TRX® Suspension Training®

Bodyweight Exercise

Scientific Foundations and Practical Applications
The goal of this review is to describe the TRX® Suspension Trainer™, the scientific basis of functional training using TRX Suspension Training® bodyweight exercise, and how it may be used effectively for the treatment and prevention of musculoskeletal injuries and in training for fitness and performance. By leveraging bodyweight and manipulating one’s stability, TRX Suspension Training can scale intensity across a continuum of low to high load and stable to unstable positions. Functional exercise as performed on the TRX Suspension Trainer can be used to rehabilitate musculoskeletal injuries, prevent injuries, promote health and fitness, and enhance performance.

Key findings regarding the benefits of TRX Suspension Training or instability training:

- Effective in reducing the risk of injuries.
  - Lower limb injuries by 39%.
  - Acute knee injuries by 54%.
  - Ankle sprain injuries by 50%.
  - Recurrence of ankle sprain decreases two-fold.
  - ACL injuries by 88%.
- Effective in improving health and fitness
  - TRX Suspension Training meets the Surgeon General’s guidelines for moderate physical activity.
  - TRX Suspension Training can promote weight-loss and reduce disease risk.
  - TRX Suspension Training is safe and effective in reducing fall risk.
  - Instability training provides a greater variety of training experiences without sacrificing strength, balance and functional performance measures.
- Effective in improving performance.
  - Vertical jump height increases 9%.
  - Hockey players improve skating speed.
  - Golfers improve performance.
  - 5000-m runners decrease their time by 47 seconds.
  - Military service members improve fitness test scores.
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Suspension Training Defined

Suspension Training is a uniquely effective form of bodyweight exercise, which allows loading and unloading of movements to meet individual needs and goals. Suspension Training refers to the broad body of unique training movements, coaching cues and program principles that have been created and systematized by Fitness Anywhere. Suspension Training require the use of the TRX Suspension Trainer and are distinguished from traditional exercises in that either the user's hands or feet are generally supported by a single anchor point while the opposite end of the body is in contact with the ground. The TRX Suspension Trainer, a highly portable training tool that builds muscular strength and endurance, core stability, balance and flexibility. The TRX allows you to manipulate body position and stability to provide hundreds of multi-planar resistive, neuromuscular, proprioceptive and balance exercises to unload or load the body. With the versatility in manipulating load and stability, the TRX is a functional training tool that is being used in the treatment and prevention of musculoskeletal injuries or disabilities and to improve fitness and performance.

Benefits of the Single Anchor System

The TRX's single-point attachment provides the ideal mix of support and mobility to train strength, endurance, coordination, flexibility, power and core stability all at once across a wide range of resistance. Some suspension devices have two anchor points. The challenge with dual anchor straps is that range of motion and tension with upper extremity exercises is limited by the width of the straps, which are typically arranged slightly wider than shoulder width. The proprietary single anchor point of the TRX Suspension Trainer enables rapid micro-adjustments of the suspension strap so the user can quickly equalize handle positioning.

It also fosters the simple performance of multi-planar exercises and a wider range of available movement in many upper extremity exercises. With dual straps connected to a single anchor, the upper extremity exercises can be performed with more control over mobility and resistance. A single anchor point also makes for an easier installation as it can be attached to any stable object of appropriate height and stability.
Versatility of the TRX
The TRX Suspension Trainer is a versatile piece of equipment that can either be used as an assistive device to help facilitate movement or as a resistance device to provide a scalable intensity. As an assistive device the TRX Suspension Trainer is used to 1) unload for stretching and mobility exercises, 2) unload to perform partial weight-bearing exercises, and 3) provide external support for postural stability to assist in learning a movement or to minimize the fear of falling.

