



FASTER BY DESIGN

*A Training Guide for
Middle School and High School Athletes*

PERSON RUN CLUB

Person County, North Carolina

PERSON RUN CLUB

PRESENTS

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Train. Inspire. Achieve.

Person County, North Carolina
Est. 2026

Foreword

PRC exists to inspire consistent progress through training, discipline, and pushing beyond limitations. Whether you are a first-time beginner lacing up for the very first time or a highly competitive racer chasing a personal record, this club is your home. We welcome runners of every age and ability who are looking to improve their overall wellness and athletic potential.

While our summer training program is designed to help middle school and high school cross country runners build a strong preseason aerobic base, this book is for anyone who wants to understand how running actually works. The science in these pages is real. The training principles are proven, recognized by, and utilized by USA Track and Field coaches at all levels.

Through weekly group runs and coached workouts tailored to all experience levels, Person Run Club provides a supportive environment where athletes can grow, stay motivated, and pursue their goals together. We will work individually with each runner to develop a training plan that includes both group workout days and self-paced runs at home, all tailored to personal goals, experience level, and training needs.

This book is the knowledge behind that plan. It explains why we train the way we do, what is happening inside your body when you run, and how to take care of yourself so you keep getting better week after week, month after month, season after season.

Running is a simple sport, but training smart is what separates good runners from great ones. The athletes who understand the science behind their training make better decisions on the road, on the track, and on race day. That is what this guide is for.

Our goal is to turn you into a runner, not just an exerciser who runs races. You do not have to attend every session. You do not have to be the fastest. You just have to show up, put in the work, and trust the process. The rest will follow.

Train. Inspire. Achieve.

Person Run Club

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PART I

The Science of Running

Chapter 1 — Energy Systems & Muscle Physiology

Running looks simple. One foot in front of the other. But underneath the surface, your body is doing something incredibly complex every time you take a stride. This chapter breaks it all down so you actually understand what is happening inside you when you run and why that matters for getting faster.

ATP: Your Body's Fuel

Your muscles run on a molecule called ATP (adenosine triphosphate). Think of ATP like tiny fuel packets. Every time you push off the ground, swing your arms, or hold your posture, your body is burning through ATP to make it happen.

Here is the problem: your body only keeps a few seconds' worth of ATP on hand at any time. Once you use it up, your body has to make more — fast. That is where your three energy systems come in. They are like three different engines your body can use to keep the ATP flowing. Think of these like three gears in a car. First gear is explosive but burns out fast. Second gear is quick but creates waste. Third gear is smooth, efficient, and can run for hours.

The Phosphocreatine System (Instant Energy)

This system gives you energy instantly, no warm-up needed. It is what fires when you explode out of the starting line or make a sudden move to pass someone. But it runs out in seconds. After that, your body needs a couple of minutes of easy running to refill it. That is why you cannot sprint forever.

The Anaerobic System (Fast but Messy)

"Anaerobic" literally means "without oxygen." This system kicks in when you are running harder than your body can get oxygen to your muscles. It makes ATP quickly by breaking down sugar, but it creates a by-product called lactate along the way.

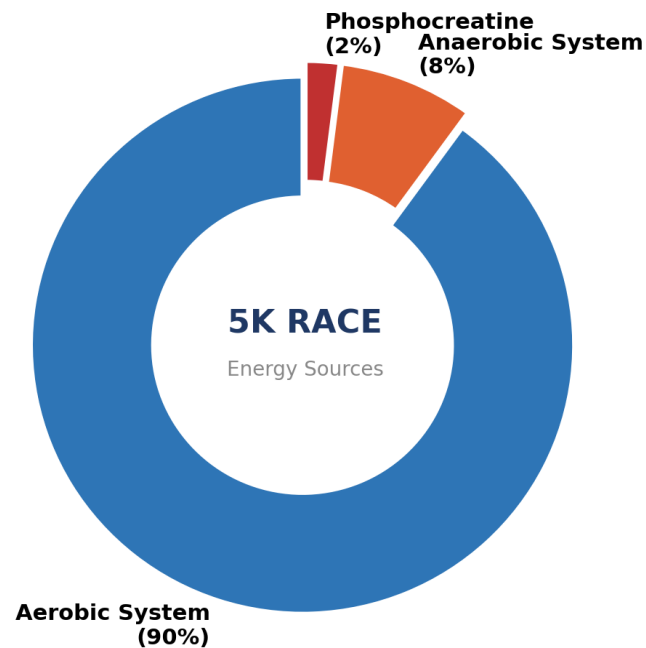
The Aerobic System (Your Main Engine)

This is your distance-running engine. It uses oxygen to break down carbs and fats inside tiny structures in your muscle cells called mitochondria (think of them as

power plants). The aerobic system is slower to fire up than the other two, but once it is rolling, it is incredibly efficient and can keep you running for a very long time.

Here is the stat that should change how you think about training: 85 to 95 percent of the energy you use in a 5K comes from your aerobic system. That is why coaches are always telling you to run easy, those easy miles are building this long term powerplant.

Where Your 5K Energy Comes From



This is why easy aerobic running is the foundation of every training plan.

Figure 1.1 — Where your energy comes from during a 5K race. The aerobic system does the heavy lifting.

How Your Body Switches Between Systems

All three systems are always on, they do not flip on and off like switches. But one of them is doing most of the work at any given time:

First 10 seconds: Phosphocreatine system handles it. Instant energy.

First 1–3 minutes: Anaerobic system picks up the slack while your aerobic system is still warming up.

After a few minutes: Aerobic system takes over and runs the show.

This is exactly why the first mile of every run feels harder than the rest. Your aerobic system has not caught up yet, so you are borrowing energy from the anaerobic

system, which makes you feel out of breath. After a few minutes, your body settles in. Some people call this the "second wind" but it is really just your aerobic engine reaching full power.

And if you suddenly pick up the pace mid-run whether due to a hill, surging in a race, or trying to catch a pack too quickly, you slip back into anaerobic mode. Lactate builds up faster, hydrogen ions spike, your legs start burning, and you slow down.

Lactate: What Is Actually Going On

For years, coaches blamed "lactic acid" for everything, my coaches sure did, sore legs, fatigue, bad races. But science has caught up, and the real story is more interesting.

Your body produces lactate all the time, even when you are sitting on the couch. It is a normal part of how your body makes energy. Your heart uses it as fuel. Your brain uses it. Other muscle fibers grab it and burn it for energy. Lactate is not waste, it is a fuel shuttle.

The real problem is hydrogen ions, they build up alongside lactate and make your muscles more acidic. That is what causes the burn in your legs, the heavy breathing, and the feeling of "I have to slow down." The pace where this starts happening faster than your body can deal with it is called your **lactate threshold** and it is one of the most important numbers in distance running.

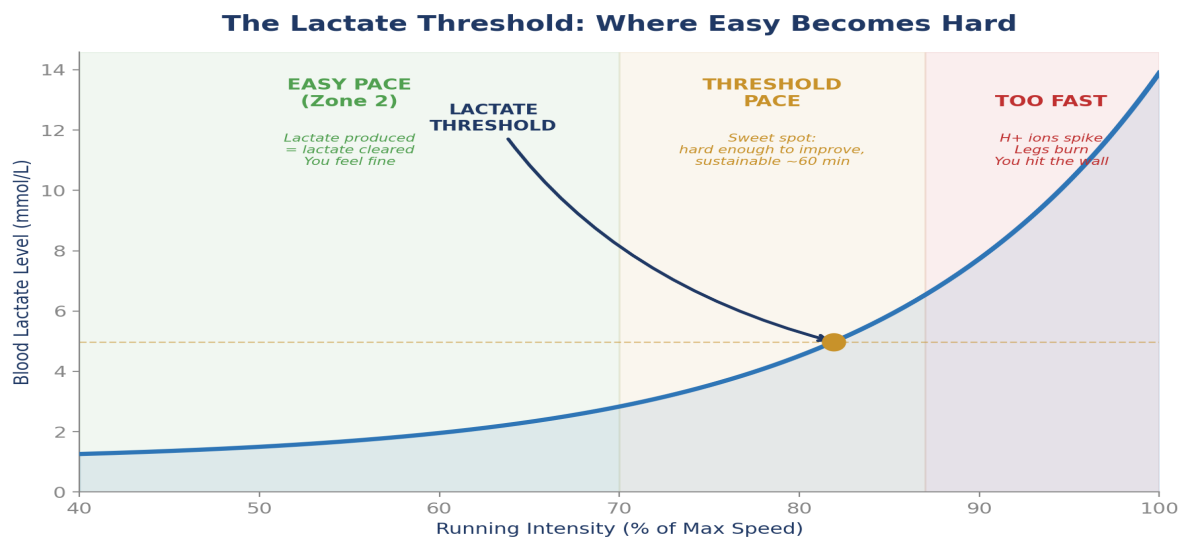


Figure 1.2 — The lactate curve. Your threshold is the tipping point between sustainable and unsustainable effort.

The good news? Training literally changes how your body handles lactate. Consistent running teaches your muscles to clear lactate faster, use it as fuel more efficiently, and push your threshold pace higher. That is why threshold workouts are so powerful. They are rewiring your body at the cellular level.

Mitochondria

If the aerobic system is your engine, mitochondria are the cylinders inside it. These microscopic power plants inside your muscle cells are where oxygen meets fuel and ATP gets produced. The more mitochondria you have (and the bigger they are) the more energy you can make aerobically. When you train, your body builds new mitochondria and makes existing ones bigger. This process starts within hours of a workout. You start seeing real gains after about 4 to 8 weeks of consistent training, and the improvements keep stacking up for years.

