/14/2018 5:35 PM
28	USA	12/14/2018 5:22 PM
29	USA	12/14/2018 5:20 PM
30	United States	12/14/2018 5:08 PM
31	United States	12/14/2018 4:47 PM
#	EMAIL ADDRESS	DATE
1	jpsteelman@longviewtexas.gov	1/14/2019 10:40 AM
2	ken.chadwick@gwinnettcounty.com	1/12/2019 9:38 AM
3	dsmith@phfire.com	1/10/2019 10:33 PM
4	gcaldwell@roanoketexas.com	1/10/2019 5:49 PM
5	scottmetzler@newtonfireems.com	1/10/2019 5:19 PM
6	jbennett@telluridefire.com	1/10/2019 4:35 PM
7	chuck.ryan@fairfaxcounty.gov	1/10/2019 3:51 PM
8	elizabeth.bednarcik@gallatin.gov	12/27/2018 9:38 AM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

9	joe.powers@henrico.us	12/25/2018 5:17 PM
10	deeks@cambridgeoh.org	12/19/2018 8:15 AM
11	snydergb@burghillvernonfire.org	12/18/2018 9:40 PM
12	cellnafirechief@celinaohio.org	12/18/2018 5:45 PM
13	rvober@akronohio.gov	12/18/2018 4:18 PM
14	btaylor@pleasanttownship.com	12/18/2018 3:12 PM
15	chris.coates@costamesaca.gov	12/18/2018 12:56 PM
16	bphillip@vbgov.com	12/18/2018 8:29 AM
17	dawilliams@chofire.org	12/17/2018 11:40 AM
18	nfr5052@yahoo.com	12/16/2018 11:50 AM
19	RFranklin@co.okeechobee.fl.us	12/15/2018 5:09 PM
20	joey.presley@shreveportla.gov	12/15/2018 3:25 PM
21	Andykovacs@ocfa.org	12/15/2018 1:20 PM
22	scott.lessard@gmail.com	12/15/2018 1:08 PM
23	Bschenking@summitfire.org	12/14/2018 6:58 PM
24	bmolloy@lakesidefire.com	12/14/2018 6:50 PM
25	sshaumeyer@gmail.com	12/14/2018 6:26 PM
26	cdymond@cityofnsb.com	12/14/2018 6:03 PM
27	tjellison@eldoks.com	12/14/2018 5:47 PM
28	dmcglyn@pbcgov.com	12/14/2018 5:35 PM
29	bmonahan@hotmail.com	12/14/2018 5:28 PM
30	allen.peltz@cityofthornton.net	12/14/2018 5:22 PM
31	wseeley@grfdaz.gov	12/14/2018 5:22 PM
32	pradford@idahofallsidaho.gov	12/14/2018 5:20 PM
33	jleeper@friscofire.com	12/14/2018 5:08 PM
34	jmoore@gvfire.org	12/14/2018 4:47 PM
#	PHONE NUMBER	DATE
1	(903) 237-1227	1/14/2019 10:40 AM
2	6788730763	1/12/2019 9:38 AM
3	224-318-1720	1/10/2019 10:33 PM
4	817-491-2301	1/10/2019 5:49 PM
5	3162846060	1/10/2019 5:19 PM
6	9707283801	1/10/2019 4:35 PM
7	571-249-0266	1/10/2019 3:51 PM
8	615 452-2771	12/27/2018 9:38 AM
9	804-517-0564	12/25/2018 5:17 PM
10	(740) 432-3232	12/19/2018 8:15 AM
11	3304427444	12/18/2018 9:40 PM
12	419-586-2127	12/18/2018 5:45 PM
13	3303752411	12/18/2018 4:18 PM
14	3302401406	12/18/2018 3:12 PM

On Duty Competitive Sports: Effects on Firefighter Fitness – External Survey

15	714-754-5091	12/18/2018 12:56 PM
16	714-473-4747	12/17/2018 11:40 AM
17	6033215982	12/16/2018 11:50 AM
18	863-763-5544	12/15/2018 5:09 PM
19	3186177627	12/15/2018 3:25 PM
20	9706852491	12/15/2018 1:20 PM
21	(860) 335-8667	12/15/2018 1:08 PM
22	9704068088	12/14/2018 6:58 PM
23	6192486822	12/14/2018 6:50 PM
24	9139639385	12/14/2018 6:26 PM
25	3163235124	12/14/2018 5:47 PM
26	561-616-7003	12/14/2018 5:35 PM
27	5089655576	12/14/2018 5:28 PM
28	3035387602	12/14/2018 5:22 PM
29	5202699408	12/14/2018 5:22 PM
30	5209049277	12/14/2018 4:47 PM

Appendix G

2018 JTFD Medical & Fitness Testing Results

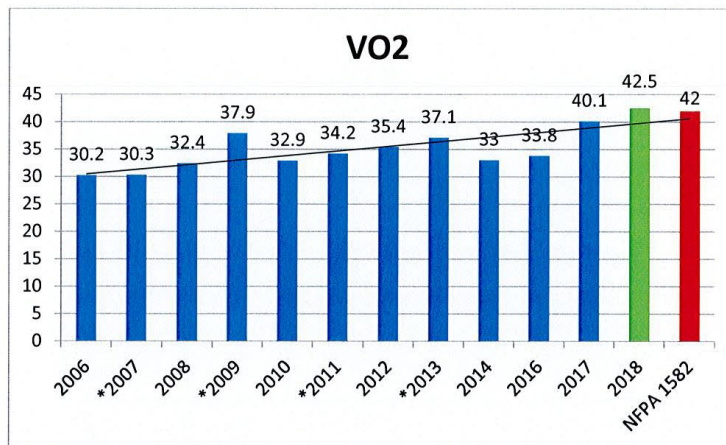
Jefferson Township Fire 2018 Medical & Fitness Testing Results