As a resistive device, the TRX Suspension Trainer has been used in the clinic, at the gym, and on sports fields and military bases to 1) improve body awareness and neuromuscular control, 2) improve muscular strength, power and endurance, and 3) metabolic conditioning. In addition to modifying an exercise based on load and stability, both body position and bilateral or unilateral exercises can be performed for the upper and lower body. The scalability of exercises along with the high portability make the TRX Suspension Trainer an option for someone undergoing physical rehabilitation, performing a regular fitness program, competing in sports, working in military, tactical, or first responder positions, or seeking the prevention of musculoskeletal injuries. The versatility of the TRX Suspension Trainer allows a full range of exercises to be performed, from low load to high load, stable to unstable, and single to multiple planes of motion.

"Using the portable TRX Suspension Trainer provides us with a new, cutting-edge way to train our athletes in our facilities or on the road…net effect is that our athletes improve their performance while reducing their risk for injury" - Sue Falsone, PT, SCS, ATC, CSCS, Athletes Performance

Customizing Intensity with the TRX
There are three key ways to alter the intensity of a TRX exercise by varying a combination of resistance and stability.

- Stability Principle: The size and positioning of the base of support (BOS) relative to the center of gravity (COG).
• **Vector Resistance:** The angle of the body relative to the ground and determines the resistance or load of the exercise.

![Vector Resistance Diagram](image1)

• **Pendulum Principle:** The horizontal positioning of the COG relative to the anchor point and determines the resistance/load of the exercise.

![Pendulum Principle Diagram](image2)
Functional Training with the TRX

Traditional weight training typically involves single plane exercises performed in a seated or lying position using free-weights and machines. In contrast, functional training typically involves an integration of multi-planar total body exercises with variable challenges to load, balance and stability. Popular definitions of functional training vary widely. Examples include:

- Any activity that enhances a performance outcome (Siff, 2002).
- Function is integrated, multi-dimensional movement that requires acceleration, deceleration, and stabilization in all three planes of motion. Functional training is training that enhances one’s ability to move in all three planes of motion more efficiently, whether you’re an athlete playing in a sport or simply performing activities of daily living (NASM Education Team, 2010).
- An exercise continuum involving balance and proprioception, performed with the feet on the ground and without machine-assistance, such that strength is displayed in unstable conditions and body weight is managed in all movement planes (Boyle, 2003).
- The unique movement repertoire of an individual comprised of general skills and special skills (Lederman, 2010).

The TRX Suspension Trainer can be used as a training modality in each of the definitions of functional training. Through differences in set-up, exercise can be performed along a continuum of low- to high-load or stable to unstable positions, allowing a broad range of outcomes to be trained, highlighting the versatility of the TRX. A proprioceptively rich training environment is created as each exercise integrates the entire body to move, stabilize, and maintain balance; and the movement parameters of a sport or activity can be and trained in these conditions while enhancing physiological related qualities such as strength, flexibility, endurance, and power.

Balance, Stability, and the Benefits of Unstable Training

Balance and stability are often used interchangeably to define the maintenance of upright movement or stance.

**Balance:** Defined as maintaining equilibrium of the body in static and dynamic conditions. During unloaded static activities, balance is maintained when the bodies’ center of gravity is within its base of support, and stability is the state of that equilibrium (Shumway-Cook & Woolacott, 1995).

**Stability:** Defined as resistance to internal and external forces. Following a perturbation, if the behavior of the body or joint is unchanged then it is considered stable; if it differs significantly, then it is considered unstable (Reeves, Narednra, & Cholewicki, 2007). We can think of stability as the sufficient stiffness in surrounding tissues and appropriate motor control around the joint(s) to resist perturbations (McGill S. M., 2007).
Types and Control of Stability

In discussing stability of body segments, say the spine or the shoulder versus the entire body, we can think of stability as the sufficient stiffness in surrounding tissues and appropriate motor control around the joint(s) to resist perturbations (McGill S. M., 2007). A stable core enables one to effectively transfer forces between the upper and lower body by contracting the right amount, at the right time, for the right duration. This complex pattern involves active and passive tissues under control of the nervous system, which continuously adjusts stability and movement through feedforward and feedback systems. Anticipatory postural adjustments (APA’s) are a type of feedforward response that precede rapid movements and are important prior to movement to stabilize the core and increase stiffness in the limbs (Carpenter, Frank, Silcher, & Peysar, 2001). An emphasis here on the importance of motor control is not meant to imply mechanical stability is unimportant, but that it is but one component under control of the motor system. According to (Cholewicki & McGill, 1996), spine stiffness is a correlate of spine stability and individuals with higher muscle activation have a higher “margin of safety” in terms of stability than individuals with lower muscle activation.

