

Run Faster, Jump Higher with the *Reverse Hyper*

The next generation of reverse hyper machines makes this great exercise even easier to perform

BY KIM GOSS

One of the latest trends in the world of strength and conditioning is “training the posterior chain” – that is, working on the major muscles located on the backside of the body, such as the hamstrings, glutes and erector spinae. Why the recent interest? Because research has shown that

strengthening these muscles is one of the best ways to make athletes run faster and jump higher. But besides prescribing leg curls to isolate the knee flexion function of the hamstrings, most coaches don't know how to isolate the other posterior chain muscles for maximum results. Until now.

It's time to take glute training seriously. Why? Because the glutes (i.e., gluteus maximus, medius and minimus), working with the hamstrings and lower back muscles, help extend the torso and pull the pelvis backward (Figure 1) and also provide most of the muscle power needed for jumping and running. Did you know that 45 percent of the muscle power from jumping comes from just the strength of the gluteal muscles?

In contrast to common belief, the quadriceps contribute less than 20 percent of the muscle force in jumping and in fact contribute very little to kicking – try getting on your knees

to kick a light medicine ball with the bottom of your thighs and you will feel the power generated from the hips. But these physiological truths don't stop the average athlete from devoting most leg training workouts on less effective lower body exercises, such as leg extensions.

As for the large lower back muscles known as the erector spinae, most coaches believe that core exercises such as squats and deadlifts are enough to strengthen these powerful muscles that, along with their many other functions, provide stability to the trunk. While this holds true to some extent, it's also true



that relatively weak lower back muscles will hold back progress in these important core exercises. Athletes are, after all, only as strong as their weakest link.

One of the concerns we at BFS often hear from coaches is that their athletes need more speed, quickness and core strength. Knowing what we do about anatomy and biomechanics, therefore, we can assure you that exercises to strengthen the glutes and the lower back should be a priority in any athlete's training program.

A Brief History of Glute Training

Until recently, the exercise industry has neglected to invest much time in engineering a machine or apparatus to specifically target the gluteal muscles. As such, glute training has been accomplished primarily by performing free-weight exercises such as squats and power cleans. Although these are great exercises, and ones that we prescribe in the BFS program, they are compound exercises that cannot isolate and therefore completely strengthen the lower back and gluteal muscles.

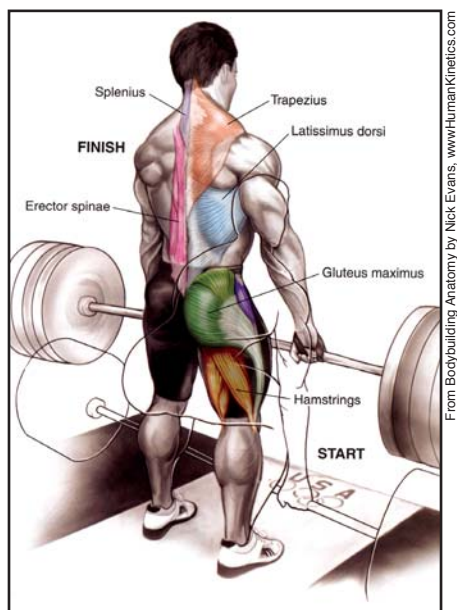


FIGURE 1. The glutes, working with the hamstrings and lower back muscles, help extend the torso and pull the pelvis backward.

About 15 years ago a weight training machine was introduced that claimed to effectively isolate the glutes, and it was aggressively marketed to women's health clubs. It involved positioning oneself on the elbows and knees and then pushing a footplate backwards and upwards, one leg at a time. Unfortunately, these machines tend to excessively arch the lower back when the leg is extended. This arching often places excessive pressure on the lower back (specifically on the L3-5 vertebrae), a stress that many athletes would be wise to avoid.

As for the lower back, another major company spent millions of dollars on developing a sophisticated machine to test and strengthen the lower back muscles. One controversy about this machine centers around the irony that, although performing back extension exercises while seated places extremely high compressive forces on the lower back, the machine was marketed to those suffering from lower back pain! For example, research published by Alf Nachemson of Sweden in 1975 showed that compared to exercising from a prone position, leaning forward about 15 degrees from a seated position can nearly double the compressive forces on the L2-3 vertebrae – not a good thing for those suffering from disk injuries. In fact, when I lived in Colorado, a friend of mine with a history of lower back pain had to be taken to the emergency room due to severe muscle spasms after performing just one set on this machine.

