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Speed, Agility, and Quickness

Features

NSCA™

about this PUBLICATION

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Performance Training Journal

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Suzie Tuffey Riewald, PhD, NSCA-CPT

about the
AUTHOR

Suzie Tuffey Riewald received her degrees in Sport Psychology/ Exercise Science from the University of North Carolina, Greensboro. She has worked for USA Swimming as the Sport Psychology and Sport Science Director, and most recently as the Associate Director of Coaching with the USOC, where she worked with various sport National Governing Bodies (NGBs) to develop and enhance coaching education and training. Suzie currently works as a sport psychology consultant to several NGBs.

Keep Your Head in the Game

This is the third installment of a series of articles that aim to provide you with the *how to's* underlying specific mental skills. Rather than emphasize the importance of a given mental skill or concept, we look at how to use the skill to enhance your athletic performance. In the first article we discussed goal-setting; in the second article we detailed how to develop and use imagery; in this article we are going to take a look at the skill of concentration.

Get a pencil and timer before reading further. Table 1 provides a grid of numbers from 00 to 99. Your challenge is to find as many numbers as you can in sequential order starting with #15—find number 15, cross it off, find 16 and cross it off, etc. You have a minute to complete this exercise.

How did you do? It is not as easy as it initially seems as internal and external distractions and scanning strategies can impede performance. As a means of comparison, people who are able to concentrate effectively and scan well, score in the upper 20s and 30s. Did your ability to concentrate on the task at hand help your performance or were you distracted such that it hurt your performance? This is a useful exercise as it illustrates the importance of effective concentration on performance (additionally, this Concentration Grid can be used as a tool to enhance concentration—as we'll discuss later).

You have probably told yourself to "focus" at some point during practice or competition. And if not you, then a coach or teammate has surely told you to "get your head back in the game," "focus on this point," "don't focus on the score," or something similar. After all, concentration is an important mental skill. In a recent *PTJ* issue, we summarized research looking at psychological characteristics of successful versus less successful athletes (2) and, as you'll recall, better concentration and focus was a characteristic that typified successful athletes.

So, you are familiar with the term focus or concentration and realize it is a valuable skill for enhanced performance —from experience and the Concentration Grid exercise— but how can you improve your concentration abilities,

> "Immediately prior to competing, I'm focused on my breathing. I'm aware of that. I also focus on the lane. When I'm on, it is almost silent except for the referee's whistle. I'm really geared into that sound and smaller details."
>
> *1992 Olympic Team Swimmer*

especially when you know a lack of focus, or focusing on the wrong things can have a negative impact on performance? First, let's take a look at the four parts of effective concentration (1). Effective concentration entails:

1. Focusing on relevant cues—that is, selectively attending to relevant cues and disregarding irrelevant cues. This is also referred to as attentional focus.

2. Maintaining your attentional focus during practice or competition.

3. Shifting attentional focus when necessary—it is important to be able to shift one's focus as required given the situation. For example, an endurance athlete may need to be able to shift from a focus on the course to an internal focus to assess how she is handling the pace.

4. Having an awareness of the situation.

Read through the list again—what are your concentration strengths? When you have lapses in concentration, what happens and can you relate it to the above components?

From a general perspective, enhancing your concentration skills will relate to developing your abilities within to address each of these components. Following are some

tips to get you started on your way to more effective concentration:

Figure Out What is Relevant

Although it seems obvious, it is worth mentioning—to focus effectively on relevant cues, one needs to know what is relevant. That is, what should you attend to in various competitive situations? For example, figure out if it is a motivation or a distraction to look at the score; determine the specific performance cues/self-talk to focus on, that trigger a desired response; know where to place your "eyes and ears" prior to and during a repetition or event. Also, know what to look at to pick up contextual cues during the heat of competition. What should you be looking at to determine if your opponent on the other side of the tennis net is going to hit a flat or kick serve? Is the pitcher you're facing unwittingly tipping her pitches? Knowing what to look at can often times give you a competitive advantage.

It Starts In Practice

Athletes often make the mistake of waiting until competition to attempt to "click into" an effective focus. This is too late. Become aware of your focus in practice and learn what works and what hurts your training performance. Then, purposefully practice the more effective concentration strategies in training.

Practice With Distractions

It is a common practice in football to pipe in fan noise over the loudspeakers during training. This helps the athlete learn how to manage external distractions and keep their focus on relevant things. Take this same concept and apply it to yourself using common distracters in your sport.

Routines

Having a routine in practice and for competition can help you focus effectively as it provides structure and consistency to your thoughts and focus. Sometimes this can be as simple as going through the same warm up regardless of whether it is a training or competition day. It can extend to having a series of physical or mental steps you go through between points or pitches, for example.

