

Starting Strength

Abs

by

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In every weight room in all the countries of the world since the dawn of training with weights, the single biggest distraction from the actual task at hand has been abs. Or rather, an obsession with/misunderstanding of the biomechanical role of/misunderstanding of the way to train abs. More people, including me, have wasted more time/incurred more injuries doing/gotten very little out of training the damn things than anything in the whole training repertoire except biceps. Some of the things I'm about to say will be met with a lot of disagreement by conventional wisdom exercise-science types and PTs, as well as virtually everybody that trains for appearance. I don't care – I have to get this off my chest (Atonement? A guilty conscience for having trained lots of people incorrectly? An attempt to come to grips with years of having been wrong?) and perhaps in the process I can be of use to some of you. We'll see.

First, by “abs”, I mean the muscles that surround the abdomen. I don't just mean the rectus abdominis, the group in the front that everybody identifies with the term “six-pack” (that I never use), the most graphic visual evidence of both low bodyfat in most people and our remote connection to phylum *annelida* through its evident septa that separate the muscle into repeated segments. I refer to abs when everybody else refers to “the core” because I insist on being difficult, contrary, disagreeable and out of step with the infomercial people. This is the way I learned it, and I see no compelling reason to update. So in this article “abs” means the rectus, the internal and external obliques running across the lateral aspect of the abdomen, the transversalis (or transversus abdominis), and the muscles of the floor of the abdominal cavity.

Second, the abs stabilize the spine, meaning that they maintain stable if not rigid intervertebral relationships under compressive or shear (moment) loading – that is their primary physical function in a biped. We have been placed under the impression that the primary role of the abs is display to other humans in either courtship ritual or as a means of evoking envy, and this temporary cultural bias has not proven useful to many of us.

Stabilizing the spine is an extremely important thing to do when working or training, since the force generated by the muscles that extend the hips and knees is usually transferred to the external environment through the arms and hands (in the case of the squat the bar is supported by the trunk itself), which means that the spine is the bridge connecting the force-producing musculature to the task to which it is being applied. This bridge must be rigid – stable enough that as force is applied

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along its length it pretty much all gets to where it should be transferred, with none absorbed by the bridge itself. Or the spine can be thought of as a wrench handle, the thing that connects the bolt to the turning force. A quick review of all the tools commonly available shows that none of these wrenches are equipped with a rubber handle, since force is quite inefficiently transmitted between these two points by a flexible segment, and force transmission is the wrench's job. The job of the muscles that stabilize the spine is producing a condition in which force is efficiently transmitted along this potentially moveable column of bones by making them immovable, so that this potentially flexible column of bones functions like a tempered steel shaft instead of the resolve of a politician.

When you deadlift, for example, you consciously set the lumbar curve of your spine before you pull, you take a deep breath, *squeeze everything tight*, and push the bar away from the floor. The setting-the-lumbar-curve part is accomplished by the posterior spinal muscles – the erector spinae group. The squeeze-everything-tight part is abs. This is when they get recruited into the pull, and their job is to reinforce from the anterior and the lateral the position established by the posterior spinal muscles. You set your back with your back muscles, and then you reinforce this position from the front and sides with your abs. Some hyperflexible people are capable of getting into a position of spinal overextension. For these people an active focus on ab contraction is necessary for positioning. Most of us find that when we concentrically squeeze the lumbar into extension, we end up in the right position to pull.

This ab squeezing makes your trunk into what is essentially a rigid cylinder that surrounds and supports the spine, the effect being that of a hydrostatic column between all points along the contracting abdominal wall and the spine transmitted through the hydrostatically uncompressible gut contents. The force of contraction transmitted through this fluid medium braces the spine into the position set by the back muscles until the moment force of the load overcomes the lifter's ability to stay in position.

In order that this job actually gets done by the muscles whose job it is to do it, they have to function isometrically. Let's review: muscles can produce force by acting on a load through the skeleton in three ways. They can shorten under a load, termed a *concentric* contraction (I know that sounds redundant, but the conventional terminology is thus, and I must draw the rugged-individualist line somewhere). They can lengthen under a load by controlling the rate of lengthening with their opposing contractile force, termed an *eccentric* contraction. And they can just maintain the same length and therefore maintain a stable, rigid relationship between the skeletal components; this is termed an *isometric* contraction. Depending on where the muscles are located, their primary function is either concentric/eccentric or isometric. The hip and leg muscles' primary function are to open and close the knee and hip joints in a variety of movements, and are therefore primarily the concentric/eccentric types. They function isometrically when you stand still, but standing still is not a primary activity to which we are adapted – at least it shouldn't be.

