

Instability Functional Training: Evidence-Based Recommendations for Coaches

Brief Review

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Published: February 6,
2023



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Research Directs in
Strength and
Performance: 2023,
Volume 3 (Issue 1): 3

ISSN: 2768-5187

Abstract

Instability Functional Training (IFT) has been a popular form of program design in personal training certifications, and thus, widely accepted among trainers and coaches when creating programs for their clients. Training philosophies around this exercise style have been plotted in various directions, ranging from mainstream advocacy to vehement opposition. It is common practice for personal trainers to utilize unstable training and blanket all clients into this methodology in specific and non-specific exercise programs. The research does support its viability in clinical rehabilitation settings; however, it may not benefit a healthier population and may even undermine their goals. We ask trainers and coaches to consider their current position on the validity of IFT and to examine the evidence when programming it for the general public whose primary goal is to improve how they look (e.g., lose fat mass and increase lean body mass). Therefore, this article aims to help identify the merit of instability functional training, objectively review the current literature and recommend a practical approach for trainers and coaches when designing general exercise programs for clients with aesthetic goals.

Key Words: Unstable exercise, personal trainer, strength training

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Introduction

Resistance training, also known as strength training, is any physical activity that causes muscles to contract against external force ¹. By its very nature, resistance training warrants a myriad of adaptations and benefits, such as increased bone mineral density, improved cardiorespiratory endurance, increased muscle size and strength, enhanced metabolism, and injury reduction, and it even has been shown to promote systemic fat loss ²⁻⁵. It also has other benefits, such as stress reduction and immunity up-regulation ⁶.

Coaches and trainers employ various methods of resistance training on their clients in pursuit of one or more of these outcomes. A widespread exercise method seen today in many certifications and training styles is “functional training”. Functional

training has taken on various forms and definitions, but for this article, we will define it simply as: exercise with the intent to improve activities of daily life. This type of training is intended to enhance the physical functionality of everyday life by performing integrated, multiplanar movements in combination, typically, with unstable environments ^{7, 8}. Improving a subject's physical function can refer to a host of things including, but not limited to, muscle strength,



balance, coordination, and mobility⁹. This increase in function is thought to segue into daily activities like walking, doing laundry, vacuuming, etc.^{10,11} thereby creating a superior quality of life.

When discussing various goals and implementations of program design, exercise stability/instability is a broad and divisive topic. In exercise science or any academic field, it is imperative to have clear and concise definitions for discussion. Stability is the state of being secured; essentially, for exercise context, it is the ability to maintain balance within static and/or dynamic environments. A subject's stability is affected by many things, such as the size of the individual, the surface they are on, their base of support and stance positions, the mass of their body (object), the center of gravity, as well as neural, sensory, and musculoskeletal variables¹²⁻¹⁴. No matter the training philosophy one supports, all exercises have varying degrees of stability; for simplicity, we will define three: stable, neutral, and unstable. A stable exercise would refer to a pin machine such as a Nautilus chest press, a neutral exercise would refer to a dumbbell chest press laying supine on a bench and an unstable exercise would refer to a dumbbell chest press laying supine on a physioball. For the purpose of this paper, we will discuss movements related to unstable exercises.

It is common practice for personal trainers and coaches to use unstable exercises in their program design and deem it functional training. The devices used offer varying degrees of instability and can range from BOSU® balls, inflatable discs, wobble boards, physio balls, foam tubes, and other tools¹⁵. Some trainers will also use unstable techniques like having clients balance on one foot while performing free weight exercises, or catching medicine balls^{16,17}. This distinct style of functional training is believed to improve strength, balance, and coordination among those who need it¹⁸.

At its fundamental roots, it is believed that exercises performed during unstable conditions will stimulate the neuromuscular system more than exercises performed during stable conditions, and therefore, theorized to enhance a subject's "function". Interestingly, it also appears a subject can improve their function by simply engaging in a progressive exercise program devoid of unstable exercise^{19,20}. Nonetheless, it has been accepted that instability functional training is valuable and essential as many coaches and PT certifications implement this style of training into client programming. Therefore, this article aims to help identify the merit of instability functional training, objectively review the current literature and recommend a practical approach for trainers and coaches when designing general exercise programs for clients with aesthetic goals.

Literature Review Methods

A literature review was carried out to investigate the utility of instability functional training in a general exercise program with subjects who want to attain aesthetic goals. The search was conducted on ResearchGate, PubMed, and Google Scholar. The primary search terms used were "instability resistance training," "functional training," "functional exercise," "unstable exercise," "balance training," and "instability functional training. Criteria included peer-reviewed papers and personal training certification manuals. The dated publications chosen were after the year 2000 apart from 3 papers. The review examined twenty-one articles on unstable exercise, fourteen articles on resistance training, thirteen articles on muscle, strength and hypertrophy, thirteen articles on functional training, six articles on exercise training specificity, two articles on posture and balance, one article on the central nervous system and one article on exercise injuries.