Enhance Your Concentration "Off the Field"

In addition to working on effective concentration on the field, you can also enhance your concentration outside of the sport environment. As mentioned earlier, you can use the Concentration Grid as an exercise to develop your concentration skills. To really challenge yourself, complete the exercise a second time with music or a TV as a distraction. To work on maintaining attentional focus, pick an object (it can be related to your sport, such as a ball or racquet, or unrelated to the sport) and practice describing the object, attending to even the most intricate details. Don't just say "it's a brown ball." Instead describe things like size, shape, how it feels, what it smells like, etc. You get the idea. The level of detail with which you describe the object is related to your attentional focus. When you find your mind wandering, start over. Similarly, you can practice your ability to shift attention by adding a second or third object—purposefully shift your focus from one object to the next. Using some creativity, you can design a concentration exercise that is meaningful and relevant for you.

Lastly, Be Realistic

Appreciate that effective concentration is mentally draining. It takes mental energy to keep your thoughts focused in a relevant, controllable, beneficial direction. So, be aware and practice, practice, practice. ■

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2. Williams, J. & Krane, V. (2001). Psychological characteristics of peak performance. In J. Williams (Ed.), Applied sport psychology: Personal growth to peak performance. Mountain View, CA: Mayfield.

Table 1. Concentration Grid

38	28	51	09	71	16	72	82	63	04
10	32	44	62	21	97	18	40	90	52
25	85	57	46	66	35	78	96	11	69
74	03	75	93	00	56	22	67	49	20
43	13	23	33	79	95	76	05	59	45
65	86	50	19	41	07	37	83	29	61
58	02	34	77	27	55	92	48	01	89
15	47	73	87	39	68	12	53	84	70
24	64	81	06	91	60	88	30	98	14
99	31	42	94	17	54	80	26	36	08

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Does Uphill and Downhill Sprint Training Improve Running Performance?

There are many techniques which have been used in an attempt to alter stride length and frequencies in order to improve sprint performance. One classic method of attempting to alter these components is the use of running on sloped surfaces. While some scientific studies have been performed looking at the performance of uphill and downhill training separately, very little research has explored the use of both methods as part of a training plan. Recently, researchers from The University of Athens and Leeds Metropolitan University examined the effects of eight weeks of training using uphill and downhill methods. Fifty-four college-aged students were divided into one of three groups. Eighteen subjects were placed in the uphill and downhill training (UDT) group, eighteen subjects were placed in a horizontal only group (H), and another eighteen subjects were placed into a no training control group (C). Both the H and UDT groups performed a 20 minute warm-up followed by six sets of 80 m sprints performed at maximal intensity three times per week for the first four weeks of the training program. During the second four weeks of the training program the number of sprints was progressively increased by one sprint each week culminating with 10 sprints during the 8th week of training. Throughout the study, 10 minutes of recovery was allotted between each sprint. The UDT group performed all of their sprints on a custom made platform which had 20-m of horizontal running followed by 20 m of uphill running (3-degree incline), 10-m horizontal running, 20 m of downhill running (3 degrees), and 10-m of horizontal running. The H group performed all sprints on an 80 m horizontal track and the C group performed no structured training. All subjects performed a 35 m sprint test before and after the eight weeks of training. After the eight weeks of training, it was determined that the UDT group significantly ($p < 0.01$) improved step rate (4.3%), contact time (-5.1%), maximal running speed (4.3%), and step time (-3.9%). The H training group demonstrated smaller improvements in step rate (1.2 %, $p < 0.01$), contact time (-1.7%, $p < 0.01$), maximal running speed (1.7%, $p < 0.01$), and step time (-1.2%, $p < 0.01$). The results of the study suggest that a combination of horizontal, uphill, and downhill running results in significant improvements to running performance and specific kinematic variables associated with running. Based upon this data strength and conditioning professionals should consider including uphill and downhill running protocols when attempting to develop maximal speed.

Paradisis, GP, Bissas, A, and Cooke, CB. Combined uphill and downhill sprint running training is more efficacious than horizontal. *Int J Sports Physiol Perform* 4:229 – 243. 2009.

Does the Sequential Development of Specific Fitness Components in Phasic Pattern Result in Physiological Improvements in Elite Athletes?

The sequential development of specific fitness aspects is an often overlooked aspect of a periodized training plan. In sports which require the development of multiple fitness and performance characteristics such as strength and endurance, the actual sequential order of training events may be of particular importance. Recently a 12-week periodized training program which sequentially developed and prioritized specific physical fitness characteristics across three mesocycles was investigated. The first mesocycle lasted five weeks and contained 10-15 high volume endurance training sessions per week totaling 52.7 ± 1 hour for the five weeks. The resistance training program contained a total of 15 ± 0.8 hours of training over the five weeks which targeted the development of strength endurance. During the second mesocycle, which also lasted five weeks, maximal aerobic power (49.5 ± 1.5 h for the mesocycle) and maximal strength (13.2 ± 0.7 h for the mesocycle) were targeted as the main training factors. In the third mesocycle, which lasted only two weeks, specific kayak endurance racing (21.5 ± 0.6 hours per 2 weeks) and maximal power (8.4 ± 0.5 h per two weeks) were the focus. Testing which included a progressive kayak performance test, strength tests (bench press), and anthropometrics (girth, skinfolds etc) were examined before the 12 weeks of training, at week 5, 10, and after the 12 weeks. When examining markers of performance it was determined that significant gains were noted between the pre and post