Conversely, the abs' job is primarily isometric, since spinal stabilization is their principal task. If the skeletal relationships they maintain are motionless, then their primary function is to exert force while allowing no position change, and to do this they must remain the same length under whatever load the spine must be stable against. Thus isometric contraction is their principle mode of action. They can be pressed into service to do a situp, acting concentrically/eccentrically to flex the spine while you are lying down, but it's not their "normal" function, the one they have developed over millions of years to accomplish. We haven't been doing situps that long – only since they were invented by Joe Weider

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back in 1980 – hardly long enough to have changed our inherited muscle physiology to accommodate him. Abs are supposed to keep the spine rigid, and this has some rather important implications for the way we have been thinking about training them to do this function.

Since the basic nature of correct ab function is isometric, the exercises in which the abs perform this function will provide exercises for the abs as well. This may seem childishly apparent, yet virtually every strength coach adds extra concentric/eccentric ab work to the program anyway. The thinking must be that just squatting, deadlifting, pressing, cleaning, snatching, chins, and barbell curls – all of which involve trunk stabilization as a critical performance component – do not provide sufficient ab work by themselves. I disagree. First, these lifts are not done *by themselves*. They are performed together in workouts composed of several of them the same day. I don't think a novice needs to do situps as a part of novice-level programming; the program relies so heavily on the good form provided by a rigid spine during all the barbell exercises that the abs are receiving as much work as they can possibly do. This is especially true of heavy work sets in the squat and deadlift which require a high degree of focus on a flat back for completion of the set as the lifter gets stronger. It's not a factor at first because the weights at first are light, and this is why it is safe. As the loads pass 200 and then 300+ pounds, it becomes enough of a challenge for the now more experienced lifter that a helluva lot of ab work is required to squat and pull properly. At weights above this range, most lifters find that a belt helps them produce harder ab contractions and therefore maintain better spinal stability, and this is why it is common that a lifter's first squat workout with a belt produces new levels of ab fatigue.

Heavy presses are extremely dependent on abs to keep the spine from overextending, and to maintain the rigid spine as part of the kinetic chain between bar and floor. Chins use the abs differently since there is no compressive load on the spine, but rather tension that must be controlled to maintain control of the body's position during the set. High-rep chins tap into abs in a palpably different way. Since a long set inevitably fatigues the abs, isometric control diminishes, and eccentric lengthening followed by a concentric reset occurs each rep. This produces ab soreness where squats and deadlifts do not, since the eccentric component of any eccentric/concentric cycle is the part that produces the soreness (I'd look this up if I were you). Abs get sore during limit presses for this reason as well.

This is important, because many coaches associate the presence of soreness with effective training and the absence of soreness as indicative that more work needs to be done. It is quite likely that this is the crux of the problem: abs get worked very hard when you use them in their normal isometric role, but they don't get sore due to the lack of an eccentric component during heavy support. The fact that you're sore indicates that the muscle belly got longer under a load, while an absence of soreness after heavy squats and pulls merely indicates that your abs did their job and kept your spine rigid. I'm suggesting here that the standard barbell exercises produce sufficient levels of ab work for their own purposes, and that, especially for novices, no other ab work is necessary.

Furthermore, let me gore an ox or two. Situps may in fact be counterproductive for an amazingly large subset of the training population. When we do situps, we usually use some version of lying down, perhaps at your favorite angle other than horizontal, and then produce an active spinal flexion by concentrically contracting the rectus abdominis, effectively shortening the distance between the "origin" on the ribcage and the "insertion" on the pubis. The eccentric lowering of the shoulders follows, with these same muscles getting longer as we lower the shoulders back to the bench or floor.

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Some variation of this movement is a “situp” everywhere it’s done. The version of it that involves no actual range of motion of the shoulders relative to the thighs is called a “crunch”; it is useless because of the inability to quantify the work. In a crunch, all the ab contraction does is place the spine in flexion, and then the movement stops without producing a measurable displacement of position, the kind that occurs when your elbows go on to meet your knees. Crunches may be hard for completely detrained veal-calves, but if no actual movement beyond spinal flexion occurs, the exercise rapidly loses its ability to produce an adaptation. I’ve trained women that have done crunches regularly for years that still could not produce three honest situps of any kind.