Origins of Functional Training

The origins of functional training and its standard implementation began with rehabilitation, rooting itself in physical and occupational therapy²¹. The term functional training and its connection to physical therapy can be traced back as early as 1949²². This type of program in a rehab setting appears to aid in the development of absent motor task skills associated with activities of daily living, typically with older adults and those recovering from injuries or disabilities²¹. The idea is to "rehabilitate" patients by having them perform specific exercises that are believed to transfer to the real world.

Typical rehabilitation protocols are a combination of unstable exercises and techniques, stretching protocols, and resistance training²³⁻²⁵. It has been proposed that physical therapists should start the rehabbing process with unstable exercises first, then progress to unstable exercises with loaded resistance, and then to stable exercises, using traditional resistance training with greater loads²³. For rehabilitation purposes, research does show that functional training used in physical therapy may benefit those attempting to recover from an injury, those who suffer from neurological dysfunctions, and the elderly who may simply have limited functional ability in daily life²⁶. Although, it is also important to highlight that traditional strength training could perhaps be just as practical for rehab when a patient is suffering



from an injury or has limited functionality in their day-to-day life ²⁷⁻³⁰. In addition, strength training also appears to have the potential to improve physical function in stroke patients ³¹.

Functional training became the norm in physical therapy, but as time went on it segued into the personal training space. Personal trainers and coaches took the functional exercise concepts from rehab clinics and began experimenting with the general population. Personal trainer Paul Check began using functional methods with clients during the '90s and trainer David Weck developed the BOSU® ball in the late '90s, which debuted in 2000 ³². Subsequently, personal training certifications also began teaching these concepts and integrated them into their programs ¹⁷ and were probably the primary driver for expanding functional fitness philosophies around the globe in gyms, alongside a few influential coaches. In the mid-2000s however, other factions like Crossfit and TRX spawned a new wave of functional fitness by integrating strength and athleticism as a pertinent focal point ³³. Since then, the functional fitness philosophy has continued to evolve unpredictably, and thus we have varied and inconsistent definitions.

Due to this confusion, we now have coach practitioners of functional fitness that are divergent in how they approach program design. It is safely conjectured that most personal training clients are not rehabilitation patients. Therefore, it is to be concluded that most personal training clients do not have a disability, injury, or any limited functional ability in daily life, but rather, have normal functionality and are devoid of injuries. Following this same rationale in concert with the importance of body image in the present day, it can be argued that most personal training clients primarily seek aesthetic outcomes from their training. If so, then the application of instability functional training for this demographic should be questioned. The following discussion is centered around instability functional training methods (unstable exercises) and how they compare to stable/neutral exercise methods in a general exercise program for clients with aesthetic goals.

Evidence-based Exercise Recommendations

As previously established, there is support for the use of instability functional training in clinical rehabilitation settings ^{23,8}. Unstable training is implemented on rehab patients by having them perform specific exercises that are believed to produce a positive transfer to everyday life. However, it should be noted that most activities of daily living are performed in stabilized environments and are not the same when a subject is performing an unstable exercise. Exercising in unstable conditions is not a specific stimulus to activities of daily life and therefore, may violate the principle of specificity.

Muscle Strength and Hypertrophy

Strength is defined as the ability to produce force against an external resistance ³⁴. To increase strength, a subject must induce an overload stimulus to acquire subsequent adaptations. Muscle hypertrophy, in a traditional sense, is defined as myofibrillar contractile proteins increasing in size, which can occur by adding sarcomeres in series or parallel to each other ^{35,36}. Not surprisingly, there appears to be a correlation between strength and muscle growth where strength improvement may potentiate muscle hypertrophy ³⁷. Increasing skeletal muscle tissue is a primary goal for bodybuilders, but many individuals who exercise recreationally share this common goal as well ³⁸. That being the case, muscle growth is probably the most relevant adaptation from resistance training for subjects that want to improve how they look as it helps improve body composition. In addition to muscle hypertrophy, skeletal muscle seems to be very important for metabolic health, reduction of disease, and the elderly ³⁹⁻⁴¹. But from an aesthetic perspective, muscle hypertrophy (myofibrillar) can lead to denser and larger muscles ^{36,38,42}, and in turn, enhance a subject's physicality. Moreover, this type of hypertrophy can also produce stronger muscles since more contractile proteins can generate additional forces, consequently, this can have an impact on the degree of mechanical tension muscle fibers experience. That said, the primary driver to influence a hypertrophic response appears to be mechanical tension ^{35,43}. It stands to reason that mechanical tension is probably the most important stimulus in a general exercise program where recreational lifters seek to improve their physique.