So What Does This Mean for Your Training?

Easy runs build your aerobic engine. More mitochondria, a stronger heart, better oxygen delivery, tougher bones and tendons. This is why the best runners in the world spend 80 to 90 percent of their training at easy pace.

Threshold runs teach your body to handle lactate better and raise the speed you can hold without falling apart.

Speed work builds your kick, your power, and your ability to handle surges.

KEY TAKEAWAYS	
✓	ATP is the fuel for every muscle contraction. Your body only stores a few seconds' worth at a time.
✓	Three energy systems produce ATP: phosphocreatine (instant), anaerobic (fast but creates waste), and aerobic (efficient, lasts for hours).
✓	85–95% of a 5K is powered by the aerobic system. That is why easy runs matter so much.
✓	Lactate is not the enemy, hydrogen ion buildup is. Your lactate threshold is the key number.
✓	Training builds more mitochondria in your muscles, which is how your aerobic engine actually gets bigger.
✓	Easy runs build the engine. Threshold runs raise your speed ceiling. Speed work sharpens your finishing kick.

Chapter 2 — Running Economy & Biomechanics

Two runners can have the same VO₂ max and the same lactate threshold, but one of them finishes 30 seconds ahead in every race. The difference? Running economy. This chapter explains what it is, why it matters, and how you can improve yours.

What Is Running Economy?

Running economy is basically your fuel efficiency. It measures how much oxygen you use at a given pace. A runner with great economy uses less oxygen and therefore less energy to run at any given speed. Think of it like gas mileage: two cars might have the same size engine, but one gets 35 miles per gallon and the other gets 25.

Here is the best part for middle school and high school runners: running economy is one of the most trainable things about your performance. Your VO₂max has a big genetic component. You can improve it, but there is a ceiling. Running economy, on the other hand, keeps improving with consistent training, strength work, and attention to form.

What Makes Running Efficient?

Good running form is not about copying someone else's stride. It is about wasting less energy on stuff that does not move you forward. Here are the big ones:

Cadence (Steps Per Minute)

Most efficient distance runners take about 170 to 185 steps per minute at race pace. Higher cadence usually means shorter ground contact (less time with your foot stuck to the ground) and less impact on your joints. If you are a heavy heel-striker who takes long, reaching strides, your cadence is probably too low.

Where Your Foot Lands

This one is huge. If your foot lands way out in front of your body, it acts like a brake on every single step. The goal is to land with your foot under or just slightly in front of your hips. Whether you hit heel-first, midfoot, or forefoot matters less than where the landing happens relative to your hips. Focus point: you lengthen your stride in the back not the front. Don't reach with your lead leg, drive with your trailing leg.

Arm Drive

Your arms are not just along for the ride. They help balance your legs, keep your rhythm, and actually contribute to forward motion. Swing them forward and back not across your body. Keep your elbows at about 90 degrees. If your hands are crossing your midline, you are wasting energy on unnecessary rotation. Your focus here should be on driving the elbows back. The rest will fall into place.

How to Get More Efficient

Run consistently: The single best thing you can do. The more miles your body logs at running-specific movement, the more efficient those patterns become. Your nervous system gets better at it, your tendons store and return more energy, and wasted movement decreases.

Do strides: Short accelerations (60–100 meters) at about 85–90% effort, 2–3 times a week after easy runs. These reinforce good mechanics at faster speeds without tiring you out.

Strength train: Stronger muscles produce more force per contraction. That means your body recruits fewer muscle fibers to hold the same pace, which directly reduces how much oxygen you use. (Chapter 8 covers this.)

Run drills: A-skips, B-skips, high knees these are all exaggerated parts of the running stride to improve coordination and elasticity.

Run hills: Hills naturally fix your form. They force higher cadence, better knee drive, and less overstriding. Plus they build running-specific strength.

What Builds Running Economy

Five ways to use less energy at any pace



Figure 2.1 — The five key factors that build running economy over time.

For high school athletes, here is something important: your running economy is going to improve a lot just from growing up. As your body matures, your limbs stabilize, your muscle-tendon system gets more refined, and your nervous system gets better at coordinating everything. Many runners see huge jumps in efficiency through high school without doing anything different, just staying consistent.

This is why patience matters more than anything. The runners who stay healthy, avoid burnout, and keep training through all four years of high school are the ones who reach their potential. The sport rewards consistency over intensity every single time.

KEY TAKEAWAYS	
✓	Running economy = how efficiently you turn oxygen into speed. It is one of the most trainable parts of your performance.
✓	Land with your foot under your hips, not way out in front. Overstriding is the most common form mistake.
✓	Higher cadence (170–185 spm), less bouncing, and purposeful arm drive all improve efficiency.
✓	Consistent mileage, strides, strength work, drills, and hills all make you more economical.
✓	You are still developing physically. Patience and consistency will unlock improvements that no shortcut can.

PART II

Training Theory

Chapter 3 — Training Paces & Their Purpose

“Don’t compare yourself to other runners; focus on your own fitness and performance.”

— JACK DANIELS

Most runners just run fast some days, slow others, whatever the group does. But every pace in your training plan exists for a specific reason. When you understand what each pace actually does to your body, you stop guessing and start training with a purpose.

Before reading this chapter, take a moment to flip to Appendix A “PRC Training Pace Charts.” Find your current 5K time and review the paces listed beside it. As you read through each training pace below, you can reference those charts to see exactly what each pace means for you personally. It will make everything in this chapter feel much more concrete.

Zone 2 (Easy Running) The Most Important Pace You Will Ever Run

Zone 2 is the pace that builds your aerobic engine. It is also the pace that most high school runners do wrong, because it feels "too slow."

What Zone 2 Actually Does

- Builds new mitochondria and makes existing ones bigger and more efficient.
- Strengthens your heart so it pumps more blood per beat.
- Trains your body to burn fat more efficiently, saving your carb stores for harder efforts.
- Grows new capillaries around your muscle fibers so oxygen can get to them faster

This is why elite runners, even Olympic-level athletes, spend 80 to 90 percent of their training at an easy pace. They are not being lazy. They are building the biggest aerobic engine possible.

How to Know You Are in Zone 2

Zone 2 is about 60 to 70 percent of your max heart rate. For most high schoolers, that is somewhere around 120 to 145 bpm. But the simplest test is this: can you hold a full conversation? If you can talk in complete sentences without gasping, you are in Zone 2. If you cannot, slow down. When you finish a Zone 2 workout you should be stopping because you have completed the workout, not because you cannot keep going.

Threshold Pace (Comfortably Hard)

Threshold pace is the fastest pace you can sustain while keeping lactate under control. It is the sweet spot where your body is producing lactate and clearing it at roughly the same rate. Threshold should feel "comfortably hard." You can get out a few words at a time, but you cannot hold a real conversation. You could hold this pace for about 45 to 60 minutes if you had to.

Why Threshold Training Is So Powerful

Consistent threshold work teaches your body to clear lactate faster, delay the onset of that burning feeling, hold faster paces longer, and push your ceiling higher. Research shows that one to two threshold sessions per week is the sweet spot. More than that and you are just piling on fatigue without extra benefit. A simple formula: take your 5K PR mile pace and add 15 to 25 seconds. If your 5K PR is 20:00 (that is 6:26 per mile), your threshold pace is about 6:41 to 6:51 per mile.

Race Pace (Your 5K Speed)

This one is straightforward: race pace is your average mile split from your fastest 5K. You use it in workouts designed to simulate racing conditions so your body knows exactly what that effort feels like before you get to the starting line. Race-pace workouts build confidence and teach pacing discipline.

Finishing Pace (VO₂max Effort)

This is your top aerobic gear. The fastest pace you can hold for about 2 to 6 minutes. You hit this in 400m to 1200m repeats, hill sprints, and hard surges. It improves your max oxygen uptake, your running economy at fast speeds, and your finishing kick. This pace is extremely hard on your body, which is why you only use it sparingly. Usually once a week during the sharpening phase (discussed in Chapter 4), and rarely during base building.

PR Pace (Training for the Future)

PR pace is your goal race pace faster than your current personal record. Because track workouts have rest built in, you can train at this speed without completely wrecking yourself. This teaches your legs and lungs what your future race pace feels like, builds the confidence that comes from hitting fast splits, and bridges the gap between where you are and where you want to be.

The Track Workout Splits chart in Appendix A lists your target 400m and 800m times at Interval pace. Having exact split targets makes hard sessions more focused and more effective.

Fartleks & Intervals (Speed Play)

"Fartlek" is Swedish for "speed play." It means alternating between fast and easy running, either by feel or with a loose structure. Intervals are the more formal version of specific distances at specific paces with set recovery times. Both are great for building speed, cardiovascular fitness, mental toughness, and running economy. Fartleks are especially good for younger runners because they feel less intimidating than structured intervals and they mimic the surging pace of cross-country racing.

Progression Runs — Start Easy, Finish Fast

Progression runs start at an easy pace and get gradually faster, finishing at threshold or race pace. They are underrated and incredibly useful because they teach pacing discipline, train you to run fast when you are already tired, and build the mental habit of finishing strong instead of fading.