While physical fitness opportunities were missing the boat on coming up with the best way to isolate the glutes and lower back, physical therapists and posture experts had come up with creative ways to train them for their patients. Two medical resources with many such exercises, published in the early 1980s, are the German physiotherapy book *Training Therapy: Prophylaxis and Rehabilitation* by Rolf Gustavsen and Renate Streeck,

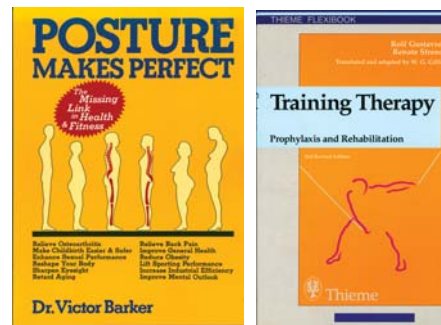
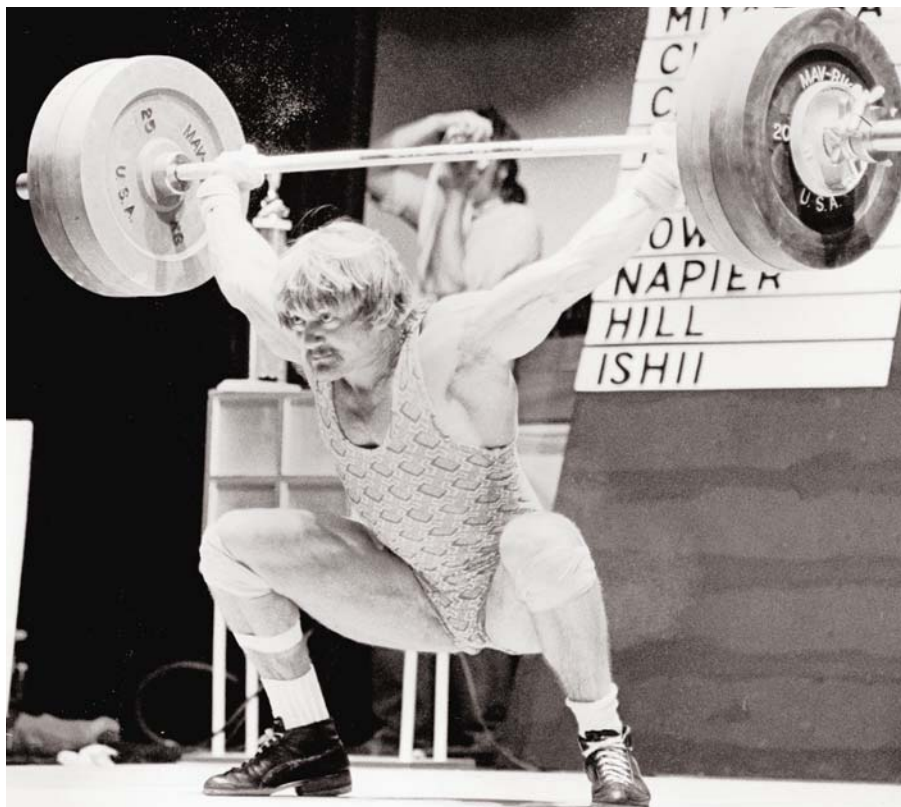


FIGURE 2. In the early '80s, the value of reverse hyperextension exercises to strengthen weak back muscles were discussed in many medical books.

and the Australian book *Posture Makes Perfect* by Dr. Victor Barker (Figure 2). An exercise common to both these books involves lying facedown on a specially designed bench that enables the user to anchor the torso and lift the legs, as opposed to a back extension, wherein the legs are anchored and the torso is lifted.

In Dr. Barker's book, resistance was applied with the roller pad of a leg extension machine. And we know from many books about gymnastics conditioning published many years before this – especially from Russia – that reverse back-extension exercise has a long history. There are also two gymnastics books, one from East Germany and the other from Hungary, that show this exercise being performed over a pommel horse with a kettlebell strapped to the ankles and another with a medicine ball held between the feet. But probably the first person to find a way to aggressively, but safely, isolate the glutes and erector spinae is American weightlifter Roger Quinn.