12-week testing periods. Specifically, maximal aerobic power increased by 9.5%, paddling speed at maximal aerobic power increased by 6.2%, prone bench press pull increased by 5.3%, and bench press increased by 4.2%. The results of this study clearly demonstrated that sequencing training and integrating training factors can facilitate the concurrent development of both strength and endurance characteristics in elite athletes. Further research is needed in order to determine the optimal sequencing patterns that can be used in periodized models.

Garcia-Pallares, J, Sanchez-Medina, L, Carrasco, L, Diaz, A, and Izquierdo, M. Endurance and neuromuscular changes in world-class level kayakers during a periodized training cycle. *Eur J Appl Physiol* 106:629 – 638. 2009.

High Intensity Interval Training Improves Insulin Action in Only Two Weeks

It is commonly accepted that traditional aerobic exercise is an excellent method for reducing cardiovascular disease and metabolic disease risk factors. One potential limitation of aerobic exercise is the time commitment that is involved with this type of training. One solution to the time commitment issue is to perform low-volume high intensity interval training. This type of training has been shown to be a very powerful training stimulus that produces marked improvement in aerobic function and cardiovascular health in a short period of time. Recently, the effects of high-intensity interval training have been shown to improve metabolic risk factors in sedentary populations. Sixteen young men performed two weeks of high-intensity interval training which consisted of six fifteen minute sessions that contained four – six all out 30-second cycling bouts. This exercise protocol expended only 250kcals of energy each week. Prior to the two week training period subjects performed a 250kj self-paced cycling time trial and an oral glucose tolerance test, which measured the subjects glucose, insulin, and NEFA (non-esterfied fatty acid) response to a 75g glucose load. After two weeks of interval training subjects demonstrated a 23% improvement in insulin sensitivity, a 6% increase in cycling performance, and reduced plasma NEFA concentration. There was a 37% reduction in insulin release in response to 75g of glucose ingested during the oral glucose tolerance test. Taken collectively, the effects of high intensity interval training on insulin action appear to suggest this method of training is valuable for reducing metabolic risk factors. While the results of this study are impressive, it is important to note more research needs to be conducted in this area to determine the long term benefits of this type of training. ■

Babraj, JA, Vollaard, NB, Keast, C, Guppy, FM, Cottrell, G, and Timmons, JA. Extremely short duration high intensity interval training substantially improves insulin action in young healthy males. *BMC Endocr Disord* 9:3. 2009.

Balancing Power and Speed in Sprinting

Juan Gonzalez, PhD, CSCS and Danielle Gaitan

about the AUTHOR

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Developing Speed for Sprinting

If you consider what the components for speed are, they include firing frequency and muscle fiber recruitment. Contemporary training programs work on increasing firing frequency through foot or leg drills or through repetitive running for set distances (1). Muscle fiber recruitment typically is done in the weight room with explosive lifts. However, explosive lifts require proper training and supervision to avoid injury. Immediate improvements in speed usually come from neuromuscular adaptations. Neuromuscular adaptations enhance firing frequency and muscle requirement. A safer method of recruiting muscle fibers for the development of speed includes the addition of more balance work into the conditioning program.

If you look at most movement patterns of the lower body, at one point during the movement the body must support itself on one leg. However, we do not ask athletes to condition that way. We usually get on a weight machine and use two limbs; thus, never really working on the weaker limb. Each time the weaker limb steps on the ground by itself, it slows you down because, for a split fraction of a second, it must adjust appropriately during the running stride.

Balance work takes advantage of proprioception, the ability of muscle to respond to abnormal positions and situations. Proprioception provides a sense of joint position and movement.

Doing balance work in conjunction with explosive power movements in your sprint training provides an opportunity to recruit and train additional muscle fibers. If done properly, the end result is improved speed. The following program will illustrate how to incorporate the right blend of balance and power into the sprinting program.

Single Leg Backbridge (Figure 1)

Lie with your back on the ball and with one leg firmly in contact with the ground. Make sure that the leg that is on the ground is at an angle greater than 90 degrees and your foot is pointed straight ahead. Raise the other leg off the ground and maintain this position for three to four sets of 30 to 45 seconds depending on the level of leg imbalance.

Balance on Wobble Board (Figure 2)

Balance on each leg on the wobble board. Repeat for three to four sets of 30 to 45 seconds on each leg. Ultimately build to 60 seconds on each leg for three to four sets.

