



**F2T** | **FIT TO THRIVE**

More Fire Fighters. More Active. More Often.

PERFORMANCE **REDEFINED**

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## Program Framework

### BACKGROUND



**Slide Objective:** Highlight the objective of the *Wellness-Fitness Initiative (WFI)* and the *Fit To Thrive (F2T) Program*.

**Background:** Historically the fire service has paid more attention to its apparatus and fire stations than the men and women who provide emergency services. Unfortunately, this has been the approach despite the fact that firefighting is one of the most physically demanding and dangerous occupations in North America.

Because of this short-sighted focus, firefighter performance has suffered, there have been substantial personal and economic costs due to firefighter injuries, and worse still it has led to several premature firefighter deaths.

The goal of the *Wellness-Fitness Initiative (WFI)* and the *Fit to Thrive Program (F2T)* is to maintain fire departments' most important resource - its firefighters, by ensuring they are fit, healthy, and capable to handle the unpredictable, physically demanding nature of the job.

**Point of Reflection:** Would your perception of a wellness program change if a particular topic was emphasized (e.g. exercise, health, injury prevention)?



**Slide Objective:** The *Wellness-Fitness Initiative (WFI)* and *Fit To Thrive (F2T)* programs place an emphasis on overall health and wellness, both on and off the job.

**Background:** Each of us is not just a firefighter, we are also a father, mother, brother, sister or friend who happens to have a demanding occupation. For this reason we would acknowledge that there are many activities beyond those performed at work that we absolutely love to do.

It is also for these reasons that many of our peers strive to become better prepared. Or perhaps it is for these reasons that we should encourage and inspire the members of our departments to become involved with the *Wellness-Fitness Initiative (WFI)*.

- This program is as much about preparing firefighters for the job as it is preparing for life, both while working and long into retirement.

**Point of Reflection:** Think about the consequences of becoming injured while on duty. First, we may become a danger to ourselves, our colleagues, and the people we aim to protect.

Secondly, our actions, or lack thereof, may prevent us from participating in many of the activities that we love to do outside of work.





Imagine not being able to take a walk with your spouse, play with your kids or grand kids, or struggling to perform simple leisure activities around the house. Now image that this was the case for the next 30-40 years.

**Slide Objective:** Exercise should be viewed in context.

**Background:** Exercise can and should be used to accomplish many things – prevent injury and disease, rehabilitation, enhance health and performance, increase energy levels, improve sleep, mood and attitude, etc.

**Point of Reflection:** Are there activities beyond those that you have to perform at work that you simply enjoy? Perhaps going for a jog, fishing, hiking...there are an infinite number of activities that we perform on a regular basis that have become part of who we are.

Consider how you would feel if you couldn't perform those activities anymore because you got hurt, perhaps because you weren't prepared? It would feel pretty crappy right? Now think back to your reasons to exercise – have you ever viewed it as a magic pill that allows you to do all the things you need or want to do? It can.



**Slide Objective:** Exercise should be viewed as a tool to impact all aspects of firefighters' lives.

**Background:** Ultimately, to make exercise matter – to ensure its impact extends beyond the training environment – we must consider the reasons why we exercise in the first place. For most individuals, exercise is a means to improve safety and/or performance at work, maintain a fitness level so that recreational activities such as golf or hiking can be enjoyed, or support a healthy lifestyle long into retirement. Regardless of the motivation to engage in exercise and structured physical activity, long-term adherence will be linked to the extent to which the performer sees a direct benefit to their quality of life. In other words, they must perceive benefit from the exercise (e.g. health, performance, enjoyment, etc.).

**Point of Reflection:** If your exercise program had an immediate impact on your safety, performance and/or productivity at work, but had little to no impact on your quality of life beyond the workplace, would these benefits be sufficient to support long-term adherence to the exercise program? Probably not, particularly for those of us who enjoy participating in recreational activities with friends and family. Effective exercise programs should be viewed as those that have a positive impact on the things that truly matter to the performer.





**Slide Objective:** Despite the benefits of exercise, many firefighters sustain exercise-related injuries.

**Background:** Although there are countless benefits of regular exercise and physical activity, particularly for firefighters, many firefighters also sustain exercise-related injuries. In other words, while making an effort to maintain a healthy lifestyle or become better physically prepared for the job (i.e. make their exercise matter), firefighters are getting hurt.

- This fact has created a challenge for many departments – exercise is good, but exercise can also be costly. However, to interpret this information and decide on a best course of action (fitness is essential for firefighters) it is important to have an appreciation for the types of injuries that are being sustained and the types of exercise that are being used. In fact, equipped with this knowledge and the skills to make a difference, Peer Fitness Trainers (PFTs) could help to prevent many of these injuries from being sustained in the first place.

Firefighting is and always will be a physically demanding occupation, and therefore all injuries cannot be avoided. But, the reality is that many of our members are getting hurt due to lack of education or awareness.

- This is one reason why it is so important to have a Wellness-Fitness program. It can equip every member with the knowledge and understanding of exercise to make a difference. It is for this reason that central to the *Fit to Thrive Program (F2T)* is a sound understanding of movement as it pertains to prevention and performance.

**Point of Reflection:** Have you ever been hurt while exercising? What were you doing? Do you think this is something that could have been avoided if you better understood how injuries are caused?



**Slide Objective:** The potential risks associated with certain exercises extend beyond the load lifted.

**Background:** Shown in this video is an individual performing a “zercher deadlift” – the barbell is lifted by using the elbows. Although most viewers would be horrified by the lifting technique exhibited by the performer (back rounded), it may be more appropriate to ask whether it is the exercise, demands (e.g. load) or performer that is most problematic.



- First, does the exercise (lifting with your elbows) provide a training stimulus that is conducive to improving some physical attribute (e.g. strength, awareness, control, coordination, etc.), and can it be performed without imposing unnecessary risk? Not all exercises will provide benefit.
- Second, is the load being used necessary to achieve the desired adaptation, and does it impose



unnecessary risk? Strength should not be defined entirely by the load used to perform a given exercise; transfer must be considered. It is a personal characteristic that also encompasses coordination and control. To exhibit “strength” during a zercher deadlift may imply similar coordination and control while performing a one-leg squat or vehicle extrication task.

