

Speed training with Distance Runners

6 Reasons Why All Athletes Should Sprint

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1. **Specificity.** To run fast you need to run fast. Although some of these athletes may never accelerate or sprint 100% maximally in their event or sport, in many cases they are required to run fast. This could be either an explosive first step to position yourself in volleyball, a high jump approach run with 9 m/sec speed or the “long sprint” that is the 800m.
2. **Sprinting develops the athletic muscles.** Sprinting is one of the most powerful activities a person is capable of and it is something that anyone can do. It forces the athlete to recruit and produce contractile velocities in the “athletic muscles” (hip and knee extensors) at speeds and eccentric loads that would be nearly impossible to achieve with any other training activity. This has great potential to improve athleticism across a very broad spectrum of movements and intensities outside of actual sprinting.
3. **Sprinting provides a neuromuscular overload.** Sprinting can provide an overload stimulus on the neuromuscular system that will improve rate coding, contractile velocities, efficiency of recruitment and relaxation of agonist / antagonist muscle groups. It can also help to reset the thresholds on the central nervous system “governors” (that every person is born with as a protective mechanism) that limit performance in high intensity activities.
4. **Increasing speed increases speed reserve.** Because sprint training will make you a faster sprinter it will allow an athlete to run with lower energy expenditure at lower velocities. This means that even if the athlete’s sport or event rarely taps in to maximal speed (like endurance races, soccer, basketball, high jump, etc) the athlete will be able to run the necessary speeds to compete in their event at a lower % of their maximal speed. This in turn permits greater energy conservation and efficiency.
5. **Enhances control of subsequent acyclic activities.** Closely related to the previous point, enhanced maximal speed will allow an athlete to perform acyclic activities at the necessary velocities with greater control. Actions like a hard lateral cut, kicking a ball, or setting up for a takeoff at a given velocity will be easier if they can be performed at a speed that is considerably less than an athlete’s absolute maximum.
6. **Sprinting improves running economy.** This is especially important for any athlete competing in a sport where there is an endurance component to the running that they must do. Sprinting will improve an athlete’s running economy. With improved running economy they can run at the same speed with less Oxygen consumption or run faster with the same Oxygen consumption.

General Benefits of sprint training

(1) Improved speed reserve

Scott Christensen: "ASR is defined as the difference between an athlete's absolute maximum velocity and their maximum aerobic speed ($vV02\text{max}$)."

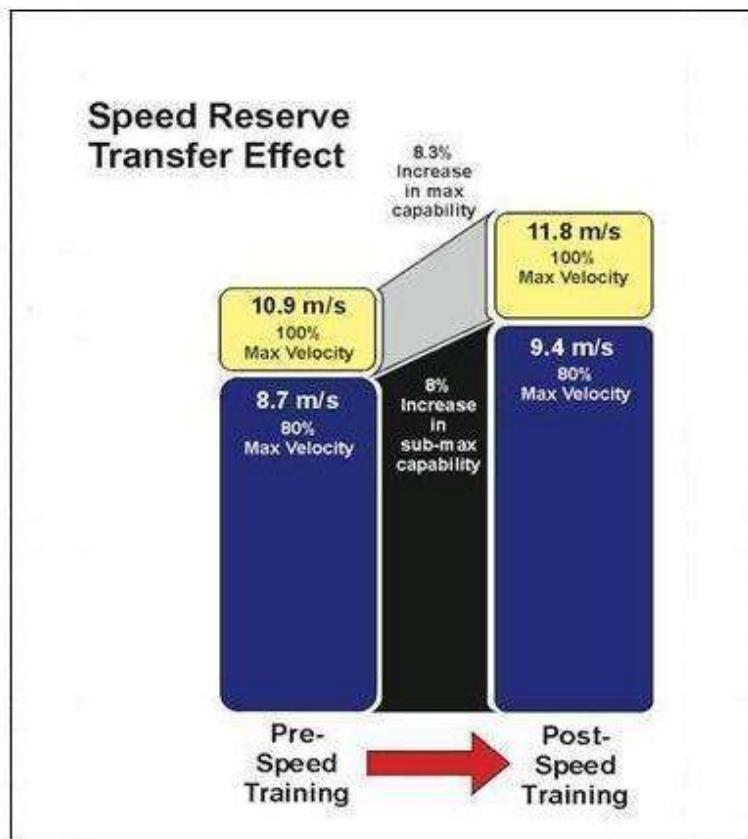


Figure 2. The ASR model predicts that as maximal velocity increases, so will sub-maximal velocity at $vV02\text{max}$, and at nearly the same percentage improvement (Derek Hansen 2014).

