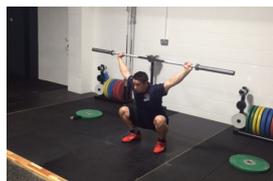


Your most
common
questions
answered.
FREE!



**CAN ANYONE DO
OLYMPIC
WEIGHTLIFTING?**



**DOES CAFFEINE
IMPROVE TRAINING
PERFORMANCE?**



**WHAT ARE BUMPER
PLATES AND DO I
NEED THEM?**



Goals? Train for performance!

The biggest single thing I believe overhauls a stagnant training process is the setting of new and meaningful targets. For competitive athletes the goals are always winning the right competitions at the right time, if not to win all the competitions all of the time. For those people who, like myself, are putting themselves under the microscope or choosing to compete in a sport at their own leisure, regular achievable milestones are helpful to increase motivation. Not all goals are created equal - I like to know both long and short term goals of an athlete or client before starting the planning process. I suggest having a 4 week, 12 week and year long target that marry-up and lead sensibly into the next. Olympic athletes plan 4 years ahead but measure progress frequently on the way. Sometimes the end goal can seem out of touch and too grandiose. Fewer smaller, more manageable targets help keep you on track.

**“If you train to
improve your
sport, training is
secondary.
Success is winning
and getting better,
not doing more in
the gym”**

Does balance training really improve balance?

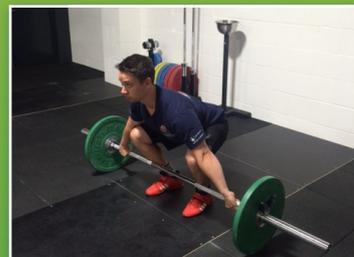
When we talk about balance from a strength and conditioning viewpoint, we mean 'is the athlete/trainee able to maintain the required position to play the sport, perform the skill, and remain uninjured'. Bio-mechanically this means is the centre of mass over the base of support, and if not, does the athlete have the strength to control it where it is or bring it back?

So, as you'd guess by reading an S&C coaches material, I'm concerned with two things here. Strength most obviously and skill second. It doesn't matter how good an athlete is if they cannot produce enough force to use that skill in unpredictable scenarios.

Research tends to think of balance training as that which is performed on something unstable - a Bosu ball, wobble boards and such. The research is fairly clear, for rehabilitation of ankle injuries, these type of unstable surfaces are brilliant (Rozzi et al., 1999). Its down to what is actually being trained - not what exercises you really do on it. What's happening at the ankle is key, not further up the chain. Proprioceptors around a joint feedback information to the brain and let you know whether you're about to fall over or hurt yourself. When you're already injured, these can become damaged or inhibited by pain so you NEED to retrain them. However, if you aren't injured, and trying to train balance, being on an unstable surface provide little to no training effect as this study on older men found: "Unstable surface training may not be effective in improving balance among persons for whom balance is not problematic" (Schilling et al., 2009).

Effects may even be detrimental to strength development. Imagine that the brain has a limited

Being able to hit the key positions is prerequisite to lifting big weights



As a weightlifting coach I want to teach as many people to lift as I can. Anyone willing to spend their time learning to lift has my respect. That said, it is much easier to learn the snatch and clean & jerk if you can already squat well, have good overhead mobility and some posterior chain strength.

amount of computing power (it kind of does). Some of this power goes to the ankle and keeps you stable, meaning that less can be at the primary muscles and joints you intend to train (Cressey et al., 2007). This means that you tend to get better at doing that exact thing - your brain can adapt to require less information at the ankle and give more juice to the hip for example - but this doesn't really transfer well to stable surfaces, you know, like the... err...ground.

You only really need to train balance when something has prevented you from being able to balance. Otherwise your time is better spent gaining strength to control your centre of mass (think middle of torso normally) which by default makes you better at balancing. Many sports are played on one foot at a time but very few are played on a wobbly surface. Skiing, ice skating and trampolining are some examples where balance training may have some value due to the nature of the playing surfaces but only in trampolining are you barefoot and able to control the distal lower limbs fully.

**Just remember that balance is really just using your strength to control your mass.
Increase strength relative to mass and it's easier to balance.**

Coffee and caffeine: does it make you train more effectively?

