

# How Exercise Can Help Promote Stronger Bones

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August 16, 2024

## STORY AT-A-GLANCE

- › Exercise promotes bone mineral density by stimulating bone growth through impact and mechanical forces. Higher-intensity and weight-bearing exercises have a stronger positive effect on bone development
- › Moderate- to high-intensity exercise is most effective for improving bone density, but excessive high-intensity exercise can be detrimental due to increased oxidative stress
- › Five recommended exercises for promoting bone mineral density include banded squats, wall pushups, side planks, tandem balance and flamingo stance, as they target several muscle groups and improve balance
- › Whole-body vibration (WBV) therapy, using vibration plates, has shown positive effects on bone mineral density in postmenopausal women and may help reduce fracture risk in healthy adults
- › Blood flow restriction (BFR) training, also known as KAATSU, can stimulate bone formation biomarkers and may be as effective as high-intensity exercises in reducing bone destruction biomarkers

There's no doubt that exercise is one of the best ways to keep yourself in top shape. Research<sup>1</sup> has shown that it provides an array of benefits, such as helping boost immune function, diversifying the gut microbiome, increasing lifespan and reducing the risk of chronic disease. In addition, exercise has an underappreciated benefit – improving bone mineral density.

Strong, dense bones are not only important for rigidity, but also protect organs and serve as an anchor point for your muscles.<sup>2</sup> If routine health tests reveal that your bone density is getting lower, your risk for acute fractures and osteoporosis increases. Instead of relying on drugs that supposedly protect skeletal health, incorporating exercise into your daily routine is a better solution.

## How Exercise Boosts Bone Density

According to Dr. Michael Greger, bone health follows a "use it or lose it" approach.<sup>3</sup> That's because like our muscles, bones are living, breathing organisms that constantly break themselves down to be replaced anew. And just like your muscles get stronger through exercise, the same occurs with your bones.

For example, a study<sup>4</sup> published in 2021 noted that exercise – especially during your youth – is a crucial factor in determining bone strength in adulthood. According to published research, the impact our bodies absorb during exercise stimulates bone growth, thereby leading to increased bone mineral density:<sup>5</sup>

*"From a mechanically centric point of view, activities that generate higher intensity or quicker loads (such as resistance training and leaping) are excellent for promoting bone health because they stimulate existing bone cells in a significant way ...*

*Mechanical forces applied to bone tissue induce the movement of interstitial fluid along tubules and bone cell pores, thereby causing cell-level shear stress and deformation of bone cell plasma membrane. These changes lead to the beginning of the bone remodeling process and stimulate bone resorption and formation cycles."*

In this regard, resistance training as well as engaging in higher-impact activities are ideal for boosting bone mineral density. However, don't discount aerobic exercise just yet – it may still exert a positive effect.

According to the same study,<sup>6</sup> aerobic exercise can positively influence bone density by boosting nutrient transport as well as creating hormonal interactions that promote bone formation. Moreover, aerobic exercise plays a role in mitochondrial repair that may influence bone health.

## **Up the Intensity to Magnify the Benefits**

Going deeper into how exercise promotes healthy bones, intensity is a crucial factor — not just the fact you need to exercise. It's been observed that adding intensity and weight "have a strong and consistent positive effect on bone development."<sup>7</sup> In other words, your bones become more resilient when subjected to greater (but controlled) amounts of force.

This hypothesis is supported by other published research. In a meta-analysis published in 2023 involving postmenopausal women,<sup>8</sup> researchers explained the crucial role of intensity in helping boost bone mineral density:

*"We established that high-intensity and high-impact exercises are effective in improving, or at the very least maintaining, bone density in the lumbar spine and femur in postmenopausal women. An exercise protocol including high-intensity resistance exercises and high-impact training is shown to be most effective in improving bone density and other parameters of bone health."*

Similar observations were made by another study.<sup>9</sup> Out of 100 trials reviewed, researchers noted that low-intensity exercises were not effective in stimulating the skeletal system to increase bone density. But, as expected, studies that used moderate-to high-level intensity impact and resistance protocols showed notable benefits for bone density.