In 2018, Mount Carmel completed medical and fitness testing on 24 Jefferson Township firefighters. This report will be comparing the results from testing in 2018 to the results from the 2006-2017 medical and fitness testing. **On the graphs in the following pages you will see an asterisk (*) in front of the years that less than 10 Jefferson firefighters were tested, indicating that these years are not a good representation of the department as a whole.**

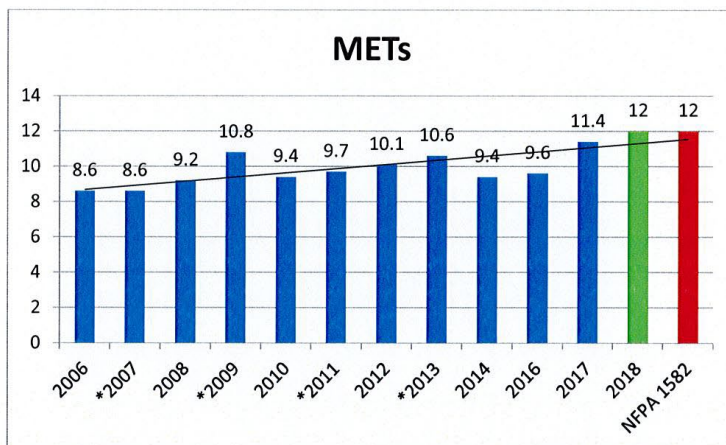
Below is a comparison of the average fitness testing results between 2006 & 2018 of Jefferson Township firefighters currently on company. *** In 2018, the Jefferson TWP fire department began using direct measurement to determine VO2 and MET's. Previously, these values were determined using an indirect estimate. We now have a much more accurate method of determining each individual's true cardiovascular fitness level.**

Year	Age	BMI	Waist:Hip	%Fat	VO2	MET's	Time	Max HR	HR Recovery
2006	39	31.6	0.93	21.3	30.2 ml/kg/min	8.6			
2007	50	30.7	0.93	23.5	30.3 ml/kg/min	8.6			
2008	43	32.9	1.0	25.8	32.4 ml/kg/min	9.2			
2009	40	30.6	0.9	25.6	37.9 ml/kg/min	10.8			
2010	38	35.3	0.9	25.2	32.9 ml/kg/min	9.4			
2011	43	30.4	0.9	21.3	36.4 ml/kg/min	10.4			
2012	39	33.3	0.9	22.6	35.4 ml/kg/min	10.1			
2013	40	31.2	0.9	20.8	37.1 ml/kg/min	10.6			
2014	39	32.8	0.9	22.3	33.0 ml/kg/min	9.4			
2016	39	32.6	0.95	23.1	33.8 ml/kg/min	9.6			
2017	37	31.9	1.0	21.2	40.1 ml/kg/min	11.4	11:25	177	24
2018	39	32.2	0.9	19.9	42.5 ml/kg/min	12.0	11:00	176	23

VO2 Comparison from 2006-2018



METs Comparison from 2006-2018



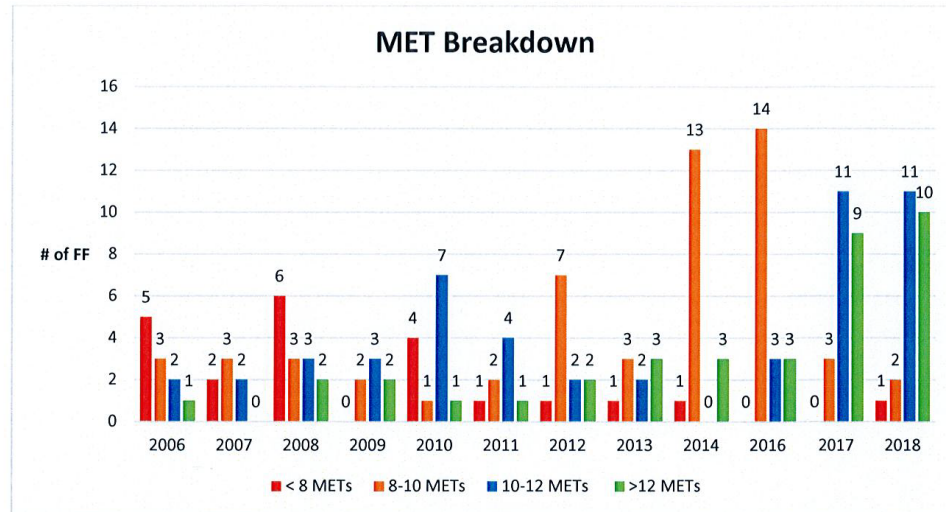
The NFPA 1582 recommends that firefighters must be able to exercise at 12 METs, a VO2 of 42.0 ml/kg/min, without symptoms or electrocardiographic changes. Fitness levels or exercise capacity equivalent to 14 METs, a VO2 of 49.0 ml/kg/min, have been recommended for active firefighters.

