

# Strength & Conditioning for Sports Chiropractors

## Dr. Benjamin Stevens

Hello and welcome to an overview of strength and conditioning for sports chiropractors. My name is Dr. Benjamin J. Stevens, and I am a sports chiropractor practicing out of Kelowna, British Columbia, Canada currently. If you have any questions for me after this presentation, please feel free to reach out at [drbenstevens@gmail.com](mailto:drbenstevens@gmail.com).


So we are going to jump right into this here. First of all, what is strength and conditioning? Well, primarily, strength and conditioning, which we're going to call S&C from now on, is a process of physical and physiological preparation of athletes for their sport or activity. And this is accomplished primarily through the design, implementation, and coaching of strength and conditioning programs. And we're going to get into exactly what that looks like a little bit later in this slide show.

So who's involved in the process of strength and conditioning? Primarily, strength and conditioning is actually a non-regulated profession, meaning that you do not need a license to become a strength and conditioning professional. But most professionals in this field would refer to themselves as a strength coach or a strength and conditioning coach.

There are many industry standard qualifications and certifications, and this is often quite dependent on exactly where this coach resides or plans on coaching. So as an example, in the United States, the National Strength & Conditioning Association provides a certification called the CSCS, or the Certified Strength and Conditioning Specialist, which has specific requirements. In Canada, the CSEP, also known as the Canadian Society for Exercise Physiology, has their certification. And in Australia, we have the Australian Strength and Conditioning Association, or the ASCA. You can attain a level 3 strength and conditioning coach. Every country will have something similar to this, or some countries will just use the certifications of other countries, which have more systematic approaches to strength and conditioning.

So in a professional or institutional setting, such as universities or colleges, most strength coaches will have a minimum of a bachelor's degree in an area such as exercise science, human kinetics, kinesiology, physical education, or sports science. And there are a few other variants as well. And a growing percentage, a very quickly growing percentage of strength coaches have master's degrees or something similar as well.

But also outside of the collegiate level and professional level, there are a lot of other variables. So in many places below that, such as high school and middle school in publicly funded programs, it's quite often the head coach that will become the strength and conditioning coach, if there's any strength and conditioning at all. It will often be a skills coach.



Sometimes it'll be athletic therapists, depending on exactly the area, athletic therapists or athletic trainers, depending on where you are. Sometimes it will be physical therapists, physiotherapists, chiropractors. I fulfilled this role as a chiropractor before here in my hometown. Student volunteers, this is a very, very common one. And I've even had this really onto my ice hockey career, I had parents who would act as a strength and conditioning coaches and skill coaches. And in many areas, there is none. There is no strength and conditioning given whatsoever, and there's no coaches, and kids or athletes are left to do their own strength and conditioning.

So primarily, what is the goal of strength and conditioning? Generally, it's to create a favorable adaptation in the athlete which will hopefully transfer to improve performance in their sport and also hopefully in reduced injury risk. So these adaptations can occur in every system of the body, dependent on exactly how you train the body.


You can create adaptations in the nervous system, both peripheral and central, in the endocrine and chemical system, such as hormones, enzymes, organelles, blood cells, the count and function thereof, and the musculoskeletal system, which is something we should all be quite familiar with, the adaptations and everything from bones, muscles, tendons, ligaments, fascia and all the other connective tissues.

So generally, this is all going to start with a study of the sport's demands and standards. So depending on the level, this might just be something that is based on an assumption, or this might be something that is done at an institutional level through addressing the scholarly world, addressing the literature, reading books, attending conferences, whatever it might be.

But strength and conditioning generally starts with understanding the demands and standards of the sport. This technically, in most places, leads into testing and assessment. So testing and assessment can come down to anything from just simple weight measures and body fat percentages and other anthropometric measures, or it can be as detailed as strength and conditioning measures. And there's a wide, wide variety. And it's usually going to be quite contextual and sports dependent.

Once testing and assessment is carried out, typically what ends up happening is a comparison. And we compare to the demands of the sport, and this might come from scientific studies, or it might come from just an understanding of a coach, the contextual standards of performance. So for instance, in Canada, where I reside, every sport will have standards with which you can qualify for a provincial level competitor and national level competitor and international level competitor and so on.

And so many of these-- many of the well-accepted sports will have standards of performance. And then there's also going to be individual context, so for instance weight classes in many of the sports, wrestling being a very good example. There's always going to be context depending on the sport and depending on the size of the person, depending on male or female, depending on a lot of other variables.



So once this is all taken into consideration comes the very important part, which is program design and implementation. This is where all the magic happens in strength and conditioning is through program design and implementation. And over time, ongoing-- let me get back to that-- ongoing retesting and evaluation. Apparently we skipped that little slide.

So how is this goal of strength and conditioning accomplished? Well, the tools of the trade are as such. Generally, there's going to be resistance-based implements, everything from dumbbells, barbells, kettle bells, but also bands, chains. These are called accommodating resistance in some instances, body weight, medicine balls, parachutes, sleds, machines, other forms of free weights, other forms of inclines and declines, all sorts of implements are used.

