IS FUNCTIONAL TRAINING REALLY FUNCTIONAL?

The term "functional training" has become a popular buzzword in the fitness field — so much so that several leading fitness organizations now call it one of the biggest current industry trends. The question is, does the concept live up to the hype?

BY BRAD SCHOENFELD, M.S., CSCS

"Functional fitness" has been defined as having the physical capacity to perform activities of daily living in a safe and independent manner without undue fatigue.[3] Some fitness professionals refer to this as "strength you can use." One of the most popular techniques touted to improve functional fitness is the use of unstable surface training. Training implements employed to induce instability include wobble boards, foam rollers, stability balls, balance discs, and BOSU devices, among others.

According to proponents, training on an unstable surface imposes a greater challenge to the neuromuscular system, thereby eliciting maximal improvements in human function. Indeed it has been shown that unstable surfaces are valuable in rehabilitation settings, particularly in helping to alleviate symptoms associated with lateral ankle sprains.[19, 15] There also is a substantial body of research showing that performing abdominal and lumbar exercises on unstable implements increases activity of the core musculature compared to similar movements performed on a stable surface.[17, 4, 16, 6] And there is some evidence that training in an unstable environment may help to improve proprioception in the lower body musculature,[11, 8] potentially by enhancing sensory perception. Whether these enhancements translate into better performance of activities of daily living, however, is open for debate.

A problem with the practical application of unstable surface training is that it often fails to take into account the concept of specificity. The "Specific Adaptation to Imposed Demands" (SAID) principle dictates that optimal transfer of the exercise benefit is achieved when movements most closely match those of a given task. Considering that the vast majority of everyday activities are carried out in a stable environment, it therefore follows that functional transfer will be optimized by training on stable surfaces. This is consistent with research by Yaggie and Campbell,[20] who found that although training on a BOSU® ball improved subjects' ability to stand quietly, it failed to improve functional markers of strength, balance, and power.

Moreover, it is important to note that people commonly lose functional ability due to a loss of muscle tissue and thus an associated loss of strength.[13, 7, 10] Accordingly, improving muscle hypertrophy and strength will result in substantial improvements in functional ability. In a study by Fiatarone *et al.*,[7] six women and four men (mean age = 90 ± 1 years) were recruited from a nursing home population to evaluate the effects of strength training on functional capability. Subjects trained three days a week, performing three sets of eight repetitions on a machine leg extension apparatus. After eight weeks, subjects increased their lower body strength by 175% and their functional scores on a test of walking and balance improved by approximately 48%. Two of the participants were actually able to walk without the assistance of their canes! These improvements in function were attained by training solely on a resistance machine – an implement that functional training proponents often dismiss as developing "non-functional" strength.

Alternatively, unstable surface training has been found to be suboptimal for increasing strength. Behm, *et al.*[2] studied the EMG response to exercise when training on both stable and unstable surfaces. Eight physically active males performed maximal voluntary contractions of the knee extensors and plantar flexors while either seated in a chair (stable surface) or on a Swiss ball (unstable surface). Results showed that training on the unstable surface resulted in a 44% reduction in muscle activity and a 70% decrease in force output compared to the same activities performed on the stable surface. Similar findings have been reported in many other studies, with results holding true in the performance of both upper body and lower body exercises.[18, 9, 14, 1] A decrease in muscle force output during training mitigates increases in muscular strength, which would seemingly attenuate functional transfer.

Further, the functional benefits of unstable surface training also may be limited in athletic populations. Cressey *et al.*[5] investigated the use of unstable surface training on athletic performance in elite athletes. Nineteen recruits (ages 18 to 23 years) from a National Collegiate Athletic Association Division I college soccer team were randomly divided into one of two groups, where ten subjects supplemented their usual exercise program by performing various lower body exercises on inflatable rubber discs while the nine others performed the same exercises on a stable surface. Performance was assessed by a variety of tests including the bounce drop jump, countermovement jump, 40- and 10-yard sprint times, and T-test. After 10 weeks, the stable surface group displayed greater performance improvements in all measures studied compared to the unstable surface group, leading the authors to conclude that use of unstable surfaces may not be optimal for athletic performance improvements in healthy, trained individuals. It was surmised that diminished results in the unstable surface group may be due to a reprogramming of neuromuscular patterns that chronically impairs stretch-shortening cycle function essential for the performance of sporting activities.

In conclusion, commonly accepted training tenets need to be reexamined with respect to the concept of functional fitness. Central to the design of any fitness program is the principle of specificity, where exercise routines are matched to an individual's needs, abilities, and goals. Based on available research, it would seem that functional improvements are best achieved when a majority of training is carried out on stable surfaces. In certain circumstances, it is possible that the addition of unstable surface exercises to a routine may provide a synergistic benefit to func-

tional capacity. McKeon *et al.*[12] posited that a combination of approximately 75% stable and 25% unstable surface training may be ideal for optimizing static and dynamic balance. Further research is warranted to shed more light on this topic.

Moreover, it can be misleading to refer to exercise as either "functional" or "non-functional" because functional transfer from training exists on a continuum. For those who are very unfit, a routine using only machines may be all that is required to sufficiently improve an individual's ability to carry out desired activities of daily living. As fitness levels improve and/or functional demands increase, exercises that challenge the body in three-dimensional space will be necessary to realize greater performance enhancements.