Jefferson Township's firefighters currently on company have an average estimated VO2 of 42.5 ml/kg/min. and an average MET level of 12.1. These are the highest cardiovascular fitness levels the department has achieved since we started testing in 2006. When looking at normative values, this increases the department from approximately the 10th percentile for aerobic capacity in 2016 to the 50th percentile in 2018.

With an average time on the treadmill of 11 mins and a Max Heart Rate of 176 bpm (which is 97% of the predicted heart rate max for a 39 year old male), we can see that a decent number of the firefighters gave a good effort and pushed themselves.

In 2017, we started tracking Heart Rate Recovery for each Jefferson TWP firefighter. Heart rate recovery is a measurement of how much the heart rate falls during the first minute after peak exercise. The healthier a person's heart is, the quicker it returns to its normal beat; the less healthy the heart is, the longer it takes it to recover from something like an exercise stress test. The average heart rate recovery in the first minute was 23 beats in 2018, which is consistent with 2017 of 24 beats.

Studies have found that people with an abnormal heart rate recovery, which consists of a decrease of 12 or less beats per minute, are at a greater risk for death from heart disease than those with normal heart rate recovery, which is a decrease of 15 to 25 beats per minute.



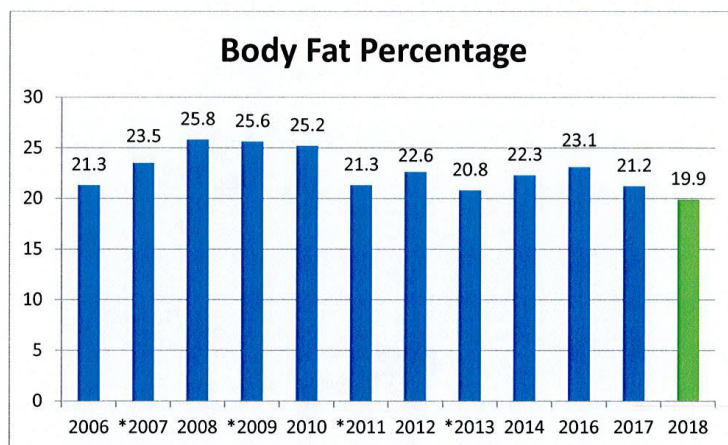
The above graph gives us a better picture of how the firefighters did individually with METs achieved.

2018 METs Achieved

- 1 (4%) firefighters achieved > 8 METs
- 2 (8%) firefighters achieved 8-10 METs
- 11 (46%) firefighters achieved 10-12 METs
- 10 (42%) firefighters achieved > 12 METs

It is worth noting that only one firefighter had less than 8 METs. In addition, over 85% of the department achieved 10 METs or better, and of those firefighters, almost 50% reached over 12 METs, meeting the NFPA 1582 recommendations.

Body Fat Comparison from 2006-2018



Body composition refers to the relative amount of muscle, fat, bone, and other vital parts of the body. It measures fat weight versus lean weight; together making up total body weight.

Body composition testing is important because excess body fat is associated with hypertension, type 2 diabetes, stroke, coronary heart disease and dyslipidemia. Obesity is now recognized as a major, independent risk factor for heart disease.

The Jefferson Township Firefighters currently on company have an average body composition of 19.9%, which based upon the average age of the department (*avg*: 39), puts the department at the 50th percentile for body composition. This is the leanest body composition we have seen from the department as a whole since we started medical and fitness testing in 2006.

Body Mass Index (BMI) comparison from 2006-2018

BMI is used to assess a person's weight relative to height. Although BMI fails to distinguish between body fat, muscle mass, or bone, a BMI greater than 30 is associated with an increased risk for hypertension, dyslipidemia, coronary artery disease, type II diabetes and increased mortality rate.

BMI Categories

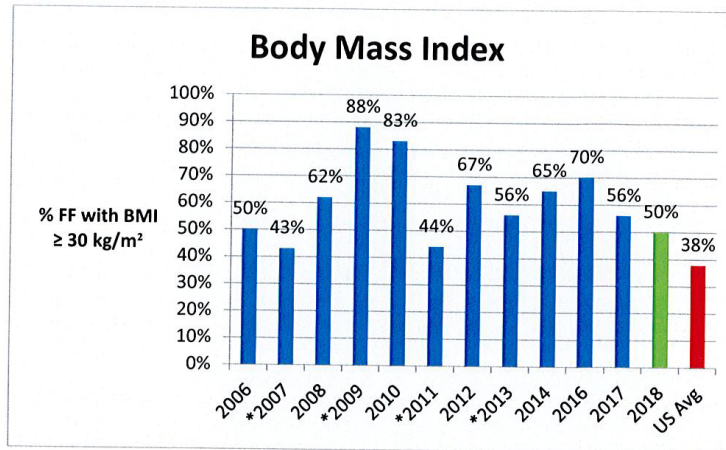
Normal: 19-24

Overweight: 25-29

Obesity class I: 30-34.9

Obesity Class II: 35-39.9

Obesity class III: 40 and above



Currently, 12 of the 24 tested firefighters on company have a BMI ≥ 30 . This is a decrease from 2016 and 2017 and trending closer towards the national average.