(2) Injury resistance

Jeff Boelé: "Many neuromuscular exercises employ large ranges of motions and high intensities. The combination of these two things allows for a varied stimulus on muscles. Stressing the body in these different ways from time to time can help prevent overuse injuries."

(3) Improved movement patterns

The various drills and exercises associated with incorporating sprint training into practice allows athletes an opportunity to focus on their form and work on form-related issues. It's much easier for younger athletes to focus on proper form while running over shorter distances.

Speed Training definitions

Speed Training	Energy System	Rest guidelines
Speed (0-7 sec @ 95-100% intensity)** E.g. 40-60m sprints, fly-10s, fly-30s	Alactic	1-2 min per sec of activity
Speed Endurance (7-15 sec @ 95-100% intensity) E.g. 80-100m sprints	Anaerobic-Alactic	1-2 min per sec of activity
Specific Endurance I (15-45 sec @ 95-100% intensity) E.g. 150-300m sprints	Anaerobic-Lactic	0.5-1.5 min per sec of activity
Specific Endurance II (45-90 sec @ 95-100% intensity) E.g. 300-500m sprints, 600m time trial	Anaerobic-Lactic	0.5-1.5 min per sec of activity
Special Endurance (7-90 sec @ 90-100% intensity) E.g., split 300s, split 400s, pairs of 300s	Anaerobic-Lactic	Incomplete recovery within sets

** shorter sprint distances work on acceleration, longer sprint distances work on absolute speed

Neural training vs Metabolic training

Metabolic training involves the contraction of muscle as that muscle synthesizes ATP (through an aerobic or anaerobic process)

- Muscular (metabolic training) fatigue occurs as muscle contractions become more difficult for a given neural signal
- Metabolic training includes most types of distance training (long run, recovery run, tempo runs, interval workouts)

Neural training involves the transmission of electrical impulses to the muscles via the CNS

- Neural fatigue occurs when neural signals (impulses) to the muscles are inhibited
- Neural training includes explosive activities like sprinting, jumping/plyometrics, weight-training

The higher the intensity and greater coordination required, the higher the CNS demand.

How we incorporate speed training into practice

Note: all efforts are at 95-100%

Workout examples from our practices

Speed Training	Examples	Recovery
Speed		
Fast 40s	2 x 40m @ 100%	slow walk back to start
30-60m sprints	(1 x 30m + 1 x 60m) @ 95-100%	
60m sprints	2 x 60m @ 95-100%	slow walk back to start
Speed Endurance		
90m sprints	1 x 90m @ 95-100%	8-10 minutes
Specific Endurance I		
Fast 150s	2 x 150m @ 100%	10-12 minutes
Fast 200s	2 x 200m @ 100%	12-15 minutes
Specific Endurance II		
Fast 300s	1-3 x 300m @ 100%	12-15 minutes
Special Endurance		
Split 300s (200/100)	2-3 x split 300 @ 100%	1 minute/10-15 minutes
Split 400s (200/200)	1-2 split 400 @ 100%	4 minutes/10-15 minutes
Split 400s (300/100)	1-2 split 400 @ 100%	1 minute/10-15 minutes
Pairs of 300 (95% effort)	2-3 sets of 2 x 300 @ goal 800 pace	1 minute/10-15 minutes

Workout design:

1. Scheduling speed training

(a) CNS fatigue is a function of both volume and frequency of sprint training

- Lower total volume (avoid the Distance Coach mindset)
- Longer rest period between reps (don't let them rush the workout)

(b) Scheduling rest days: before vs after (rule of thumb: 48 hrs between sprint days)

(c) Be aware of your athletes' school, work, and personal schedule

- Big exams create stress that may affect recovery (finals, AP exams, etc).
- Lack of sleep affects recovery
- Some athletes may not recover as well as other athletes

2. Approaches to incorporating speed training:

(a) Microdosing your speed training (lower daily volume, greater frequency)

(b) Training deeper in the same pool (back to back days)

(c) Hard/Easy – 2-3 workouts per microcycle w/ easy days or rest days between hard days

3. Periodization

(a) Decide how you will periodize your overall season (i.e. Winter vs Spring)