Balance on Wobble Board with Weighted Ball (Figure 3)

Once balance work on a wobble board has been mastered, the next level of progression is to hold on to a weighted jelly ball or medicine ball. Repeat for three to four sets of 30 to 45 seconds on each leg.

Bulgarian Step Ups (Figure 4)

With a 35lb universal bar on your back (trapezius), place the right foot on a box. Make certain that the effort is placed on the foot that is on the box to step up. Step up on the box with the trailing leg. Do three to four sets of six repetitions on each leg.

Jelly Ball Kick Ups (Figure 5)

Use a three to four pound jelly ball for beginning training programs to allow for safe progressions to a heavier weighted jelly ball. Place the ball between the feet. Squeeze the ball with the feet and drive down during the preparation phase. Next, drive up while kicking the jelly ball up in the air. Repeat for three to four sets of six to ten repetitions.

Figure 1. Single Leg Backbridge

Figure 2. Balance on Wobble Board

Figure 3. Balance on Wobble Board with Weighted Ball

Split Squat Jump (Figure 6)

Place one leg in front of the other in a split position. Drive down with the legs and arms and explode up while maintaining the split squat position. Landing should be done in the same position as the drive phase. Do three to four sets of six jumps on each leg.

L Hops (Figure 7)

Place one leg on a table making the hip angle about 90 degrees to the floor. Make sure that you have a soft landing mat or floor while performing these routines. Drive down on one leg and explosively drive up on the same leg. Do three to four sets of six to eight repetitions on each leg.

Box Step Ups (Figure 8)

Place one foot on a box and step up on that foot while driving the other leg up. Make sure to maintain the same arm action that you would in the running motion. Do three to four sets of six to eight repetitions on each leg.

Quick Foot Step Ups (Figure 9)

Place an aerobic step on a secure floor to prevent movement of the box. On command, the athlete will step onto the box with the leg/foot that they normally drive off with the blocks. The athlete will step on and off the box as fast as possible for 30 seconds. Make sure to maintain the proper sequence of arm movements in the running motion.

Stadium Hops (Figure 10)

Use aluminum stadium steps to do this exercise, as it will provide a much softer landing. Place the hands behind the head and squat, then explosively drive up to the next step. Perform this for about 10 rows and walk down and repeat the same procedure three to four times.

Single Leg Hops (Figure 11)

Find an area that is soft and level if you are outside. Line up six cones and practice jumping over one or two to line up the appropriate distance between cones. Take a running start at the cones and then single leg hop over each one. Perform this drill three to four times on each leg.

Granny Throws (Figure 12)

Use a 16 pound jelly ball or medicine ball. Squat down and drive straight up while tossing the ball as explosively as you can. Perform this drill six to eight times.

Inclined Sprints

Find an inclined area that is no more than four to five percent grade. The distance needed should be about 25 to 35 meters in length. On command sprint for a set distance of 25 to 35 meters. Perform this sprint six to eight times.

There are many ways to train for speed such as tubing, parachutes, and shoulder harnesses. (2,3). The isolated balance work and explosive routines done by each leg as depicted in this article will target those individual muscle fibers not normally conditioned by traditional sprint training. Incorporating balance and explosive movement patterns, as it relates to sprinting will develop the sprinter into a faster athlete. By following this program during the pre-season, the sprinter will have an excellent base of functional and explosive strength training as it relates to sprinting. The simplicity of this training program is that it does not require an expensive weight room to get results. ■

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3. Letzelter, M., G. Sauerwein, and Burger R. Resistance runs in speed development. *Modern Athlete and Coach* 33:7 – 12. 1995.

Figure 4. Bulgarian Step Ups

Figure 5. Jelly Ball Kick Ups

Figure 6. Split Squat Jump

Figure 7. L Hops

Figure 8. Box Step Ups

Figure 9. Quick Foot Step Ups

Figure 10. Stadium Hops

Figure 11. Single Leg Hops

Figure 12. Granny Throws

about the AUTHOR

Travis Brown has led a career as a Strength & Conditioning Coach for over 12 years in Atlanta, GA, and at the University of Tennessee, Knoxville. He currently works for Speed to Win, which provides a pro level speed and agility training program, training progressions, and performance tracking software to colleges and high schools. He has trained, or played next to, over 90 NFL starters, 12 Pro-Bowlers & 1st-round NFL draft picks. During his career, he has trained a number of athletes ranging from youth to elite professionals, which include several MLB, NBA and two Olympic medal winners.

Speed and Agility: What Defines Them and How to Train for Both

Travis Brown, MS, CSCS,*D

Speed: Definition and How to Develop It

Speed is simply stride length (SL) x stride frequency (SF), or how far you step by how quick you step. No matter what height, weight or size an athlete is, to improve speed one must maximize each step for stride length and stride frequency. In order to do so, an athlete must be trained with different drills specific to each.

