

Issue: 16.06 September 2006

In Search of Instability

From sand to wobble boards, unstable surfaces are everyone's newest training device. However, it's important to understand your performance goals before you start getting tipsy.

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Fifteen years ago, I first experimented with unstable surfaces, and I very quickly liked what I saw. I noticed that athletes rehabbing ankle sprains and ACL tears with unstable surfaces seemed to have better functional balance and body control. I felt that if we could incorporate what they had done in rehab into training for healthy athletes, we should see similar gains.

Initially, this was the case. I did not devote much time to this training, maybe five or 10 minutes a day, but seemed to get good returns. As often happens, I decided that more had to be better. So I began to seek out more exotic unstable surfaces—the more unstable the better. At the time, it seemed to be a great way to achieve overload.

But as I continued to experiment with the concept, I became uncomfortable with the direction I was heading. I saw that instead of making the athletes better, all the work on unstable surfaces was taking them further and further away from the performance arena. They were learning tricks, not functional movements. The exercises became an end to themselves.

Since my introduction to them, unstable surfaces have become very popular. Coaches use them in many different situations, but not always with a lot of thought behind their purpose. In this article, I hope to bring a degree of sanity—and balance—to the use of unstable surfaces.

What Is the Goal? Most of the research regarding the use of unstable surfaces comes from the rehabilitation arena. There is good evidence to suggest that these surfaces are effective for both injury prevention and rehab situations.

The November 2001 issue of the *Journal of Orthopaedic & Sports Physical*

Therapy includes a very good article on ACL injury prevention through a balance routine. High level soccer players were given a 20-minute workout, performed daily, using apparatuses like a K-board and wobble board. Of the 300 players who performed the exercises, 10 suffered ACL injuries over the next three seasons compared to 70 in the control group, which also consisted of 300 athletes.

The authors' theory was that using these two pieces of equipment produced quick ankle movements similar to those that occur on the field at the time of an ACL injury. The sensory input in terms of improved kinesthetic sense and improved proprioception was thought to help prevent the injury. The results were pretty convincing and showed a good return on the time invested using simple exercises.

Athletic trainers and physical therapists have also made great progress in using unstable surfaces for rehab. Many articles promote the use of rehab protocols that utilize unstable surfaces. The key in rehab is that the devices produce controlled instability and exercises are performed in a very systematic and progressive manner.

However, the question I want to explore is: How can unstable surfaces best be used to enhance performance? There is not much hard data in this area, and most results are basically anecdotal.

To start, let's ask ourselves why we would deviate from a flat surface in our training. What is the goal in using an unstable surface?

In most cases, we are trying to challenge the proprioceptive system and thus make it better. When the body senses a change in surface, it will self-correct to achieve appropriate positions for the movement. These rapid adjustments are based on the proprioceptive input that detects speed and stretch. The body's proprioceptors act as very sophisticated motion sensors, and it is this motion detection function that we are attempting to train by using uneven surfaces. If we can improve body awareness and spatial awareness, the result should be an athlete who has more balance and more athleticism on the field of play.

But how unstable should the surface be to challenge our athletes? An unstable surface is any surface that the body perceives as unstable. In fact, the body is sensitive to even small changes in surface. To the eye, a surface may appear stable, but if the body proprioceptively perceives it as unstable, it is.

In most sports, the ground does not move from under us. (Surfing, water

skiing, wind surfing, and skiing to a certain extent are examples of sports where the ground does move under the athlete.) The instability in a surface is very subtle, such as a slightly bumpy field. If we train our athletes on surfaces that differ too much from the normal competition surface, there is a risk of developing a skill set that is not needed. If the stability gains do not transfer to the field, it is a waste of time to develop them.

A good example is training athletes to balance while standing on a physioball. Except for a very few sports, there is no carryover. It is a discrete skill that does not translate to a sport skill. That time would be better spent doing more sport-appropriate activities.

New Thinking I'm not trying to say that unstable surface training is inherently bad. First of all, it has a definite place in injury prevention and rehab. Second, I still agree with the idea of developing proprioception through unstable surfaces. However, I would urge you to think deeply about the surface you are using and why.

When it comes to performance enhancement, the key is the application. Will the movement transfer? Is the movement sport appropriate? If it is sport appropriate, it will have some carry-over to the sport. A quick rule of thumb I use is: If the athlete has to spend undue amounts of time learning a new skill set in order to train with unstable surfaces, it is not sport appropriate.

By a new skill set, I mean skills that exaggerate movement through significantly larger amplitudes and speeds that are not similar to sport movements. And just looking similar to sport movements is not good enough. The speed and angles must be in the range that will be used on the field.

To use unstable surfaces in a way that will transfer to improved performance, a sound approach is to begin to create instability through movement itself. In many cases, the normal environment is enough. Just stepping and hopping, and jumping and sticking the landing, are two examples. Then, you might progress to using an inclined surface like a hill.

Next, consider employing a few environmental modifiers. An environmental modifier is anything that creates an increased proprioceptive demand and also transfers to the movements of the sport. So the question you must ask yourself is: What will transfer? And what will create a skill set that doesn't transfer?

Success or failure in most ground sports depends on how effectively

athletes are able to use the surface they compete and train on. The surface can give back energy or dampen force. When you consider unstable surfaces, use those that teach the athlete how to use the surface to his or her advantage.