And these are the tools of the trade that we use to put a different type of resistance onto the body. We also have maneuvering and reaction type implements, things that we have to move the body around or move and implement around, such as hurdles, cones, poles, walls, Swiss balls, et cetera. And then we also have our cardiovascular implements, things such as treadmills and variance there of, stationary bikes, rowers, ski ergs, track and field. And then we have direct cardiovascular training implements that can actually be placed over the mouth, or we can put the athlete into specific environmental factors as well, which will train the cardiovascular and other systems quite differently.


So here's the basics of designing a program. The first thing that we have to consider are the training variables. What kind of exercises? What kind of implements? What range of motion? What contraction mode? And so on and so forth. When I say contraction mode, I mean concentric, eccentric, isometric, or combined. So we have to pick the training variables, essentially what it is exactly that we want our athletes to be able to do.

Then we have to decide exactly the kind of load we want them to use with these movements. So what intensity, as in what percentage of their rep max? How much volume, as in the total amount of work? What speed? What frequency? How long are the rest periods? So on and so forth.

And this will create what we're hoping for adaptations and outcomes, such as speed, strength, agility, hypertrophy, endurance, and a whole other array of different adaptations and outcomes that we could hope for in the strength and conditioning process.

So over time, this whole process we would label as something called the SAID principle, or Specific Adaptation to Imposed Demand. And so the goal of a good strength and conditioning program is to work backwards from the adaptations and outcomes that we desire and create the specific adaptations through training variables and training load.

So the primary variable that most coaches are going to be altering is the load. And the load is generally going to be calculated in two ways. So it is going to be calculated through our volume, and the volume being the total amount of work performed in a specific time frame. And that time frame will be measured differently during different periods.



So it's most easily understood as simply sets and reps with a weight. So 225 pounds, let's say it's a deadlift, a trap bar deadlift, 225 pounds for 10 reps will give us 2,250 total pounds of volume. Now you do that for 10 sets, then you just 10x that volume, and we have [? 22,500 ?] pounds with the volume. So that is how we calculate volume in general.

And then next on the list, we have intensity. So intensity is going to be generally, not always, but generally, calculated as the relative percentage of maximum weight or effort. And again, this will go back to testing, which is done very early on in the process, to give some kind of indication of what a maximum might be, whether a 1 rep max or 3 rep max or something thereof. And so it's generally noted as a percentage of the rep max, and sometimes it's becoming more common to use and RPE, which is short for rate of perceived exertion.

So the next thing we're going to talk about is load types. And so this is something that's becoming very, very common to track nowadays, and it's becoming more common for people to research. So the acute training load would be how much work do the athlete perform today in this session in this short amount of period. It might be a day, it might be a session, it's going to depend on the person. But generally, the acute load is how much work did the athlete perform today.

The chronic load is how much work did an athlete perform during a specific period. So this might be a month. This might be a week. This might be an entire training cycle, which we'll talk about in a minute. But this is something that a lot of coaches are starting to track as well.

And so what we're starting to understand now is that the acute to chronic ratio should be tracked because it can give us indicators as to injury risk in certain sports. Now this is not a perfect science, but most people are starting to go down the road of figuring out that we can-- not predict-- but we can get an indicator of a likelihood of injury risk purely by comparing the acute to chronic workload ratio over time. So something else that we might call the training load to be training load, workload, or volume.

So moving on, there's the last few things that we can vary, that we can change in a program. So there's a lot of variables and one of the things that an excellent coach will be able to do is pick out the variable that needs the change at any given time depending on the desired outcome and the desired adaptation.

So the frequency of training/movements. So some teams, for instance, I've worked with teams that they have one strength and conditioning session a week, and they're operating at a provincial or national level, but in a sport that does not generally have a lot of strength and conditioning, and some of them up to six days a week, depending on the sport and depending on the level of athlete.

The exercise selection and order, that's rather self-explanatory. The rest, so anything between inter-set and inter-workout, so maybe from one set to the next, you have anything from 15

seconds all the way up to five minutes worth of rest. And inter-workout, some athletes are getting three days between workouts. Some are literally getting three hours.

The contraction mode, eccentric, concentric, isometric, or mixed. Some of these will be altered by some coaches. Some of them will not. The tempo, meaning exactly how fast or slow you are doing a movement can be decided and specifically timed. The range of motion should be self-explanatory. The type of resistance would be typically given by the type of implement that we use, the vector, meaning what direction the resistance is coming from.

Speed or intention thereof. The reason we say intention there is because sometimes speed can only be seen from the outside, but the intention of moving fast can actually create a similar adaptation to moving fast itself in certain instances. There is starting or ending position, single versus multiple joints, the complexity of a movement and task, not just the movement and task, but the environment that it is performed, the attentional focus and attention.