KEY TAKEAWAYS

- ✓ Every pace in your training has a specific job. Training with purpose beats training by feel.
- ✓ Zone 2 (80–90% of your mileage) builds your aerobic engine. If you can't hold a conversation, slow down.
- ✓ Threshold pace raises the speed you can sustain. 1–2 sessions per week is enough.
- ✓ Race pace and finishing pace sharpen race-specific fitness. PR pace prepares you for future goals.
- ✓ Fartleks and intervals build speed and adaptability. Progression runs teach you to finish strong.

Chapter 4 — Periodization & Seasonal Training Blocks

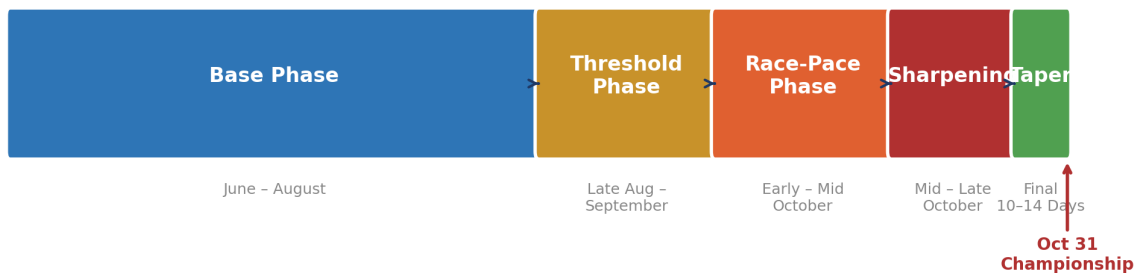
“A good process produces good results.”

— NICK SABAN

You cannot train the same way all year and expect to keep getting faster. Your body needs structure or phases of building, phases of sharpening, and phases of rest. Periodization is the system that makes sure you peak at the right time, not three weeks before your championship race.

PRC Seasonal Periodization Timeline

Cross Country Season — October 31 Championship



* Timeline targets an October 31 championship race. Adjust phase start dates if your championship falls on a different date.

Figure 4.1 — PRC Seasonal Periodization Timeline — June through October 31 championship.

Why Periodization Works

Your body gets stronger through a cycle: stress, recovery, adaptation. You push it with a workout. You rest. Your body rebuilds slightly stronger than before. Periodization organizes this cycle across weeks and months so each phase builds on the last.

Without periodization, most runners end up stuck in the "gray zone" running at a moderate intensity every day that is too hard to recover from and too easy to actually improve. That leads to plateaus, injuries, and burnout. Periodization prevents all of that.

Base Phase (Summer)

This is the most important phase of your entire year. Everything that comes after depends on the aerobic foundation you build in the summer. Skip the base, and you hit a ceiling that no amount of speed work can break through.

- 80–90% of your running at Zone 2 (easy, conversational pace)
- Gradual mileage increases (no more than 10% per week)
- Long runs making up 20–30% of your weekly mileage
- Strides 2–3 times a week to keep your legs sharp
- Light strength training to build structural toughness

Threshold Phase (Early–Mid Season)

Now you start adding structured intensity. The goal is to raise the pace you can hold without lactate spiraling out of control. Workouts include tempo runs, cruise intervals, and progression runs.

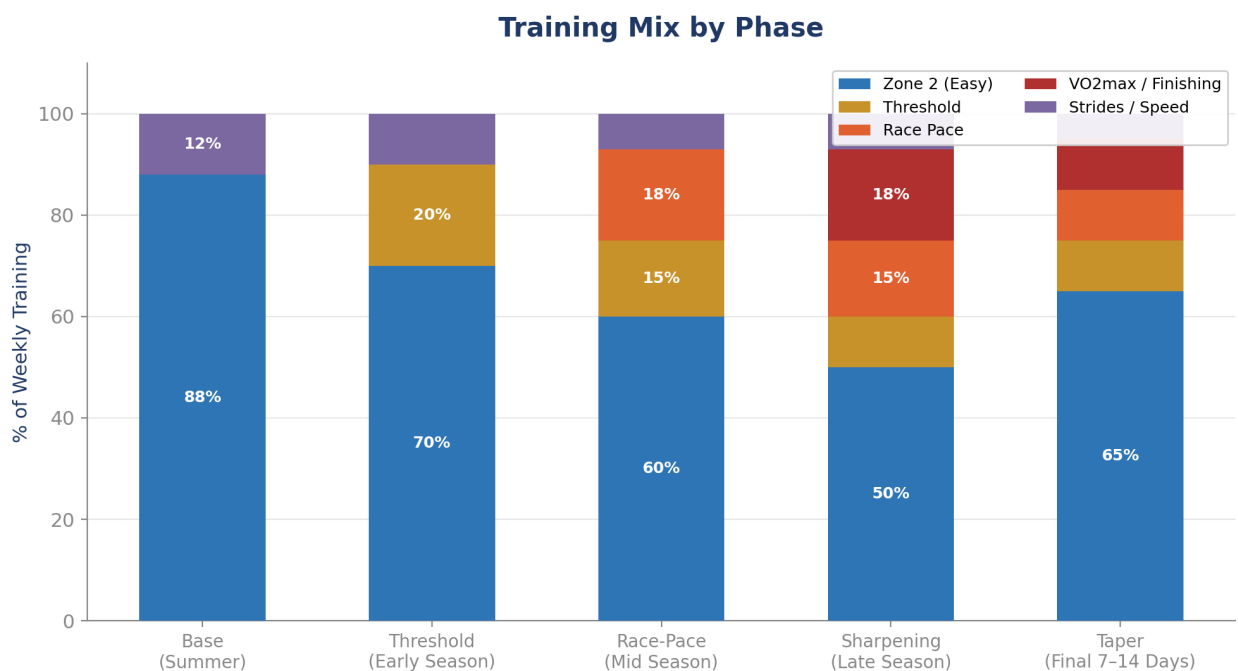


Figure 4.2 — Training mix shifts from almost entirely Zone 2 during base building to a more varied mix during sharpening. Easy running remains the foundation in every phase.

Race-Pace Phase (Mid–Late Season)

The focus narrows to race-specific work. You are doing intervals at 5K pace, longer repeats, and workouts that simulate the exact stress of competition. This phase builds specific endurance, confidence, and the mental toughness to hold pace when your body wants to quit.

Sharpening Phase (Late Season)

Training gets shorter, faster, and more explosive. Total volume goes down while intensity goes up. You are doing VO₂max intervals, fast strides, and short hill sprints. The goal is to go from "fit" to "race-ready."

Taper (Final 7–14 Days)

This is where the magic happens. Mileage drops by 20 to 40 percent, but you keep a few key intensity sessions at shorter durations. Your body absorbs all the training you have done, repairs micro-damage, restores energy stores, and arrives at race day feeling rested, snappy, and ready to compete.

A lot of runners freak out during the taper because lower mileage feels like losing fitness. It is the opposite. Research shows a proper taper improves performance by 2 to 3 percent. That could be 20 to 30 seconds off your 5K. Trust the process.

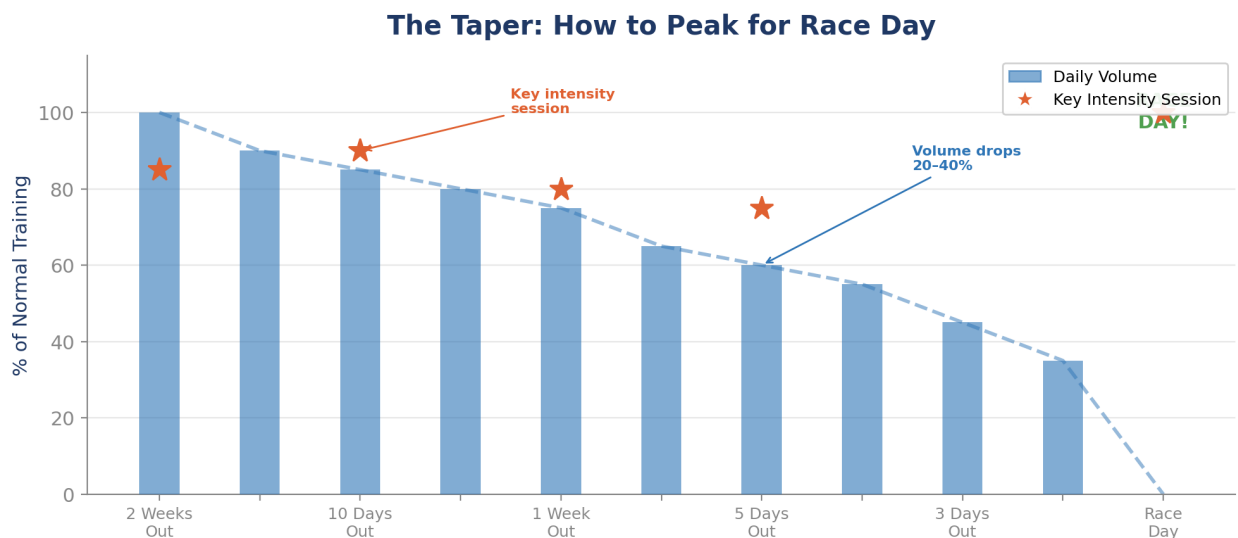


Figure 4.3 — During the taper, daily volume drops progressively while key intensity sessions (stars) keep your legs sharp. Lower mileage does not mean losing fitness.