- Third, does the performer have the ability and awareness to perform the exercise with the assigned load? Sometimes, the exercise or demand may simply be too advanced for the experience level and/or ability of the performer.

**Point of Reflection:** If the aim of training was to teach someone how to lift, or improve their lifting coordination/strength, would there be any reason to recommend a “zercher deadlift” instead of a regular deadlift? Would your decision depend on the load being used?

**Slide Objective:** From a low back perspective, your spine curvature is more important than your trunk angle when lifting.

**Background:** We are often told to “lift with our legs, and not with our back” to avoid lifting--related low back injuries. But what does this mean? And is it the best advice to give to someone who is lifting a heavy load like was shown in the previous video? First, it is impossible to lift without using your back. When an object is lifted in front of our body, our back muscles must contribute to oppose the influence of gravity – gravity pulls the load and our upper body down, and our back muscles become active to hold us up.



Second, when lifting our low back curvature is more important than our trunk angle. Typically, it is assumed that “lifting with our legs” implies that the knees must be bent, and the trunk kept upright to protect our back.

- However, provided that the spine curvature remains comparable to that exhibited while standing (neutral spine), a forward trunk lean could be an effective lifting strategy. When bending over with a neutral spine the back muscles act at a 45 degree angle (approximately) to the spine and serve to oppose the pull of gravity (i.e. they prevent the upper body from falling forwards). When flexing the spine, the orientation of the back muscles change such that they run parallel to the spine (McGill et al 2003). This is critical because they can no longer oppose gravity. Instead, other tissues such as ligaments, discs and bones must produce the necessary forces to oppose gravity. This is not ideal and will increase the risk of sustaining a low back injury.
- Furthermore, quite often when trying to lift “properly” with our legs we actually bend our spine anyways. This attempt to keep the trunk upright also serves to shift our bodyweight forwards towards our toes, which places more load on the knees (this can be felt if lifting with your heels up). As such, instructing someone to “lift with the legs and not with their back” could be worse for their back and their knees. Lifting like the individual on the right can be extremely effective because he has adopted a good low back curvature and kept his heels on the ground. The only



thing that would improve this lift would be to bring the load closer to his body. The closer it is, the easier it will be to lift and the less work the back muscles have to do.

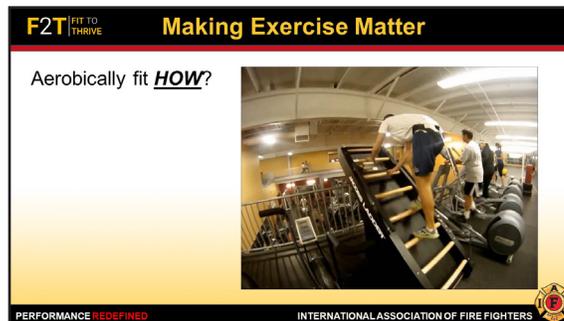
**Point of Reflection:** Have you ever been told to lift with your legs? What was your perception of this instruction?

**Slide Objective:** An emphasis must be placed on how we perform cardiovascular training activities, aerobic, anaerobic or otherwise.

**Background:** Because exercise-related injuries are not typically associated with (perhaps unjustly) “cardiovascular exercise” such as running, cycling or climbing on a Stepmill, rarely do trainees consider how they are performing these types of activity. Because the body cannot distinguish between running up a steep hill (typically viewed as cardio training) and walking lunges (typically viewed as resistance training), how we perform is always important.

- The risk of injury during an activity performed with bodyweight could be as high or higher than an exercise performed with high loads if little attention is placed on the movement patterns being used.
- Exercise provides an opportunity to establish movement habits that transfer to a range of activities. Practicing a poor movement pattern such as that shown in the video could also influence how the individual executes a heavy lift.

**Point of Reflection:** Is it possible that many of the exercise-related injuries being sustained by firefighters could be the result of poor movement habits created outside of the gym environment? What impact could exercise have on the incidence of fireground injuries if it was viewed as a means to create new good habits?



**Slide Objective:** An emphasis must be placed on how we perform any flexibility exercise.

**Background:** Similarly to that discussed previously regarding the “cardiovascular” exercise, an emphasis should be placed on how we are stretching when attempting to improve our flexibility.

The individual shown in the video describes the intent of his actions as “stretching his hamstrings”. His primary objective is to reach farther forwards and higher up the wall.





- However, to stretch the hamstrings implies lengthening of the muscles, which in this exercise will only occur if the pelvis is rotated forwards because the knees are fixed. This is not the case for this video. Instead, the individual reaches farther forwards by increasing the range of motion in his back.
- The back's range of motion is rarely limited by the length of its muscles. Typically, at end range it is the ligaments, discs and/or bones that prevent further motion; tissues that we do not necessarily want to stretch.
- As a result, performing this type of exercise without placing an emphasis on how it is performed could increase the individual's risk during the activity, and establish a habit that transfers to other activities.
- Stretching and flexibility exercise can be great, but it will likely be important to understand how the activity should be performed to actually lengthen the tissues of interest.

**Point of Reflection:** If in attempting to stretch our hamstrings a habit was created so that every time our hips were flexed we also flexed our spine, what could the implications be for lifting, squatting, running, etc.?

**Slide Objective:** Define acute injuries, and discuss the relationship between the applied demands and a tissue's capacity.

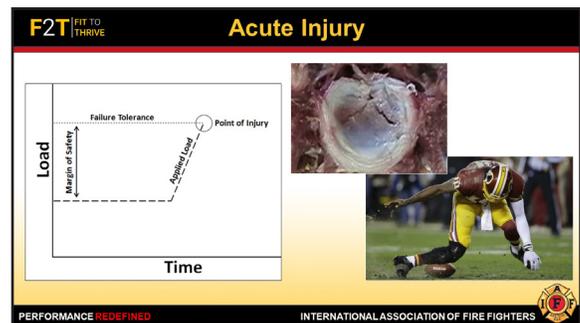
**Background:** Every firefighter injury cannot be avoided, but having an understanding of how injuries happen in the first place can help to prevent many that are being sustained.