Waist Circumference Comparison from 2006-2018

In addition to BMI, another common measurement to define obesity is a waist circumference measurement ≥ 40 inches in males. This increased abdominal fat is associated with an increased risk for the same conditions mentioned above.

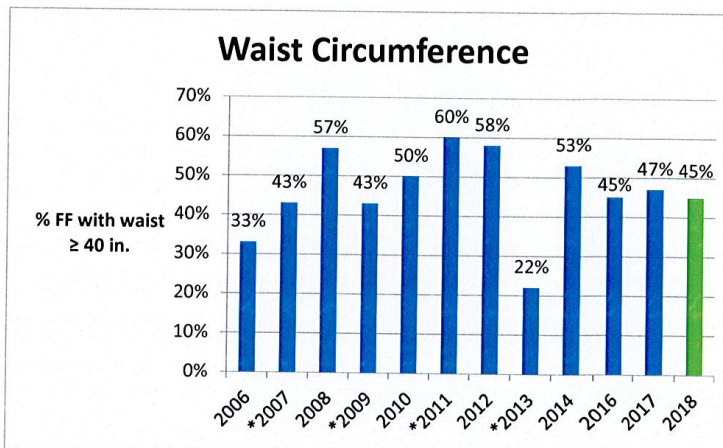
Waist Circumference Categories

Very low: < 31.5 inches

Low: 31.5-39 inches

High: 39.5-47 inches

Very High: > 47 inches



In 2018, the average waist circumference for the Jefferson Township Fire Department was 39.1 inches. Taking a closer look, 11 out of 24 (45%) firefighters tested had a waist circumference greater than the recommended <40 inches and of those, only 2 had a waist circumference >47 inches. This is a slight improvement from 2017 and consistent to what we have seen from the department over the past few years.

It appears that with the combination of a decrease in average body fat percentage, a decrease in the percentage of firefighters with BMI ≥ 30 , and a decrease in the number of firefighters with waist circumferences above 40 in, a number of individuals on the department have made weight management a priority over the past year.

Body Mass Index (BMI) comparison from 2006-2018

BMI is used to assess a person's weight relative to height. Although BMI fails to distinguish between body fat, muscle mass, or bone, a BMI greater than 30 is associated with an increased risk for hypertension, dyslipidemia, coronary artery disease, type II diabetes and increased mortality rate.

BMI Categories

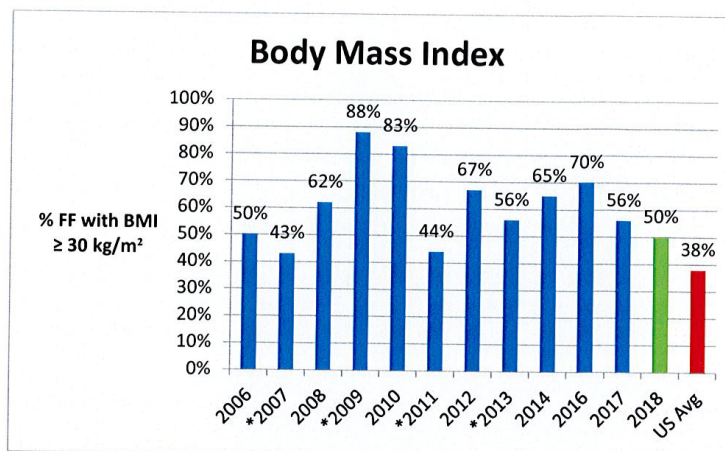
Normal: 19-24

Overweight: 25-29

Obesity class I: 30-34.9

Obesity Class II: 35-39.9

Obesity class III: 40 and above



Currently, 12 of the 24 tested firefighters on company have a BMI ≥ 30 . This is a decrease from 2016 and 2017 and trending closer towards the national average.

Waist Circumference Comparison from 2006-2018

In addition to BMI, another common measurement to define obesity is a waist circumference measurement ≥ 40 inches in males. This increased abdominal fat is associated with an increased risk for the same conditions mentioned above.

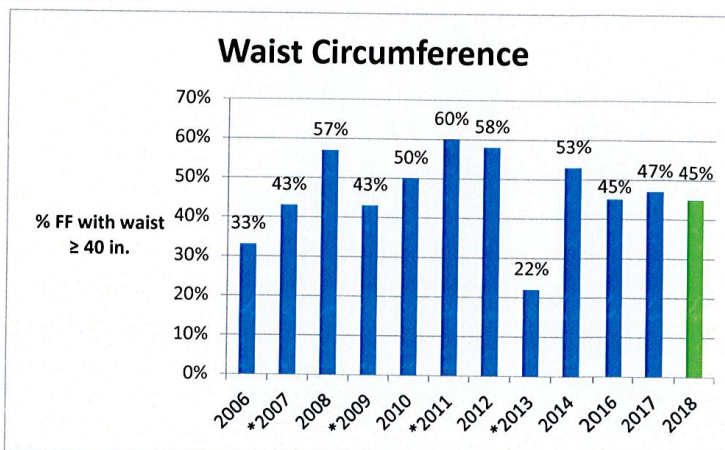
Waist Circumference Categories

Very low: < 31.5 inches

Low: 31.5-39 inches

High: 39.5-47 inches

Very High: > 47 inches



In 2018, the average waist circumference for the Jefferson Township Fire Department was 39.1 inches. Taking a closer look, 11 out of 24 (45%) firefighters tested had a waist circumference greater than the recommended <40 inches and of those, only 2 had a waist circumference >47 inches. This is a slight improvement from 2017 and consistent to what we have seen from the department over the past few years.