I'm a coffee drinker. A coffee lover in fact, so I'm aware of my bias on this one. What does some objective research recommend?

For a long time caffeine has been considered an ergogenic aid. This means that the "scientific body" describes caffeine as having a performance enhancing effect. Don't rush straight away to buy a huge can of 'Monster'. The dosage and timing also influence how much of an effect each person will gain, depending on dose per kg of body weight and each individuals sensitivity to this stimulant.

Lets explore how caffeine works. For those without a degree in pharmacology or exercise science, there are a few fairly complex ideas here but don't skip past it, bare with me...

- Caffeine is considered an illegal stimulant once above 12_{ug}/mL in pro-athletes.

- Caffeine can cross the blood/brain barrier and influence the neurotransmitter balance.
- Caffeine effects the central nervous system by blocking adenosine receptors.
- Caffeine effects multiple tissues within the body thus affecting multiple systems
 - In addition to the CNS, caffeine can influence metabolism and energy production, even increasing fat oxidation.

(Nutrition in Sport - Maughan, 2008)

All of this adds up to thinking coffee is the best pre work out ever right? Well, as always in sports science, the answer is it depends.

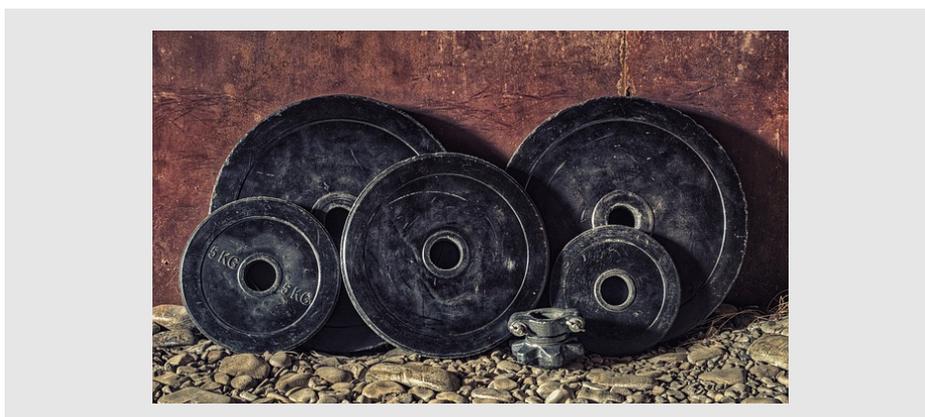
- Sensitivity to caffeine is largely individual. Body weight is one factor, hydration may also change the plasma concentration of caffeine changing the immediate effects.
- It takes between 40-80mins for concentrations to peak but again this varies among individuals.
- I've personally been part of a caffeine study in which I was given a placebo (unknowingly at the time of course) but was certain my heart rate increased and that I was experiencing a 'buzz'. I didn't perform any better than usual - disappointingly - but I was aware that the feeling of having had caffeine (though I hadn't), made me think I was working harder. I genuinely thought I tried harder on the tests.
- Longer duration aerobic exercise and short term strength and power exercises are both shown to be affected by caffeine supplementation.

What's the optimal dose and how do I get that in a drink?

Caffeine ingestion (3–13 mg · kg⁻¹ body mass) prior to exercise increases performance during prolonged endurance cycling and running...Caffeine doses below 9 mg · kg⁻¹ generally produce urine caffeine levels below the IOC (International Olympic Committee) allowable limit of 12 mg · ml⁻¹.

In the average home brewed cup of black coffee there is around 95mg of caffeine but this can reportedly vary from ~50-140mg. Factors like the beans, the roast and obviously the serving size can effect the dosage (Authority Nutrition online). This means a person weighing 80kg consumes approximately the 'right amount' of caffeine for performance enhancement after two cups of coffee.

My personal choice tends to be on the side of slight excess and average intake is around 2-3 coffees on a training day and cut back to 1-2 on non-training days. I've trained people that have far more than this and because they never stop this intake it's impossible to say if they'd perform better with or without it. The main point for me is to stop caffeine consumption prior to around 4pm and ensure that sleep is good quality. If you are relying on huge amounts of caffeine to get through each day, maybe it's time to put your lifestyle under the microscope.