KEY TAKEAWAYS

- ✓ Periodization organizes your season into phases so you peak at the right time.
- ✓ The summer base phase is the most important — it builds the aerobic foundation for everything that follows.
- ✓ Each phase adds a layer: threshold, race pace, sharpening, taper.
- ✓ A proper taper improves race performance by 2–3%. Lower mileage does not mean losing fitness.
- ✓ Without periodization, you risk the gray zone — too hard to recover, too easy to improve.

Chapter 5 — Building Mileage Safely

More miles generally equals a stronger aerobic engine. But "too much too soon" is the number one cause of running injuries in high school athletes. This chapter teaches you how to increase your training volume without breaking down.

The 10% Rule

The classic guideline: do not increase your weekly mileage by more than 10 percent from one week to the next. It is not a perfect rule, going from 10 to 11 miles is a very different jump than going from 50 to 55, but the principle is solid. Your muscles adapt to more mileage faster than your bones and tendons do. Those structures need time, and ramping up too fast is how you end up in a boot.

The 3-Week Build, 1-Week Reset

One of the smartest patterns in running: build your mileage for three weeks, then drop it by 15 to 25 percent in week four. That recovery week is not wasted time. It is where your body actually absorbs all the stress you threw at it and comes back stronger. Skipping recovery weeks is a fast track to overuse injuries.

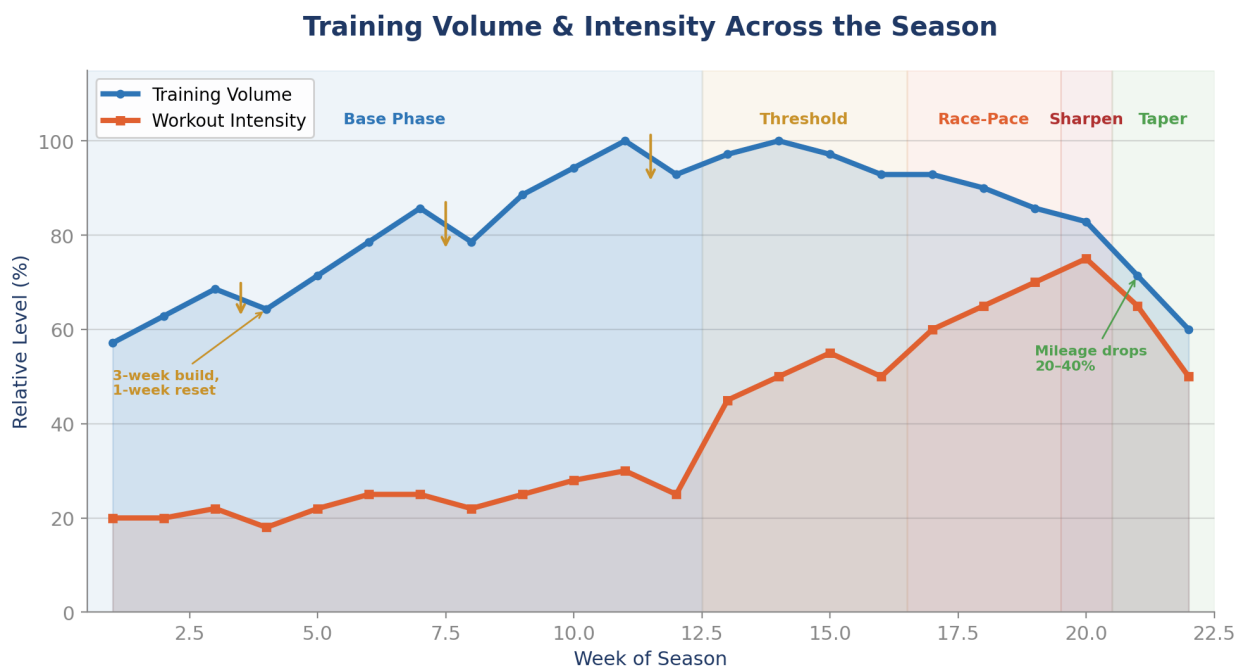


Figure 5.1 — Training volume peaks during base building while intensity stays low. As intensity rises through the competitive season, volume gradually decreases.

Long Runs

Your long run is the single most important run of the week for building aerobic endurance. Some guidelines:

- It should be about 20–30% of your total weekly mileage
- Increase it by no more than 1 mile per week
- Run it at easy, conversational pace not a race simulation
- Take an easy day or rest day before and after

“There is no continuum for success. Focus on the progress, not the results. . . It's not about the victory lap, it's about the extra laps that led to the victory”

— NICK SABAN

KEY TAKEAWAYS

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|---|---|
| ✓ | More mileage builds a bigger aerobic engine — but only when you increase it gradually. |
| ✓ | The 10% rule is a good ceiling for weekly mileage increases. |
| ✓ | Build for 3 weeks, drop back in week 4. Recovery weeks are where you actually get stronger. |
| ✓ | Your long run should be 20–30% of your weekly mileage, at easy pace. |
| ✓ | Know the overtraining warning signs. Pushing through them leads to injury, not improvement. |

PART III

Warm-Ups, Strength & Mobility

Chapter 6 — Warm-Up Science

Most runners jog a lap, do a few stretches, and figure they are ready. The science says that approach is incomplete and that one of those things (static stretching) is actually making you slower and more injury-prone when done before running.

Why Ground Work Matters

Ground-based drills activate the stabilizer muscles that running alone does not hit hard enough. Think of ground work as turning the engine on before you drive. Skip it, and weaker muscles have to pick up the slack. Which means sloppy form and earlier fatigue. These are the muscles that keep your form together:

- **Glutes:** Your main power muscle. Weak glutes lead to knee collapse, IT band pain, and overstriding.
- **Core:** Keeps your posture tall and transfers force between your upper and lower body.
- **Hips:** Control your stride length and pelvic stability.
- **Upper back and shoulders:** Support your arm drive and help you breathe efficiently.

Why Dynamic Warm-Ups Work

Dynamic warm-ups do three things that static stretching cannot:

1. **Raise your core temperature.** Warm muscles contract faster, absorb impact better, and get injured less. Research shows dynamic warm-ups cut overall injury risk by 35 percent and cut severe injuries nearly in half.
2. **Improve range of motion while moving.** Running is a dynamic activity. Your joints need to be mobile while producing force at the same time. Dynamic drills train exactly that.
3. **Wake up your nervous system.** This is what makes your legs feel snappy instead of heavy. Dynamic warm-ups prime the connections between your brain and your muscles so you can fire faster and with better coordination.

Why Static Stretching Before Running Hurts You

Static stretching (holding a position for 20 to 30 seconds) is great for recovery. But doing it before you run actually works against you:

- **It reduces power:** Studies show static stretching temporarily weakens the muscle for 10 to 20 minutes. That is the opposite of what you want before training.
- **It relaxes instead of activating:** Running needs your muscles primed and ready. Static stretching tells your nervous system to chill out.
- **It does not warm anything up:** Cold muscles being held in long stretches is not a recipe for preparation. It is a recipe for a pulled hamstring.

Save static stretching for the evening (Chapter 9). Before running, go dynamic every time.

KEY TAKEAWAYS

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|---|
| ✓ Ground work activates the stabilizer muscles that keep your form efficient. |
| ✓ Dynamic warm-ups raise your temperature, improve mobility, and prime your nervous system. |
| ✓ Research shows dynamic warm-ups reduce injury risk by 35%. |
| ✓ Static stretching before running temporarily weakens muscles. Save it for the evening. |
| ✓ A proper warm-up is ground work, then dynamic drills, then strides. Every time. |

Chapter 7 — PRC Ground Work & Dynamic Warm-Ups

This is the playbook. These are the exact routines you should do before every single training session with our club. No skipping, no shortcuts. When you do them consistently, you will run better, feel better, and get hurt less.

PRC Ground Work Routine

(Do these before every practice. Takes about 5–7 minutes.)

Sun Gods

What it does: Warms your shoulders and upper back for arm drive.

Stand tall with your arms straight out to the sides. Make slow circles forward, gradually making them bigger. Then reverse direction. Repeat with your arms out in front. Keep your core tight — do not let your ribs flare out.

Neck Circles

What it does: Loosens up neck tension from sitting in class all day.

Drop your chin toward your chest. Roll your head slowly in a full circle, pausing wherever it feels tight. Do 5 to 8 circles, then switch directions. Do not force it.

Reach-Throughs

What it does: Opens up your upper back and improves rotation.

Get on your hands and knees. Slide one arm underneath your body like you are threading a needle. Let your shoulder and ear drop toward the ground. Come back up and switch sides. Do 6 to 8 reps each side.

Donkey Kicks

What it does: Fires up your glutes — the main power muscle for running.

Hands and knees. Keep your knee bent at 90 degrees and kick one leg straight back and slightly up until your thigh is level with your body. Keep your hips level — do not twist. Switch legs. Do 10 to 12 reps per side.

Cat-Cows

What it does: Warms up your entire spine and deep core muscles.

From hands and knees, arch your back up like a cat (tuck your chin and tailbone). Then drop your belly and lift your chest like a cow. Move slowly and breathe with each one. Do 8 to 10 full cycles.

Standing Leg Swings

What it does: Opens up your hips — crucial for your running stride.

Hold onto a wall or a teammate. Swing one leg forward and backward like a pendulum, gradually increasing the range. Do 10 to 15 swings, then switch to side-to-side swings across your body. Keep your torso tall.

PRC Dynamic Warm-Up Routine

(Do these after ground work. Takes about 8–10 minutes.)