We can accomplish this by working through five different progressions or levels, which is what we use in the "Speed To Win" curriculum. The five levels of progression are as follows:

- Pre-Conditioning Aerobic Base
- Build Sprint Form & Anaerobic Base
- Develop Stride Length
- Develop Stride Frequency
- Addition of Power & Acceleration

In the Pre-Conditioning level, the goal is to get in aerobic shape, or to develop an aerobic base so sprinting can be taught to the athlete. We can accomplish this by doing specific dynamic warm-up drills such as high-knee grabs, high-knee walks, high knees, ankle-quad grabs (Figure 1), butt-kick walks, butt kicks, and more. We also incorporate long bungee cords while doing backpedals and sprints for about ten yards. The athlete should also develop his/her aerobic base by jogging short and long distances.

In the next level, we focus on building sprint form and anaerobic conditioning. We implement this by increasing flexibility and form through the use of speed warm-up and various stride-strengthening drills. We also incorporate heavy sled pulls. This forces the athlete to stay low when coming out of their stance and to drive the knee high and increase stride length, thus working on sprint form.

During the next level, focus is on developing stride length. We continue to apply the base dynamic warm-up exercises, with the addition of a high-knee grab, toe touch-skip, front lunge and press. This will help to increase flexibility and recruitment of the muscles which will help with the increase in stride length. And perhaps one of the more important components in increasing stride length is to implement the use of short bungee cords to work hip flexor (lying on your back) and hamstrings (laying face down).

While developing stride frequency, in the next level, we simply learn how to turnover an adequate stride length. We incorporate more advanced dynamic warm-up drills such as 1-2-3 skip with a high knee grab and a toe touch and flatten (Figures 2 – 6). A toe touch and front leg kick (Figures 7 – 8) would be another ideal warm-up drill to incorporate. This is also where the athlete learns how to sprint with increased stride length and stride frequency.

With the addition of power and acceleration, we apply sled pulls, the mule cords and push up starts. It is during this phase the athlete learns that in order to accelerate and use power, a forward lean must be created. Many times coaches focus on this phase, before developing most or any of the other phases or levels. The sled pulls that were used in the previous levels are now much lighter. This forces the athlete to practice accelerating zero to ten yards, transitioning to top speed between ten and twenty yards, and continuing to sprint at top speed for another ten yards. It is a thirty yard sprint working on forty yard dash technique. We also concentrate on the mule cords with a partner. As one athlete is pulling against their partner, which is working on deceleration, the other partner is working on acceleration with resistance. Then they switch after twenty yards.

In conclusion, it's important to remember that all of the levels overlap somewhat. For example, a simple high knee drill will and can develop aerobic conditioning, sprint form, and stride length. A simple butt kick drill can do the same, and if the heel is snapped quickly, stride frequency will be improved.

Agility: Definition and How to Develop It

Agility can be simply defined as change of direction. In other words, quickness is controlled deceleration. In order to improve agility, an athlete must increase acceleration, increase deceleration, and then increase change of direction. Too many times we see an increase in acceleration targeted without an additional effort to increase deceleration. This is a major mistake.

Let us think about the heavy/fast athlete. In sports today, we see a number of non-contact injuries, from torn ACLs to sprained ankles and sprained knees. In today's world, athletes are like a high performance sports car. Very fast and agile, able to turn corners at high speeds and stop on a dime. However, we are adding more and more muscle and body mass to the same frame that has supreme acceleration. It's like increasing the horsepower on that same sports car, without improving the brakes and framework of the car. And much like an athlete who tries to stop on a dime after accelerating, and ends up tearing their knee/ankle, the same would happen to the sports car. When attempting to stop, the body would tear right off the frame.

We can avoid this by working through five different levels of progression, and ensuring deceleration is stressed as much as acceleration. The five levels of development are as follows:

- Pre-Conditioning Agility
- Improve Footwork and Deceleration Strength
- Foot Work Patterns—Learn How to Accelerate and Decelerate
- Change of Direction with Conditioning Drills
- Develop Explosive Ability to Change Direction

In the Pre-Conditioning level, you implement various lateral movement conditioning drills, such as over-under walks, cariocas, side bounding, etc. In this level athletes must learn how to stay low, turn their hips and move laterally. This is the base of agility and must be set as the foundation.

In the next level, we focus on improving footwork and deceleration strength. While you are working on improving agility, you are also working on improving speed. Therefore, a lot of agility work at the beginning is teaching the body to stop. It is during this level that we implement proper footwork at change of direction spots with the ladder. The athlete works on this by doing a series of basic ladder drills, such as straight one foot in every hole, side two feet in every hole, one-two-three cuts (a.k.a. Icky Shuffle, Figures 9 – 12) and one-two-three-four in and outs. We also incorporate the same ladder drills with low hurdles. This forces the athlete to change direction around an obstacle (the hurdle). And finally, we increase strength at change of direction spots with change of direction strengtheners, which is simply starting from a lunge position sprinting forward, stopping at five-yards, and backpedaling back to the beginning and then starting over.