Injuries can be described as damage to a tissue – think bone, ligament, tendon, muscle, disc – and occur when an applied load (i.e. demand) exceeds the tissue's tolerance (i.e. capacity).

- For example, consider the events surrounding an anterior cruciate ligament (ACL) injury. When do they occur? When the demands imposed on the ligament exceeded its capacity. This typically happens when the knee is hyper-extended or rotated inwards. Similarly, when someone fractures a bone or herniates a disc, the demands imposed on these tissues have exceeded their capacity.

Injuries can be categorized as acute and cumulative, each of which are described by different pathways.

- Acute injuries are the result of a single event – perhaps due to blunt force, a slip, trip or fall, or overexertion. But as with all injuries the point of failure can be described as the instance when demands exceeded capacity (i.e. where the two lines meet in the figure on the slide)



- The aim of training, whether for performance, safety or general health, should be to increase the difference between our **demands** and **capacity**, be it through changes to awareness or fitness. This difference is defined as the **margin of safety** and is highlighted by the space between the two lines shown in the figure on the slide.

**Point of Reflection:** Have you ever sustained an injury? Was the event associated with a traumatic event? If not, the injury may have been cumulative in nature.

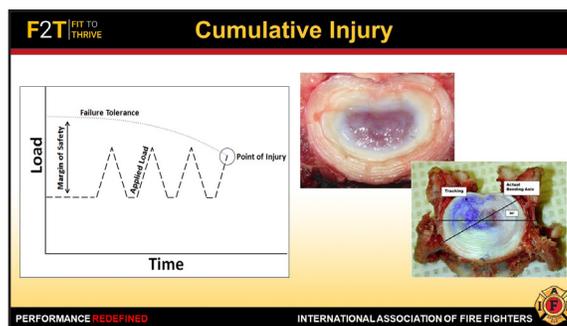
**Slide Objective:** Define cumulative injuries, and discuss the relationship between the applied demands and a tissue's capacity.

**Background:** Many injuries described as acute are in fact cumulative in nature and the result of repeated sub-maximal exposures over an extended period of time.

- Initially, the applied load was not of a magnitude that could cause harm; however, given inadequate recovery, or the fact that the tissue's capacity was reduced over time, a seemingly insignificant demand became sufficient to cause injury.
- Many of the injuries sustained by firefighters are cumulative in nature despite the fact that they are commonly attributed to a single event. The progression of a cumulative injury can be demonstrated by considering what happens when a wire coat hanger is bent repeatedly. Initially, the wire hanger deforms, yet remains intact. The applied load was not of a magnitude to cause failure (capacity > demands). However, over time, without increasing the applied load, the hanger's tolerance decreases and it eventually breaks. Our tissues respond in a similar manner; however, they do have the ability to recover and adapt over time.

The figure on the slide describes an instance whereby a submaximal load is applied periodically (e.g. stepping off the truck) and acts to reduce the capacity of the tissues. Without adequate recovery, the same seemingly insignificant load exceeded the tissue's capacity and an injury was sustained.

- Getting off the truck would appear to be a low-risk task; however, if for any reason (e.g. the truck's steps are narrow) a firefighter's knees are not aligned with their hips and feet, or their bodyweight is shifted forwards, this simple activity could eventually lead to substantial problems.
- The two images on the right hand side of the slide illustrate the effects of repeatedly flexing your spine. The figure on the top left shows a healthy vertebral disc – a gelatinous center with a fibrous outer layer. The figure on the bottom shows a disc that has been subjected to repeated flexion and twisting. The gelatinous center has wormed its way through the fibrous layers and out of the back of the disc.
  - Looking at the direction of travel, which in this case is towards the disc's right, can also explain a lot about the mechanism of injury. The only way for the gelatinous center to travel back and to the right is flexing forwards and twisting to the left repeatedly.

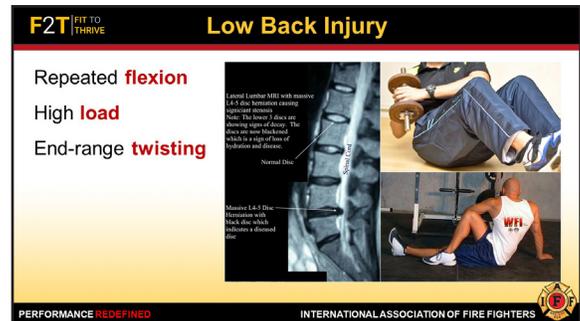




**Point of Reflection:** It is not uncommon for runners to experience knee problems because of the repetitive (and cumulative) nature of the activity; however, in many instances problems only surface on one side of the body...where was the other knee while they were running? Perhaps running wasn't the issue...

**Slide Objective:** Injuries are associated with specific mechanisms (i.e. causes).

**Background:** It was mentioned that repeated spine flexion is associated with an increased risk of disc herniation. This risk can be further elevated by combining spine flexion, with high loads (via muscle activity or external resistance), and/or end-range spine twisting. These repetitive motions provide opportunity for the gelatinous center of the disc to worm its way through the outer fibrous layers.



Based on this information, it would be easy to say that all spine flexion is bad; however, this is not true. The context in which the information is provided must be highlighted.

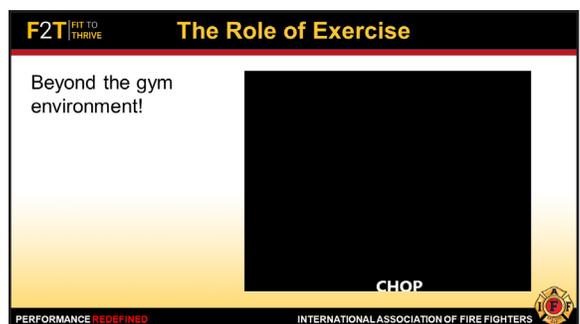
- Spine motion (flexion, lateral bending and twisting) does increase the risk of disc herniation and vertebral fracture under load (i.e. when demands are raised), which suggests that there are definitely instances when it should be avoided. However, this does not imply all. Walking involves spine motion as do countless other activities; the important distinction from a risk perspective is highly repetitive and end-range motions, which can become increasingly dangerous when performed with elevated load.