Heel Walks (20 meters)

Walk on your heels with your toes pulled up toward your shins. This lights up your shin muscles and helps prevent shin splints.

Toe Walks (20 meters)

Walk on the balls of your feet with your heels off the ground. Warms your calves and ankles and gets your Achilles tendon ready for impact.

Butt Kicks (20 meters)

Jog while snapping your heels up to your glutes as fast as you can. Warms your hamstrings and reinforces the leg-recovery part of your stride.

High Knees (20 meters)

Drive your knees up to waist height in a quick marching or jogging rhythm. Gets your heart rate up, activates your hip flexors, and improves your turnover.

Carioca (40 meters)

Move sideways while crossing your trailing leg in front, then behind, then in front again. This improves hip rotation, coordination, and lateral agility.

Hurdle Walks (20 meters each direction)

Lift your knee up and rotate it outward like you are stepping over a waist-high hurdle. Do both directions. This opens up your hip joint in rotation — something running by itself does not do.

Walking Lunges (20 meters)

Step into a deep lunge. Keep your front knee over your ankle, not past it. Warms your quads, glutes, and hip flexors while challenging your balance.

Walking Lunges with Reach Backs (20 meters)

Step into a deep lunge, then reach both arms up and slightly backward at the bottom of each lunge. This adds a thoracic spine extension to the standard lunge — opening your hip flexors while mobilizing your upper back and improving posture for running.

A-Skips (20–30 meters)

Skip forward while driving one knee up high. Focus on staying tall, keeping your core tight, and driving your arms. This drill teaches proper running mechanics and builds elastic energy return.

Reverse into Forward Sprint (40 meters)

Start with backward chop steps with high knee drive. At the halfway point, transition into a forward sprint. Do one set transitioning left and another transitioning right. This drill improves agility, hip coordination, and acceleration mechanics.

High Knees into Sprint (40 meters)

Start with high knees, driving your knees to waist height with quick turnover. At the halfway point, transition directly into a sprint. This drill connects the high-cadence mechanics of high knees with full-speed running.

Strides (3–4 x 100 meters)

100 meters performed at race pace with a strict focus on controlled effort, prioritizing form over speed. Stay relaxed and tall. Let yourself fully recover between each one. Strides are the bridge between warming up and the actual workout.

Note: For a printable quick-reference version of the entire warm-up routine, flip to Appendix B, PRC Warm-Up Quick Reference. It has every exercise and its key cues on a single page. Perfect to bring to practice.

KEY TAKEAWAYS	
✓	Ground work (5–7 min) wakes up your stabilizers and mobilizes your spine, hips, and shoulders.
✓	Dynamic drills (8–10 min) raise your temperature, open up your joints, and fire up your nervous system.
✓	Transition drills (reverse sprints, high knees into sprints) build agility and acceleration.
✓	Strides bridge the gap between warming up and running fast. Prioritize form over speed.
✓	Do the full warm-up before every practice and every race. No exceptions.
✓	Consistency with warm-ups reduces injury risk and makes every workout better.

Chapter 8 — Strength Training for Runners

“Only the disciplined ones in life are free. If you are undisciplined, you are a slave to your moods and your passions.”

— ELIUD KIPCHOGE

A lot of distance runners think strength training is for football players and sprinters. That could not be more wrong. Stronger muscles mean better form, more power, fewer injuries, and faster times. This chapter shows you exactly what to do.

Why Strength Matters

Every stride you take is basically a single-leg squat at speed, with two to three times your bodyweight slamming through your leg on impact. If your muscles are not strong enough to handle that, the force goes straight to your joints, tendons, and bones. Most running injuries come from muscles that are too weak to handle the repetitive stress of training. Targeted strength work reduces shin splints, runner's knee, IT band issues, calf and Achilles problems, hip tightness, and lower-back pain. In a study of competitive young runners, 63 percent of those who strength trained said they did it specifically to prevent injuries.

The Exercises

If you have a strength training plan, stick to it. The below exercises are a supplement and consist of important strength training for runners that you are likely not currently doing. Add them into your routine, Do these 2–3 times per week, after running or on cross-training days. Start with body weight. Add weight only when your form is solid.

Leaning One-Leg Calf Raises

Works: (Calves and Achilles tendon)

Every step loads your calf-Achilles complex with 6 to 8 times your bodyweight. Strong calves protect against Achilles tendinitis, calf strains, and plantar fasciitis. Lean into a wall, rise up on one foot, lower slowly. 12 to 15 reps per side, 2 to 3 sets.

Tibialis Raises

Works: Front of your shins

This is the single best exercise for preventing shin splints. Stand with your back against a wall, feet about a foot out. Lift your toes toward your shins, hold for a second, lower. 15 to 20 reps, 2 to 3 sets.

Bulgarian Split Squats

Works: Quads, glutes, hamstrings, hip stabilizers

Running is a single-leg sport, and this exercise mimics that. Put one foot on a bench behind you, lower into a lunge on the front leg. Keep your front knee tracking over your toes. 8 to 12 reps per side, 2 to 3 sets.

One-Leg Heel Tap Squats

Works: Glute medius, quads, ankle stabilizers

Stand on one leg on a step. Lower slowly until the opposite heel taps the ground, then drive back up. This prevents the inward knee collapse that causes so many running injuries. 8 to 10 reps per side.

Glute Bridges

Works: Glutes, hamstrings, lower back

Your glutes are the engine of running. Lie on your back with knees bent, feet flat. Drive your hips up, squeeze your glutes at the top, hold for 2 seconds, lower. 12 to 15 reps. Progress to single-leg when it gets easy.

Hip Thrusts

Works: Glutes, hip extensors

A more advanced version of glute bridges. Sit with your upper back against a bench, feet flat on the floor. Drive your hips up until your thighs are parallel with the ground. This builds the explosive hip extension you need for speed and hills. 8 to 12 reps, 2 to 3 sets.

Fire Hydrants

Works: Glute medius, hip rotators

Hands and knees. Keep your knee bent and lift one leg out to the side (yes, like a dog at a fire hydrant). Keep your hips level. This keeps your hips stable and your knees aligned during running. 12 to 15 reps per side.

Note: For a printable quick-reference version of all seven exercises, flip to Appendix C, Strength Training Quick Reference. It lists every exercise with sets, reps, and key cues on a single page. Great for the weight room or at home.

KEY TAKEAWAYS

- ✓ Every running stride hits your body with 2–3x your bodyweight. Strength training prepares you for that.
- ✓ Research confirms strength training is safe and beneficial for high school distance runners.
- ✓ 63% of competitive young runners who lift do it specifically to prevent injuries.
- ✓ Focus on single-leg exercises: split squats, calf raises, bridges, and hip work.
- ✓ Bodyweight is enough. 2–3 sessions per week is all you need.

PART IV

Recovery & Mobility

Chapter 9 — Evening Static Stretching

Training does not end when the run ends. What you do in the hours after practice, especially before bed, determines how well your body recovers and how ready you are for tomorrow. Evening stretching is one of the most important habits you can build, and also one of the hardest to get high schoolers to actually do.

Why It Works Best at Night

It restores muscle length. Running shortens your hip flexors, calves, quads, and hamstrings over time. Evening stretching gently lengthens them back out, which improves your stride, your posture, and your resistance to injury.

It speeds up recovery. Stretching reduces muscle tension, improves blood flow, and shifts your nervous system from "go" mode into "recover" mode. This means better sleep, less soreness in the morning, and faster tissue repair.

It prevents overuse injuries. Most running injuries build up slowly from tight, overworked muscles. Evening stretching targets the exact areas you overloaded during training — calves, hamstrings, hips, quads, and glutes.

The Routine

*Hold each stretch for 30–60 seconds. Breathe deeply. Never force or bounce.
Takes about 10–15 minutes.*

Standing Calf Stretch

Step one foot back, press the heel into the ground, lean into a wall. Tight calves cause Achilles problems, shin splints, and limited ankle mobility.

Lying Hamstring Stretch

Lie on your back, raise one leg toward the ceiling as straight as you can. Use a towel or strap if needed. Tight hamstrings cause overstriding and low-back tightness.

Figure-4 Wall Stretch

Lie on your back, cross one ankle over the opposite knee, pull the bottom leg toward you. Targets your glutes and piriformis, prevents IT band pain.

Half-Kneeling Hip Flexor Stretch

Kneel on one knee with the other foot flat in front. Shift your weight forward, keeping your torso tall. Running shortens your hip flexors constantly. This stretch fights that.

Child's Pose to Cobra

Flow between sitting back on your heels with arms extended (child's pose) and lying flat and pressing your chest up (cobra). Resets your spine after a day of running and sitting in class.

Hip Flexor Couch Stretch

Kneel with one foot on the ground and the other foot up on a couch or wall behind you. Squeeze the glute on the kneeling side and shift forward gently. This is one of the most effective stretches for runners — it hits deep hip flexor tightness that most other stretches miss.

90-90 Hip Stretch

Sit with both legs bent at 90 degrees — one in front, one to the side. Lean over the front leg, then rotate to the back leg. Running moves you in a straight line. This stretch restores rotational hip mobility that running neglects.

Lying Quad Stretch

Lie on your side, pull your top foot toward your glute, knees together. Reduces knee pain and improves hip extension. Push your hips forward gently for a deeper stretch.