For the next level, we focus on footwork patterns and learning how to accelerate and decelerate. The athlete accomplishes this by implementing straight ahead and lateral stop and go drills. This can be accomplished through five-yard sprints and stopping (going forward, as well as moving laterally). And to work on footwork patterns, we add in more advanced ladder drills, such as two feet in every hole going forward, one foot in every hole moving laterally, one-two-three spin cuts (Figures 13 – 17) and one-two-three-four in and out of the ladder moving laterally. These would be in addition to the other ladder drills in the previous level, therefore, increasing intensity. We also incorporate the same ladder drills with the combination of low and high hurdles, thus increasing intensity.

In the fourth level, we work on changing direction with conditioning drills. It is during this level that we implement even more advanced dynamic warm-up drills, such as opposite elbow to ankle lunge and toe touch-hand walk-hurdler stretch (Figures 18 – 21). Remember, our lateral movement drills, change of direction strengtheners, and learning how to start and stop are what teach us how to change direction. We also add in cone drills, such as the W drill, outside foot cuts and shuffle-sprint-shuffle. Now athletes are ready to condition themselves by actually changing direction.

In the final phase, we develop explosive ability to change direction. Here is where the athlete should be able to put together everything for agility (acceleration, deceleration, and change of direction). This can be done by practicing the five-ten-five pro agility shuttle and the three-cone drills. We also incorporate more advanced cone drills, such as backpedal-sprints and spin cuts.

Keep in mind, just as with the speed levels, the agility levels do sometimes overlap. Many of the base dynamic warm-up drills, are key components in the foundation for becoming more athletic. This is thoroughly accomplished in both "Speed to Win" curriculums, by overlapping speed, agility, and explosion to become a more explosive athlete that is extremely quick. ■

Figure 1. Ankle Quad Grab

Figures 2. 1-2-3 Skip to Touch Flatten

Figure 3. 1-2-3 Skip to Touch Flatten

Figure 4. 1-2-3 Skip to Touch Flatten

Figure 5. 1-2-3 Skip to Touch Flatten

Figure 6. 1-2-3 Skip to Touch Flatten

Figure 7. Toe Touch

Figure 8. Front Leg Kick

Figure 9. 1-2-3 Cuts

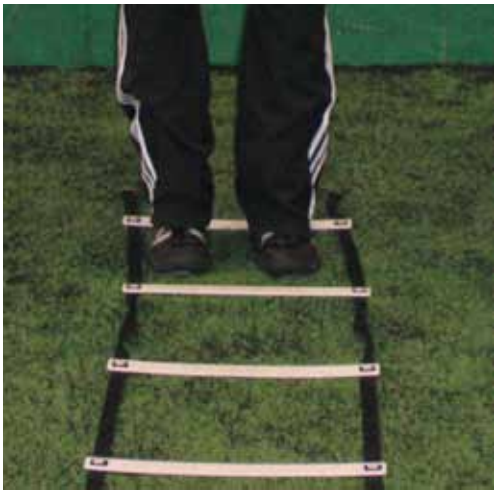

Figure 10. 1-2-3 Cuts

Figure 11. 1-2-3 Cuts

Figure 12. 1-2-3 Cuts

Figure 13.. 1-2-3 Spin Cuts

Figure 14. 1-2-3 Spin Cuts

Figure 15. 1-2-3 Spin Cuts

Figure 16. 1-2-3 Spin Cuts

Figure 17. 1-2-3 Spin Cuts

Figure 18. Toe-Touch Hurdler Stretch

Figure 19. Toe-Touch Hurdler Stretch

Figure 20. Toe-Touch Hurdler Stretch

Figure 21. Toe-Touch Hurdler Stretch

Kyle Brown, CSCS

Speed, Agility, and Quickness Training: No Pain All Gain

about the **AUTHOR**

Kyle Brown is a health and fitness expert whose portfolio includes everything from leading workshops for Fortune 500 companies and publishing nutrition articles in top ranked fitness journals, to training celebrity clientele—from pro athletes to CEOs to multiplatinum recording artists. Kyle's unique approach to health and fitness emphasizes nutrition and supplementation as the foundation for optimal wellness. After playing water polo for Indiana University, as well as in London, Kyle became involved in bodybuilding and fitness for sport specific training. Kyle is the creator and Chief Operating Officer for FIT 365—Complete Nutritional Shake (www.fit365.com).