In the '70s Roger Quinn was one of America's best weightlifters, having clean-and-jerked 352 pounds at a bodyweight of 165 pounds, and 385 pounds at a bodyweight of 181 pounds (Figure 3). That lift of 385 placed him second in the US 1976 National Championships (he attempted to lift 402 pounds to try to win this prestigious event and earn a spot on the Olympic team but was unsuccessful). This performance would still be impres-



FIGURES 3 (left) and 4 (above). In the '70s Roger Quinn was one of America's best weightlifters, just missing a berth in the 1976 Olympics. In the March 1974 issue of *International Olympic Lifter* magazine, Quinn wrote about how he used reverse hyperextensions with manual resistance to strengthen his glutes and lower back.

sive today, as the third-highest clean and jerk in the 187-pound class at the 2008 Senior Nationals was 374 pounds. But what also adds to the significance of this accomplishment is that Roger had chronic knee injuries that were made worse from excessive squatting. Thus, in the few years before performing that lift he had to find another way to strengthen his glutes and lower back to be able to continue competing at the national level. The answer was a reverse hyperextension, performed with manual resistance.

In an article published in the March 1974 issue of *International Olympic Lifter* magazine, Quinn showed how to perform the reverse hyperextension exercise with his coach, Bob Hise Sr., applying manual resistance to his legs (Figure 4). With this exercise, Roger was able to keep his legs straight and therefore not place any stress on the knees, shifting it instead to the glutes and lower back. Quinn's article is probably the first published article showing how to perform the reverse hyperextension with enough resistance to match

the strength of the trainee. Said Quinn, "These reverse hyperextensions... seem to work the buttock muscles in the same fashion that the two-hand curl works the biceps. I feel that this exercise comes close to really isolating the buttocks while at the same time employing the spinal erector muscles of the lower back."

Although the reverse hyper exercise can be performed on a high, sturdy bench, it is difficult to increase resistance – and a flat edge tends to be very uncomfortable. And having a training partner provide manual resistance to the legs as Roger Quinn had done can be impractical, especially as the athlete becomes stronger. But if there's one thing that is not lacking in the iron game, it's creativity. As such, in 1993 powerlifter Louie Simmons patented the first reverse hyperextension machine, which applied resistance by the use of a strap that wrapped around the ankle. The other end of the strap was attached to a lever arm, which had a pivot point under the bench (set about mid-chest level). Powerlifters loved it, and with good reason.

The squat and deadlift, two lifts performed in powerlifting competition, require strong glutes. Case in point: Dr. Fred Hatfield, a former world record holder in the squat with a best lift of 1,014 pounds, was found to have relative-



FIGURE 5. In the BFS machine, the pivot point of the lever arm is in line with the hips, unlike other reverse hyper machines.



FIGURE 6 An adjustable range limiter device is attached to the machine that allows the user to prevent the lever arm from swinging too far forward, beyond the safe range of motion for those with flexibility restrictions.



FIGURE 7. As photo shows, using a chest pad that is parallel to the floor and lifting the legs too high will cause potentially harmful hyperextension of the lower back.

ly weak quads when tested by Nautilus inventor Arthur Jones. Writing in his book *My First Half-Century in the Iron Game*, Jones said, “While here, we tested his [Fred Hatfield’s] full-range quadriceps strength.... We have tested more than a hundred women who weighed less than half of his 260 pounds and yet were stronger in the quadriceps than he was.” The explanation given by Jones as to why Hatfield could squat so much with such relatively weak quadriceps is that the strength for squatting comes from the glutes, hamstrings and lower back.

Introducing the BFS Reverse Hyper Machine!

Because the lever arm of many reverse-hyper machines can pull the legs under the hips, this exercise can provide traction to stretch and strengthen the erector spinae through their full range of motion. For athletes who are constantly placing strong compressive forces on the spine, such as basketball players and gymnasts, this traction helps keep the back healthy by relieving muscle tension.

This traction is also valuable for helping to rehabilitate lower back injuries – many athletes with disk injuries have reported being able to exercise the lower back muscles on a reverse hyper, whereas more-conventional exercises aggravated their injuries. One reason is that the compressive forces on the spine can be much lower on a reverse hyper exercise machine than on standard seated back-

extension machines (as discussed in Gustavsen and Streeck’s *Training Therapy*). And if an athlete has a foot injury or, as with Roger Quinn, a knee injury, working on the reverse hyper will enable them to not just maintain but also improve their lower body strength.

The BFS Reverse Hyper expands upon the original concept of glute- and lower back training introduced to the weightlifting community by Roger Quinn. Instead of placing the pivot point of the lever arm under the chest, it places it in line with the axis of rotation of the hips (Figure 5). This design helps prevent the roller pad from sliding up the calves, a common complaint of those using other reverse hyper machines. Also, an adjustable range limiter device is attached to the machine that allows the user to prevent the lever arm from swinging too far forward, beyond the safe range of motion for those with flexibility restrictions (Figure 6).