It appears that with the combination of a decrease in average body fat percentage, a decrease in the percentage of firefighters with BMI ≥ 30 , and a decrease in the number of firefighters with waist circumferences above 40 in, a number of individuals on the department have made weight management a priority over the past year.

Metabolic Breakdown

A targeted baseline was established using current medical recommendations for ideal lipid profiles and blood pressure measurements to establish healthy targets. The targeted baselines below show ranges that are strived for to be considered a healthy range.

Systolic BP < 120 mmHg
 Diastolic BP < 80 mmHg
 Triglycerides < 150 mg/dL
 HDL (Good Chol) > 40 mg/dL
 LDL (Bad Chol) < 100 mg/dL
 Glucose < 100 mg/dL

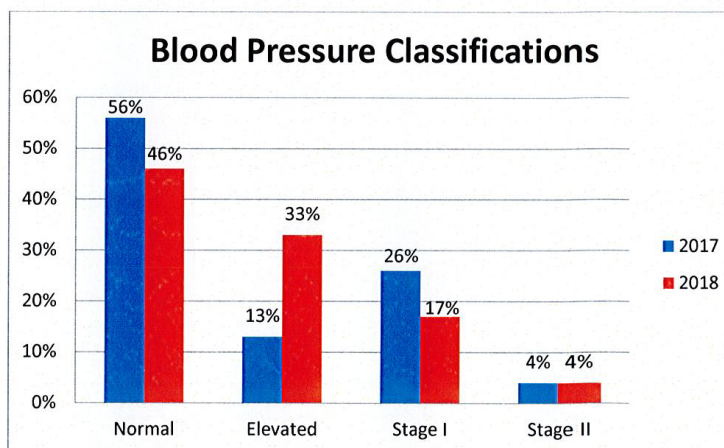
Hypertension Comparisons from 2017-2018

In November of 2017 the American College of Cardiology (ACC/ AHA) came out with new guidelines for categorizing the stages of hypertension. According to the ACC/ AHA, the new guidelines lower the definition of high blood pressure to account for complications that can occur at lower numbers and to allow for earlier intervention. The new guidelines also eliminate the category of prehypertension, categorizing patients as having either Elevated or Stage I hypertension.

Blood Pressure Categories:

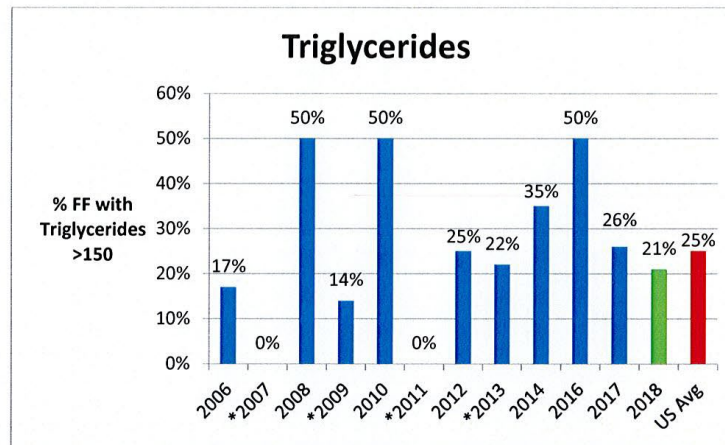
- Normal: Less than 120/80 mm Hg
- Elevated: Systolic between 120-129 *and* diastolic less than 80 mm Hg
- Stage 1: Systolic between 130-139 *or* diastolic between 80-89 mm Hg
- Stage 2: Systolic at least 140 *or* diastolic at least 90 mm Hg
- Hypertensive crisis: Systolic over 180 and/or diastolic over 120 mm Hg

The graph to the right helps us get a better picture of how the firefighters did, by category, with blood pressure regardless of if they were on medication or not.



In accordance with the new guidelines, currently, the Jefferson TWP Fire Department is below the national average (45.6%) with 21% (5 out of 24) of the firefighters on the department having high blood pressure.

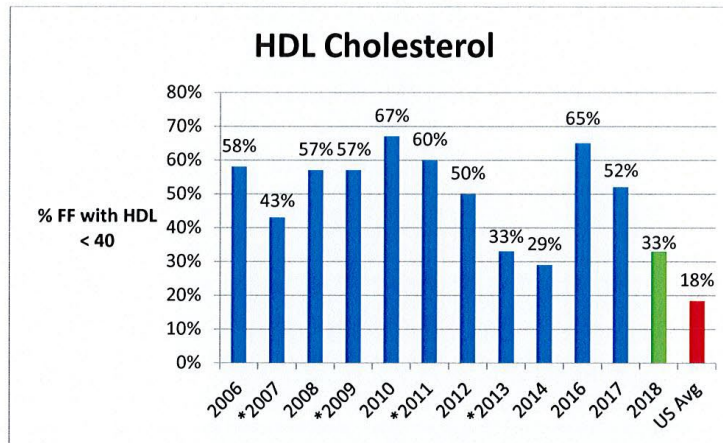
Triglyceride Comparison From 2006-2018



Triglycerides are the major form of fat that moves through your blood stream. There is growing evidence that supports an association between elevated triglyceride levels and cardiovascular disease risk. High triglyceride levels may also show that you have or are at risk for diabetes. Normal triglyceride levels are indicated as < 150 mg/dL.