Mindset is one of the most important factors to long-term success in any exercise protocol in the gym. When an athlete enters the gym for a typical strength training workout, his/her expectations are typically to train the muscles to fatigue and in most cases gauge the success of that workout on muscle soreness, albeit right or wrong, that perception is reality. With strength training, this muscle soreness is a result of microtears in the muscle fibers, which creates DOMS or delayed onset muscles soreness (2). Yet with speed, agility, and quickness training, the muscles are not undergoing the same time under tension as resistance training. On the contrary, speed, agility, and quickness training focus on challenging the central nervous system and creating a better mind/muscle connection. Therefore, the change in outcome requires a change in the athlete's mindset.

Speed, agility, and quickness training are all interrelated as they fall under the category of neuromuscular training. Neuromuscular training or proprioceptive training is designed to create a better body awareness, balance, and coordination in order to increase reaction time and effectiveness. No matter how skilled you are at a particular sport, you are at a strong disadvantage if you are slower than your competition.

Many athletes confuse quickness and speed. Quickness refers to explosive acceleration from a stationary position (3). Speed is the ability to reach a high velocity of movement in whatever mode of locomotion- running, cycling, skating, swimming, etc (1). Agility is the ability to quickly change directions. Quickness, agility, and speed training improve an athlete's ability to perform sport-specific skills.

When performing any type of neuromuscular training, the focus is on the quality not the number of repetitions and the set is complete when proper exercise technique is compromised due to fatigue. You also want to stay relaxed and loose, like a seasoned MMA fighter or boxer who enters the ring looking as loose as someone who just had a massage. Practice at 100% speed but 90 percent effort.

Sample Gym Exercises

Depth jumps

Stand on top of a box, and jump to the ground off of it, absorbing the impact as you bend your knees into a squat position. Upon hitting the ground, immediately jump as high as possible.

Single Leg Lateral Jumps onto Bench

Stand to the side of the bench on one leg and jump laterally onto the bench, landing on the same foot.

Tucks

Squat down to 90 degrees and explode vertically as you bring your knees up to your chest at the top of the jump. As soon as your feet connect with the ground, immediately jump back up into another repetition.

Box Drop Into a Sprint

Stand on top of a platform and step off the platform. As soon as you hit the ground, immediately explode into a full sprint for just a few steps.

Make sure you are focusing on results, not muscle soreness or burn out. When designing and evaluating the effectiveness of any speed, agility, and quickness program, focus on quantifiable measurements like decreasing the amount of time it takes to perform a certain number of repetitions, increase the number of repetitions performed in a particular time, or decreasing your reaction time to a particular sport-specific stimulus. If your goals are weight-loss related and you decide to incorporate speed, agility, and quickness training into your strength training regime, realize that your body will change as it must adapt to any stress you put upon it, including getting leaner and more conditioned. ■

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Top Sport Nutrition Myths

The field of sports nutrition is filled with myths that people follow blindly. This articles looks at the top sports nutrition myths, and what science has to say about them.

Myth: The more protein I eat, the better.

Truth: While protein is necessary to support increased protein oxidation during endurance training as well as muscle growth for athletes participating in strength training activities, there is insufficient evidence to support the notion that "the more I exercise, the more protein I need." Athletes should consume between 1.2 – 1.8 grams per kg of body weight or 10 – 35% of total calories (4,7,8).

Myth: It is not possible to drink too much water.

Truth: Headache, vomiting, swollen hands and feet, confusion edema, respiratory arrest and even death can occur in athletes who drink too much water. (7) Hyponatremia, low sodium in the blood stream, is more likely to occur in smaller, less lean individuals who run slowly, sweat less, and drink water (as opposed to fluids with electrolytes) before, during, and after exercise. (7) Weigh yourself before and after a "typical" exercise session to make sure you have not put on weight (which is a sign that you're drinking too much).

Myth: An eight-ounce serving is the right amount of fluid to drink.

Truth: There is a large range in sweat rates and total sweat losses of individuals between and within activities making individual recommendations difficult (7). Individuals should strive to consume between 72 ounces and 100 ounces for men, and let thirst be their guide according to the Institute of Medicine's recent report on Dietary Reference Intakes (5).

Myth: All athletes need supplements.

Truth: According to the joint ACSM / ADA position statement "…no vitamin and mineral supplements are required if an athlete is consuming adequate energy from a variety of foods to maintain body weight." Athletes who are consuming too few calories (such as in dieting), is ill, recovering from injury or has a specific medical / nutritional reason to supplement, may benefit from a single supplement to correct that specific condition (6). Always remember, food first, supplement if needed. Speak to an MD or RD about your specific situation.

Myth: Vitamin C will prevent me from getting sick during my training season.

Truth: While vitamin C has been shown to lessen the symptoms and severity of a cold, research to date does not show that vitamin C supplements help individuals ward off colds (3). The best method to avoid getting sick is regular hand washing and a healthy diet. Vitamin C does play a role in respiratory defense mechanisms, so taking in additional vitamin C when you first feel a cold coming on may help.

Myth: Diluting sport drinks is a good idea to reduce my calorie intake.