- Characteristics of our Winter Speed Training:
 - Typically running in training flats
 - Microdosing with speed: speed in the warmup
 - Emphasis on specific endurance w/ some speed endurance and special endurance
 - Special endurance includes 100% efforts
- Characteristics of our Spring Speed Training:
 - Transition to running in racing spikes
 - Microdosing with speed: speed in the warmup or beginning of workout
 - Continued use of speed endurance, specific endurance I and II, special endurance
 - Special endurance increasingly includes 95% efforts

Before and during the workout:

1. Before the workout: warming up

(a) Longer warm-ups are important

(b) Drills reinforce correct sprint mechanics, so do them right

(c) Separating kids into groups may help with distractions and make them more accountable

2. During the workout: what if the athlete doesn't run their prescribed or appropriate time?

Adjust the workout if "power output" decreases

- Is the athlete rushing the workout or getting insufficient rest – increase rest interval
- Is it a bad day – end the workout

3. During the workout: monitoring movement patterns

(a) Coaching focal points: we focus on 3 things

- **Running tall**
 - Straight line: ankle-hip-shoulder-head (slight forward lean)
 - Common problems: bending at the waist, slumping shoulders
- **Foot plant** (e.g. below or ahead of center of gravity)
 - Foot below knee, not extended ahead of knee (overstriding)
 - Foot plant is a function of knee/ankle flexion
- **Arm swing**
 - Avoiding arm cross-over (crossing the midline)
 - Arm angles and hands (hands – open vs closed; arm angles – arms as levers)

(b) Monitoring is more difficult when working with a large group (decide how you will approach this – focus on specific athletes vs wait for something noticeably wrong)

4. Time everything, record, and post it (Tony Holler – Record, Rank & Publish)

5. Extra things

(a) Have fun with it

- Preferred lanes (e.g. #1 ranked kid picks their lane or gets lane #4, etc.)
- Speed days are great opportunities for “team support”

(b) Great teaching moments

After the workout:

1. Posting results

(a) We provide rankings in every sprint

(b) We note the improvement of each athlete (or at least typing a previous best)

- Remind your athletes that they don't necessarily PR with every attempt
- Performing well below a typical mark can be a signal of some underlying issue

2. Interpreting results

(a) Looking for areas where an athlete can improve – e.g. the relative standing of some athletes may change between speed vs speed endurance vs specific endurance bests

(b) Translating results – e.g. sprinting at practice can help predict racing performance

Tuesday's practice, Distance runners (4/23) – Assumption Green (3:30pm)

Warmup:

2 laps run

Hip girdle exercises I:

Side-Side leg swings – 15 reps/leg
Front-back leg swings – 15 reps/leg
Hurdle trail leg (forward) – 15 reps/leg
Hurdle trail leg (backward) – 15 reps/leg

Hip girdle exercises II:

Fr/So: green mini-bands, Jr/Sr: blue mini-bands

Standing hip abduction (kick out) – 15 reps per leg
Straight leg back kicks (kick back) – 15 reps per leg

Lower leg exercises:

Dynamic calf stretch (straight leg - gastroc) – 15 reps/leg
Dynamic calf stretch (bent knee - soleus) – 15 reps/leg
Heel walk – 15 steps out, 15 steps back

Hurdle walkover exercises:

Forward walkover – 15 reps
Backward walkover – 15 reps
High knee sidestep – 15 reps facing left, 15 reps facing right

Drills I:

A march – 10m (out/back)
A skip – 10m (out/back)
Hamstring scoops – 10m (out/back)
Buttkicks – 10m (out/back)
Carioca – 10m (out/back)
High knee carioca – 10m (out/back)

Drills II: mini-hurdles

2 x sprint over 8 mini-hurdles (rest: walk back)
2 x lateral run over 8 mini-hurdles (rest: walk back)
2 x lateral hop over 8 mini-hurdles (rest: walk back)

Sprinting:

4 x 60m sprint @ 75-80% (rest: slow walk back)
1 x 40m sprint @ 100% (rest: slow walk back)
2 x fast 40s (timed/lanes - rest: slow walk back)

Tuesday's practice, Distance runners (4/23) – Assumption Green (3:30pm)

<p><u>Group 1:</u></p> <p>(lane 1) Anna Dierken (lane 2) Rachel Dierken (lane 3) Madeline Powell (lane 4) Audrey Babcock (lane 5) Lindsey Domene* (lane 6) Sophie Bouldin (lane 7) Sophie Jerome (lane 8) Taylor White</p>	<p>Workout: 1 x fast 300 <u>in lanes</u> + 2 x fast 150s <u>in lanes</u> Rest: 10-15 min rest between reps <i>(Group leader decides rest)</i></p> <p>Warmdown: 10 min easy run</p>
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* Group leader