**Point of Reflection:** Activities we need or want to perform on a daily basis, such as watching television, driving, or riding a bike, may contribute to the accumulation of tissue damage over time. For this reason, it is critical to ensure that other opportunities are provided (e.g. structured exercise) to encourage recovery and the development of good movement habits. These opportunities would serve to increase our margin of safety and allow us to continue performing the activities we need or want to do without becoming injured.

**Slide Objective:** Exercise must be used as a tool to facilitate changes in performance/ behavior that extend beyond the training environment.

**Background:** Ultimately, if exercise is going to be used to impact firefighters' risk of injury, performance, health and overall quality of life, it must influence the activities performed beyond the gym environment.

Building on theoretical foundations of exercise science,





biomechanics, ergonomics, motor learning, physiology, psychology and coaching, several researchers have begun to explore the utility of exercise as a means to change firefighters' behaviors.

- The model animations shown in the video reflect the work of Frost, Beach, McGill and Callaghan. In collaboration with the Pensacola Fire Department, the researchers examined the influence of two different 12-week exercise programs on the firefighters' fitness and how they performed a battery of general and specific job simulations that were not practiced during training. In other words, they examined the transfer of both exercise programs.

**Point of Reflection:** None

**Slide Objective:** Regular exercise or physical activity can improve firefighters' fitness (e.g. aerobic capacity, strength, etc).

**Background:** Regular exercise or physical activity provides numerous health- and performance-related benefits, and can be used to improve several traditional fitness metrics such as aerobic capacity, strength, muscular endurance, power and flexibility.

Given the elevated demands of firefighting, a high level of fitness is essential to members' safety and effectiveness.

**Point of Reflection:** How might having poor aerobic capacity, strength, endurance or flexibility impact a firefighter's safety and effectiveness? More specifically, what would happen to their performance if one or more of these characteristics were lacking?



**Slide Objective:** Regular exercise or physical activity can also change firefighters' habitual movement patterns (behaviors).

**Background:** Although the benefits of exercise are often discussed in relation to its impact on fitness and performance, exercise should also be viewed as a tool to change firefighters' habitual movement patterns.

Performing a particular exercise or group of exercises (i.e. session or program) repeatedly in a semi-controlled environment has shown to elicit changes in the way that firefighters perform a range of unrehearsed tasks of varying loads and speeds. In other words, exercise has been used to change the way firefighters perform without providing instructions or feedback (i.e. their behaviors).

- However, the direction of change (whether they get better or worse) appears to be influenced by the instructions and feedback provided while exercising, and the attention that is given to how





each exercise is performed.

- Frost et al (2014) found that when an emphasis was placed on select key movement patterns that have been associated with a higher injury risk and poor performance (e.g. control of spine flexion and frontal plane knee motion), firefighters' movement behaviors improved post-training. In comparison, when an emphasis was placed on fitness alone, the firefighters exhibited less control of their low backs and knees following the exercise intervention than before they started.

The individual depicted on the slide is displaying a motion pattern that has been associated with an elevated risk of ACL and MCL injury (i.e. knee problems) and poor jump performance.

- When the knees are aligned with the hips and feet, and frontal plane motion is avoided the muscles that extend the knee act to decelerate and accelerate the body. When this occurs the forces generated to propel the body upwards are directed through the knees in the vertical direction and little force is wasted (little force is also applied to the ACL and MCL). However, when the knees collapse medially and the forces generated are directed lateral to the joint, the muscles' contribution is limited – they are now oriented at an angle and assistance is sought from the supporting ligaments. This is not an ideal scenario with regards to safety or performance.
- Performed repeatedly in this manner over an extended period of time is likely to cause a cumulative injury (damage is accumulated, the margin of safety is reduced, and a submaximal load exceeds the capacity of the tissue). It may also establish a movement habit that transfers to other similar activities performed outside of training such as running, cutting and squatting.

**Point of Reflection:** The individual shown on the slide has sustained two ACL injuries, one before this picture was taken and one after.

**Slide Objective:** A firefighter's movement patterns can impact their risk of injury and performance.

**Background:** One of the most important factors to reducing our demands and elevating our capacity is the realization that the way we move every single day can have a dramatic impact on our lives.

Quite often, a seemingly mundane task – something you do every day, perhaps getting on and off the truck – can become an injury causing event. What if you stepped off the truck and your knee collapsed inwards like the individual shown in the picture? How many times could you get on and off the truck without sustaining an injury? Perhaps a few, but it probably wouldn't take long for your knee to start hurting. Perhaps it's not getting off the truck that's the problem – maybe your left knee acts up when you run. Why is the discomfort only in your left knee – your right leg was there the whole time wasn't it?? The way you run matters!

- Could the runner shown here maintain his level of performance if his knees collapsed like the firefighter every time he took a step? Not a chance. He wouldn't be able to take advantage of



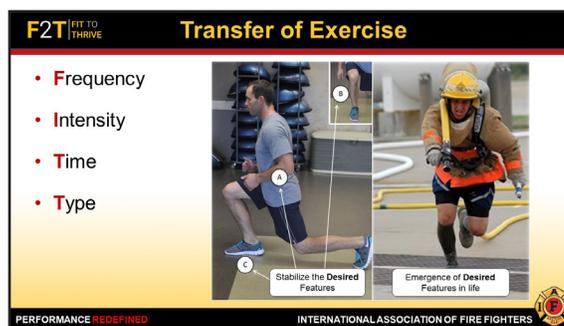


an incredible VO<sub>2</sub> max because his movement patterns did not support it. The most probable outcome is that he would become injured.