So the most commonly altered variable when it comes to attentional focus would be internal versus external locus of attention, which will change the outcome quite often. Blood flow changes, both local and systemic, so these can be focused on through the use of something like a moxie or blood flow restriction or just other general indicators, depending on the adaptation we're looking for both locally and systemically.

We can train through fatigue, to fatigue, or not at all to fatigue, and the same with failure, depending on the adaptation we're looking for. Positive restraints, meaning that we can actually change how someone moves by introducing something into their movement or environment that will make them incapable of moving in a specific way, thus forcing them to move another way.

We have pattern, assist, and resist. There are certain implements and types of resistance that we can use to help our athletes move in a very specific way. Open versus closed chain, we can be reactive, proactive, or creative around our movements and around our resistance, and we can also alter the rate of perceived exertion, which is an inside out type of change.

So as you can see, there's a lot of different things that can go into program design and a lot of them that can become varied over time. And excellent strength coaches and, a lot of the time, excellent therapists that work with strength coaches will begin to get a general sense of how all of these change how the tissues of the body are loaded and the adaptations that the athlete will have as a result.

So the last piece we're going to talk about is periodization. And this is where it all comes together. So we first start with what we call a macro cycle. So a macro-cycle typically constitutes an entire training year. And in most athletes, this will be a year. Sometimes it can be as short as one to two months. Others, it can be up to four years depending on the sport so a macro cycle for an Olympic athlete, that their only form of competition is the Olympics or the competition leading up to the Olympics in a specific year, they may spend two years without doing any actual competition, and as a result have a two-year macro-cycle. But we can have them very, very short as well, such as in a lot of professional sports that may have a very, very short off season. Their training might just end up being a one to two-month off season because their type of sport does not lend itself to training during the season.

Next, we have a meso-cycle. So every macro-cycle will generally have two or more meso-cycles. And these are typically one or more months in length. And they tend to focus on a very specific goal, building towards a specific outcome. So that specific goal might be a hypertrophy cycle. It might be a strength cycle. It might be power cycle, or it might be something completely different which is contextual depending on the sport, depending on the coach, depending on the athlete.

So within each macro-cycle, we usually have at least two, potentially more, meso-cycles. Underneath those meso-cycles, we quite often, again, have micro-cycles. So within each meso-cycle, we have usually two or more micro-cycles, typically much shorter, one to four weeks in length, and tend to focus on daily and weekly training variables.

So this might be the kind of movement that a person is doing this might be rest periods. This might be a whole array of different things that you could treat that you could change one workout to the next, all generally trying to support the overall goal of the meso-cycle. So every micro-cycle should feed towards the goal of the meso-cycle that it is in. And all of the meso-cycles together should train towards the ultimate goal of the macro-cycle, which is the large, overarching goal that we are going to take an athlete and put them through. So macro-cycle is largest. Meso-cycle, there's several inside of a macro-cycle, and micro-cycles, there's several, if not many, inside of a meso and macro-cycle. And I realize that the verbiage on that makes it hard to follow.

But we have come full circle to our takeaways. So here's the implication is that we need to be able to take away as sports chiropractors. So first, resistance training can equal injury prevention. And this is primarily dose dependent. Not enough training, not enough strength and conditioning actually leaves most athletes more susceptible to injuries, but too much training can actually lead them susceptible to injuries as well. And this can be fickle but it is very dose dependent.

So as a result, resistance training can also be injurious. It can either prevent injuries or can cause injuries. And it's going to depend on how you train, and it's going to depend on the volume and dose of the training. It is very, very important for us to collaborate, because generally as a chiropractor, especially a sports chiropractor, there's going to be an overlap in roles.

So most strength coaches are going to take it upon themselves to help their athletes get better at preventing injuries and working through injuries. As a result, it is their job and yours to collaborate and make sure the athlete gets the best possible service to prevent injuries, as well as work through them. And another thing-- the last thing that we really need to make sure that we understand is that our therapy can act as load. Take the extreme example of a really long, really deep tissue massage. If you've ever experienced that sort of thing, you can walk out of a massage room after an hour and a half, and you can feel just obliterated. You can feel really tired and feel like you've got a really hard workout.

So at a certain end, therapy can equal load, to the nervous system, to the musculoskeletal system, and to the tissues. And so that's something that if you're going to be working with a team, and you're going to be working with people in strength and conditioning, you need to understand where your therapy fits in and start to work towards a deeper understanding of how that can integrate into the rest of the program. And all training variables, including what you do, can alter musculoskeletal adaptations.

So I realized this was a very quick overview of the strength and conditioning process and what it means for sports chiropractors. If you have any more questions, feel free to reach out to me personally [drbenstevens@gmail.com](mailto:drbenstevens@gmail.com). I would like to take this opportunity to thank FICS and Northwestern Healthcare Sciences University and their Human Performance Center specifically for welcoming me to do this presentation. I look forward to chatting with more of you in the future. Take care.