But the spinal flexion may be the problem for some people. Those with obvious spinal pathologies like a spondylolisthesis often do not tolerate spinal flexion/extension well. I have a member with a grade 2 spondylolisthesis that squats and deadlifts over 200 pounds with no pain or other symptoms when his active surgical practice permits regular training. He cannot do situps or back extensions at all, and we discovered this when a long enough period of uninterrupted training allowed the accumulation of the relevant observations. His back trouble was quite persistent during periods of trying to be a Good Boy and do his situps and hypers, and was absent when time permitted only the basic lifts. The flexion/extension of his abby-normal spine mashes the discs in an unfriendly way, while plain old squeezing just keeps everything strong and in place.

I myself have had low back problems for many years, and a recent experience leads me to believe that most of them may have been the result of my own misdirected attempts at keeping my abs strong. I was showing a situp variant I like to John Welbourn a couple of months ago, a version we do here on a bench that places the femurs at 90-degrees to the back as you lay down, the backs of the knees across a pair of rollers, the shins tucked under another pair. This produces a very short situp with the hips already in flexion, thus removing the hip flexors from the situp pretty effectively. He hadn’t seen the bench before, so I demonstrated the movement to him with 25 lbs. for ten reps held behind my head in the preferred position for loading the movement. I have done a lot of weight on this bench, and 25 was an easy set, but it had been probably a year since I’d done them. In fact, I know from previous experience with this exercise that I could have done 50 x 10 with no trouble that day, meaning that I had the ab strength having not done this exercise in a long time – having only done squats, presses, pulls, and chins.

Again, it was an easy set, and I got up, walked back into the main gym to squat, and my low back was out. Not bad – in fact I finished my squat workout with the 315 x 10 I had planned to do by just squeezing the shit out of my abs and holding it still – but it was out, and it took several days to fix. It occurs to me that this was perhaps the first time I had been able to see a direct correlation between moving my spine around in flexion/extension and my little facet joint problem I have had for decades that, coincidentally, hadn’t bothered me in about a year.

Let Me Be Clear (aren’t you really tired of that?): I am not saying that situps are bad for everybody that does them. That would be foolish, and I may be a lot of things but I am not foolish in this way. I am suggesting that if you have recurrent back problems like lots of us older lifters have, that situps may be both unnecessary and a possible contributor to the problem. It’s quite likely that pre-existing damage at the spinal-arthritis level will not tolerate a lot of intervertebral movement, and that since we can get enough ab work from the support function our abs provide when squatting, deadlifting, etc., doing

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them with the intention of keeping your back stable by strengthening the abs may just be another ironic little reason to continue questioning the conventional wisdom.

That having been said, the 90-degree bench may well be one of the best tools for training the abs in any gym. The movement is short, and while not isometric, short is a better version of spinal flexion than the extreme ROMs typical of the again-popular Roman Chair situp. (They have always hurt my back, and they appear to be an excellent way to so thoroughly disrupt the rectus bellies that rhabdomyolysis has been frequently reported in association with their abuse. So if you do them be sure that you control the movement by keeping the tempo slow.) The much shorter ROM provided by the 90-degree bench more closely mimics the actual function of the abs, while allowing increasingly heavy weight to be used safely. This short, heavy situp is much more useful as a functional approximation of isometric ab work, and for more advanced trainees may be just the extra training needed for stability under very heavy barbell loads. This kind of specific ab work is used for “topping-off” the work inherent in the major exercises, and it can be quite useful for most lifters at the right time in their training career.

However, nobody makes three years of linear progress on abs trained with conventional situps in any form, especially as measured by the ability to show increased weighted situp numbers for years. Or even one year, if I remember my members’ progress correctly. (I am not particularly concerned with the world situp record-guys, currently lead by Skip Chase, who did 110,915 sit-ups in 24 hours. High reps like this are primarily done by learning to use the whole body in the movement, distributing the work across a lot of muscle mass, so that once you cross the 10,000 threshold the problem becomes mastery of boredom. And they don’t leave much time for heavy squats and pulls.) My experience is that you can slowly add weight for the first several months and then progress slides to a halt. But by then the object has been achieved: abs tend to stay strong if you keep using them heavy.

But for most lifters – and I mean the vast majority who will never squat 600, or even 500 – the stresses normally encountered under the bar provide all the work the abs need. They provide it safely, in the context in which it is used, and have the added advantage of not irritating the facet joints and discs with a lot of loaded flexion and extension. Ab training can provide a little additional strength stimulus for a while, but it just reinforces the work the abs are already receiving from squats, presses, and pulls. If you want to do them, wait until it is appropriate, and then choose an exercise that can be done heavy for a short ROM with strength-range reps and sets. When they plateau, just hit them occasionally. But for those of you with recurring low back problems, see what six situp-free months does to your back problems. I think you’ll be pleasantly surprised, and just as strong as you were before.

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