**Point of Reflection:** What would be considered a fast 5k (or 3 mile) run time. What would be considered a fast half marathon (21k or 13 miles)? The individual on the slide ran a 13 minute 5k on his way to a 58:23 (runs a 33 second 200 race...but for one hour!) half marathon. This would not be possible with poor movement patterns!

**Slide Objective:** To ensure the transfer of exercise, an emphasis should be placed on ingraining “key” movement features that are common to many relevant activities.

**Background:** If exercise is viewed as a way to establish desirable movement behaviors, there is evidence to suggest that an emphasis should be placed on ingraining select key movement features (e.g. spine and frontal plane knee motion control) that have been shown to be or cited as possible injury mechanisms, or performance-limiting factors.



- Against this backdrop, exercise can and perhaps should be used strategically to stabilize or ingrain these desirable patterns using a variety of frequencies, intensities, times and types of activities such that they emerge and persist in relevant activities beyond the training environment.
- Using a range of loads, speeds, activities, etc. to improve a firefighters’ control and coordination of these key features is critical to the transfer of exercise since it would not be possible to practice every possible activity they may encounter in life. Instead, introducing gradual changes to the demands, complexity of the activity, and training environment (i.e. periodization) could alter the habitual patterns of complex-firefighting skills, or life-related activities, without having to replicate these exact tasks. In fact, there is evidence to suggest that there may be attributes, or “key features”, of an individual’s movement behavior that are common to a range of activities. The hope is that a desirable behavior emerges as a new habit.
- Progressing the frequency, intensity, time, and type of exercise will also serve improve the performer’s fitness.

**Point of Reflection:** If you only ever performed one squat variation in training (same load, speed, reps, foot width, etc.), how might this influence the degree of transfer? What could you do to improve the possibility of transfer?



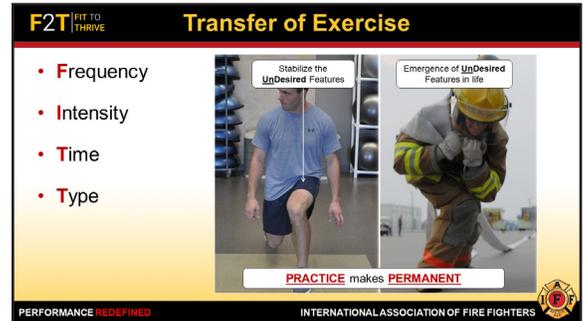
**Slide Objective:** If undesirable movement patterns are performed repeatedly during exercise, they could become ingrained habits.

**Background:** Although exercise provides an excellent opportunity to ingrain desirable behaviors such as spine and frontal plane knee motion control, rehearsing an undesirable movement pattern could lead to undesirable consequences.

- Attention must be given to how firefighters exercise to maximize the potential benefits. Having great strength, endurance and aerobic capacity will have little influence on a firefighter's safety and performance if they move like the individual depicted on the slide. Your knees are not meant to bend like that!

It is often stated that practice makes perfect; however, the truth is that practice makes permanent. Only perfect (deliberate) practice makes perfect. Bad practice leads to bad habits.

**Point of Reflection:** If firefighters are getting hurt while engaging in exercise, perhaps because an emphasis is not being placed on how they move, might they also be creating bad habits that contribute to the cumulative injuries sustained while performing other job duties?

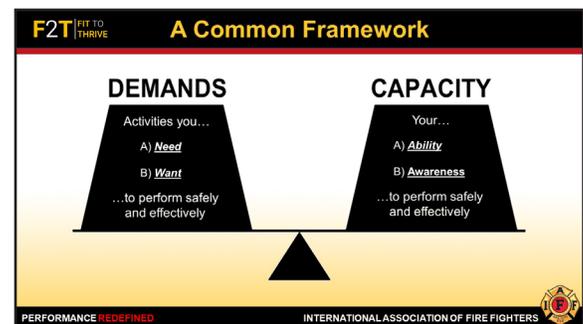


**Slide Objective:** Introduction to the demands-capacity framework.

**Background:** Given the information that exists through courses, the Internet, books, etc., we can easily lose sight of our reasons to engage in physical activity. But when we step back and reflect on the reasons why we exercise, it likely boils down to this slide.

Ultimately, we train, exercise, become educated, etc. to ensure that we have sufficient capacity to meet the demands of our lives (balance).

- Your demands reflect the activities that you need or want to do. For example, they reflect the skills necessary to safely fight a live fire and effectively assist at the scene of an accident, and encompass those activities that you perform at the end of the day such as going for a run, doing chores around the house, or playing with your kids. Every one of these activities places demands on your body.
- Your capacity can be viewed as your ability, (e.g. strength, endurance, flexibility), desire (e.g. motivation) and awareness (e.g. perception of risk) to perform, safely and effectively.

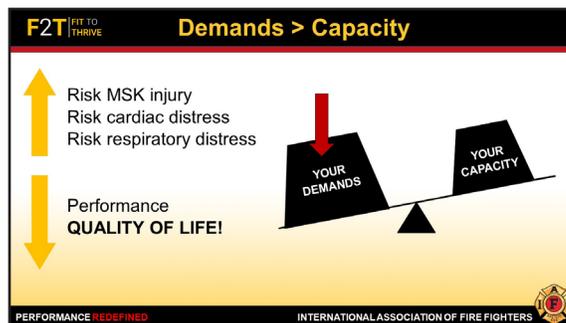




**Point of Reflection:** What if you had the ability and motivation to perform everything you needed or wanted to do? What if you didn't? This framework can be used as a foundation to help anyone make their exercise matter, but can be extremely beneficial in guiding the physical preparation of occupational athletes like firefighters.

**Slide Objective:** Highlight the potential outcomes when we don't have the capacity to meet our demands.

**Background:** In the unfortunate situation that a firefighter's demands exceed their capacity, they will be at an increased risk of musculoskeletal injury and cardiac and respiratory distress, their safety (and that of the people they are trained to protect) and effectiveness will be compromised, and their quality of life will suffer.



In these situations, we can seek to reduce demands through various means. For example, in many work environments ergonomic strategies can be used to reduce the physical demands of several job tasks. Although an effective strategy, this type of approach is not always practical for firefighters.