Types of Unstable Training

Unstable training can be performed by exercising on an unstable surface (foam pad, physioball and wobble board are less stable compared to firm ground) or by using an unstable load (TRX® chest press is more unstable than dumbbell chest press, which is more unstable than barbell bench press) where the individuals’ point of contact (feet, hands, torso) is on solid ground. As a stand-alone device, TRX Suspension Training enhances balance and stability through unstable load training. It can also be integrated with a labile surface for unstable surface training.

Benefits of Unstable Training

Unstable training provides greater sensory feedback to enhance both feedback and feedforward responses of the motor system thereby increasing the levels of co-contraction and joint stability (Gantchev and Dimitrova 1996). Unstable training provides a high level of muscle activation and minimizes maximal force output and the resultant joint torques (Behm & Anderson, 2006). In the upper-body, unstable training provides the benefit of increased proprioception and neuromuscular control in a closed-chain environment, improving joint stability and incorporating training variety (Kibler & Livingston, 2001) (Marshall & Murphy, 2006).

Suspended bodyweight row
In comparing a suspended bodyweight row, a standing bent-over barbell row, and a standing one-armed cable row for muscle activation of the spine and hip extensors, spinal loading, and muscle-generated stiffness during, Fenwick, Brown, and McGill (2009) showed the suspended bodyweight row participants had the lowest compressive forces and the highest muscular activation. This has specific applications in rehabilitation and fitness training where one wants to limit joint loading or in performance programs to allow recovery while maintaining muscle recruitment. The push-up for example, is an effective upper extremity and abdominal exercise (Howarth, Beach, & Callaghan, 2008), and in the spine there are increased levels of muscular co-contraction during unstable training compared to stable training (Norwood, Anderson, Gaetz, & Twist, 2007) (Beach, Howarth, & Callaghan, 2008).

**TRX for Musculoskeletal Rehabilitation**

“The TRX Suspension Trainer is a dynamic, versatile, compact training tool that allows for proprioceptive core stabilization enhancement during rehabilitation exercises for a multitude of conditions.” - Rajan Perkash, MD, Head Physiatry and Neurosurgery Departments, Palo Alto Medical Foundation

**Integrative Closed Chain Exercise**

It is common in rehabilitation to observe exercises being performed that are localized to the injured or disabled body part. In addition to being able to replicate many traditional therapeutic exercises, the TRX Suspension Trainer engages the entire body, and hence the core, with every exercise. This full-body engagement is partly under volitional control, while challenges to balance and stability rely on feedback mediated adjustments and anticipatory control. In the upper and lower extremities, TRX Suspension Trainer exercises are predominantly closed kinetic chain (CKC) exercises. Compared to open kinetic chain exercise, CKC exercises result in greater joint stability and decreased shear forces through increased muscular co-contraction/co-activation (Kibler & Livingston, 2001). For example, during unstable bench press the triceps and deltoid show increased muscle activation and co-contractions (Marshall & Murphy, 2006). Depending upon the phase of rehabilitation and the individual needs, exercises with the TRX Suspension Trainer may be modified to place more emphasis on motor control adaptations than tissue adaptation. During the performance of whole body, multi-planar exercises muscular and joint forces are distributed across the body and while the total muscular activation is lower than that of single-plane exercises the exercise difficulty is rated as strenuous by participant's (McGill & Karpowicz, 2009). In the torso, the lower muscle activation levels during whole body multi-planar exercise is the motor control systems response to organize activity in all muscles to achieve joint stability and balance 3 moments about each joint (McGill & Karpowicz, 2009).

