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# THE "SIMPLEST" FINGER TRAINING PROGRAM

↔ WITH DR. TYLER NELSON ↔



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By Matt Pincus Published On: August 15th, 2019

Categories: Boulder Strength And Power, Training Tips, Tyler Nelson

15 Comments

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**Learn More from Tyler:** If you want to work with Dr. Tyler Nelson on an individual basis for injuries or strength training, he offers [remote consultations](#) to people all over the world. He also teaches [online](#)

[classes](#) on strength training and injuries. [Learn more.](#)

The idea that finger strength is an important factor in climbing performance is a well-established fact. As a community, we've also accepted certain assumptions about training finger strength, including that hanging from a hangboard is the most effective way to improve finger strength. While I won't argue that the hangboard is an invaluable climbing training tool, our assumptions about how to use it, including that you should train in a full crimp or that hangs need to last for a certain duration (think 10-second max hangs), can be limiting.

It's with challenging some of these assumptions in mind that we give you this article by [Dr. Tyler Nelson](#), a sports scientist and climber who owns a chiropractic sports medicine clinic and strength and conditioning business in Salt Lake City. In it, Dr. Nelson outlines his take on the "simplest" finger training program.

Note: This article has been so popular that we did a [podcast episode about this same topic](#) with Dr. Tyler Nelson.

Now, if you've read any of Dr. Nelson's [other articles](#) on [TrainingBeta](#), you're aware that "simple" isn't really his forte. However, with this finger training program, Dr. Nelson has created an easy to follow protocol based on the latest sports science research on isometric muscle contractions. You don't need any equipment beyond a hangboard, and Tyler believes this program is suitable for climbers of all ability levels. Give it a look, but prepare to keep an open mind about how you utilize the hangboard. Also, remember that simple doesn't mean easy: For this

program to be effective, you still need to show up and put the hard work in...

# The “Simplest” Finger Training Program

Tyler Nelson DC, MS, CSCS

[Camp4 Human Performance](#)

It's very apparent to anyone who's been climbing for over a few years that having strong fingers is incredibly important for progressing in the sport. When it comes to training finger strength, there is a spectrum of programs that range from simple to complex, and it's important to understand that there's a time and a place for both.

The simplest forms of finger training are generally more suited to beginners to the sport and the more complex programs reserved for those at the advanced level. This is because athletes with a larger training age (years climbing and training) require more unique stimuli (added load, 1-arm hangs, micro edges) to create further adaptation, whereas those newer to the sport just need some dedicated finger training which can take the shape of hanging on their fingers and climbing harder routes.

If you've read my previous articles on TrainingBeta, you already know that I usually lean towards creating nuanced finger training programs. As a coach, my athlete assessment panel and programming entail precise measurements of force and the time it takes the finger flexors to create that force. This allows me to be as accurate as possible when prescribing training loads specific to each individual. To some climbers that hits home, but for others, it misses the mark due to its complexity, and that is ok. Not everyone is interested in minor details or has the tools necessary to

apply this type of intervention. **So, here's the good news. You can cover all the components necessary to make your fingers stronger with just one tool: the hangboard.**

Based on 2019 review papers in the *Scandinavian Journal of Science and Medicine in Sports*\* on isometric muscle contractions, I've created this program for climbers, both beginners and experts, looking to make finger training as simple as possible. No weights added, no scales to measure with, and no pulley system used. Just a hangboard with multiple edge sizes. This could be a board fixed to the wall of your home or even a portable one you use while on the road. My personal preferences are the [Tension Climbing Grindstone](#) (home), or portable [Flashboard](#) (road). I like the feel and comfort of the wood on my fingers and really appreciate their craftsmanship.



Because this program is advertised as “simple,” I need to make it very clear that by simple I mean in its application, not necessarily that the workouts will be easy. My goal here is to be clear and straightforward in the description of each component of the program and its rationale so that anyone can incorporate this program into their training. Doing the work and trying hard is still on you.