If the job cannot be modified, it is also possible to remove the demands from life or play.

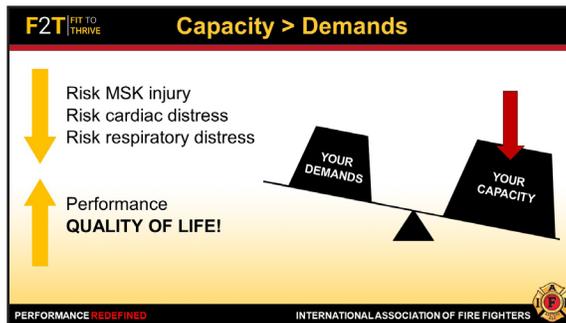
- It is not uncommon for someone to be told by a medical professional that they should avoid playing golf on their days off because it is bad for their back. Alternatively, they could be told to avoid any lifting-related activities. And yes, this also applies to playing with their kids. This is no way to live.

Firefighters are active individuals and therefore one of the primary objectives of the *Fit to Thrive Program (F2T)* is to equip members within every Department with tools to help them live the lives that they want, well into retirement.

**Point of Reflection:** Consider how you would feel if you were told that you could not participate in an activity that you really enjoy.

**Slide Objective:** The *Fit to Thrive Program (F2T)* places an emphasis on building capacity.

**Background:** When appropriate, interventions can and should be used to reduce demands; however, the emphasis of the *Fit to Thrive Program (F2T)* is to provide peer trainers with the knowledge, skills and confidence to improve their colleagues CAPACITY.



Perhaps there are activities that a client has always wanted to perform but never had the ability to. With your



guidance you may find that they are able to achieve things they never thought possible. Improving someone's capacity in relation to their demands will result in a reduced risk of musculoskeletal injury and cardiac and respiratory distress, improved safety and effectiveness, and a better quality of life.

This approach also offers an excellent strategy to enhance motivation and adherence to exercise.

**Point of Reflection:** Would you find exercise more enjoyable if you saw a direct transfer to your health and performance both on and off the job?

**Supplementary Slide Objective:** Describing firefighters' demands begins with three simple questions.

**Background:** To gain a better appreciation for the demands of a client's life, PFTs can begin by asking themselves three simple questions.

1. What activities does my client need or want to perform on a regular basis? This includes activities performed both on and off the job.
2. In general, what frequencies, intensities, and times are associated with the activities that my client needs or wants to perform? In other words, how frequent, challenging, and long are the exposures? Using descriptors of low, moderate and high will be sufficient to gain a general appreciation.
3. In general, what motion patterns, and more specifically, what key features are associated with the activities that my client needs or wants to perform? In general, every firefighter should exhibit the control and coordination to perform a squat, lunge, lift, push and pull pattern. The key features of these five patterns will be discussed later, but the three most commonly injuries sustained by firefighters are those to the back, knees and shoulders.

Describing a firefighter's demands provides insight into their reasons to exercise (i.e. how fit they need to be).

**Point of Reflection:** Are your firefighting duties the most physically demanding tasks that you perform on a regular basis, exercise not included?

**Supplementary Slide Objective:** Describing someone's capacity can be achieved by posing the same three questions.

**Background:** A client's demands can offer insight into how fit they need to be, their capacity highlights where they are now.

As a first step towards establishing a client's capacity,

**F2T** FIT TO THRIVE
**Demands**

**Three Questions**

1. What activities?
2. What F.I.T?  
(Frequency, Intensity, Time of activity)
3. What motions?  
(Type of activity)



PERFORMANCE REDEFINED
INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS 

**F2T** FIT TO THRIVE
**Capacity**

**Three Questions**

1. What motions?  
(Type of activity)
2. What F.I.T?  
(Frequency, Intensity, Time of activity)
3. What activities?



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PFTs can pose the same three questions used to describe their demands, albeit in the opposite order.

1. In general, what motion patterns, and more specifically, what key features are associated with the activities that my client needs or wants to perform? This question will help to establish the types of exercises/activities that will be needed during an assessment or training session to evaluate the client's control and coordination.
2. In general, what frequencies, intensities, and times are associated with the activities that my client needs or wants to perform? This will help to establish the range and magnitude of demands that could be used during an assessment or training session to evaluate the client's control and coordination. However, because PFTs will have limited knowledge of their clients before administering an assessment or session, the initial demands should always be low. Provided that the client exhibits the control and coordination to perform safely the demands can be progressed gradually.
3. What activities or exercises will provide me with an opportunity to assess the motions and demands listed in my responses to question 1 and 2?

Equipped with this information, PFTs will be able to recommend a suitable starting point for training.

**Point of Reflection:** Traditionally, when assessing an individual's capacity, the focus is placed on fitness metrics (e.g. strength) and performance outcomes (e.g. jump height) alone. However, would there also be benefit in knowing how they performed? Consider the jump example shown on the slide. What recommendations could be made if the only information you were given was jump height? What recommendations could be made if you were also given information regarding their movement patterns?

**Slide Objective:** Using this framework, a firefighter's demands and capacity can be viewed in the same way.

**Background:** Describing the demands of a firefighter's life in terms of the relevant frequencies, intensities, times and motion patterns, provides an opportunity for PFTs to view their clients' demands in an exercise-specific context – that is, in the same way as their capacity, which is based on the F.I.T.T. Principle of training (discussed in more detail in The F.I.T.T. Principle Module).

**F2T<sup>FIT TO THRIVE</sup> A Common Framework**

**Describe Demands**

- F.I.T.
- Motions

**Evaluate Capacity**

- F.I.T.
- Motions

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Within this common framework, exercise can be viewed as a means to improve clients' capacity by progressively adapting the frequency, intensity, time and type of exposures such that it meets or exceeds the demands of their life (i.e. capacity is greater than or equal to demands).

**Point of Reflection:** None.



**Slide Objective:** Emphasize the relationship between movement and fitness.

**Background:** Being physically fit, in the traditional sense (e.g. strong) does not equate to being physically prepared for a particular job, sport, or activity of daily living.

