



FUNCTIONAL AND UNSTABLE TRAINING REVISITED

With research findings contradicting initial assumptions, renowned strength coach *Tony Boutagy* questions the fitness industry's enthusiastic acceptance of functional training for strength development before it underwent scientific scrutiny.



unctional and unstable training became immensely popular in the fitness industry around the mid 1990's, due in large part to the work of Paul Chek. At its core, functional training proposes that the body knows movement and not muscles. The majority of gym equipment at that time was designed to train muscles in a manner in which, the proponents of functional training believed, they were never designed to work. To exercise effectively, so the argument goes, movements must mimic actions and activities encountered in everyday life.

Like most things in life, the enthusiastic acceptance in the fitness industry of functional training preceded scientific inquiry into the topic to confirm or refute the many claims made by those endorsing it. 'The earth is round; we should squat on a ball' and 'When in life do you lie on your stomach and pull your feet towards your butt? You don't, so don't do leg curls'. These were just some of the many early popular arguments that were made for abandoning traditional strength training and adopting a functional approach instead. It would be fair to say that the initial viewpoint was that functional training is a better way to exercise than traditional, stable methods and that destabilising strength exercises or mimicking movements from everyday life would lead to superior outcomes in functional strength gains and neuromuscular activation.

Questioning functional and unstable training

Prior to substantial research being conducted, two articles appeared in 2002 that questioned some of the central tenets of unstable and functional training. The first was written by me and published in this magazine¹, the second was written by the late Mel Siff² and was published several months later. We both argued that the term functional training was being largely confused with sports specific training, which few question the value of in a periodised program. The issue we raised was the universal recommendation of functional exercises to the exclusion of traditional strength exercises and the claim that they would lead to superior functional strength gains than traditional movements.

Periodisation experts dating back to the 1970's proposed that a training cycle should incorporate phases that emphasised the development of general motor capacities and strength (the GPP: General Physical Preparedness) and those that transform those abilities into sports specific qualities (the SPP: Specific Physical Preparedness). In other words, generalised theories of training that have formed the basis of our training knowledge encourage coaches to use both traditional strength training exercises and those that are sports specific – or in our language – functional (and not one or the other).

Defining function

In an attempt to clarify positions, defining functional and unstable training becomes critical, so arguments for and against functional or unstable training are fairly levelled. Santana notes that the term functional training is most commonly used for any training that is not bodybuilding³. Instability training can involve unstable conditions with body mass or external loads (kettlebells, dumbbells, barbells) as resistance. Instability can be induced with unstable foot pads, Swiss or BOSU balls. Reducing the base of support or performing unilateral exercises will also provide a challenge to the body's equilibrium. Another common way to apply instability is offloading a barbell, using bands or chains or attaching swinging bands with kettlebells to the ends of a barbell (the chaos method).

Proponents of functional exercise and unstable devices, such as Paul Chek, suggest that the higher instability demands may stress the neuromuscular system to a greater extent than traditional strength training. The rationale is that destabilising training environments may enhance neuromuscular adaptations and training specificity, while



THE QUICK READ

- The enthusiastic adoption of functional training by the fitness industry preceded scientific research into its efficacy
- Periodisation experts have long encouraged coaches to train athletes using both traditional strength training exercises and sports specific/functional ones
- The rationale behind unstable training is that destabilising training environments may enhance neuromuscular adaptations and training specificity, while providing a more varied and effective training stimulus
- 'Functional' training may be seen to apply to exercises that improve the function of the activity or to the function of muscle/capacity of the system it targets
- Studies showing the ability of machine resistance training (considered non-functional) to dramatically improve function, as well as evidence that instability training can result in decreased force and power output, highlight the problem of elevating functional and unstable training above traditional training methods.

providing a more varied and effective training stimulus.

Research examining the muscular activation levels during stable and unstable exercises reveals that no single exercise can challenge and develop all the motor aspects required for performance, muscle growth or health. Acknowledging this point allows us to examine each exercise choice and establish what that particular movement does well and when it should be used in a long-term training plan. To know this, the literature examining direct comparisons between stable and unstable training, functional and non-functional exercises must be explored.

In the past two decades, several well conducted studies have been published on unstable training, most notably by the Canadian David Behm. Professor Behm has been one of the most prolific researchers examining the difference between functional and traditional strength training on several parameters of muscular performance.