While upping the exercise intensity has its benefits, take care not to overdo it for the sake of increasing bone density. According to a study published in *Aging and Disease*, doing high-intensity exercises can eventually backfire on your health, as explained by the authors:

*"Excessive high-intensity exercise does not benefit bone health but induces a high level of oxidative stress in the body, which has a negative impact on bone tissue.*

*Regular moderate exercise can improve the body's antioxidant defense ability, inhibit an excessive oxidative stress response, promote the positive balance of bone metabolism, delay age-related bone loss and deterioration of bone microstructures and have a prevention and treatment effect on osteoporosis caused by many factors."*

## **Five Exercises That Can Help Promote Bone Density**

Now that you know the importance of moderate-intensity exercise for promoting bone health, what are exercises that fall under this category? Hinge Health<sup>10</sup> recommends these five examples, which were chosen by licensed physical therapists.

Before trying these exercises, make sure to consult with your primary care physician. According to Greger,<sup>11</sup> weight-bearing workouts may be detrimental to certain groups of people, such as those already diagnosed with severe osteoporosis or those who recently had fractures.

- **Banded squat** — According to board-certified physical therapist Mary Kimbrough, this exercise can help strengthen your hips and lower back, which are common areas affected with low bone density.
  1. Place a looped resistance band just above your knees.
  2. Stand tall with your feet hip-width apart.
  3. Hinge at the hips, lowering them into a squat until they're parallel with your knees. Stand tall again. Press your knees into the band, and pull your abdominal muscles for support.
  4. As you do each repetition, you'll feel the muscles in your legs, glutes and hips working.

- **Wall pushup** – Try this exercise to help strengthen the bones in your torso, particularly the shoulders, arms and upper back.
  1. Stand with your hands placed on a wall at chest height. Keep your arms straight and your feet a few steps away from the wall. Some of your weight will be supported through your arms.
  2. Bend through your arms to move your chest toward the wall. Stop when your head and chest get close to the wall.
  3. Focus on keeping your hips from dipping toward the wall as you hold this position.
  4. Push through your hands to straighten your arms and return to the starting position. As you do each repetition, you'll feel your arms, chest and shoulder muscles working.
  
- **Side planks** – Targeting your core, hip and shoulders, side planks are an effective full-body exercise, according to Kimbrough.
  1. Lie down on a gym or yoga mat on your side with your legs straight and feet together.
  2. Place a forearm on the floor, under your shoulder. Push through your feet and forearm to lift your hip toward the ceiling.
  3. Focus on squeezing your core muscles as you hold this position.
  4. Lower your hips back to the floor. As you do each repetition, you'll feel your hips, back, core and shoulder muscles working.
  
- **Tandem balance** – This exercise can help improve overall lower leg strength and balance, which can reduce your risk of falls.
  1. On a yoga mat, stand with your feet apart and your hands on your hips.
  2. Place one foot in front of the other. Position your heel directly in front of the toes of the other foot, like you're standing on a balance beam.

3. Focus on keeping your hands on your hips. You'll notice that your body is moving a lot as it tries to maintain this position.
  4. Spread your feet apart to return to the starting position. As you do each repetition, you'll feel your lower leg, ankle and foot muscles activating.
- **Flamingo** – This exercise is an advanced version of Tandem Balance, since you'll be standing on one leg only.
    1. Stand next to a table but without touching it. It's there for support (if you need it), but try to do the exercise without using it.
    2. Bend one knee to lift your foot off the floor, balancing on the other foot. Then, return your foot to the floor. Don't worry if you're wobbling – pull in your abdominal muscles to support your balance.
    3. As you do each repetition, you might feel the muscles in your feet and ankles working.