Fitness is essential, particularly for firefighters, but alone it is not sufficient to ensure peak performance and long-term durability; it simply reflects an individual's potential.

- Poor torso extensor endurance has been cited as a marker for future low back troubles (Beiring-Sorensen, 1984), although it is not one of the commonly described mechanisms of low back injury (as is spine posture (Callaghan and McGill, 2001)). A possible explanation is that superior endurance provides the opportunity to maintain spine-sparing postures for extended periods of time by delaying the onset of fatigue. But, if individuals cannot adopt these postures for any number of reasons (e.g. perhaps they are unaware of the importance), muscular endurance becomes secondary and will have little bearing on the risk of injury.

Great fitness in the presence of poor movement or great movement in the presence of poor fitness will limit performance and increase a firefighter's chances of sustaining a musculoskeletal injury. Both scenarios reflect the undesirable state where a firefighter's demands will exceed their capacity.

**Point of Reflection:** Although there are instances when firefighters are forced to sacrifice their safety (the way they move) to complete certain tasks, how might placing an emphasis on fitness and movement when exercising help to ensure that these behaviors do not become habit?

**F2T** FIT TO THRIVE **Guiding Principles**

Performance = **fitness** and **movement**



FIT MOVE POORLY X	FIT MOVE WELL ✓
UNFIT MOVE POORLY X	UNFIT MOVE WELL X

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**Slide Objective:** Firefighters' movement patterns can be used to guide the progression of their training program.

**Background:** Let movement guide the progression of fitness. A client's movement patterns should be used to guide the progression of their training program. Only after they have displayed the capacity to perform (e.g. ability, awareness) should an activity's frequency, intensity and time be modified to make it more challenging. Advancing too quickly may compromise the client's safety and limit the potential benefits of the program.

It is important to recognize that there is no reason to sacrifice fitness when emphasizing movement. Unfortunately, it is also very easy to sacrifice movement when emphasizing fitness.

**Point of Reflection:** How could you determine whether an activity's frequency, intensity or time is too challenging or too easy?

**F2T** FIT TO THRIVE **Guiding Principles**

Use **movement** to **guide** the progression of fitness



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**Slide Objective:** Exercise professionals cannot see muscles, which implies that it is more appropriate to simply focus on movement.

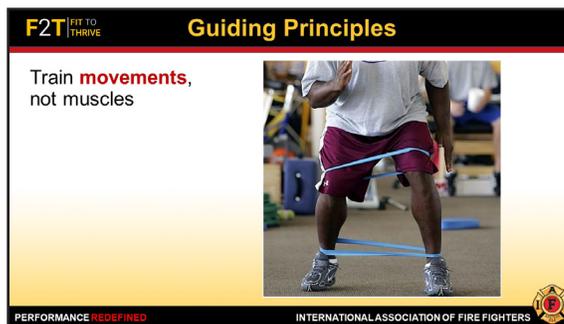
**Background:** Train movements not muscles. Every movement is the result of the muscular system acting on the skeletal system. Muscles produce force through concentric (shortening), eccentric (lengthening) and isometric (no length change) actions and provide us with an opportunity to perform the physical activities that we need and want to do. If sufficient force cannot be produced to perform a particular activity today, muscles have the unique ability to grow and become stronger in response to applied stimuli, or demands imposed on the muscular system.

However, accurately describing the muscles that are responsible for a given action, let alone the forces that are being produced relative to a muscle's maximum ability is not possible without sophisticated equipment. And while the scientific literature does offer insight into select relationships between various stimuli and their corresponding muscular adaptations, numerous assumptions would be needed to develop an appropriate course of action for training if the primary objective was to enhance muscle function.

Further, enhancing muscular strength or endurance in the absence of a global objective will likely have little influence on an individual's risk for injury or their performance. Every PFT should appreciate the complexity of muscle mechanics and muscle physiology, but ultimately their decisions to use a particular exercise or make a session more demanding should be based largely on observations made during training.

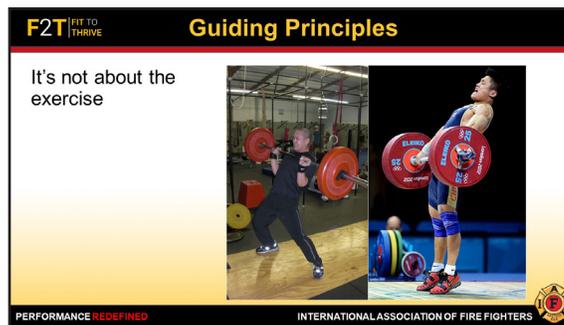
- PFTs cannot see muscles, they only see movement.

**Point of Reflection:** The individual shown on the slide is performing an exercise commonly used to “target the glutes”. If he were to say “my glutes are burning” but performed with frontal plane knee motion, should the exercise be viewed as beneficial? Aside from rare cases where there might be a rationale to target a particular muscle with disregard for how the individual is moving, a PFT's feedback should be based on how their clients look, irrespective of what muscle is “burning”.



**Slide Objective:** There are many exercises that can be used to achieve every training objective.

**Background:** Building firefighters' capacity is not reliant on any specific exercise. A client's capacity will not be improved with just one modality, exercise, or exercise program; there are countless options that will provide an effective training stimulus. Exercises are simply tools at the PFT's disposal to help them achieve a particular training objective.





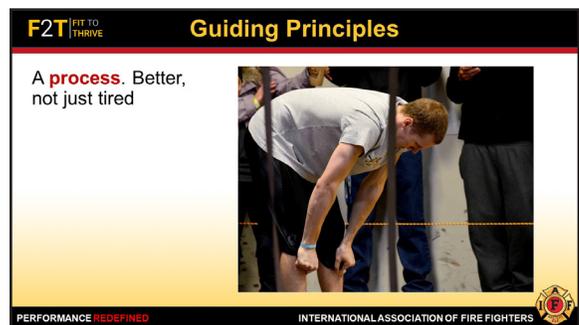
There is also no reason why any specific exercise needs to be included in every training program given that almost every client will perform differently, have a different background and varying personal interests/objectives.