Warmdown: Strength day warmdown routine + Strength routine

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Workout results: 40s, 300m + 150s

4/23/19

Group 1	40	40	300	150	150
A-Dierken	7.1	6.7	48.8	23.7	24.3
R-Dierken	6.9	6.6	47.1	23.9	23.9
Powell	6.2	5.9	43.8	21.8	21.7
Babcock	6.5	6.2	45.6	22.9	22.4
Domene	6.7	6.4	46.8	22.9	22.4
Bouldin	6.5	6.3	47.9	23.3	23.3
Jerome	6.8	6.5	50.9	23.2	23.5
White	6.9	6.7	52.3	24.8	25.2

	Tied personal best
	New personal best

Making Performances Comparable: 40m, 150m, 300m + ratios (150:40, 300:40)

Performances are ranked on the basis of 150:40 ratios

First name	Last name	40m	150m	300m	150:40	300:40
Madeline	Powell	5.9	20.0	43.6	3.390	7.390
Lindsey	Domene	6.2	21.3	45.8	3.435	7.387
Anna	Dierken	6.6	22.9	46.9	3.470	7.106
Sophie	Jerome	6.3	22.1	49.0	3.508	7.778
Jessica	Stein	6.3	22.4	49.3	3.556	7.825
Kendall	Norrenbrock	6.3	22.4	50.7	3.556	8.048
Rachel	Dierken	6.4	22.8	46.3	3.563	7.234
Sophie	Bouldin	6.0	21.4	47.9	3.567	7.983
Mary Clare	Stukenborg	6.8	24.7	55.9	3.632	8.221
Katie	Flaherty	6.8	25.1	51.1	3.691	7.515
Ellie	Burns	6.5	24.0	52.5	3.692	8.077
Caroline	Nett	6.6	24.4	53.9	3.697	8.167
Lauren	Locke	6.3	23.3	51.7	3.698	8.206
Trisha	Sexton	6.8	25.4	54.2	3.735	7.971
Claire	O'Bryan	6.7	25.1	53.8	3.746	8.030
Ella	Bidwell	6.7	25.1	52.3	3.746	7.806
Olivia	Kostyo	7.1	26.6	55.1	3.746	7.761
Rachel	Barber	7.1	26.6	53.8	3.746	7.577
Claire	Gibson	6.5	24.6	51.7	3.785	7.954
Julia	Corman	6.6	25.0	52.0	3.788	7.879
Julia	Renz	7.1	26.9	57.6	3.789	8.113
Megan	Dillman	7.2	27.3	54.6	3.792	7.583
Taylor	White	6.3	23.9	49.5	3.794	7.857
Emma	Weigel	6.7	25.6	51.8	3.821	7.731
Josie	Scannell	6.4	24.7	52.4	3.859	8.188
Cammie	McIntyre	6.9	26.8	54.7	3.884	7.928
Charlotte	Burnett	6.4	25.2	51.8	3.938	8.094
Gillian	Dillman	6.8	26.8	55.2	3.941	8.118
Taylor	Rodighiero	6.8	27.2	59.2	4.000	8.706
Audrey	Turchetta	7.2	29.5	61.1	4.097	8.486

Converting 300m to 400m
(HS girls)

300m	400m	800m
41.0	58.3	2:16.3
41.5	58.9	2:17.8
42.0	59.7	2:19.7
42.5	1:00.4	2:21.4
43.0	1:01.1	2:23.0
43.5	1:01.8	2:24.7
44.0	1:02.6	2:26.6
44.5	1:03.3	2:28.3
45.0	1:04.0	2:30.0
45.5	1:04.7	2:31.6
46.0	1:05.4	2:33.3
46.5	1:06.2	2:35.2
47.0	1:06.9	2:36.9
47.5	1:07.6	2:38.6
48.0	1:08.3	2:40.3
48.5	1:09.0	2:41.9
49.0	1:09.7	2:43.6
49.5	1:10.5	2:45.6
50.0	1:11.2	2:47.2

References

Twitter:

Simplifaster	@SimpliFaster
Tony Holler	@pntrack
Mike Young	@MikeYoung
Jonathan Marcus	@jmarpdx
Steve Magness	@stevemagness

Websites:

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