



# THE MIGHTY “CORE”

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Dumbbells (1800's), barbells (early 1900's), kettlebells (17<sup>th</sup> Century), stability (Swiss) balls (1960's), medicine balls (15<sup>th</sup> Century), chains and stretch bands (1950's), functional training (new wave), and now balance training are the buzzwords in most gyms. Throw in the word “core training” and some fitness enthusiasts begin to “corelucinate.”

During my tenure (1973 – 1977) as the Director of Strength Training at The United States Military Academy at West Point, the term “corps” was used to describe the “Corps of Cadets.” The term “core training” did not exist.



We are not sure when the core revolution began but we think it was influenced the most when Reebok introduced Core Training and the Reebok Core Board in 2000. The Reebok Core Board is an unstable platform you stand on while exercising. The board tilts forward, backward, and side to side. According to Reebok the purpose of these exercises was to strengthen the “abs, torso, and core muscles.”



NFL Strength Coaches were flown to Florida (Riley did not attend) for a weekend of fun and to learn how to use the core boards. Several complimentary core boards were sent to each NFL team. “Core mania” was upon us.

Google search “core training” and you will observe a variety of definitions depending upon the web site and the fitness “expert.” To keep it simple Roberta and Riley will say the muscles of the core primarily incorporate the muscles of the midsection. Some experts will throw in the big and powerful muscles of the hips. If you are really interested in getting a unique perspective on core training, Google “Dr. Mel Siff Core Training.”

During the past decade “core hype” has created frenzy over the muscles of the hips and midsection. How did we survive in the 70's, 80's, and 90's, without recognizing

the need to worship the “core?” I was fortunate to be part of four Super Bowl Teams (1982 – 1992) and never heard of the term core training. Have the “core fanatics” discovered some new muscles?

An *evidenced based fitness professional* must possess a minimum amount of education to include physiological, anatomical, biomechanical, and neurological information, to prevent “shooting from the hip” when providing fitness advice. Because you see something on a video; hear it from a retired NFL strength coach or a personal trainer does not mean the information is evidenced based or reliable.

Pick up any muscle magazine or fitness magazine and an article on “core training” is current, popular, and front page news. Athletes and fitness enthusiasts have been mesmerized by the “core hype.”

We have a library of academic texts authored by eminently qualified professors and researchers, to include books in the area of exercise physiology, anatomy, kinesiology, biomechanics, and motor learning (a subject unfortunately removed from most physical education/exercise science curriculums). The only reference to “core” in any of these text books is “*core temperature*.”

Riley first published in 1976. It was a manual used to teach a Strength Training class at the United States Military Academy, at West Point, in the Office of Physical Education Department of Tactics. It was the first strength training course of its’ kind at the Academy.

In this manual I wrote about the need for total body strength when organizing a strength program. **Total body** strength must be a priority for both athletes and non-athletes and especially for adults as we grow older (sarcopenia). During my thirty-six year career as a strength coach I somehow survived without “corelucinating.” The muscles surrounding the hips and midsection are only part of the equation when it comes to developing total body strength.

In 1976 I divided the body into five major segments (and continue to do so today). These segments include the following:

- Neck and Traps (trapezius)
- Hips and Legs
- Midsection
- Torso
- Arms

I have always taught that every muscle group and all exercises are equally important. During my career as a strength coach my number one priority was *injury prevention* first, and *performance enhancement* second. In the area of injury prevention the muscles of the midsection (“core”) are ***no more important*** than any other muscle group in the body.

In the area of core strength and performance enhancement the literature is not very supportive and at best provides conflicting support for the impact “core strength” has on performance enhancement. Dr. Thomas Nesser (Indiana State) has conducted two major studies to develop the relationship between core stability and strength and power variables in Division I football and soccer players.

In his 2008 study with football players Nesser determined that core stability is only moderately related to strength and performance. In his conclusion he stated, ***“Increases in core strength are not going to contribute significantly to strength and power and should not be the focus of strength and conditioning.”***

In his 2009 study Nesser and Lee evaluated the relationship between core strength and performance in Division I female soccer players. In this study Nesser and Lee determined ***“No significant correlations were identified between core strength and strength and power. The results of this study suggest core strength is not related to strength and power. Core strength does not contribute significantly to strength and power and should not be the focus of any strength and conditioning program with the intent to improve performance.”***

If we have to prioritize areas of the body, and protection is the primary concern, the musculature of the **neck**, **traps**, and muscles surrounding the **shoulder capsule**, must have the highest priority for any athlete engaged in activities involving collisions and physical contact. It is amazing how many professional football players I have trained that lacked neck and trap development. Many had ignored the smaller muscles crossing the shoulder capsule.

Strength and conditioning coaches and personal trainers continue to extol the value of training the **core** (it is the popular thing to do, money, and trendy). They spend a significant amount of time each workout emphasizing core training.