A postulated argument for focusing on strength and hypertrophy is that a subject will be potentially exposed to greater amounts of mechanical tension to hopefully, optimally initiate morphological changes in muscle. Nonetheless, the mechanical tension stimulus must be applied safely and appropriately. When we examine unstable exercises and what they have to offer for muscle hypertrophy, they appear to mitigate the growth response and are typically not substantiated by research for this goal ³⁵. Unsurprisingly, numerous studies show that unstable exercises attenuate strength and power, and hinder the ability to overload the prime movers, or motor muscles, due to less force production ⁴⁴⁻⁴⁸. This seems plausible since skill acquisition is the primary focus when exercise movements are unstable and/or unskilled. If mechanical tension is reduced, then it may also follow that the overload stimulus could be



diminished, too. It is also reported that unstable exercise does not allow sufficient loading to induce strength (and growth) adaptations and that exercise performance improvement could even be diminished in healthy, trained clients⁴⁹. Interestingly, a study conducted by Medrano and colleagues showed that stable deadlifts elicit higher production of maximum strength and muscle activity when compared to unstable deadlifts⁵⁰. Although, some studies show no difference in superficial muscle activation from stable to unstable surfaces^{51,52}, and some literature does suggest that unstable exercises induce greater muscle activation in stabilizer muscles when compared to prime movers^{53,54}. Nonetheless, this consideration may not be pertinent to a general exercise program when superficial muscle development is a primary goal.

An argument could very well be framed that if stabilizers are trained sufficiently and thoroughly that a subject will become stronger overall, and there seems to be some support for this⁵⁵. But other research shows that no statistical differences occur in stabilizer muscle activations between stable and unstable conditions^{51,52,56}, so it can also be argued that training stabilizer muscles for this goal may be irrelevant.

Muscle Density

It is well-documented in the literature that to increase muscle fiber diameter, an overload tension stimulus must be present⁵⁷. An overload stimulus to induce growth can come from load increases, repetition increases, set-volume increases, and other manipulation of training variables⁵⁷. When myofilaments are added intracellularly there is more fiber tissue and thus, it aids in a muscle being denser^{36,42}. There is research that muscle density may also be associated with strength as well⁵⁸. However, the density of muscle can be sourced back to a myriad of factors, one of which is tonus. Muscle tone, or tonus, is defined as the slight, continuous contraction of a skeletal muscle⁵⁹ and this can be considered a form of “muscle density”. This resting tension is dependent on efferent innervation where motor neurons carry nerve impulses away from the central nervous system (CNS) and to the effectors, such as muscle⁶⁰. An increase in tonus will result in an increase in resting tension within that muscle, or more appropriately, the motor neurons which innervate that muscle. This will increase the neural connection to the muscle fibers, which will cause a constant supply of nerve impulses to some fibers within that muscle^{61,62}.

All things considered, the increase in muscle density through neurological pathways is likely based on which skeletal muscles are being contracted and their degree of activation. As already mentioned, unstable exercises may produce inferior muscle activation in comparison to stable exercises⁵⁰, and the stabilizer muscles may very well be more active than the prime mover muscles during unstable exercises^{53,54}. Therefore, increasing strength in superficial muscles may be a more applicable direction since it can facilitate neural adaptations which improve nerve-muscle interactions with muscles. Consequently, this enhances muscle tone and benefits subjects seeking to look better since a denser muscle will appear tighter and firmer.

Practical Applications

Instability functional training is a popular method that is employed when attempting to increase the kinesthetic mobility of subjects, such as in rehab clinical settings. Interestingly, it appears that exercises performed in unstable conditions do not have a positive transfer effect outside what is being specifically trained, or at least are negligible⁶³⁻⁶⁶. Therefore, unstable exercise to improve function outside these unstable environments is equivocal, and instead, it may only improve in the specified task/exercise within those conditions^{67,68}. Physical therapy practices where patients perform unstable techniques solely at the clinic and not in daily life are up for debate. In the personal training realm, many coaches implement instability functional training into their program design through phases or what are called mesocycles. Interestingly, if being more “functional” is a sub-goal of the client, having more muscle contributes to balance and coordination and increasing strength appear to enhance these conditions, too^{18,69}. Though it is generally accepted that most people who engage in exercise want to improve their aesthetics (body recomposition) instead of kinesthetic function. Therefore, it can be argued that most who hire a personal trainer do so for the same reason: to enhance their appearance. Maintaining the integrity of exercise specificity, the focus would then be to increase lean body mass using a strength and hypertrophic-focused program. To optimize this goal, exercises deemed stable and neutral are most appropriate whereas exercises classified as unstable are not. It is understood that there are varying degrees of stability in exercise and not all exercises that contain unstable variances are bad or negligent. However, it is contended that the extreme margin of this type of training is not optimal or even appropriate for those in the general exercise crowd since most are looking to simply change how they look. Resistance training in and of itself possesses an inherent risk, although very low⁷⁰. However, combining resistance training with greater degrees of instability could very well increase this risk⁷¹. Therefore, the more unstable a subject is during exercise, the greater the risk. Since unstable exercises appear to reduce strength and hypertrophy adaptations, it is recommended that personal trainers



apply a level of stability where muscle/s are being stimulated and activated at a high level while at the same time, mitigating risk. If a personal trainer wants to implement a form of skill-oriented exercise in their program for clients, it is recommended that more neutral-based movements such as free weights, cables, or calisthenics are utilized.

Acknowledgments

None

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