# A Few Things to Understand First

To make our fingers stronger for rock climbing, we need to develop a few very important things:

1. Muscular recruitment and size
2. Density in the tendons, phalanges (bones), and pulleys
3. Adequate blood flow (capillary density)
4. Stiffness of the entire system to exert force rapidly

Let's briefly discuss how each of these mechanisms works:

## 1. Muscular Recruitment and Size

By developing muscular recruitment and size, we train the nervous system and muscles to produce more overall force but do so slowly with low to zero velocity. To do this, we need to either pull on something at max effort (overcoming isometric) or hold onto something until our muscles fail (yielding isometric).

By trying hard (over 85% effort) and pulling for 3-5 seconds we can recruit the largest muscle fibers of the finger flexors. By holding onto an edge at a lower intensity (40-70%) for 30-45 seconds, or failure, we cycle through all the fibers of the finger flexors. This quickly fatigues the small fibers and ultimately ends in using the largest muscle fibers as well.

By training, we gain more overall force potential (maximum strength), but also better capacity to produce force for a longer period (endurance). In addition to more recruitment, we also gain muscle size in the form of fat-free mass (hypertrophy). This can add additional force potential but slightly less endurance. This component generally comes from holding on to failure each set.

## 2. Connective Tissue Density

The next thing we need to discuss is how to increase the density (collagen thickness) and stiffness of the tendons, ligaments, and bones that allow our muscles to create movement across a joint. After all, these are the real limiting factors in most climbers' ability to grasp small holds quickly, and not fall off.

A hard-to-visualize principle is that when we grab onto something statically (no objective joint movement) and hold for an extended period of time (30-45 seconds) our tendons are stretching slowly. As the tendon continues to stretch the individual fibers within it slide next to each other. This sliding disrupts the chemical bonds that attach the fibers as a unit. If we follow this type of slow static loading with adequate rest and nutrition, over time we create more bonds and thus denser connective tissues. While we load the tendons of the finger flexors, we also get stress (perpendicular force) to the pulley system of the fingers and the bones to which they attach.

By creating denser connective tissue, we create a more robust system overall. This means the fingers are not only capable of creating more force, but are also more resistant to injury and capable of withstanding the stress of hard climbing.

## 3. Adequate Blood Flow

To fuel muscle work and remove waste products, we need an adequate blood supply to the working tissue. This comes in the form of blood vessel density surrounding the finger flexor muscles. If you're a route climber, you need to fuel those muscles with oxygen as long as possible and if you're

bouldering you need to clear out waste products between attempts.

We train better blood flow to the working tissue through a couple of different mechanisms. We can build up the metabolic byproducts in our muscles intentionally (4×4 type training), then rest before doing it again to train the system to work with partial clearance. We can also train right below the threshold of accumulating metabolic byproducts (ARC training) to force better working blood supply and cellular metabolism. Finally, we can severely reduce the blood flow to working tissue (blood flow restriction training and isometrics) in order to force anaerobic modes of energy production chronically.

When we consider training blood flow on a hangboard it comes in the form of the last mechanism – severely restricted blood flow – even when not using tools like blood flow restriction bands. That's because we use levels of muscle work (30-50% and above) adequate to create full compression on the blood vessels of the finger flexor muscles. This disallows new blood to and from working muscle, which creates hypoxia locally. Long term this creates more efficient use of oxygen when it is available.

#### **4. Rates of force development and Muscle-tendon stiffness**

The final component, or icing on the cake, that ties everything together is improving the rate at which force is generated in the finger flexors. Just as the name implies, it is literally the rate (time in milliseconds) at which force is exerted through the muscle-tendon unit to the joints of the fingers. To best optimize this component of our finger training, we need to have already worked on tendon density

and recruitment. The reason for this is that training recruitment gives us the strength that we are then trying to apply with speed and training density makes the muscle-tendon unit robust enough to tolerate the forces created by rapid loading. Once these attributes have been trained, by using moderate to high intensity (40-80%) muscular work for 1-3 seconds, we can focus on moving/creating force as quickly as possible.