Explore the simple and obvious before going to the complex. For example, shoes are worn to protect the foot during ground contact. Therefore, perhaps the simplest way to increase instability is to do some activities barefoot. Because of the abundance of proprioceptors in the bottom of the foot, this affords the possibility for heightened sensory input. Working barefoot will have a quick and obvious transfer.

Ready to Wobble

With an understanding of the true purpose of unstable surfaces for performance enhancement—as well as the limitations—you can start incorporating them into your workouts. In most cases, they should be placed within the body of the actual workout, probably done alongside agility work or lower-body strength training.

Let's take a look at a sampling of unstable surfaces coaches use for training:

Sand is a viable unstable surface, although it has some limitations. On the positive side, it enables big angles and aggressive movements that allow the athlete to push the edge. The primary downside is that the softness of the sand slows everything down significantly. It dampens the elastic response, which is both a plus and a minus. It is a plus because it develops good concentric strength response. It is a minus because it negates elastic response, so it is not real life.

Large pits such as high jump and pole vault pits, dampen impact and should not be used extensively. The depth of the pits virtually eliminates any elastic response, and work done in them will be dominated by concentric muscle action. Pits are good for repetitive jumping, some running in place, and some planting and cutting, but I do not use them more than twice a week for a six-week block of training. And I always follow any pit work with one or two drills on a stable surface.

Trampolines are obviously bouncy and very responsive, which is good for body awareness and control. A trampoline is a good surface to work on landing and sticking a position to create stability.

Exercise floors are very springy surfaces, which provide a very

predictable response with some give. They are a good surface to work on barefoot.

Wrestling mats are not as responsive as exercise floors, but are another good surface for barefoot work. They can also be used for multidirectional activities because of the size of the mat.

Foam pads especially those that are small and high-density, are good for static balance activities. The level of instability can also be easily controlled by using different pads.

K-boards are nice for side-to-side instability. The pivot point of the board allows movement in the frontal plane only. Use them for static balance in an athletic stance with the knees slightly bent. Build up to three to five 10-second holds without the edges of the board touching the floor.

Another good exercise is a single-leg balance with the foot parallel to the pivot point. Hold 10 seconds, switch legs, and repeat three times. Repeat movements with the foot perpendicular to the pivot point.

Wobble boards have a pivot allowing 360-degree movement, which creates rotational instability. Here are three drills to use:

- . Standing on the board with two feet, rotate the board 360 degrees clockwise touching all the edges. Repeat counterclockwise.
- . Standing on the board with two feet touching the edge of the board, move feet to 12 o'clock, 3 o'clock, 6 o'clock, and then 9 o'clock. Repeat back, reversing the order.
- ▢ Do a single-leg balance in the middle of the board. Hold 10 seconds, then switch legs. Do three 10-second holds with each leg.

BOSU balance trainers can be used like the wobble boards, with the same exercises. Using the flat side allows 360 degrees of motion as well as a tipping effect. The degree of instability is determined by how inflated the BOSU is. Most of the time it should be fairly well inflated.

Leather medicine balls are great to step on to and off of, or from one to another in a stepping stones pattern. They are very effective when combined with several BOSUs.

Balance beams allow movements forward, back, and side to side. They are also an effective platform for single-leg squats. The edges of the beam

should be beveled to create a bit more instability.

The key to using unstable surfaces is understanding that not all apparatuses are appropriate for all situations. A good craftsman knows how to effectively use the tools in the toolbox—a hammer cannot replace a screwdriver. These surfaces and apparatus are analogous to the skilled craftsman's tools for the coach. Use them sensibly, remember more is certainly not better, and be very specific about your goals.

Sidebar: **A Balanced Week** The following is a sample workout using unstable surfaces during one full week of training.

Monday **Single-squat balance:** Do a one-leg squat with focus on balance. **Balance shift:** Hold each of the following positions for 10 counts:

- . Shift from the center. The upper body should be quiet.
- . Step right shifting weight onto right leg.
- 0. Step left shifting weight onto left leg.
- . Step forward shifting weight onto right leg.
- . Step forward shifting weight onto left leg.
- . Step back shifting weight onto right leg.
- . Step back shifting weight onto left leg.

Wobble board storks (Advanced): Stand on one leg with the non-support leg bent. Hands should be out in front or overhead. Perform a single-leg squat by balancing on one leg and squatting down, proportionally bending at the ankle, knee, and hip and holding the non-supporting leg flexed with thigh parallel to the ground. Hold at the bottom position for 10 counts. Use three different positions:

- . Straight ahead (free leg pointing straight ahead).
- . Side (free leg reaching out to side with knee straight).
- . Rotation (free leg rotating at hip to face to side).

Tuesday **Wobble board rolls:** With both feet on the board, rotate clockwise touching the edges of the board. Repeat counterclockwise. **BOSU rolls:** Use the same instructions as for wobble board rolls, using a BOSU ball. **BOSU single-leg balance:** Balance on

one leg in the middle of the board.

Wednesday **Single-squat balance Balance shift Wobble board storks**

Thursday **Wobble board rolls BOSU rolls BOSU single-leg balance**

Friday **Single-squat balance Balance shift Wobble board storks**

Saturday **Wobble board rolls**