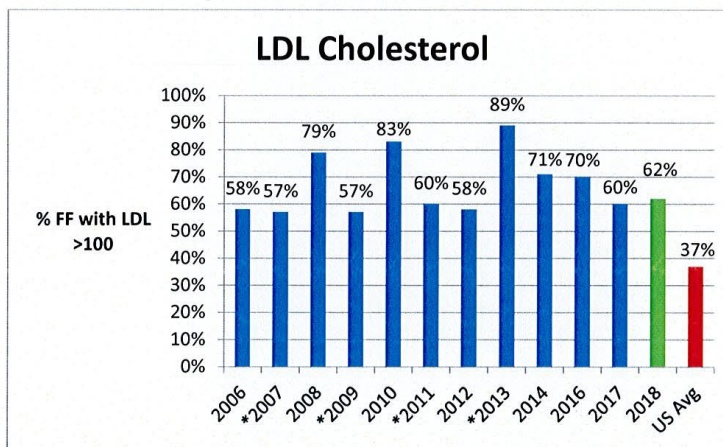
In 2018, 21% of the firefighters on company had elevated triglyceride levels, which is not only a decrease from 2017 but also the first time the department has been below the US national average since 2012.

HDL Cholesterol Comparison from 2006-2018



High Density Lipoproteins (HDL) is considered “good” cholesterol and tends to carry the extra cholesterol in your blood back to the liver so your body can get rid of it. The more HDL cholesterol you have, the lower your risk for heart disease will be. Currently, only a third (33%) of the firefighters tested exhibited HDL levels < 40 mg/dL. This is a significant decrease from 2017 and some of the lowest percentages we have seen from the department since 2014.

LDL Cholesterol Comparison from 2006-2018



Low Density Lipoproteins (LDL) is considered your “bad” cholesterol. Too much of this “bad” cholesterol is strongly associated with a high risk of heart disease.

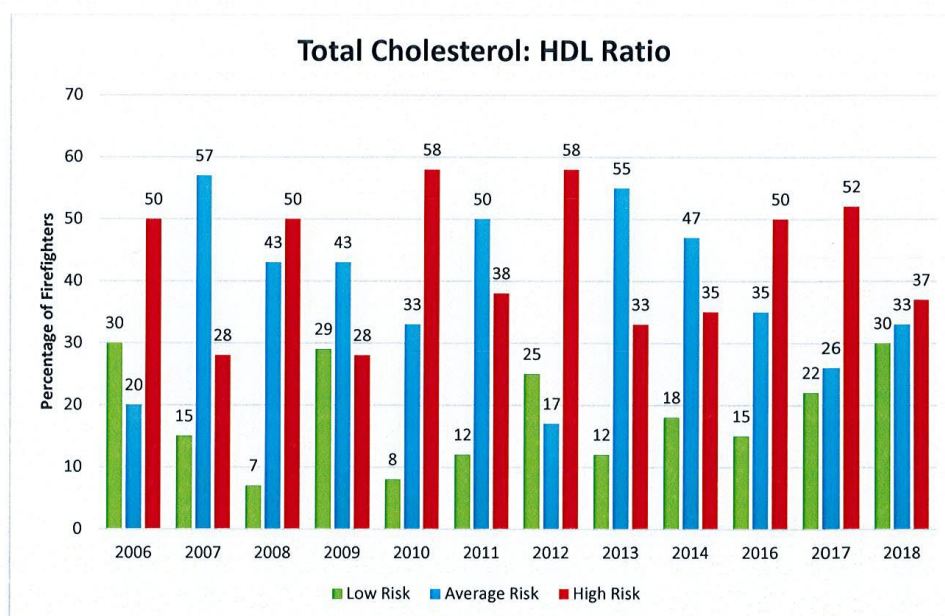
Currently, 62% of the Jefferson TWP firefighters have elevated LDL (bad) cholesterol levels. Although this is a slight increase from 2017, it is consistent with what have seen from the department over the past 12 years.

Total Cholesterol/ HDL Ratio Comparisons from 2006-2018

Total Cholesterol/HDL Ratio (TC/HDL Ratio) is a number that is helpful in looking at a person's risk for developing heart disease in the future. The number is obtained by dividing the total cholesterol value by the value of the HDL cholesterol. This ratio is useful when looking at a person's overall cholesterol numbers because even if someone has a slightly elevated total cholesterol level, it could be explained by above average HDL or "good" cholesterol levels. Conversely, if a person has total cholesterol numbers in the normal range but below optimal levels of HDL, they could still be at an increased risk for developing heart disease.