By training force production rapidly, the tendons stretch less while the muscles shorten as quickly as they can. This produces an overall slight reduction in force but creates the contact strength and stiffness necessary to be dynamic on the wall.

## **How do we train each with a simple tool like the hangboard?**

### **Hangboard Workout 1: Recruitment Pulls**

Recruitment pulling is the high-intensity finger training portion of this program. To get the intensity right all you need to do is find a few specific edge sizes, get fixed underneath them with the board overhead, and pull with max effort, 1 arm at a time, for 3-5 seconds. When positioning for this, I suggest that people get set up with a large elbow angle (120-150 degrees) and not with the elbow in full extension.

It's important to point out that we are not necessarily hanging on the board here, but are pulling vertically downward with muscle force through the entire upper extremity. If you're strong enough to do a 1-arm hang, that's great. Find an edge size that you can hang on for approximately 5 seconds with 1 arm. If you can't do a 1-arm



hang, no need to worry. The goal is to try and generate enough force to lift your body off the ground, even if you can't. As long as you are pulling with maximal effort, you will get the appropriate stimulus even though your feet don't leave the ground.

An important thing to note about this movement is the speed at which you develop force. The goal is not to grab and pull as fast as you can for 5-seconds. The goal is to slowly bring on the pulling force for 1-2 seconds, then really grip down as hard as you can for the remainder of the time (3-5 seconds). This allows the largest muscle fibers to be engaged during the last few seconds of the effort. It should feel similar to the speed of a max hang.

Whether you are hanging or pulling, progress by trying hard and using smaller edge sizes to hang on.

### Recruitment pull - open hand



## Recruitment pull - half crimp



## Hangboard workout 2: Density Hangs

Density hangs are the lower intensity, longer duration portion of this program. To get the intensity right here you want to find a few specific edge sizes that you can hang on with 2-arms for approximately 20-40 seconds. In this case, you could use either a large joint angle at the elbow or use a fully extended elbow position. This portion of the protocol will look like a long duration hang on the board and is the most similar to what you've probably done in the past.

The goal here is to hang to muscular failure. I use the term density hangs here to refer to both the tendons and the finger flexor muscle density, which are improved through long-term contractions to failure. With longer hang times at reduced intensity, we create new bonds in the tendons but also some cross-sectional area (hypertrophy) to the muscle fibers themselves.

Progress by increasing the time to failure on the chosen edge size or drop the edge size if you can hit 30-seconds easily.

### Density hang - open hand



### Density hangs - half crimp



## Hangboard workout 3: Velocity pulls

Velocity pulls are moderate to high-intensity efforts done for a short duration. Once you get to this portion of the program, you'll have already established the edge sizes from the previous two workouts and now will focus on the rate at which you develop force on those edges. These can be done with either one or two arms depending on the intensity you can tolerate.

At its simplest, you would stand under the board with your arm at 120-150 degrees of flexion with your fingers slightly engaged on the edge and pull down as fast as you can, or "hop" onto the board. As with the recruitment pulls, we aren't necessarily hanging here, but just pulling with the intention of creating force quickly.

When doing velocity pulls, I always recommend starting with slight tension into the hold (10-20% max) before pulling down fast. This creates less shock load to the pulleys and also gets the muscle-tendon unit engaged to pull down as rapidly and hard as possible for 1-3 seconds. If you were performing these 2 arms at a time, you would simply get set up with some tension and quickly lift your feet off the ground and hold on with your fingers at the same time. The most advanced progression would be to fully load a 1-arm hang quickly for a total of 3 seconds.

What matters most with stiffness training is the rate of force development in the first quarter of a second, which is why the focus on speed is so important. However, some research has shown that maintaining that force for up to 3 seconds produces better dynamic performance. If we think about force production for climbing, this principle makes sense as it's more specific to how we engage holds when climbing.