KEY TAKEAWAYS

- ✓ Evening stretching belongs after training, not before. Your muscles are warm and your nervous system can shift into recovery.
- ✓ Running shortens your hip flexors, calves, hamstrings, and quads. Nightly stretching reverses that.
- ✓ Hold each stretch for 30–60 seconds. Breathe deeply. Never force it.
- ✓ This 10–15 minute routine is one of the most overlooked habits in running — and one of the most impactful.
- ✓ The athletes who do this every night stay healthier and run better all season.

Chapter 10 — Foam Rolling & Soft Tissue Care

A foam roller is one of the cheapest and most effective recovery tools you can own. When paired with your evening stretching routine, it becomes a system that keeps your muscles loose, reduces soreness, and keeps you healthy all season.

What the Science Says

Recent research (2024–2025) has confirmed that foam rolling works. Here is what it actually does:

- **Increases blood flow:** Rolling significantly boosts circulation to the muscles you just trained, which speeds up recovery.
- **Helps you recover force faster:** After hard training, foam rolling helps your muscles regain their strength more quickly. If you are training 4 to 5 days a week, this means you show up to each session fresher.
- **Reduces stiffness:** Controlled studies show immediate, measurable reductions in muscle stiffness after rolling.
- **Reduces soreness:** Foam rolling effectively reduces that next-day soreness (DOMS) after hard workouts.

How It Actually Works

Foam rolling does not "break up" knots or scar tissue, the forces are not strong enough for that. What it does is send signals to your nervous system that reduce muscle tension. Your nervous system is constantly "guarding" tight areas, keeping them contracted. Foam rolling overrides that signal and tells the muscle to relax.

That is why rolling before stretching works so well: the roller convinces your nervous system to release its grip on the muscle, and then the stretch takes that muscle to its full length.

The Basics

- Roll slowly — about one inch per second
- When you find a tender spot, pause and hold for 15 to 30 seconds
- Do not roll directly on your joints or bones

- Breathe deeply the whole time
- Roll before stretching in your evening routine
- Spend at least 2 minutes per muscle group for the best results

Where to Roll

- Calves — from ankle to just below the knee
- Hamstrings — sit on the roller, roll from above the knee to your glute
- Quads — face down, roll from knee to hip
- IT band area — roll the muscles around it, not directly on the band itself
- Glutes — sit on the roller, cross one ankle over the opposite knee, roll in small circles
- Upper back — roller under your shoulder blades, support your head, roll gently

How Long

- 30–60 seconds minimum per muscle group (2 minutes is ideal)
- Total: 8–12 minutes
- Pair with your evening stretching for maximum benefit

KEY TAKEAWAYS

- | |
|---|
| ✓ Research confirms foam rolling increases blood flow, speeds recovery, reduces stiffness, and cuts soreness. |
| ✓ It works by telling your nervous system to release tension in tight muscles. |
| ✓ Roll slowly, pause on tender spots, and spend at least 2 minutes per muscle group. |
| ✓ Roll first, then stretch — this order is more effective than stretching alone. |
| ✓ 8–12 minutes of rolling adds up to significantly better tissue quality over a season. |

Chapter 11 — Sleep, Nutrition & Hydration

“It is easier to maintain a level of fitness than it was to achieve that fitness.”

— JACK DANIELS

Training gives your body the stimulus. Recovery is where you actually get stronger. And the three pillars of recovery: sleep, food, and water are not extras. They are the foundation. If you are nailing your workouts but skipping meals, staying up late, and showing up to practice dehydrated, you are throwing away your own improvement.

Sleep: Your #1 Recovery Tool

Sleep is not just rest. It is when your body does its most important repair work. During sleep, your body releases growth hormone (which repairs muscles and helps you grow), locks in the movement patterns you practiced during training, restores your energy stores, and keeps your immune system strong.

Research consistently shows that not sleeping enough makes you slower, weaker, and more likely to get injured. For high school athletes, this is an even bigger deal because your body is already spending energy on growing and developing.

How Much Do You Need?

Sports scientists recommend 8 to 10 hours per night for teenage athletes. That is more than most non-athletes need. During heavy training weeks, aim for the higher end of that range.

Sleep Tips

- Go to bed and wake up at the same time every day. Yes, even on weekends
- Put your phone away 30 to 60 minutes before bed. Blue light from screens messes with your melatonin.
- Skip the caffeine after 2:00 PM
- Use your evening stretching as a wind-down routine that signals your body it is time to sleep

- If you nap, keep it to 20–30 minutes and not after 3:00 PM

Nutrition: Fuel the Machine

A high school runner covering 30 to 40 miles per week needs a lot more fuel than a classmate who is not training. Undereating is one of the most common problems in high school distance running. It leads to fatigue, poor recovery, more injuries, hormone issues, and declining performance. You cannot outrun a bad diet.

What to Eat

- **Carbs (50–60% of your calories):** Carbs are your primary fuel for running. Aim for 5 to 7 grams per kilogram of bodyweight per day. Good sources: oatmeal, whole-grain bread, rice, pasta, sweet potatoes, fruit, and vegetables.
- **Protein (0.6–0.8 g per lb of bodyweight):** Protein repairs your muscles. Spread it across the day instead of loading it all into one meal. Good sources: eggs, chicken, fish, yogurt, milk, beans, lentils, and nuts.
- **Fats (25–35% of calories):** Healthy fats support your hormones, brain function, and vitamin absorption. Good sources: avocados, olive oil, nuts, seeds, and fish.

When to Eat

- **2–3 hours before running:** Easy-to-digest carbs. Oatmeal with banana, toast with peanut butter, or a bagel with honey.
- **Within 30–60 minutes after running:** Something with a 3:1 or 4:1 ratio of carbs to protein. Chocolate milk is honestly one of the best options. A smoothie with fruit and yogurt or a turkey sandwich works too.
- **Before a race:** A familiar, easy-to-digest meal 2 to 3 hours before. Never try new foods on race day.

Hydration: It Is Not Just Water

By the time you feel thirsty, you are already dehydrated. Hydration is not optional, it is performance fuel. Your body depends on water for almost every function that matters during a run: delivering oxygen to muscles, regulating body temperature, cushioning joints, and flushing out metabolic waste. High school athletes are especially vulnerable to heat because you have a higher surface-area-to-body-mass ratio than adults, which means you heat up faster and lose fluids quicker.

The Science Behind Hydration

When you are dehydrated, even a little, a cascade of problems starts that directly slows you down:

- **Blood volume drops.** Your blood volume drops, which means your heart has to pump harder to deliver the same amount of oxygen. Your heart rate climbs and every pace feels more difficult than it should.
- **Muscles get less oxygen.** Your muscles get less oxygen and less fuel per contraction. Your pace slows down even though your effort stays the same.
- **Temperature regulation fails.** Your body loses its ability to regulate temperature efficiently. Your risk of cramps, dizziness, nausea, and heat illness increases significantly.

Here is the number that should stick with you: even a 2 percent drop in hydration, can noticeably hurt your performance. Studies show it reduces endurance, impairs decision-making, increases perceived effort, and raises your core temperature faster. In hot weather, the effects are even more dramatic.

Daily Hydration Goals

Hydration is not something you can cram right before practice. It is a daily habit. If you start practice already behind on fluids, no amount of water at the trailhead will fix it. Here are the targets:

- **Young men:** Aim for roughly 95 ounces (about 12 cups) total fluids per day.
- **Young women:** Aim for roughly 72 ounces (about 9 cups) total fluids per day.

All fluids count toward your daily total: water, sports drinks, juice, milk, even the water content in fruits and vegetables. That said, water should be your primary source. Soda and energy drinks do not belong in a runner's rotation.

Before Training

Think of pre-practice hydration as priming the pump. You want to show up with your tank full, not scrambling to catch up.

- **2 hours before:** Drink 15 to 20 ounces of water or a sports drink in the 2 hours before practice. This gives your body time to absorb it.
- **15 minutes before:** Drink another 8 to 10 ounces in the 15 minutes right before practice starts. A final top-off.

During Training (Especially in Summer Heat)

Once you start sweating, the clock is ticking. You need to replace fluids and electrolytes as you go, not just hope for the best. Every 15 to 20 minutes, aim for:

- **Fluids:** 8 to 10 ounces of fluids. Small, consistent sips are better than chugging a whole bottle at once.
- **Electrolytes:** 600 to 1,000 milligrams of sodium per hour. This is especially important in hot weather when sweat losses are high. Sports drinks, electrolyte tablets, or salt packets all work.

Electrolytes - sodium, potassium, magnesium is not optional. These minerals help your muscles contract, your nerves fire, and your body hold onto the water you drink instead of just flushing it through.

After Training

Recovery hydration is just as important as what you drink before and during. Within 30 minutes after practice, aim to drink 16 to 24 ounces of fluid for every pound of body weight lost during the session. If you do not have a scale handy, just keep drinking steadily until your urine returns to a pale yellow color.

How to Check Your Hydration

Simplest test: look at your urine. Pale yellow — like lemonade — means you are well hydrated. Dark yellow or amber means you need more fluids, and you should not wait to start drinking. Totally clear might actually mean you are overdoing it, which can dilute your electrolytes. Aim for that light straw color throughout the day.

Another easy check: weigh yourself before and after practice. If you have lost more than 2 percent of your body weight, you were not drinking enough during the session. Use that information to adjust your intake next time.

Resting Heart Rate: Your Daily Check-In

Your resting heart rate (RHR) is one of the simplest and most powerful tools you have for tracking recovery. It costs nothing, takes ten seconds, and can tell you more about how your body is handling training than almost any other single number. Think of it as a daily weather report for your body. It tells you whether conditions are good for hard training or whether you need to back off.