On the BFS Reverse Hyper the chest pad is tilted downward (rather than being parallel to the floor) so that the head is slightly lower than the hips. Guy Voyer, D.O., one of the world’s foremost authorities on sports rehabilitation (and who was featured in our January/February 2007 issue), explains that this angle is beneficial because it serves to work the erector spinae muscles through a greater range of motion than the way they would function during squats and power cleans, in which the lower back is arched. Canadian posturologist and strength coach Paul Gagné agrees, “The safest way to exercise the erector spinae is with a neutral spine, not the hyperextended postures you

see being used by many individuals using reverse hyper machines. Also, Gagné says – and this comment is reinforced by Gustavsen and Streeck – “When performing the reverse hyper the legs should be lifted approximately three quarters of the way up and NOT to parallel, as doing so can place adverse stress on the L3 to L5 vertebrae by causing the spine to hyperextend.” (Figure 7)

The design of the BFS Reverse Hyper also allows the exercise to be performed with one leg, which is the preferred training method to help correct muscle imbalances that often occur with athletes in throwing sports such as baseball. Although you could simply just lift one leg at a time, a better version would be to place one leg behind the roller pad and the other on top (Figure 8).

Taking advantage of an effect called *reciprocal inhibition*, Gagné says that by activating the antagonist of one muscle, the agonist achieves a greater strength training effect. For example, if you did a triceps pressdown with one arm, and a biceps curl for the other, the biceps would contract harder than if the exercise were performed without the pressdown exer-



FIGURE 8. Performing the reverse hyper one leg at a time, with the free leg applying resistance against the roller pad, creates a stronger muscle contraction of the glutes, lower back and hamstrings.

cise. For the reverse hyper, this means the glute, lower back and hamstrings would contract harder. “Research has shown that using this method increases the training effect by 10 percent!” says Gagné. For more information on reciprocal inhibition and other aspects of how the nervous system influences strength training, Gagne recommends Roger M. Enoka’s excellent textbook, *Neuromechanical Basis of Kinesiology* (Human Kinetics).

Another modification is a unique, U-shaped pad attached to the edge of the machine (Figure 5). This pad reduces the stress on the abdomen, a common complaint among users of other reverse hyper machines. In fact, one strength coach at a private gym in Dallas had to have his reverse hyper machine reupholstered with thicker padding, as his shorter athletes, especially female athletes, refused to perform the exercise because the square pad was too uncomfortable.

When we first began experimenting with the Reverse Hyper, we found that its unique chest pad design enables you to perform many valuable rehabilitation exercises. For example, by mounting the machine backwards and having someone hold your legs, you can perform extension exercises for the upper back (thoracic spine), as shown in Figure 9, to help correct forward head posture.

The BFS Reverse Hyper is 50 inches tall and has an adjustable roller pad that enables it to comfortably accommodate a wide range of athletes. In fact, a 5-foot gymnast can use the machine as easily as a 6-foot-5 football player. Sealed ball bearings make for the smoothest operation, and a 12-inch-high step is provided to make it easier for shorter athletes to enter and exit the machine. The machine is wide (62 by 44 inches) and weighs nearly 200 pounds to enhance stability, uses commercial-grade 11-gauge steel, and you can be assured



FIGURE 9. By mounting the machine backwards and having someone hold your legs, you can perform extension exercises for the upper back to help correct forward head posture.

it is of the highest quality, as it is made in our manufacturing plant in Utah. Further, no lead-based paint is used in the manufacturing process.

The BFS Reverse Hyper is a great complement to the BFS Glute-Ham Developer, as the primary muscle group worked with this machine is the hamstrings (Figure 10). In the BFS program, reverse hypers would belong in the auxiliary group of exercises.

As for reps and sets, the hamstrings are considered fast-twitch muscles compared to the lower back muscles, so you would perform slightly more reps on the Reverse Hyper machine than on the Glute-Ham Developer. For example, you could perform sets of 5-8 reps for 3-5 sets on the Glute-Ham Developer, and

10-15 reps for 2-3 sets on the Reverse Hyper. Although some coaches recommend performing the reverse hyper for extremely high reps, such as sets of 30, Gagné says that for restoration purposes he is unaware of any research available that proves the value of such an extreme exercise protocol.

Many great strength and conditioning programs emphasize free weights, which is as it should be, but the Reverse Hyper is the only weight-training machine that effectively isolates the glutes while safely working the lower back. Make the decision to choose a BFS Reverse Hyper for your athletes – it’s a definite asset to any program. After all, when it comes to training athletes, it’s often what’s behind that counts! **BFS**



FIGURE 10. The BFS Reverse Hyper is a great complement to the BFS Glute-Ham Developer.