Progress by using smaller edge sizes or being able to 1-arm load for more reps.

### Speed pull 1-arm



## Speed pull 2-arm



## Implementing the Program

Hopefully, by now you've got a basic understanding of the different types of training interventions and what they target. The reason you can train all of them with the same tool is based on your ability to manipulate the intensity, time under tension, and the rate at which you apply force to the fingers on your board. Applying force at the high intensities slowly trains recruitment. Applying lower-intensity force for long durations to failure trains hypertrophy and connective tissue density. Moderate to high-intensity work done very rapidly trains contact strength and stiffness. Simple and you cover all your bases!

Now let's discuss how to implement all these principles this into an actual finger training program.

## You Have Total Control

The reason I think this is practical for both beginners and experts is due to the autoregulatory nature of force in the finger flexors. A beginner pulling hard on their fingers on a 20mm edge is likely producing 30-50% of their body weight, where an expert might be pulling 100-120% of theirs. For the density hangs, the beginner likely will be

hanging on a jug or 35mm pocket where an expert will be hanging on a 15 or 10mm edge to failure. With the velocity pull workout, the expert will be pulling their body weight in force around 1.5 seconds where the beginner will only get to 40% body weight. As you can see, those are huge force differences which are regulated automatically by the strength and stiffness of each individual's fingers. So, as long as each athlete understands the principles of the workouts, is properly hydrated, fed, rested, and giving a good effort, this program will work for anyone.

## **When and How Long – What the Program Looks Like**

When to do a hangboard workout is entirely up to an athlete's schedule and where it fits within the rest of their training program. Personally, I think the time that you can get it done is the best time to do it, so long as it's not right after or before your climbing-specific work. The one exception here would be a few recruitment pulls before climbing, which serve as a final warm-up for climbing.

I am also a big fan of training the fingers on the same day as your climbing day but separated by at least 4-6 hours. The fact that you can do this all on a hangboard, which you likely have at your house, makes this manageable for mostly everyone. The rationale for having multiple training sessions in a day separated by a long break is to give the finger pulleys enough time to return to their normal shape and get hydrated before loading again.

In regards to the frequency, 2 days per week separated by two days of rest is an ample stimulus for beginners. For experts, I think 3 days per week is optimal.

Some general programming ideas:

Workout	Beginner	Expert
Workout 1: Recruitment pulls		
Frequency	2 x / week 4-6 hours after climbing.	2 x / week 4-6 hours after climbing
Grip positions	Two positions of 1-arm pulls: 20mm open hand 20mm half crimp	Two positions of 1-arm pulls (or) hangs: 20-15mm open hand 15-10mm half crimp
Sets	1	1-2
Repetitions	3	4-5
Time under tension	3-5 seconds	
Velocity of movement	Slow	
Intensity	Maximum	
Focus	Force focus (try hard)	
Rest between efforts	60-120 seconds	
Cycle time	4-5 weeks	4-5 weeks

Workout	Beginner	Expert
Workout 2: Density hangs		
Frequency	2 x / week 4-6 hours after climbing. Done after recruitment pulls	1 x / week 4-6 hours after climbing. On a day by itself
Grip positions	Two positions of 2-arm hangs: Easy slope - open hand 25-25 mm half crimp	Three positions of 2-arm hangs: Hard slope - open hand 15-10mm half crimp 10mm full crimp
Sets	1	1-2
Repetitions	2	3
Time under tension	20-40 seconds, or failure	
Velocity of movement	Slow	
Intensity	Moderate to low	
Focus	Slow static loading to muscular failure	
Rest between efforts	3-5 minutes	
Cycle time	4-5 weeks	4-5 weeks