What Is Resting Heart Rate?

Your resting heart rate is the number of times your heart beats per minute when you are completely at rest — not moving, not stressed, not digesting a big meal. For most high school runners, a normal RHR falls somewhere between 45 and 65 beats per minute (bpm). That is lower than the general population (60–100 bpm) because endurance training makes the heart stronger and more efficient. Each beat pumps more blood, so the heart does not need to beat as often.

Your RHR is influenced by your fitness level, genetics, hydration, sleep quality, stress, and overall health. Over time, as your aerobic fitness improves, you will likely see your resting heart rate drift lower. That is a sign your cardiovascular system is adapting to training and a genuinely encouraging marker of progress.

How to Measure It

The key is consistency. Measure your RHR at the same time every day, under the same conditions. The best window is first thing in the morning, before you get out of bed. Here is how:

- ✓ **Keep your watch or heart rate monitor by your bed.** As soon as you wake up — before checking your phone, before sitting up — strap it on or place two fingers on the inside of your wrist.
- ✓ **Lie still for 60 seconds.** If you are using a watch with continuous HR tracking, just look at the reading. If you are counting manually, count beats for 30 seconds and multiply by two.
- ✓ **Write it down.** Keep a simple log — a notes app, a training journal, or even a sticky note on your nightstand. The number itself matters less than the trend over days and weeks.

PRC Tip: Many GPS running watches (Garmin, Apple Watch, WHOOP, etc.) track RHR automatically overnight. If yours does, check the morning reading each day and note the trend over time. You do not need fancy tech, though — two fingers and a clock work just as well.

What the Numbers Tell You

A single RHR reading does not tell you much. What matters is how today's number compares to your personal baseline or the average you have established over several weeks of consistent measurement. Here is how to read the signals:

- ✓ **Normal (within 1–4 bpm of baseline):** Your body is recovering well. Sleep was adequate, hydration is good, and stress is manageable.
- ✓ **Elevated by 5–10 bpm:** Something is off. Common culprits include poor sleep the night before, dehydration, emotional stress, or the early stages of a cold. This is your body's way of saying it is working harder than usual just to maintain normal functions. Consider dialing back intensity.
- ✓ **Elevated by 10+ bpm:** This is a warning sign. A jump this large often indicates overtraining, illness coming on, or significant accumulated fatigue. Take a full rest day. If it stays elevated for two or more consecutive days, talk to your coach and consider seeing a doctor. Pushing through a 10+ bpm elevation is how minor fatigue becomes a two-week setback.
- ✓ **Lower than usual:** Good news. A gradual downward trend in RHR over weeks or months is one of the clearest signs that your aerobic fitness is improving. Your heart is getting stronger and pumping more blood per beat. Celebrate this.

What Your Resting Heart Rate Is Telling You

Check your RHR every morning before getting out of bed

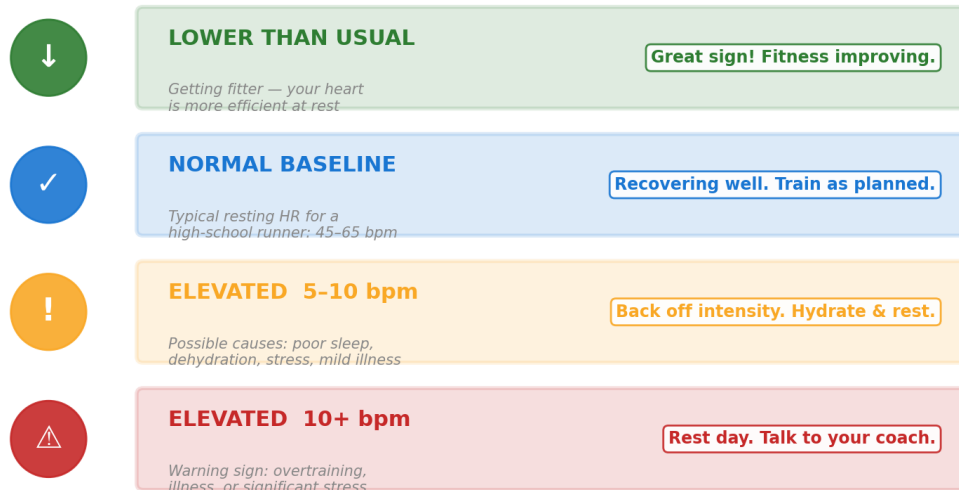


Figure 11.1 — Use your morning RHR to guide daily training decisions. Small changes are normal; large spikes deserve attention.

Resting heart rate is not a perfect tool. It can be affected by caffeine, medications, room temperature, and even what you ate before bed. But over time, as you build a consistent measurement habit, you will start to see patterns. You will learn what your normal looks like, and you will notice early when something is off. That awareness alone — knowing when to push and when to pull back — is one of the things that separates smart runners from injured ones.

Bottom Line: Check your resting heart rate every morning. It takes ten seconds and gives you a daily snapshot of how your body is handling training. Normal means go. Elevated by 5–10 bpm means ease up. Elevated by 10+ bpm means rest. A gradual decrease over time means you are getting fitter.

KEY TAKEAWAYS

- ✓ Sleep is the most powerful recovery tool you have. Aim for 8–10 hours every night.
- ✓ Not sleeping enough makes you slower, weaker, and more injury-prone.
- ✓ Undereating is one of the most common and fixable problems in high school running.
- ✓ Carbs are your main fuel. Get protein at every meal. Do not skip healthy fats.
- ✓ Post-run nutrition matters — eat within 30–60 minutes. Chocolate milk is legit.
- ✓ Even a 2% drop in hydration hurts performance. Young men need ~95 oz/day, young women ~72 oz/day. Drink all day, not just at practice.
- ✓ Check your resting heart rate every morning. Normal = train as planned. Elevated 5–10 bpm = ease up. Elevated 10+ bpm = rest day.

PART V

The Mental Game

Chapter 12 — Race Strategy & Mental Toughness

Fitness gets you to the starting line. Your brain determines what happens after the gun goes off. The best runners in the world still lose races when they panic, go out too fast, or let negative thoughts take over. Mental toughness is not something you are born with, it is a skill you build, just like threshold pace or hill strength.

Have a Plan

"Go out as hard as I can and try to hold on" is not a race strategy. It is a recipe for a terrible second half and a slower time. Every race should start with a plan: what pace you are targeting, where you expect it to get hard, and how you are going to respond when it does. Course walkthroughs are a great time to refine this plan.

"A lot of people run a race to see who is fastest. I run to see who has the most guts."

— STEVE PREFONTAINE

Even Splits vs. Negative Splits

The most efficient way to run a 5K is with even splits (running each mile at basically the same pace). This spreads the workload evenly and prevents the lactate blowup that comes from going out too fast. An even better strategy is the negative split: running the second half slightly faster than the first. It takes discipline, but it puts you in position to pass people who went out too hard.

The First Mile Trap

The opening mile is where most races are lost. Adrenaline, crowd energy, and the urge to keep up with faster runners pull you out too fast. Here is the math: going out just 10 to 15 seconds too fast in mile one can cost you 30 to 45 seconds by the finish because the anaerobic debt you built up early has to be "paid back" with interest. Know your goal first-mile split before the gun goes off and stick to it.

Course Strategy (XC)

In cross-country, the course matters as much as the competition. If you can, walk or jog the course before the race. Figure out where to push (downhills, flat sections after

turns), where to protect your effort (long uphill, soft ground), and where to make your move (the final 800 meters). Position yourself early getting boxed in a big pack wastes energy from constant adjustments.

Mental Skills for Racing

Focus on the Process

The best thing you can do during a race is focus on what you can control right now — your cadence, your breathing, your arm drive, your posture, staying relaxed. When your brain is locked on executing the process, there is no room for panic, doubt, or spiraling negative thoughts.

Break It Into Pieces

A 5K feels like a lot when you think of it as one thing. Break it into pieces: three one-mile efforts, or five one-kilometer chunks, or even shorter landmarks. Focus only on the piece you are in. The next one will take care of itself.

Reframe the Pain

Pain is going to happen in a race. That is not a question. The question is how you interpret it. The burning legs, the labored breathing, the voice in your head saying "slow down" those are signs that you are working hard, not signs that something is wrong. The best runners do not feel less pain. They just interpret it differently. "This hurts because I am running my best" is a very different thought than "this hurts, I need to stop."

"The hard part is getting to that point, because the ticket to victory often comes down to bringing your very best when you feel your worst."

"Most wars are won or lost in our own heads."

— DAVID GOGGINS

Pick a Mantra

A mantra is a short phrase you repeat when it gets hard. It interrupts negative thought loops and redirects your focus. The best mantras are short, positive, and personal. Some examples: "Light and fast." "Relax and drive." "I belong here." "Strong." Pick one before the race and have it ready for when you need it.

Building Mental Toughness in Practice

You do not develop mental toughness on race day. You build it every day in training:

- Practice pacing discipline during tempo runs. Resist the urge to go faster than you are supposed to.
- Run the last rep of every interval session at your fastest pace. Train the habit of finishing strong.
- Practice positive self-talk during long runs when fatigue kicks in.
- Visualize your goal race: the course, the competition, your splits, how you respond when it gets hard.
- Embrace the discomfort of threshold workouts. That uncomfortable feeling is literally where you get better.