Truth: Sport drinks are designed to provide a 6 – 8% carbohydrate solution and a reference amount of electrolytes to replace both fluids and electrolytes for athletes who lose these thru sweat. For exercises lasting 60 minutes or longer, taking in a sport drink, without diluting it is appropriate for optimal hydration (6).

Myth: If I'm thin, I don't need to worry about what I eat.

Truth: Low energy intake compromises performance and negates the benefits of training. With a hypocaloric diet, fat and lean tissue will be used for fuel by the body leading the loss of strength and endurance, as well as compromised immune, endocrine, and musculoskeletal function. A poor nutrient intake, may also result in metabolic dysfunctions associated with nutrient deficiencies as well as a lowered resting metabolic rate (RMR) (6).

Myth: I need to watch my weight because my BMI is too high.

Truth: Trained athletes typically have more skeletal muscle and less body fat than sedentary individuals. Therefore, BMI is not an appropriate disease risk screening tool for athletes (2). The Centers for Disease Control and Prevention (CDC) recommends that athletes use methods other than BMI to assess body composition (1). Waist circumference is a good indicator of risk, as abdominal fat is a strong predictor of obesity related diseases (1). The CDC also recommends using Bioelectric Impedance (BIA), underwater weighing, or Dual-Energy X-Ray Absorptiometry (DXA) to determine body fat percentage (1).

Myth: Eliminating carbs will help me lose weight.

Truth: While taking in fewer calories than your body requires (thru a decrease in any macronutrient—carbs, protein or fats) will lead to weight loss, eliminating (or severely restricting) carbohydrates can lead to fatigue and poor performance as carbohydrates fuel your working muscles (even during high intensity activities such as strength training) (4, 8). According to the Institute of Medicine, individuals should consume between 45 – 65% of total calories from carbohydrates (4, 8), with athletes requiring the higher end of that recommendation (6).

The bottom line is do not believe everything you hear. Always consider the source and check to make sure your information comes from credible sources such as nationally recognized medical and research organizations. ■

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Reducing Tendon Injury Risk in Athletes

Skeletal muscles, and by extension their tendons, are responsible for human motion. Tendons serve two functions in sports: to facilitate movement or joint stability by transmitting forces from a muscle to a bone and to store energy for subsequent explosive movements (as in the case of plyometrics; the series elastic component stores elastic energy in response to a rapid eccentric stretch of the muscle).

Tendons have the ability to withstand significant physiologic loads. For example, during the pitching motion, the pitcher's shoulder rotates up to 7000 degrees per second with 400 newtons (N) of posterior shear forces, 300 N of inferior shear forces, and 1000 N of compressive forces experienced at the joint during the deceleration phase (3). An athlete who experiences supraphysiologic stress, like the aforementioned, may be at risk of developing an acute or chronic tendon injury.

Injury to a tendon may significantly impair an athlete's functional ability. One's experience after a tendon injury may range in severity from minor pain with minimal functional loss to severe pain with prolonged or indefinite functional loss. Tendon injuries may be slow to recover or, in a worst case scenario, require surgery. The inclusion of specific exercises may help to reduce one's risk of developing a tendon injury.

Eccentric and Plyometric Exercises

Tendon injuries occur in response to either a traumatic supraphysiologic overload to the tendon or to repeated subphysiologic stresses over time. Current evidence is suggesting that eccentric training programs are helping to reduce pain and restore function in athletes with chronic tendon injuries (even in those who have been awaiting surgery) (1,2,4,5).

The Supraspinatus tendon (shoulder), the Patella tendon (knee), and the Achilles tendon (ankle) are particularly prone to injury. Who is at risk for these types of injuries? Baseball pitchers and other overhead throwing athletes risk injury to the supraspinatus or the other rotator cuff tendons (3). Basketball and volleyball players are at risk for injury to the patella tendon (2,5). Runners and older, weekend warrior basketball players risk injury to the Achilles tendon (4). Including eccentric and plyometric exercises (which contain an eccentric movement component) may help to reduce injury risk and should be incorporated into one's training program.

Table 1 presents a few examples of exercises that could be included in one's training program. It is recommended that an athlete train under the supervision of a Certified Strength and Conditioning Specialist® (CSCS®). The CSCS will be able to develop a complete periodized training program that will maximize one's performance and reduce one's risk of injury.

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Table 1. Tendons at Risk for Injury and Exercises That May Help Reduce the Risk of Injury.

Body Region	Tendon	Exercises
Shoulder	Supraspinatus tendon	1. Scaption Exercise with Arms in External Rotation 2. One Arm Physioball Throws to a Rebounder
Knee	Patella tendon	1. One-legged squat 2. Lunges
Ankle	Achilles tendon	1. Eccentric heel raises

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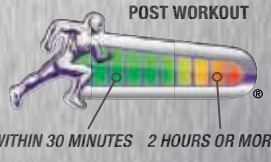

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