Workouts	Beginner	Expert
Workout 3: Speed pulls		
Frequency	Only performed after cycle of recruitment and density hangs. 2 x / week	2 x / week 4-6 hours after climbing. Done after recruitment pulls
Grip positions	Two positions of 2-arm hangs: Easy slope – open hand 35mm pocket	Two positions of 1-arm pulls (or) hangs: 20mm open hand 20-15mm half crimp
Sets	1	1-2
Repetitions	2-4	5-8 (or) until power drops
Time under tension	1-3 seconds	
Velocity of movement	Fastest	
Intensity	Moderate to high	
Focus	Speed focus	
Rest between efforts	10-20 seconds	
Cycle time	4-5 weeks	4-5 weeks

As a point of clarification, you'll note that I suggest beginners only perform the speed pulls after having completed a cycle of both recruitment pulls and density hangs while experts can do so after only a cycle of recruitment pulls. The reason for this is that, as stated above, the density of the muscle-tendon unit is important for safely withstanding the forces created with rapid loading. We can safely assume that experts (those with a longer training history) can handle these forces while beginners who are new to training/climbing should err on the side of caution and train this attribute first.

## Pairing Finger Training with Climbing and Progressions

There are many ways to program finger training into your climbing schedule during the week. I've already talked about how I prefer doing it later in the day on a climbing day. In addition to performing the finger training later in the day, I'm also a fan of matching the intensity/focus of the finger workout with the focus of the climbing session. This



keeps things simple and assures that you’re addressing all of the components of your finger training. So, if you’re performing a limit bouldering session in the morning you would perform a recruitment/speed pull workout later in the day. If you had a capacity workout, you would do the density hangs and so on. Here is a rough outline. Be sure to leave 4-6 hours between sessions and note that it is no problem to switch them around so you train in the morning and climb in the afternoon.

AM Climb	Limit Boulder	Capacity Climb	Project Boulder
PM Train	Recruitment or Speed Pull	Density Hangs	Recruitment or Speed Pull

## Citations

\* The articles I pulled from are from academic journals that are not open source. The citations are as follows:

- “Isometric training and long-term adaptations: Effects of muscle length, intensity, and intent: A systematic review”; *Scandinavian Journal of Science and Medicine in Sports*; Dustin J. Oranchuk, Adam G. Storey, André R. Nelson, John B. Cronin
- “Effects of plyometric and isometric training on muscle and tendon stiffness in vivo”; *Scandinavian Journal of Science and Medicine in Sports*; Keitaro Kubo, Tomonobu Ishigaki, Toshihiro Ikebukuro
- “Brief Review: Effects of Isometric Strength Training on Strength and Dynamic Performance”; *Scandinavian Journal of Science and Medicine in Sports*; Danny Lum, Tiago M. Barbosa

## About The Author



**Tyler Nelson** owns and operates a chiropractic sports medicine clinic and strength & conditioning business in Salt Lake City. While earning his doctoral degree, he completed a dual program Master's degree in exercise science at the University Of

Missouri. While in graduate school he worked with the University of Missouri athletics department and currently is employed through two colleges in Utah. He teaches anatomy and physiology at a community college and works as a team physician for the Brigham Young University athletics department. He is certified through the National Strength and Conditioning Association as a Certified Strength and Conditioning Specialist and spends any extra time in his life with his wife and three kids or trad climbing in Zion National Park. He has been climbing for 17 years and gravitates toward all-day adventure climbing. His expertise in human physiology and cutting-edge knowledge of strength and conditioning science are what drive him to always challenge the norms in training.

**Learn More from Tyler:** If you want to work with Dr. Tyler Nelson on an individual basis for injuries or strength training, he offers [remote consultations](#) to people all over the world. He also teaches [online classes](#) on strength training and injuries. [Learn more.](#)

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Nigel White July 27, 2023 at 11:55 pm - [Reply](#)

“A beginner pulling hard on their fingers on a 20mm edge is likely producing 30-50% of their body weight”

That’s depressing. I’m still a beginner after 30 years in the sport then!

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**Evan S** January 11, 2023 at 12:34 pm - [Reply](#)

What do you mean by complete a “cycle” of density and recruitment before the velocity pulls? Also, can I do the density and recruitment pulls on the same day? Thanks!