Finding activities that enable a patient to confidently perform and progress on their exercise program is important to long-term success (Vlaeyen, de Jong, Geilen, Heuts, & van Breukelen, 2001). Increasingly, physical rehabilitation practitioners are finding that TRX Suspension Training bodyweight exercise is scalable across a wide range of loads and can integrate the entire body into every exercise, challenging balance and stability, and facilitating greater
proprioceptive and neuromuscular control. For lower extremity rehabilitation the TRX Suspension Trainer can be used as a de-weighting device to allow partial weight bearing in the early phases of rehabilitation or as a safety device as they progress to full weight-bearing. Once full weight bearing is achieved, multi-plane, proprioceptive and neuromuscular challenging exercise can be incorporated to restore function. With the TRX Suspension Trainer, muscle activation levels and joint loads can be manipulated by varying the angle of the body and level of stability for each exercise. Based upon the patient’s stage of healing and goals, the TRX Suspension Trainer can be used as a replacement or complement to traditional exercise devices used in musculoskeletal rehabilitation programs. By incorporating the entire body, muscular forces will be shared across the body, enhancing proprioception and the patient’s awareness of how their body moves.

Core Stabilization and Strengthening

Within a rehabilitation program, core stabilization and strengthening is typically trained across a continuum of motor control, endurance, strength and power exercises; with the early phases of rehabilitation emphasizing motor control and endurance through changes in torso stiffness and later stages emphasizing strength and power through altering torso rigidity. Stiffening of the spine via intra-abdominal pressure has been performed by abdominal hollowing or abdominal bracing. Abdominal hollowing draws the navel towards the spine (Richardson and Jull, 1995) and results in 32% less stability than abdominal bracing (Grenier & McGill, 2007), which involves a co-contraction of the muscles surrounding the spine.

A decrease in core muscular endurance (McGill S. M., 2007) and the size of the trunk muscles as measured by MRI (Hides, Boughen, Stanton, Strudwick, & Wilson, 2010) are related to low back pain. In the torso, the transversus abdominus is under anticipatory control and shows a burst in activity prior to arm or leg movements (Hodges and Richardson, 1997a, 1997b), while the non-contractile and contractile tissues provide sensory feedback via proprioceptors and muscle spindles, respectively. Specific motor control training can help restore the deep abdominal muscles that show delayed activation and histological changes secondary to injury or pain, and has been shown to be beneficial for spondylolisthesis (O’Sullivan, Phyty, Twomey, & Allison, 1997), acute low back pain (Hides, Jull, & Richardson, Long-term effects of specific stabilizing exercises for first-episode low back pain., 2001), and pregnancy related pain (Stuge, Veierød, Laerum, & Vøllestad, 2004).

Suspended Push-Up
Suspended push-ups show a significantly increased activation of the abdominal wall muscles and latissimus dorsi compared to standard push-ups (Beach, Howarth, & Callaghan, 2008). Spine loads appear to be position specific, with lower spinal loads in pulling exercises and higher spine loads in pressing exercises, each with higher muscle activation levels when compared to the stable version of the exercise. This is not to imply that higher spine loads are bad. In athletics, spine loads may be high, and training programs should be structured to permit the individual to develop an appropriate motor response to a variety of postures and load. It is as equally important to have the ability to relax the muscles of the core as it is to know how and when to activate muscles. For many people, especially those with a history of back pain, too much muscle activity was the problem and not too little; and low load exercises with diaphragmatic breathing can help reduce this excessive activity (McGill S. M., 2007). This suggests the importance of feedforward and reflexive motor control training enhancing torso stiffness prior to enhancing torso rigidity a goal of core stabilization training. Using the TRX allows practitioners to integrate the core into every exercise along a full continuum of motor control, endurance, strength and power training.