Bumper plates - even the cheapest gym chains are buying them, but why?

Bumper plates - the big, slightly more intimidating weight discs that are now in most commercial gyms - are important. 100kg is not always the same shape and size and for very good reason.

Bumper plates look great, and make a cool noise when you drop them. You're allowed to drop them for a start, that's kind of the point... Metal plates and traditional plastic coated concrete discs break from being dropped which makes them more dangerous, and a worse investment in my mind. But why make weights that you're ok to drop? Surely you should lift them and place them down with equal care? Well no, not always.

WEIGHTLIFTING (THE SPORT OF WEIGHTLIFTING THAT IS) REQUIRES LIFTING WEIGHTS OVERHEAD IN ONE OR TWO RAPID MOVEMENTS. THE MARGIN FOR ERROR IS VERY NARROW AND ONCE OVERHEAD IN THE WRONG POSITION THE WEIGHT CAN, AND OFTEN SHOULD, BE DROPPED RATHER THAN ATTEMPTING TO CATCH IT.

The need to drop weights comes from Olympic style weightlifting. Not to be confused with the lifting of weights. Weightlifting has been around for over a century and has changed a bit in that time. Now what you'll see at the olympics and commonwealth games, world championships, european championships and national level competitions, all the way down to in house club competitions, is the snatch lift and clean and jerk lift. The snatch is one single movement in which the bar is moved from the floor to overhead. The clean moves the bar from the floor to the shoulders, before the jerk takes the bar overhead. Don't get too bogged down in the details yet. That will come. First, consider what would happen if you missed the lift and dropped the bar on your body or leg or even head! I don't disagree that it would hurt a bit, ok sometimes a lot. I've done all three actually, BUT the size of the discs (the diameter to be precise) is cleverly designed to be big enough not to fully crush you. A smaller plate wouldn't hit the floor and your body would take the brunt of the force. This is a huge reason not to try weightlifting unless you have access to bumper plates.

The start position of a deadlift is similar to that of a clean, and not a million miles from that of a snatch (the wider grip of a snatch means the whole body has to drop closer to the ground but still looks fairly close to the clean position). Using bumper plates elevates the bar from the ground - "Presently, Olympic plates of 10 kilograms or more are 450mm (18") in diameter." (Wikipedia). This is the agreed non body-crushing distance apparently. Another benefit is the height it puts your body in for lifting off the ground. Smaller plates change the mechanical advantage of the legs/hips and make for a more lower back dominant lift. Fine if it's what you're aiming for, however, a lower start position also requires more hip and ankle mobility. It requires more posterior chain strength too. Not everyone has adequate range and strength to do this safely. I recommend learning to lift using bumpers. It is safer, more comfortable and definitely more reassuring knowing that if something goes wrong, you can drop the bar without being told off by a gym employee!

Should I be taking protein powder?

This is a contentious issue among athletes and gym goers with a huge business pouring fuel on the fire at regular intervals. The research is a little cloudy but mainly due to those businesses funding some research that then gets labelled as bias. A quick dissection of the literature should help make your mind up but first lets look at the theory behind protein intake in general.

Government recommended protein requirements are as little as 0.8g/kg body mass. However this is thought to increase by 40-100% when training because of the increased demand.