By way of definitions, function in science refers to the way in which an organism operates⁴. Functional training, then, refers to training methods or exercises that improves the way we operate in the world. The way we operate is specific to the environment in which we want to function. These might include functioning in a power or speed-based sport, a prolonged endurance endeavour, being self-sufficient in old age, returning to walking and running after a knee injury or improving glucose control in type 2 diabetes. The term functional



training is always context-dependent and merely deciding that an exercise is functional if you carry your centre of mass over your base of support, or you destabilise the movement, is an extraordinarily unhelpful and simplistic way of looking at exercise selections.

Practice the actual activity

Siff was one of the first to note that there is no such entity as a truly functional exercise, except for the actual sporting or daily movement that we are trying to enhance by training. Siff also argued that many of the tools (exercises, equipment and accessories) used in current functional training have long been employed in rehabilitation and conditioning programs and that, therefore, little is actually new.

Other experts, since Siff, have stated that the optimal method to promote increases in balance, proprioception and spinal stability for any given sport is to practice the skill itself on the same surface on which the skill is performed in competition. In his classic paper on power, Professor Schmidtbleicher stated that intermuscular coordination can only be developed by practising the movement for which coordination is sought⁵.

Function in action and in muscle

In line with the principle of training specificity, functional training or SPP exercises should reflect movement velocity, contraction types (i.e. concentric, eccentric, or isometric), and intensities (strength vs. endurance needs), joint angles, balance challenges, range of motion, and other applicable capacities. Any exercise can be categorised as functional if it develops strength, power, balance, motor coordination, endurance, or improves the ability of individuals to execute activities of daily living (ADLs), whether they be simpler tasks or more complex athletic manoeuvres.

Another way I have looked at the classification of functional is that any exercise can be deemed functional if it improves the function of muscle or the capacity of the system it targets. In support of this viewpoint are the majority of the early studies examining the effects of traditional strength training on activities of daily living in the elderly population. These studies have convincingly showed that machine-based resistance training dramatically improved strength, power, balance and muscle mass which transferred to the ability to carry bags, prevent falls, safely climb stairs and rise from a seated position. In other words, machine resistance training, which is by any definition non-functional, improved functional capacity in this population.

Destabilising – and decreasing

With respect to destabilising strength exercises, unstable exercise-based programs have been shown to decrease force and power output by around 30% compared with comparable traditional strength training⁶. This negative aspect makes unstable training more suitable for rehabilitation, as the instability-induced decrease in strength and power output provides a healthy stress on a recovering joint or muscle. For example, Cholewicki and McGill showed that the multifidus strength can be improved with training loads as low as 30 to 40% of maximal voluntary contraction⁷. These lower force outputs are suitable for back rehabilitation, while the increased trunk and limb muscle activation provide greater stabilisation. Behm and Colado reported a 47% increase in trunk stabiliser muscle activation with unstable resistance training⁸.

Behm has also conducted several studies on beginners to resistance training and showed similar gains in strength and muscle mass between stable and unstable exercises. These findings, similar to exercises used in rehabilitation, support the idea that beginners can develop appreciable muscle and strength at much lower levels



of muscle activation than well-trained individuals⁹. It appears that this is only effective during the early stages of training¹⁰, as losses in strength and power have been repeatedly reported when experienced lifters use unstable exercises, as there is a shift from prime mover activation to favour core and stabiliser muscle recruitment¹¹.

Professor Behm has also shown that programs comparing unstable training with traditional stable strength training did not provide balance advantages, irrespective of the age group considered. This is most likely due to the fact that traditional strength training provides moderate levels of instability, owing to the placement and movement of bars or dumbbells on the shoulders, overhead or in front of the body. Free weights place a disruptive force outside the centre of mass, challenging the neuromuscular system to maintain balance and equilibrium. Although the challenges to postural stability are normally much greater during unstable exercises, Behm demonstrated that this greater degree of balance challenge does not lead to greater systematic balance improvements¹². Other studies¹³ that have directly compared stable with unstable training on measures of strength and muscle activation generally conclude that there is 'little support for training with a lighter load using unstable loads or unstable surfaces.'

Metabolic impact

Similar findings have been replicated with respect to metabolic health. The ability to control glucose levels in the blood, lower blood pressure or improve other cardiovascular parameters is independent of the type of resistance training performed. Put another way, our blood glucose does not know if the muscle contraction came from leg presses (machine), squats (free weights) or squatting on an unstable surface (functional training). To metabolism, muscle contraction is muscle contraction.