**TRX for Health & Fitness**

**Health Promotion & Weight Loss**

Fitness can be modified through all types of physical activity. Patients seen in a clinic for a musculoskeletal problem or clients beginning an exercise program often present with negative health and fitness measures that can influence their ability to heal or train, increase their risk for re-injury, or otherwise negatively influence their quality of life. Rehabilitation and fitness professionals are in a unique position to promote physical activity by utilizing their unique skills to develop therapeutic programs that incorporate the minimum dose-response of physical activity for their patient. Both younger and older adults can use the TRX as part of their exercise program. Dr. Christian Thompson at the University of San Francisco determined that **TRX Suspension Training is a safe and effective exercise modality in older adults who were deemed to be at risk for an accidental fall.** This research, which has been peer-reviewed by the American College of Sports Medicine, was an eight-week training program using the TRX Suspension Training system to enhance functional fitness in a group of older adults. Significant improvements were measured for the Functional Reach Test and the Timed Up-and-Go Test (TUG). Additionally, **TRX Suspension Training meets the Surgeon Generals guidelines for moderate physical activity** (Dudgeon, Aartun, Herrin, Thomas, & Scheet, 2010) (Scheett, Aartun, Thomas, Herrin, & Dudgeon, 2010) and **can be used as part of a clinical fitness program to promote weight-loss and reduce disease risk**, thus enhance their patient’s quality of life and decrease the long-term costs of health care. Physical activity and exercise prevents the occurrences of cardiac events and reduce the risk of stroke, hypertension, type 2 diabetes mellitus, colon and breast cancers, osteoporotic fractures, gallbladder disease, obesity, depression, and anxiety. At any age, individuals who change from a sedentary lifestyle to a physically active lifestyle lower their rates of disease and premature mortality.
All Places, All Goals

With its portability and ease of use, the TRX Suspension Trainer is a solution for your clients or patients to be consistent with their exercise program as they can use the TRX at home, outdoors, or on the road. For those returning to the gym and looking for individual instruction or group classes, TRX trained personal trainers or TRX or group classes are easily found. The ability to scale exercise across a wide continuum of challenge allows people of all ability levels and all goals to find a way to effectively incorporate instability training into their program. Many exercise programs have a high rate of recidivism and TRX Suspension Training may increase exercise compliance through the ability to create a wide variety of novel activities and provide musculoskeletal benefits for those who do not have access to or want to complete intensive free-weight training programs. Instability training provides a greater variety of training experiences without sacrificing strength, balance and functional performance measures; and should be incorporated into the training program of inexperienced trainers (Kibele & Behm, 2009).

TRX for Injury Prevention & Performance

"You can only put fitness on top of dysfunction for so long before you get an injury" – Gray Cook

Injury Prevention in Sports

A systematic review of neuromuscular training, which includes unstable surface and unstable load training for sports injury prevention showed that exercise programs incorporating instability exercises were effective in reducing the risk of lower limb injuries by 39%, the risk of acute knee injuries by 54%, and the risk of ankle sprain injuries by 50%, and for upper limb injuries (Hubscher, Zech, Pfeifer, Hansel, Vogt, & Banzer, 2010).

While a specific dose-response was unable to be determined by the review, at least 10 minutes of neuromuscular training performed 2 or more times per week can reduce injuries. Trunk and hip neuromuscular training is advocated for the prevention of non-contact anterior cruciate ligament (ACL) injuries in female athletes considered to be at higher risk due to biomechanical differences (Myer, Chu, Brent, & Hewett, 2008). In a group of female soccer players the incorporation of a neuromuscular and proprioceptive training program reduced the incidence of ACL injuries by 88% in year one and 74% in year two (Mandelbaum, et al., 2005). Basketball and soccer players with a prior ankle sprain have a two-fold decrease in the recurrence of an ankle sprain through the incorporation of balance and proprioceptive training into their normal conditioning program (McGuine & Keene); and musculoskeletal injuries in youth aged 15 to 17 were significantly reduced with neuromuscular and proprioceptive exercises (Olsen, Myklebust, Engebretsen, Holme, & Bahr, 2005).