TC/HDL Ratio Categories

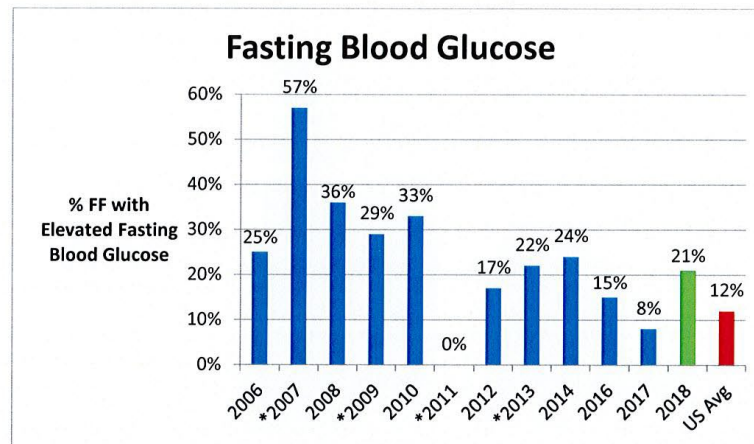
- Low risk- 3.5:1 and below
- Average risk- 4.9:1 to 3.6:1
- Increased risk- 5:1 and higher



When looking at the department's Total Cholesterol/ HDL Ratios over the past few years, we can see some positive trends. In 2017, over half the department (52%) had ratios in the "high risk" category, and this value dropped all way to 37% in 2018. In addition, the percentage of firefighters with "low risk" ratios has steadily climbed over the past 5 years.

Despite the slight increase in LDL Cholesterol levels this year, it is encouraging to continue to see an improvement in the overall cholesterol levels of the department over the past couple years.

Blood Glucose Comparisons from 2006-2018



In 2018, 5 out of 24 (21%) firefighters exhibited elevated fasting blood glucose or take medication for pre-diabetes or diabetes. This is a spike from 2017 but, it should be noted, we are using a conservative cutoff of >100 , which is technically considered "pre-diabetic" and "elevated" beyond the normal values. When taking a closer look at the individuals who had elevated fasting blood glucose, all except for one individual were within 5 points of the "normal" range.

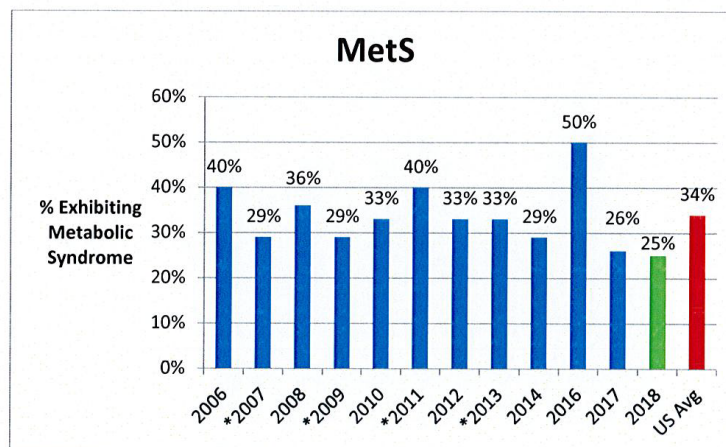
Metabolic Syndrome

In reviewing the data from the last 12 years of fitness testing and firefighter's medical results, we closely track individuals that have Metabolic Syndrome (MetS). Metabolic Syndrome is not a disease, rather it is: "a group of risk factors or conditions that occur together and significantly increase the risk of coronary artery disease, stroke and Type II diabetes." It is also occasionally referred to as "Syndrome X" or "Insulin Resistance Syndrome." MetS is defined as a combination of three or more of the following factors:

Large waist circumference (>40 inches in men, > 35 inches in women)
 Blood Pressure > 130/85 mm Hg or on medication
 Elevated triglycerides (>150 mg/dL in men) or on medication
 Low HDL cholesterol (<40 mg/dL in men, < 50 mg/dL in women) or on medication
 Elevated fasting blood glucose (100-125 mg/dL or on medication)

The first year we tested Jefferson Township, 40% (4 out of 10) of firefighters had MetS. This year, only 25% (6 out of 24) of Jefferson firefighters have MetS, a decrease of 15% over the past 12 years and well below the national average. Additionally, the 3 firefighters who had metabolic syndrome in 2017 but not in 2018, had improvements in either one or a combination of the following factors: Blood Pressure, Triglycerides and Fasting Blood Glucose.

Metabolic Syndrome Comparison from 2006-2018



Appendix H

Interview with Anna Sapp conducted on January 10, 2019

1. What is your current job title and job duties? Specifically, what is your role with Mount Carmel Occupational Health?

I currently work for Mount Carmel Occupational Health as an exercise physiologist who provides annual fitness testing and stress testing for 18 fire departments located in the greater central Ohio metropolitan area. Additionally, I assist with providing exercise prescriptions and consultations while also coordinating exercise functions for the program.

2. What is your educational and training background (i.e. education, training, experience, etc.) in regards to physical fitness?

I have a Bachelor of Science Degree in Exercise Science. Additionally, I am certified as a clinical exercise physiologist (CCEP) and also credentialed by the American College of Sports Medicine as an exercise physiologist.

3. What are the minimum fitness requirements for firefighters?

MCOH follows NFPA 1582 standard on comprehensive occupational medical program for fire departments. NFPA 1582 is used to establish the requirements for medical testing and physical examinations outlining specific requirements for firefighter's cardiac aerobic capacity.