Racing is a skill. Like any skill, it gets better with practice. The runners who train their minds as carefully as they train their bodies are the ones who show up on race day and perform at their best.

KEY TAKEAWAYS	
✓	Every race needs a plan. Know your splits and your strategy before the gun goes off.
✓	Even or negative splits beat going out too fast. A 10–15 second mistake in mile one costs 30–45 seconds at the finish.
✓	Focus on process (cadence, breathing, posture) instead of outcome (time, place).
✓	Pain during a race is normal. Reframe it as evidence of effort, not a reason to stop.
✓	Mental toughness is built in practice — every hard workout is a chance to rehearse.
✓	Pick a mantra. Have it ready. Use it when it counts.

APPENDIX

PRC Training Resources

Appendix A — PRC Training Pace Charts

Based on Jack Daniels' VDOT Running Formula corresponding to Chapter 3: Training Paces & Their Purpose.

Chapter 3 defines five training paces. The table below shows how each maps to Jack Daniels' VDOT training zones. Find your 5K PR in the charts that follow to see your exact training paces.

Chapter 3 Term	Daniels Zone	Description
Zone 2	Easy (E)	65–79% VO ₂ max. Conversational. Builds aerobic base, capillaries, and mitochondria.
Threshold	Threshold (T)	88% VO ₂ max. Comfortably hard. Improves lactate clearance. Sustainable ~60 min.
Race Pace	5K Race	Your current 5K average mile split. Simulates race conditions.
Finishing Pace	Interval (I)	98% VO ₂ max. Hard 2–6 min efforts. Builds VO ₂ max and finishing kick.
PR Pace	Repetition (R)	105% VO ₂ max. Fast, short reps with full recovery. Builds speed and economy.

How to Use These Charts

Find your current 5K personal record in the left column. Your VDOT value is listed next to it. Read across to find your Daniels-calculated training pace for each workout type. As your fitness improves and you set a new PR, move up the chart and recalculate all your training paces.

Training Paces Per Mile

All paces in min:sec per mile. Easy pace shown as a range.

5K PR	VDOT	Easy (Zone 2)	Threshold	Race Pace	Interval (VO2max)	Repetition
16:00	64.6	6:04–7:07	5:34	5:09	5:06	4:49
17:00	60.2	6:26–7:32	5:53	5:28	5:24	5:06
18:00	56.3	6:47–7:56	6:13	5:48	5:42	5:23
19:00	52.9	7:08–8:21	6:32	6:07	6:00	5:40
20:00	49.8	7:30–8:46	6:52	6:26	6:18	5:57
21:00	47.0	7:51–9:10	7:11	6:46	6:35	6:14
22:00	44.5	8:12–9:35	7:31	7:05	6:53	6:31
23:00	42.3	8:33–9:59	7:50	7:24	7:11	6:48
24:00	40.2	8:54–10:23	8:10	7:43	7:29	7:05
25:00	38.3	9:15–10:47	8:29	8:03	7:47	7:22
26:00	36.6	9:36–11:11	8:48	8:22	8:05	7:38
27:00	35.0	9:57–11:35	9:08	8:41	8:22	7:55
28:00	33.5	10:17–11:59	9:27	9:01	8:40	8:12
29:00	32.1	10:38–12:22	9:46	9:20	8:58	8:29
30:00	30.8	10:59–12:46	10:05	9:39	9:16	8:46
31:00	29.6	11:19–13:09	10:24	9:59	9:33	9:03
32:00	28.5	11:40–13:32	10:43	10:18	9:51	9:20
33:00	27.5	12:00–13:55	11:03	10:37	10:09	9:37
34:00	26.5	12:21–14:18	11:22	10:57	10:27	9:53
35:00	25.6	12:41–14:41	11:41	11:16	10:44	10:10

Track Workout Splits

5K PR	T Pace 400m	I Pace 400m	R Pace 400m	T Pace 800m	I Pace 800m	R Pace 800m
16:00	1:23	1:16	1:12	2:46	2:32	2:24
17:00	1:28	1:20	1:16	2:56	2:41	2:32
18:00	1:33	1:25	1:20	3:05	2:50	2:41
19:00	1:38	1:29	1:25	3:15	2:59	2:49
20:00	1:42	1:34	1:29	3:25	3:08	2:57
21:00	1:47	1:38	1:33	3:34	3:17	3:06
22:00	1:52	1:43	1:37	3:44	3:25	3:14
23:00	1:57	1:47	1:41	3:54	3:34	3:23
24:00	2:02	1:52	1:46	4:03	3:43	3:31
25:00	2:07	1:56	1:50	4:13	3:52	3:40
26:00	2:11	2:00	1:54	4:23	4:01	3:48
27:00	2:16	2:05	1:58	4:32	4:10	3:56
28:00	2:21	2:09	2:02	4:42	4:19	4:05
29:00	2:26	2:14	2:07	4:51	4:27	4:13
30:00	2:30	2:18	2:11	5:01	4:36	4:21
31:00	2:35	2:23	2:15	5:10	4:45	4:30
32:00	2:40	2:27	2:19	5:20	4:54	4:38
33:00	2:45	2:31	2:23	5:29	5:03	4:47
34:00	2:49	2:36	2:27	5:39	5:11	4:55
35:00	2:54	2:40	2:32	5:48	5:20	5:03

Training Notes

- ✓ Easy runs (Zone 2) should make up 80–90% of your weekly mileage. If you cannot hold a conversation, slow down.
- ✓ Threshold sessions work best at 1–2 per week. Total T-pace volume should be 20–40 minutes per session.
- ✓ Interval (I) repeats should total 8–10% of weekly mileage, with equal-time recovery jogs between reps.
- ✓ Repetition (R) reps are short and fast with full recovery. Focus on form and speed, not endurance.
- ✓ Adjust for conditions: add 10–20 sec/mile for heat, humidity, hills, or trails.
- ✓ For progression runs: start at your Easy pace and build through Threshold to Race Pace.
- ✓ Paces are calculated using the Daniels/Gilbert VO₂ formula. Your actual ideal training paces may vary slightly based on individual physiology.

Appendix B — PRC Warm-Up Quick Reference (Chapter 7 Cheat Sheet)

Print this page and bring it to practice. Complete Ground Work first (5–7 min), then Dynamic Warm-Up (8–10 min). Do both before every training session and every race.

Ground Work Routine (5–7 minutes)

Exercise	Quick Reference
Sun Gods	Arm circles forward & back, gradually bigger. Core tight.
Neck Circles	Slow full circles, 5–8 each direction. Pause on tight spots.
Reach-Throughs	Hands & knees, thread arm under body. 6–8 reps/side.
Donkey Kicks	Hands & knees, kick leg back, hips level. 10–12 reps/side.
Cat-Cows	Arch up (cat), drop belly (cow). 8–10 slow cycles.
Standing Leg Swings	Forward/back then side-to-side. 10–15 swings each.

Dynamic Warm-Up Routine (8–10 minutes)

Exercise	Quick Reference
Heel Walks	20m on heels, toes pulled up. Prevents shin splints.
Toe Walks	20m on balls of feet. Warms calves & Achilles.
Butt Kicks	20m, heels snap to glutes. Warms hamstrings.
High Knees	20m, knees to waist height. Fires hip flexors.
Carioca	40m sideways, crossing legs front & back. Hip rotation.
Hurdle Walks	20m each direction. Opens hip joint in rotation.
Walking Lunges	20m deep lunges. Knee over ankle, not past.
Lunges + Reach Back	20m, reach arms up & back at bottom. Hip flexors + upper back.
A-Skips	20–30m, drive knee high while skipping. Running mechanics.
Reverse → Sprint	40m, backward chop steps then sprint. Left & right turns.
High Knees → Sprint	40m, high knees then transition to full sprint.
Strides	3–4 x 100m at race pace. Relaxed, tall, full recovery.

Appendix C — Strength Training Quick Reference (Chapter 8 Cheat Sheet)

Do these 2–3 times per week, after running or on cross-training days. Start with bodyweight only. Add weight when form is solid. Quality over quantity — every rep should be controlled.

The Exercises

Exercise	Quick Reference
Leaning Calf Raises	Lean into wall, rise on 1 foot, lower slowly. 12–15 reps/side, 2–3 sets.
Tibialis Raises	Back against wall, feet out. Lift toes to shins, hold 1 sec. 15–20 reps, 2–3 sets.
Bulgarian Split Squats	Rear foot on bench, lunge down on front leg. 8–12 reps/side, 2–3 sets.
Heel Tap Squats	Stand on step, 1 leg. Lower until opposite heel taps. 8–10 reps/side.
Glute Bridges	On back, knees bent. Drive hips up, squeeze 2 sec. 12–15 reps. Progress to single-leg.
Hip Thrusts	Back on bench, drive hips up until thighs parallel. 8–12 reps, 2–3 sets.
Fire Hydrants	Hands & knees, lift bent knee to side, hips level. 12–15 reps/side.

Key Reminders

- Every stride hits your body with 2–3x your bodyweight. Strength prepares you for that.
- Single-leg exercises are king: split squats, calf raises, heel taps, single-leg bridges.
- Tibialis raises are the #1 exercise for preventing shin splints. Do not skip them.
- Glutes are your running engine. Bridges, thrusts, and fire hydrants keep them firing.
- Bodyweight is enough. Consistency beats intensity. 2–3 sessions/week is all you need.
- 63% of competitive young runners who strength train do it specifically to prevent injuries.