In addition to these exercises, the National Institute of Arthritis and Musculoskeletal and Skin Diseases recommends the following activities that can help boost bone health:<sup>12</sup>

- **Weight-bearing exercises** – Brisk walking, jogging, tennis, badminton and dancing
- **Resistance training** – Free weights, bodyweight exercises and gym machines
- **Balance training** – Tai chi, stepping on a wobble board and walking backward

## Consider Using a Vibration Plate

Whole-body vibration (WBV) therapy is an exercise wherein you stand on a vibrating plate. As the energy transfers through your body, you're constantly balancing yourself even while in a stationary position. This physical exertion may produce benefits, according to researchers, including increased bone mineral density.

For example, a 2022 review<sup>13</sup> of 14 randomized controlled trials noted that WBV therapy has a positive effect on patients diagnosed with knee osteoarthritis (OA). According to the research findings:

*"Meta-analysis showed that low-frequency and high-frequency whole-body vibration had additional positive effects compared with strengthening exercises alone on pain, knee extensor muscle strength, and physical function in individuals with knee OA. Whole-body vibration with strengthening exercises can be incorporated into treatment protocols."*

In another meta-analysis,<sup>14</sup> researchers discovered that WBV therapy helped boost the bone mineral density of postmenopausal women, as well as reducing the risk of fractures in generally healthy adults. Moreover, WBV therapy may help in other aspects of health, such as helping boost cognitive function.<sup>15</sup>

For a deeper dive into the science behind WBV therapy, as well as exercises that you can do on a vibration plate, I recommend reading my article "[Utilize the Power of Vibrations to Promote Wellness](#)."

## **Add Blood Flow Restriction Training Into Your Routine**

I believe that blood flow restriction (BFR) training is one of the greatest innovations in exercise in the last century. Also known as KAATSU in Japan, BFR training involves partially obstructing blood flow to your extremities while exercising.

The intermittent hypoxia created by the restriction results in anti-inflammatory myokines that help build muscle strength without lifting heavy weights – a big boon for the elderly population looking to stay fit. In [my interview with Steven Munatones](#), an expert KAATSU practitioner, he explains how it works:

*"KAATSU cycle is basically a very clever biohack that will allow the muscles to work and allow the vascular tissue to become more elastic. You don't perceive the pain of heavy lifting, but your vascular tissue and muscle fibers are being worked out just as effectively, and you can do it for a longer period of time."*

But that's not all KAATSU has to offer. As it turns out, it may help boost bone density as well. In a study<sup>16</sup> published in *Frontiers in Physiology*, researchers monitored participants who exercised thrice a week with BFR training for a total of six weeks,

monitoring their knees for bone formation biomarkers. Results revealed that even at just a low intensity, "BFR resistance training was effective for stimulating acute bone formation marker and hormone responses."

In another study,<sup>17</sup> similar results were observed among inactive adolescent women. According to the researchers, low-intensity BFR training was just as effective as high-intensity exercises in helping reduce C-terminal telopeptide, a known biomarker of bone destruction.

So, how do you incorporate KAATSU into an exercise routine? According to Munatones, you can use it not just during exercise, but also while doing your day-to-day activities:

*"Putting the KAATSU bands on your legs and walking down to the beach, walking your dog or just walking around the neighborhood, standing, cleaning your windows of your house, folding your clothes, banging out emails, all of these things can be done with the KAATSU bands on your arms or legs. You're getting the benefit of exercise."*

*Beta endorphins are being produced; hormones and metabolites are being produced as you're doing simple things – and that is the way to get the older population in Japan, in the United States, around the world, to understand that you can stop sarcopenia, but you have to exercise. You don't have to run a 10K, you don't have to go down to Gold's Gym. Just put on the KAATSU bands and live your life."*

While using BFR bands in everyday activities is a welcome convenience, you can still incorporate them into a proper exercise routine. For an in-depth look at how you can do this, visit my article "[How to Stay Fit for Life](#)." There, I also describe what BFR-specific exercises you can do.

## Sources and References

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