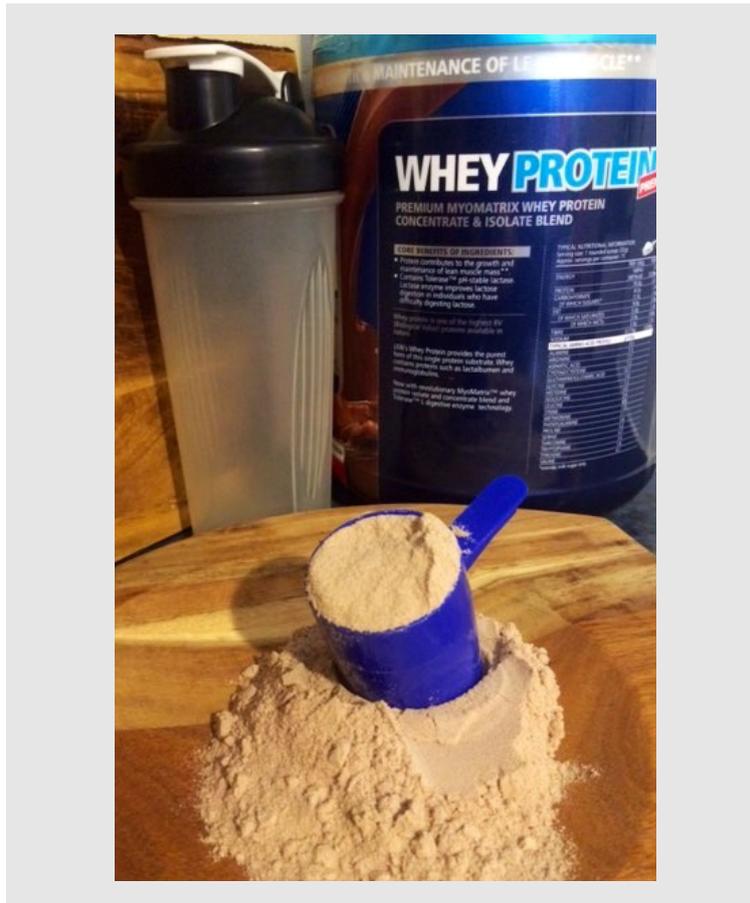
- Resistance training (and cardiovascular training) begins a process of catabolism as a response to damaged cells.
- The upstream result is stimulation of pathways that repair this damage and build tissue that should be able to cope with the same stress if it were asked to do so in future. This includes re-building muscle tissue, connective tissue and replacing energy substrates.
- The theory is that by providing exactly what the body requires in this 'window' of up-regulated growth and repair, we can enhance and speed up the process.
- Studies have shown that when training hard the human body can require up to ~3g protein per 1kg body mass (Helms et al., 2014). The standard recommendation is around 1.3-2g/kg depending on the activity level and body composition (Phillips & Van Loon, 2011). This amount partly depends on the training, and partly on the other macronutrient make up of the athletes diet.
- Moore et al (2014) looked into the requirements of endurance athletes and found that many are getting too little protein for optimum recovery. Remember that there are large differences in optimising performance and just keeping disease at bay. RDA's are concerned with preventing illness not maximising performance.

SO DO I NEED A SUPPLEMENT?

- Protein powders look to deliver some of this quantity in the form of an easily absorbed and bioavailable drink. They can be milk derivatives, plant based or even meat based products. All protein is made up of amino acids but different sources have differing amounts and ratios. Milk and meat based have a complete amino acid profile while plant based sources have to be fortified or combined to get the same ratios.
- In the immediate period after training there is a faster rate of protein regeneration and a quicker shuttling of energy (in the form of blood sugar) into cells. This happens due to a complex interaction of hormones but essentially created the argument for a

'fast digesting' protein source straight after training. The rate of regeneration slows down after around an hour so 20-60mins became known as a 'protein window'.

- Research has now repeatedly shown that the protein repair still happens even when this window is missed AS LONG AS TOTAL PROTEIN CONSUMPTION IS HIGH ENOUGH over the course of around 24 hours. Muscle recovery is still enhanced when protein is consumed 3hrs, or even 24 hours after an exercise bout (Macnaughton & Witard, 2014).



- If that's true, why do protein powders make up such a big part of gym culture?
 - Anyone that needs to recover as fully as possible quickly - those who train every day or even 2/3 times per day - needs to get as much protein in quickly absorbed form post training.
 - Those on very high protein diets can struggle to get enough in whole food sources so drinks/powders simply make life easier. Whole food tends to be more recommended for everyone but sometimes it just isn't realistic.

MY ADVICE:

Most people don't ever sit down and figure out how much protein they are consuming. Do this first to see if you really require a powder. If your training schedule is demanding and sessions are close together, you would almost definitely benefit from protein shakes of some kind. Try a few out and make sure they don't upset your stomach, and that you actually like them enough to drink. Lastly, try not to rely on them for all your protein. Even vegans can find powders to suit them but whole food is generally better other than immediately post training.