The risk of injury may be decreased by improving the functional qualities of the musculoskeletal system, improving the resistance to fatigue or durability. Altered lower extremity kinematics
have been observed in cyclists following fatiguing core exercises (Abt, Smoliga, Brick, Jolly, Lephart, & Fu, 2007). These altered kinematics may subsequently decrease efficiency of movement, which ultimately effect performance and may decrease the tissue tolerance to continued loading. When an athlete has a non-painful biomechanical dysfunction or inefficient kinematics and is exposed to increasingly heavy loads, body positions that are compensatory to the dysfunction, or the stresses of training and competition, there is an increased risk that the biomechanical dysfunction is either going to prohibit the athlete from progressing in their training or worse, a musculoskeletal injury.

The vast majority of athletic endeavors involve stable surfaces where instability is applied further up the kinetic chain. A comprehensive training program should include unstable exercises to ensure spinal stability is trained under a broad range of conditions (McGill S., Karpowicz, Fenwick, & Brown, 2009), mastery of movement skill, and enhancing the functional qualities of the musculoskeletal system. The torso and arms often encounter instability in open-chain motion while the base is stable, as in throwing a ball. The TRX Suspension Trainer can be used for unstable load training in the upper extremity and torso with the feet on a stable surface. In performance conditioning where external loads and speed of movement are greater than what is found in rehabilitative and fitness settings, the technique of movement becomes increasingly important to reduce the risk of injury. Unstable load training can be used to enhance awareness of how the body moves through the conscious need for greater attentional demands to the task and unconsciously through feedback and feedforward mechanisms.

Core stability training was a component of the neuromuscular training programs effectively used for injury prevention. In spite of the effectiveness for injury prevention, a common criticism of core stability and neuromuscular training in strength sports has focused on two factors, the decrease load one can move while utilizing unstable training and the high core stability achieved during traditional heavy training. Core stability is inherent with heavy traditional closed chain training (deadlift, squat), which may preclude the need for other core stabilization exercises. Kohler, Flanagan, and Whiting (2010) examined the amount of weight lifted and EMG activity under four seated overhead pressing conditions; stable load/stable surface, stable load/unstable surface, unstable load/stable surface and unstable load/unstable surface and found more weight could be lifted under stable conditions. EMG activity of the abdominals, external oblique, and erector spinae were greater under stable conditions, most likely due to the increased load. This study is in agreement with Cressey, West, Tiberio, Kraemer, and Maresh (2007) who showed that for greater absolute strength gains stable positions should be utilized. However, stability in the spine is required for the efficient execution of performance based skills, and a comprehensive program should include a certain level of destabilization type exercises (Behm, Drinkwater, Willardson, & Cowley, 2010), to help reduce the risk for injury (Willardson, 2007).

**Performance Enhancement with Unstable Training**

For strength athletes, this may be completed by performing a destabilizing exercise such as a TRX Suspension Training exercise following a ground based strength exercise like the deadlift, squat, or clean. Structured in a blocked fashion, with agonist-antagonist pairings will allow the body to recover sufficiently between exercises without increasing the rest normally taken
between the strength based exercises, effectively increasing volume without a concomitant decrease in intensity. Unstable training could also be used for deloading phases or within a periodized program as a way to decrease joint stress without decreasing muscle activation levels. The decision to include unstable training will depend upon the phase of the training, the needs of the individual, and the demands of the sport.