**Point of Reflection:** Consider five individuals with varying degrees of training experience. Would you expect each of them to use the same movement strategy to perform a vertical jump? Given the potential variation in training history alone, there is little chance that each individual would jump in the same way. And if the movement patterns used to perform a given exercise are different across a group of individuals, so too will be their adaptations to training. For this reason, it may not be appropriate to have each of them perform a vertical jump in training.

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**Slide Objective:** Physically preparing firefighters should be viewed as a process to enhance – not make tired.

**Background:** Enhancing capacity is a process. Firefighters need to be physically prepared to perform safely and effectively today, tomorrow and five years from now. There is no date after which time their capacity to perform becomes more or less important, nor is there opportunity to take advantage of an “off-season”.



Much consideration should be given to the design of any training program so that it serves to enhance capacity in a manner that is sustainable over an extended period of time.

Short- and long-term objectives are needed to effect sustainable change. It would be very disappointing for a client to quit after only a few months because they were unable to maintain the training intensity assigned by their PFT; or worse yet, they became injured. A client’s program should be challenging but not simply for the sake of being hard when the goal is to better prepare them for life.

- There is an important, yet often overlooked, distinction between making someone better and making them tired. PFTs will be equipped with the knowledge and skills to develop and administer exercise programs that can change lives, as opposed to simply making “hard workouts”.

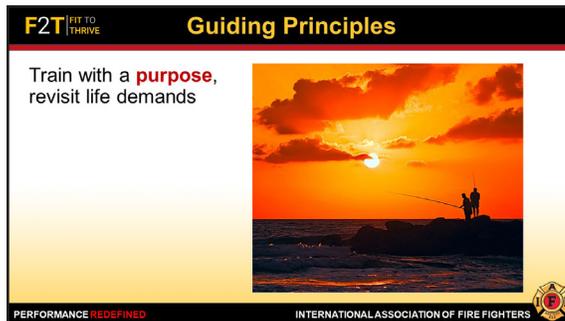
**Point of Reflection:** Have you ever stopped participating in an exercise program because it was too difficult? Remember, not everyone appreciates muscle soreness.

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**Slide Objective:** PFTs should frequently revisit a client’s demands, given the possibility that their needs/goals may change.

**Background:** Exercise can be used to prevent injuries, improve performance and enhance the quality of our lives. But each of us is different, both with regards to our physical demands and our capacity to perform. Without acknowledging these differences and establishing a purpose for training, any exercise-related initiatives to become better physically prepared may be misdirected.



It will be important for PFTs to recognize that physically preparing their peers is a process. This process will require simple, yet sustainable strategies that keep clients motivated and engaged. It is often the small seemingly insignificant steps that are the most beneficial to effecting long-term permanent change.

- Developing SMART short-term goals is an essential step on the road to success.

**Point of Reflection:** What are your short- and long-term goals? Are your reasons for exercising today the same as they were last year? Might they change again in the next few months?

**Slide Objective:** Coaching is both an art and a science. There is no “best” approach that should be used with every client in every situation.

**Background:** Coaching and designing exercise programs is a science. There are fundamental principles related to exercise physiology, biomechanics, motor learning and behavioral change that should be considered in the design process so that clients are challenged in a manner that is appropriate to effect positive change.



That said, designing programs is also an art. There is no single “best” approach that should be used with every client in every situation. Trial and error is necessary because all clients will not respond to a given stimulus in the same manner, nor will they always respond as expected.

Although structure is important, every program must also be easily adapted to suit the progress made by the client. PFTs need to understand the science behind programming so they are able to provide their clients with the best opportunity to succeed, but creativity is needed to make adjustments and deviate from the plan when things do not progress as expected.

- Plus, the “best” program in the world will prove to be ineffective if an emphasis is not placed on coaching, rapport, and building the PFT-client relationship.

**Point of Reflection:** What strategies might you use to build rapport with a client?



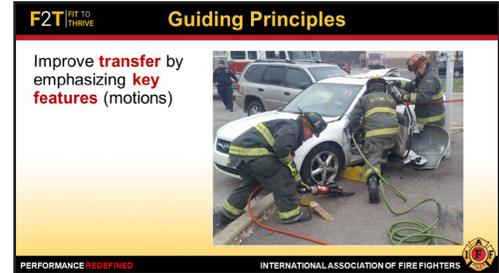
**Slide Objective:** The transfer of training can be improved if an emphasis is placed on ingraining desirable movement behaviors (key features).

Improving job performance does not require that a specific task be replicated in the gym. Many factors can influence the way we move (e.g. perception of risk, awareness, strength), and thus a range of physiological, mechanical and behavioral adaptations could, theoretically, be exhibited in response to subtle task differences. Simply altering the load, modality or instructions, for example, might elicit a different movement strategy than was used to perform the original activity.

However, if “key features” (e.g. control of spine motion) of an activity are emphasized while training it is possible to alter the habitual patterns of a complex-firefighting skill without having to replicate the exact task. There is evidence to suggest that there may be attributes, or “key features”, of firefighters’ movement behaviors that are common to a range of activities (Frost et al. 2013).

- Exercise can and should be used to ingrain or enhance desirable movement patterns such as spine and frontal plane knee motion control in order for these patterns to emerge in life. This may require that PFTs challenge their clients by adapting the demands (frequency, intensity and time) and exercise complexity and/or environment as training progresses.

**Point of Reflection:** Practice does not make perfect – practice makes permanent.



### Assess Your Understanding

1. What is the most likely cause of an acute injury?
  
  
  
  
  
  
  
  
  
  
2. Describe two events/circumstances that may cause an acute injury.
  
  
  
  
  
  
  
  
  
  
3. What is the most likely cause of a cumulative injury?





10. Describe two things that may occur when a firefighter's capacity exceeds their demands.



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More Fire Fighters. More Active. More Often.

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PROGRAM FRAMEWORK

## **Practical Application**