Why do I get DOMS and is it necessary?

Delayed onset muscle soreness is the feeling of pain usually 24-72hrs after a hard training session. Sometimes even a session that felt relatively easy at the time can make you sore, and some body parts don't get DOMS while others are always agonising. Don't fall into the trap of thinking a training session that doesn't make you sore is a waste of time or that a workout is only good if you can't walk for days afterwards. Despite its prevalence and decades of research on it, one of the leading papers (Cheung, Hume & Maxwell, 2003) suggests that there is a complex interplay between multiple factors making an exact cause of DOMS hard to distinguish. Whatever the exact mechanism within the physiology of our bodies, it can be agreed that new stimuli and exercises with a large eccentric loading component cause greater DOMS.

The worst DOMS I think I ever experienced was during a strength training course in Sweden. The course tutor (a very well known strength coach) put us through a session that top bodybuilders may do (or did do we were told). The idea being that when a mature bodybuilder trains - with a huge training history and a calorie consumption of a gorilla who may (or may not) have been on pharmaceutical aids - they can do things that would quite literally kill or injure lesser men. It was a deeply unpleasant experience. Twelve back exercises each performed for 10-12 repetitions with very little rest between, for four rounds. That's 120-144 reps on the same muscle group, four times! It is little wonder I woke at around 5am in my single bed of a tiny hotel room, whimpering in pain as I struggled to find a comfortable position. With no respite over the next 24-48 hours I then had to shower, dress, eat *and train* all without proper use of functioning upper

limbs. I'd happily have used a dog bowl rather than use a knife and fork. It was a great lesson and one I'll never forget.

To my disgust I didn't suddenly have enormous lats, the chiselled 'V' of Arnold or the ability to do 20 unbroken pull ups. Why not?! The thing about DOMS is that it signifies muscle/metabolic damage, the result of training. The absence of DOMS however does not signify adaptation but merely the absence of pain and damage. This is the key take home; one session alone does not create much in the way of positive adaptation. It takes many, progressive and sensibly planned sessions to create change and they don't need to disable you for 5 days.

A session that creates damage just above and beyond your current capabilities is the ideal scenario. You want to stress the system you train just enough to cause change but not so much you cannot recover to repeat the process. This is known as a minimal dose. Doing the least work needed to make you better, stronger, faster, more resilient. DOMS isn't always a result of this. Many factors such as muscle group, training/exercise history, energy substrate availability and general fatigue can all influence DOMS. Potentially the biggest factor in whether or not you get sore is training volume. The more sets you perform at challenging weights, the more you exhaust a muscle and cause some kind of cellular damage. Again, this isn't always a good or bad thing. It can be necessary for growing muscle, and not needed for improving power or speed. Your training aims dictate the kind of training programme you do and thus the consequences.

It is important to note that when you've got DOMS your body is at greater risk of injury due to altered muscle recruitment patterns, lower strength and power outputs from effected muscles and the consequence that has on joint stability (Cheung et al., 2003).

I hope this all makes sense despite being an overwhelming 'it depends'. Introduce new exercises sensibly and take it easier on days you're in agony. Enjoy the days that you can climb stairs freely and embrace the struggle on days that leave you hobbling!

What are HIIT and LISS? When should I do them and why?

The fitness industry is full of acronyms almost as if to bamboozle everyone into spending money. They wouldn't, would they? HIIT and LISS are now popular in mainstream media - I was asked to discuss LISS by Marie Claire in 2016 - but does anyone actually know what they mean? Gyms advertise HIIT classes but when you arrive they actually resemble 'Step Aerobics' from 1985. Have we really gone full circle?

HIIT stands for high intensity interval training. The two important parts to that are **HIGH** intensity and **INTERVAL** training. Point being that the interval or rest periods need to allow adequate recovery to reach high intensity. In sport science it is measured as a % of maximum oxygen uptake or % VO_{2Max} (Buchheit & Laursen, 2013). In your case intensity could be measured as heart rate (a percentage of your maximum heart rate - %HRM) or as a percentage of another objective measure (e.g. running speed, cycling power or speed etc). At least, you could use a rating of perceived exertion (RPE) which is supported by plenty of research (Borg, 1982).