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**Marcus Granli** November 13, 2019 at 12:03 am - [Reply](#)

Hi, some questions have come up after reading this:

1. Isn’t warmup necessary? (This is the first FS protocol I’ve read that doesn’t mention it explicitly)
2. In density hangs, the targeted duration is 20-40s or failure. If TTF (time to failure) is outside of that range, could (or should) adjustments be made by adding weight, or is lower edge size the best adjustment?

Anyways, can’t wait to try this out in early 2020 after upcoming trips! Cheers.

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**Neely Quinn** November 19, 2019 at 4:21 pm - [Reply](#)

Hi Marcus, Tyler asked me to request that you send him an email at [camp4performance@gmail.com](mailto:camp4performance@gmail.com).

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Jason October 26, 2019 at 9:15 pm - [Reply](#)

Love the article but slightly confused on implementation. Should we do one of each style of workout once a week?. Or stick with one workout 2-3x per week for several weeks then move to the next?

Thanks!

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Anonymous November 5, 2019 at 9:45 am - [Reply](#)

did you ever get an answer? I have this doubt myself 😊

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Neely Quinn November 12, 2019 at 10:51 am - [Reply](#)

Hey there, Tyler asked me to request that you send him an email at [camp4performance@gmail.com](mailto:camp4performance@gmail.com) with any question you have. Sorry I can't answer these questions for you! -Neely

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Jason October 26, 2019 at 9:13 pm - [Reply](#)

Are you suggesting that each of the workouts be part of their own training cycle so that it would take 12-15 weeks to complete 1 full cycle of every workout? Or, are you suggesting that the workouts be combined during the week to create a full cycle of all workouts in 4-5 weeks? If we take the expert level as an example, you suggest experts can train three days a week, and that

speed pulls can be done after recruitment pulls, while density hangs should be done by themselves. Combining all of these workouts would fill the three day a week criteria, but I want to make sure I am visualizing this layout correctly. A little clarification would help.

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**John** September 22, 2019 at 5:37 pm - [Reply](#)

What does rest between effort mean? Rest between reps or sets or does the xx-xx, i.e. 60-120 seconds indicate rest between reps and sets. Thanks!

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**AJ** September 3, 2019 at 6:54 am - [Reply](#)

I have a similar question about cycle time as the commentators above. It wasn't very clear. Can you clearing your definition of a 'cycle'?

---

**Scott** August 29, 2019 at 8:07 am - [Reply](#)

Always love the stuff that Tyler is putting out! Question – can we perform the hangboard workouts in the AM and climbing workouts in the PM?

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**Scott** September 3, 2019 at 8:47 am - [Reply](#)

Nevermind – I read the article more closely....

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**Noah** August 23, 2019 at 7:43 pm - [Reply](#)

Rad!

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**Anonymous** August 21, 2019 at 3:18 pm - [Reply](#)

Thanks for the interesting approach, one question:

When you write that the density hangs are done 'after the recruitment pulls', does that mean a density cycle after a full cycle of recruitment pulls or a density workout after a recruitment workout? i.e. can you mix the 3 types of workouts or should you cycle them strictly one after another?

Tom

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Gus Wathen August 16, 2019 at 5:08 pm - [Reply](#)

This was a very informative article. The physiological drivers behind each different hangboard routine seem logical and sound. I look forward to giving this protocol a shot! The one thing that does not come out very clear is the Cycle Time and how it plays within the Program Ideas. Are you suggesting that each of the workout be part of their own training cycle so that it would take 12-15 weeks to complete 1 full cycle of every workout? Or, are you suggesting that the workouts be combined during the week to create a full cycle of all workouts in 4-5 weeks? If we take the expert level as an example, you suggest experts can train three days a week, and that speed pulls can be done after recruitment pulls, while density hangs should be done by themselves. Combining all of these workouts would fill the three day a week criteria, but I want to make sure I am visualizing this layout correctly. A little clarification would help.

Thanks for sharing your knowledge!

Gus



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