4. How are firefighter fitness levels measured?

MCOH offers a variety of occupational health and fitness testing services designed to increase safety and well-being of firefighter fitness levels. Using NFPA 1582 firefighter fitness levels are measured and evaluated by testing aerobic capacity, muscular strength,

and endurance during their physicals annually. MCOH achieves this goal through a medical surveillance program and annual fitness assessments.

5. Since implementing annual fitness testing have you seen any changes in firefighter fitness levels at JTTFD? Also, please explain how this would be measured.

Yes, in reviewing the data from the last 12 years of fitness testing and firefighter medical results, we closely track individuals that have metabolic syndrome (MetS). The first year we tested Jefferson Township, 40% of firefighters had MetS. This year, only 25% of Jefferson firefighters have MetS, a decrease of 15% over the past 12 years and well below the national average.

6. Have you seen any injuries to firefighters that were specific to on duty competitive sports? If so, please explain frequency, type, and severity.

I have not seen any on duty injuries associated with competitive sports from the JTTFD. However, I routinely work with firefighters to rehab from other agencies who have been injured due to sports activities. Generally speaking these injuries can take anywhere from several weeks to months to heal properly.

7. How could on duty competitive sports be used to increase firefighter fitness levels?

Involvement in any type of physical activity is better than none. However, working with large populations of firefighters I have seen firefighters suffering from sports related injuries. As a result, I would recommend fitness activities in a controlled gym setting to minimize the risk of injury when conducting fitness related activities.

8. How can firefighters minimize the risk of injury associated with on duty competitive sports?

Restrictions on the type or length of activity and education on injury prevention and how it relates to sports activities.

9. Do you think the JTFD should allow its members to play on duty competitive sports?

Why or why not.

Yes, because competitive sports help with comradery and gets those involved who would not be likely to work out otherwise.

Appendix I

Interview with Mathew Sulka conducted on January 10, 2019

1. What is your current job title and job duties? Specifically, what is your role with Mount Carmel Occupational Health?

I am a clinical exercise physiologist with Mount Carmel Occupational Health and currently fill the role of department coordinator who works with a team of exercise physiologists to coordinate fire department physicals for various agencies located in the greater central Ohio metropolitan area. As an exercise physiologist I work with various agencies to analyze patient's fitness through the use of stress testing, VO₂ measurement, and fitness evaluations to include strength, endurance, and flexibility measurements.

2. What is your educational and training background (i.e. education, training, experience, etc.) in regards to physical fitness?

I hold a Bachelor of Science degree from the Ohio State University in exercise science and certified as a clinical exercise physiologist from the American College of Sports medicine with 15 years' experience working for MCOH.

3. What are the minimum fitness requirements for firefighters?

When measuring aerobic capacity, I believe firefighters need to be able to achieve a minimum workload of 10 METS. Firefighters also need to be able to complete annual physical fitness testing as outlined in NFPA 1582 with fitness testing being functional similar to the firefighter combat challenge.

4. How are firefighter fitness levels measured?

Firefighter fitness levels are measured using a metabolic cart with a 12-lead stress test and direct measurement VO₂. Using stress tests and other evaluation tools, I am able to

evaluates a firefighter's cardiovascular function and metabolism and then help design a fitness program to help them meet their individual and professional fitness goals.

5. Since implementing annual fitness testing have you seen any changes in firefighter fitness levels at JTFD? Also, please explain how this would be measured.

Yes, in reviewing the data from the past several years the JTFD personnel have started trending in a healthier direction. As an example, in 2018 the JTFD achieved the highest cardiovascular fitness levels ever since starting annual fitness and medical testing since 2006. Subsequently the department has achieved the leanest body composition we have seen from the department as a whole since we started medical and fitness testing in 2006.

6. Have you seen any injuries to firefighters that were specific to on duty competitive sports? If so, please explain frequency, type, and severity.

Yes, I have seen several injuries directly related to competitive sports. Generally, these injuries have been a direct result of basketball but I have also seen a few from volleyball. Most often these types of injuries are either ankle or knee related injuries related to the sudden stopping or change of direction associated with the sport activity. As far as severity is concerned, I have seen simple ankle or knee sprains to more severe injuries associated with ligament or tendon tears often requiring surgery to repair the injury before rehabilitation.

7. How could on duty competitive sports be used to increase firefighter fitness levels?

Looking at it from an exercise aspect and considering those who do not workout competitive sports will more than likely get someone to do something other than nothing. However, there is an extreme amount of risk assumed and the potential for injury is greatly increased.

8. How can firefighters minimize the risk of injury associated with on duty competitive sports?

Not allowing competitive sports activities. Competitive sports activities are the highest risk of injury in fitness.

9. Do you think the JTFD should allow its members to play on duty competitive sports?

Why or why not.

No because of the associated risk for injury. Off duty I would condone competitive sports for activity however, fitness activities in a controlled gym setting and mandatory physical fitness when on duty is easier to control.

Appendix J

JTFD Injury Data

Date	Description	Loss of time	Cost
9/26/2011	BASKETBALL; ANKLE	75	6,000.00
8/10/2013	BASKETBALL; R ANKLE	0	\$286.75
5/8/2015	BASKETBALL; L ANKLE	33 days	\$7,219.15
9/3/2017	BASKETBALL; R KNEE	Unk.	\$4,644.00 (initial)