How often do you hear mention how important it is to strengthen the muscles of the neck and traps? **Hmmmm!**

How much time is spent developing the muscles surrounding and protecting the shoulder capsule (rotator cuff, rear deltoid and medial deltoid)? **Hmmmm!**

Are the muscles of the midsection important muscles to develop? Roberta and Riley would agree absolutely. We have established all muscles are important. For those athletes involved in repetitive impact forces to the head and neck is the “core” more important than strengthening the musculature of the neck and traps? Roberta & Riley would agree **absolutely not!**

Refer to any anatomy book and the muscles of the midsection are primarily made up of three major muscle groups. They include the following:

- Trunk flexors
- Trunk rotators
- Trunk extensors

In their text, *Anatomy & Physiology*, Seeley, Stephens, and Tate, list (p. 325 – 331 tables 11.8 – 11.10) the major muscle groups moving the vertebral column and the abdominal wall. Also listed are the major functions of each muscle group. The muscles of the lower back and abdominal region primarily **flex** (approximately 30 degrees), **rotate**, and **extend** the trunk. For maximum strength benefits find an exercise that provides the fullest range of motion for each of these muscle groups.

The term **stabilizer** is another trendy “core” term. Do the muscles of the midsection (core) serve as stabilizers? Absolutely, however most muscles in the body serve as a stabilizer in some capacity. Almost every muscle in the body stabilizes to help keep us erect. The calves stabilize to prevent us from falling over. The muscles of the quads and hip stabilize to prevent us from collapsing to the floor. The muscles of the neck are constantly stabilizing the head to prevent it from falling forward. Is this stabilization meaningful strength producing exercise? Not quite.

Perform a leg extension while holding a dumbbell out in front of you extended at arm’s length. The primary exercise is the leg extension for the quadriceps. Are the muscles of the deltoids “stabilizing” while holding a five pound dumbbell at arm’s length? Yes. Does the deltoid expend energy and eventually become tired? Yes.

Is this meaningful, full range, strength producing exercise, for the deltoids? The answer is a resounding **no**. There are far more productive alternatives.

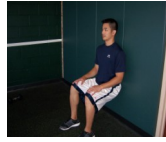
Is the activation of “core muscles” to stabilize while sitting on a stability ball meaningful progressive overload and strength producing exercise? It is better than nothing but performing exercises that provide full range exercise with progressive resistance is far more productive than contracting a muscle at one fixed point. Because you can make muscles tired does not mean it is meaningful full range progressive strength producing exercise.

Do the muscles of the midsection serve as “stabilizers” while performing an overhead press on a stability ball? The answer is yes. Is this meaningful strength producing exercise for the muscles surrounding the trunk? The answer is no. Find an effective full range exercise for each of the major muscles used to flex, rotate, and extend the trunk.

In a recently published article Kohler et. al. compared muscle activation patterns while lifting stable and unstable loads on stable and unstable surfaces. “The results showed that as the instability of the exercise condition increased, the external load decreased.” The authors’ state, “The findings provide little support for training with a lighter load using unstable loads or unstable surfaces.”

In his book Primary Anatomy, Basmajian refers to muscles that stabilize as postural muscles or fixators. He states, “A great many muscles that have nothing to do with the actual performance of the specific feat come into play to “fix” the position of the body as a whole; these are known as fixators or postural muscles. In most, if not all, group movements, fixators play their part. When for example, the elbow is to be flexed, it becomes necessary to fix (stabilize) the shoulder joint in a suitable position, in order to steady the whole elbow region; the shoulder muscles, thus contributing to the efficient working of the elbow flexors, act as fixators.”

Is the biceps curl a good exercise to strengthen the muscles of the shoulder because the muscles surrounding the shoulder capsule are involved as stabilizers while performing a biceps curl? Common sense tells us no. The shoulder strength gained is insignificant and only at one fixed point. Basmajian calls this additional exercise as “*dubious*” at best.



The plank and air seat are excellent examples of this exercise phenomenon. These are static contractions. Muscles are contracting at one fixed point. Multiple muscles are stabilizing to hold this position. Is this stabilization meaningful progressive strength producing exercise through the muscles full range of motion? The answer is a resounding no. Not if you rely upon the literature in the area of the sliding filament theory.

To develop strength through a muscles full range of motion a muscle must be shortened (concentrically) and lengthened (eccentrically) through its full range of motion. Remember, because you can make a muscle tired and/or sore does not mean that it is meaningful strength producing exercise.

So how can you best strengthen the mighty muscles of the midsection (core)? First you must determine the primary function of the muscle group you wish to target. We have established the midsection is made up of three major muscle groups:

- Trunk flexors
- Trunk rotators
- Trunk extensors.

The trunk flexors have the ability to contract through approximately 30 degrees. Use the Roberta and Riley Rep Rules when performing sit-ups/crunches/abdominal exercises. Eliminate momentum when sitting up. Also emphasize the lowering of the weight. Use a stop watch and allow at least three seconds to raise the weight when doing a sit-up and pause for a second in the sit-up position before allowing at least three seconds to lower the weight.

Eventually the weight of your torso will not be enough to provide progressive overload if your goal is to increase the strength of your abdominals. You will be forced to find a way to add more resistance while performing trunk flexion. You can adjust the position of your body to increase the difficulty but eventually we would recommend an exercise tool that provided full range exercise for the muscles involved and the ability to increase the resistance.

Roberta and Riley recommend there is no need to **“adore the core.”**



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