An unstable argument for strength development

In the mid 1990's I had been heavily influenced by Paul Chek and his reasonings for adopting a functional approach to exercise selection. I had used many of these unstable exercises with clients, with varying degrees of success. My viewpoints began to change when my continuing education took me to Arizona at the beginning of the new millennium to study under the late renowned strength coach Charles Poliquin. He challenged the inclusion of a single-arm dumbbell press

and a single-leg Romanian deadlift in the many programs I had to write for him. His argument was simple: if you can bench press 100kg with two hands, you cannot dumbbell press close to half of that without flipping off the bench, so the exercise has 'limited value'¹⁴ for strength development.

Poliquin highlights the majority view of that time – in many instances of unstable training, the load able to be lifted is dramatically reduced such that the prime movers are not sufficiently overloaded. This has obvious implications if one has the training goal of strength, power and hypertrophy – as muscle motor unit (MU) recruitment is paramount for a training effect.

Numerous studies published over the years have supported this general claim. Research has shown that although neuromuscular activity remains similar between stable and unstable training, the MU recruitment of the prime movers is reduced and shifted towards the core and peripheral muscles (normally those muscle groups in contact with the stable surface, such as the floor).

Indeed, an early study by Professor Stuart McGill and colleagues showed that a standing single-arm cable chest press produced 65% less force production than a lying bench press¹⁵. Standing pressing exercises have been shown to be limited to 40% of the individual's bodyweight, and that is why strength coaches of elite shot putters, for example, use bench pressing exercises to develop upper body pushing strength, often in excess of 240kg. Furthermore, the study found that the bench press highly recruited the pectoral and deltoid muscles – much more so than the core. The standing single-arm press had internal oblique and latissimus dorsi activity levels similar to the pectorals and deltoids in the bench press. The researchers found that the limiting factor for the unstable exercise was maintaining whole-body stability together with joint stability. If the goal was upper body strength or muscle mass development of the chest and deltoids, clearly, the bench press derivatives would be the primary choice. If joint and muscle group stability or whole-body equilibrium was the goal, the destabilising traditional exercises would provide the advantage.

No advantage for strength or power

David Behm and colleagues recently conducted a meta-analysis on unstable training and reported that there was no advantage of unstable training for the development of maximal strength or power¹⁶. Behm concludes that 'the application of unstable training compared with traditional strength training has limited additional effects on measures of muscle strength, power and balance in healthy adolescents and young adults. Therefore, the use of unstable as compared with



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stable surfaces during strength training is only partially recommended'. This word 'partial', as a coach, is important. In certain instances, where you desire lower joint forces (rehabilitation) or higher stability or core activation (correcting imbalances or the GPP), then unstable exercise choices would be advisable.

This has a message to both sides in the strength industry. To those who feel that traditional strength exercises such as squats, deadlifts, presses and pulls are all that is needed to challenge all motor abilities, including core muscles and joint and muscle stabilizers, the data strongly argues against this viewpoint.

For those who feel that strength program design should be only functional, with all machines replaced by unstable, unilateral and functional derivatives, then the literature suggests that maximal strength, power and muscle hypertrophy will be compromised in favour of stabilising muscle groups.

Lessons for exercise selection

What conclusions can we draw on exercise selection from studies investigating muscle recruitment levels across various stable and unstable tasks? Here are my practical take-home messages for the strength coach and trainer:





- No one exercise can challenge both prime movers, stabilisers and core muscles equally.
- No one movement – with the exception of the actual sporting activity or the ‘activity of daily living’ – can replicate the unique demands of sports, so we can use the terms ‘functional’ or ‘sports specific’ with the big proviso that they are closer in some of the physical demands than others. I have sympathy to the view that functional training is a meaningless descriptor in practice.
- There is a continuum with which we should view strength exercises, and the precise choice depends on the training goals of that particular phase of training.
- As a rule, the more stable the exercise, the higher the prime mover muscle recruitment is, with stabiliser, core and peripheral activity being reduced. The more unstable an exercise becomes, the greater the neutral drive to the stabilising, core and peripheral muscles, typically those that are in contact with the ground.
- Exercise can be periodised in two primary ways: the first, in a classical manner commencing with exercises that demand higher stability levels and therefore a lower training load. As the programs progress, more stable and traditional exercise choices would be incorporated.

The second approach, proposed by the late Yuri Verkhovanski and known as conjugate sequencing, would be to perform both stable and unstable exercises within one session. The sequencing of stable to unstable, or vice versa, would be made on the training goal. This utilises the concept that states we are only as strong as our weakest link¹⁷, with the advice to identify and strengthen ‘energy leaks’. Exercises must be viewed on a continuum – from highly unstable to highly stable – with each offering unique stressors. A wise coach or trainer will periodise all exercise types in the long-term development of their client and athlete. **N**

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