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Editor's Note regarding the Wellness Article, "Piriformis Syndrome: A Real Pain in the Butt" in the April–June 2010 issue of *ACSM's Certified News*

Several figures in the article show the hip being placed in external rotation. The piriformis muscle is an external rotator and weak abductor of the femur at the hip joint and internal hip rotation is an important component of a piriformis stretch. Shortening of the piriformis muscle may limit internal rotation. They might experience discomfort during and/or a difficulty achieving much femoral internal rotation. As an alternative to internally rotating the femur, the benefits of femoral internal rotation can be achieved by rotating the trunk ipsilaterally (to the same side) and by flexing the trunk slightly (in a supported manner). Piriformis stretches are often performed in conjunction with stretches for the gluteus maximus, hamstrings, and iliotibial band because of their collective effects on hip joint motion and stability. A supine piriformis knee-hug stretch can become a gluteus maximus stretch by eliminating the femoral internal rotation.

Knee should be pulled gently toward contralateral shoulder (opposite) to initiate femoral internal rotation and to stretch the piriformis.

Another alternative. Notice slight adduction and internal rotation. The quadriped position might not be well tolerated by or appropriate for all clients.

This is technically stretching the piriformis too.

Seated piriformis stretch (notice slight adduction and internal rotation).

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References

1. Anderson KG, Behm DG. (2004). Maintenance of EMG activity and loss of force output with instability. *Journal of Strength and Conditioning Research*, 18(3): 637-40.
2. Behm, D.G., Anderson, K., and Curnew, R.S. (2002). Muscle force and activation under stable and unstable conditions. *Journal of Strength and Conditioning Research*, 16: 416-422.
3. Collins K, Rooney BL, Smalley KJ, Havens S. (2004). Functional fitness, disease and independence in community-dwelling older adults in western Wisconsin. *Wisconsin Medical Journal*, 103(1): 42-8.
4. Cosio-Lima, L.M., Reynolds, K.L., Winter, C., Paolone, V., and Jones, M.T. (2003). Effects of physioball and conventional floor exercises on early phase adaptations in back and abdominal core stability and balance in women. *Journal of Strength and Conditioning Research*. 17(4): 721-725.
5. Cressey EM, West CA, Tiberio DP, Kraemer WJ, Maresh CM. (2007). The effects of ten weeks of lower-body unstable surface training on markers of athletic performance. *Journal of Strength and Conditioning Research*, 21(2): 561-7.
6. Duncan M. (2009). Muscle activity of the upper and lower rectus abdominis during exercises performed on and off a Swiss ball. *Journal of Bodywork and Movement Therapies*,13(4):364-7.
7. Fiatarone MA, Marks EC, Ryan ND, Meredith CN, Lipsitz LA, Evans WJ. (1990). *High-intensity strength training in nonagenarians. Effects on skeletal muscle.* JAMA, 13;263(22): 3029-34.
8. Hoffman, M. and Payne, V.G. (1995). The effects of proprioceptive ankle disk training on healthy subjects. *JOSPT*. 21(2): 90-93.
9. Kohler JM, Flanagan SP, Whiting WC. (2010). Muscle activation patterns while lifting stable and unstable loads on stable and unstable surfaces. *Journal of Strength and Conditioning Research*, 24(2): 313-21.
10. Lord SR, Ward JA, Williams P, Anstey KJ. (1994). Physiological factors associated with falls in older community-dwelling women. *Journal of the American Geriatric Society*, 42(10), 1110-7.
11. Mattacola, C.G. and Lloyd, J.W. (1997). Effects of a 6-week strength and proprioception training program on measures of dynamic balance: a single-case design. *Journal of Athletic Training*, 32(2): 128-135.
12. McKeon, P.O. et al. (2008). Balance training improves function and postural control in those with chronic ankle instability. *Medicine and Science in Sports and Exercise*, 40(10): 1810-1819.
13. Melton LJ 3rd, Khosla S, Crowson CS, O'Connor MK, O'Fallon WM, Riggs BL. (2000). Epidemiology of sarcopenia. *Journal of the American Geriatric Society*, 48(6), 625-30.
14. Nuzzo JL, McCaulley GO, Cormie P, Cavill MJ, McBride JM. (2008). Trunk muscle activity during stability ball and free weight exercises. *Journal of Strength and Conditioning Research*. 22(1): 95-102
15. Osborne MD, Chou LS, Laskowski ER, Smith J, Kaufman KR. (2001). The effect of ankle disk training on muscle reaction time in subjects with a history of ankle sprain. *American Journal of Sports Medicine*, 29: 627–632.
16. Sternlicht E, Rugg S, Fujii LL, Tomomitsu KF, Seki MM. (2007). Electromyographic comparison of a stability ball crunch with a traditional crunch. *Journal of Strength and Conditioning Research*. 21(2): 506-9.
17. Vera-Garcia FJ, Grenier SG, McGill SM. (2000). Abdominal muscle response during curl-ups on both stable and labile surfaces. *Physical Therapy*, 80(6): 564-9.
18. Wahl MJ, Behm DG. (2008). Not all instability training devices enhance muscle activation in highly resistance-trained individuals. *Journal of Strength and Conditioning Research*. 22(4): 1360-70.
19. Wester JU, Jespersen SM, Nielsen KD, Neumann L. (1996). Wobble board training after partial sprains of the lateral ligaments of the ankle: a prospective randomized study. *JOSPT*, 23: 332–336
20. Yaggie, J.A. and Campbell, B.M. (2006). Effects of balance training on selected skills. *Journal of Strength and Conditioning Research*. 20(2): 422-428.