When you perform HIIT, the effort of the working interval should mean spending time above 90% VO_{2Max} . In real terms for you and I, I suggest you **must be above 7/10 RPE or 70% of max speed/power**. This requires rest periods to be long enough for you to repeat this same effort. In the well known Tabata protocol, work periods are twice the length of the rest periods - 20s effort vs 10s rest - or 2:1 as we say. (Tabata et al., 1996). Guess how long a Tabata session is? 4 minutes. If done properly you can pretty much only do 4 minutes (or 8 intervals) then you're spent! Only after a long rest could this level of effort be repeated. When scientists tried to recreate the experiment in 2016, they found that no athlete was able to achieve the intensity recommended more than 3 times (Gentil et al., 2016). It turned out that it was two different studies over the gap of a year that gave rise to what we now know as the 'Tabata' protocol. In the original, performed on a bike, resistance was modified so that athletes could maintain 85rpm each interval, and performed 7 to 9 bouts of 20s with 10s rest periods.

This kind of ratio is known as negative, whereas a positive rest ratio is longer than the work periods. Part of why doing it properly is unpopular is that you actually should be resting more than you're working. It's not that it can't be done differently, of course all exercise is better than none. It's just that calling something high intensity when in fact you cannot physically work at a high intensity because its planned poorly is annoying and counterproductive. The whole point of HIIT is that it is time efficient. You cannot do an hour of HIIT. If you have, you're actually doing MIIT - moderate intensity interval training. The results aren't the same because it's a different protocol.

Journal of Obesity

5

TABLE 1: Description of exercise interventions.

Week	Frequency	Intensity	Session duration		Total weekly training time (including warm-up and cooldown, min)
			Work : recovery	Intervals (number)	
HIIT					
1	3	120% VO _{2peak} : 30 W	30 : 180 s	4	60
2	3	120% VO _{2peak} : 30 W	30 : 120 s	5	55.5
3	3	120% VO _{2peak} : 30 W	45 : 120 s	5	59.25
4	3	120% VO _{2peak} : 30 W	45 : 120 s	6	67.5
5-12	3	120% VO _{2peak} : 30 W	60 : 120 s	6	72
CONT					
1	3	50% VO _{2peak}		30 min	108
2	3	60% VO _{2peak}		40 min	138
3	3	65% VO _{2peak}		45 min	144
4	3	65% VO _{2peak}		45 min	144
5-12	3	65% VO _{2peak}		45 min	144

HIIT: high intensity interval training; CONT: continuous aerobic exercise; W: watts; VO_{2peak}: peak aerobic capacity.

(Excerpt from Keating et al., 2014: Fat redistribution was shown to be greater in continuous moderate exercise but it took double the weekly training time).

LISS on the other hand is Low Intensity Steady State training. Speed walking, slow jogging, slow cycling, and swimming long durations all fall under this acronym. The aim is to spend a longer duration at a relatively low intensity (measured the same - %HRM, speed, power etc). Endurance athletes will often use this method to improve technique because they can focus more on it going at a slower pace. It does have benefits for general calorie consumption and heart health. The issue I have with LISS is that it is much more time consuming and you get less of a return for your investment. If you currently struggle to get 3/4 training sessions in per week then you should be as efficient as possible. For those who train multiple times per week where those sessions are all high intensity, a LISS session here and there will aid recovery and improve economy of

movement. There isn't inherently anything wrong with LISS, just that less time could be spent getting more benefits, hence the industry moved away from promoting long aerobic sessions to those who don't compete in such events a long time ago.

Gillen & Gibala (2013) rightly say that one of the most common reasons for not exercising is lack of time. Low duration HIIT is therefore the most valuable tool for large parts of the population, including time poor athletes.

**THANKS FOR READING - IF YOU FOUND THIS
INFORMATION USEFUL PLEASE SHARE IT WITH
TRAINING PARTNERS, FRIENDS AND FAMILY.
STRONGER TOGETHER.**

**FOR MORE INFORMATION VISIT AASC.LONDON
AND ENTER YOUR CONTACT DETAILS**

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