Neuromuscular training has also been shown to increase sports performance. **Incorporating balance training into a 5 week program resulted in 33% improvement in static balance and 9% increase in vertical jump height** (Kean, Behm, & Young, 2006). **Additionally, Behm, Wahl, Button, Power, and Anderson (2005) reported a positive correlation (0.65) between maximum hockey skating speed and static balance test in hockey players under 17 years of age.** It is thought that improvements in performance due to unstable training allow the decrease in sway observed with training to optimize force direction during the skilled event. **Functional and core strengthening training can improve performance and fitness measures in golfers** (Thompson, Cobb, & J, 2007) and has produced greater results compared to stable training in a group of female athletes (Myer, Brent, Ford, & Hewett, 2008). **In recreational and competitive 5000-m runners, core stabilization exercises were shown to increase performance after 6 weeks of training** (Sato & Mokha, 2009). **The runners in the core stabilization group decreased their average 5000-m run by 47 seconds, compared to 17 seconds for the control group.**

**TRX for Military and First Responders**

Military personnel and first responders are similar to athletes in the type of physical demands they must tolerate. Standardized training programs aimed at developing the level of fitness required for the successful job performance have led to overuse injuries and less than optimal performance and prevention outcomes. Unstable training can be a valuable part of a training program to prevent injuries and maintain physical preparedness in military and first responder personnel.

Sprains or strains accounted for nearly 49% of acute outpatient visits across the military in 2004, resulting in over 3 million days of limited duty (Ruscio, et al., 2010). Sports and physical training was the number one, two, or three activity associated with each of the five leading Department of Defense injury types (Ruscio, et al., 2010). Musculoskeletal injuries are the greatest health and readiness threat to the US Armed Forces with 70-80% of musculoskeletal injuries in the military due to overuse injuries, which are largely avoidable. These overuse injuries result in 25 million lost duty days, affecting nearly 50% of the military force, costing the military $1.5 trillion annually (JSPTIPWG, 2008). On a per individual basis the total potential cost savings per injury avoided is over $3000 per injury (JSPTIPWG, 2008).

During initial military training, about 25 percent of men and about 50 percent of women incur one or more training related injuries (Recommendations for Prevention of Physical Training (PT)-Related Injuries: Results of a Systematic Evidence-Based Review by the Joint Services Physical Training Injury Prevention Work Group (JSPTIPWG), 2008). **A report by the US Army Public Health Command showed the prevention of overtraining by including multi-planar,
neuromuscular, proprioceptive and agility training was one of the most effective measures for the prevention of musculoskeletal injuries (JSPTIPWG, 2008). The JSPTIPWG (2008) found good evidence that increasing the proportion of physical training time devoted to improvement of body movement skills reduces injuries.

With the goal of creating safe and effective conditioning programs, the US Army developed Physical Readiness Training. Through gradual progressions, a wide variety of the types of exercise and quality execution of the exercises, the US Army was able to decrease overuse injury rates by 32% (Vickers, 2007). Similarly, injuries rate was decreased in first responders whose exercise program improved core strength and functional movement (Peate, Bates, Lunda, Francis, & Bellamy, 2007).

Dynamic core stabilization exercises increased the sit-up pass rate (5.6%) for a physical fitness test in military training (Childs, et al., 2009). Using the TRX improved the run (6.4%) and sit-up (5 ± 2) test in members of the Citadel military academy who were preparing for the Citadel physical fitness test. Incorporating TRX exercise can reduce injury risk by more evenly distributing the musculoskeletal stresses of training and enhance neuromuscular control.

Summary

Exercise programs of any kind should be tailored for the goals and needs of that individual. Whether rehabilitating an injury or disability, weight-loss, performance, or injury prevention; the TRX Suspension Trainer is a safe and effective functional training tool. TRX Suspension Training should be a part of any comprehensive training program across the full spectrum of function. Research will continue to be developed to further elucidate the benefits of core stabilization, core strengthening and unstable training for rehabilitation, fitness, performance and injury prevention.
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At Fitness Anywhere, our mission is to democratize world class fitness. We are committed to helping our customers achieve peak physical condition by creating exceptional physical training products and exercise programs that can be used anywhere. We will create and sell our products in an environmentally sustainable fashion and maintain the highest standards of corporate responsibility. We will earn the trust of the world’s most demanding consumers by creating best-in-class products that deliver results, not promises.
Bibliography


