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How Exercise Can Improve Bone Mass & Slow Osteoporosis

Recommending load-bearing activities will benefit patients

BY TANYA BRICKING LEACH

BARBARA HANNAH GRUFFERMAN WAS IN HER early 50s when it happened. She fell while walking her dog and broke a bone. It was not a hard fall, and nothing about it suggested a serious injury.

No one raised concerns about osteoporosis or recommended a bone density test. She healed and moved on.

Months later, at her annual physical, she mentioned the fall. Her doctor ordered a bone density scan. It showed low bone density. "I went on this mission to save my bones," she says.





Grufferman began running and made exercise part of her daily routine, then added strength training. Since then, she has run 17 marathons and urged other women to pay attention to their bones before something breaks. Grufferman, now 69, is an author and host of the *Age Better* podcast. She writes about healthy aging and is an ambassador for the Bone Health & Osteoporosis Foundation.

Doctors who treat fractures say her experience is familiar. Bone loss can develop gradually and often goes undetected until an injury brings it to attention. Bone density peaks by the late 20s or early 30s and declines after that, says Dr. Vivek “Sunny” Chander, an emergency medicine physician in Massachusetts who has spent more than two decades treating fractures and other acute injuries. He is also the lead clinical advisor for BodySpec, a company that provides body composition and bone density scans.

For many people, Chandler says, the first indication of a problem is not the results of a screening test but a broken bone.

Exercise is one of the few factors that can influence how bone holds up over time, Chandler says, but the effect depends on the type of stress placed on it. “Bone responds to load,” he says. “If you don’t give it that stimulus, it has no reason to maintain itself.” That response can help maintain bone and slow loss as people age, he says. Without load-bearing exercise, bone continues to weaken.

What fractures reveal

In the operating room, the difference is hard to miss. Dr. Myra Trivellas, an orthopedic sports surgeon with Hoag Orthopedic Institute in Newport Beach, California, sees it in the way bone responds under pressure. In some people, it holds. In others, it does not. “There are times when I’m trying to put a bone back together and it’s just crumbling,” she says.

Trivellas played lacrosse at Yale and trained in sports medicine at Duke, where she worked with Division I athletes, including the university’s football, basketball, and women’s lacrosse teams. Her background informs how she approaches strength, conditioning, and how much load the body can handle. She has seen firsthand how rigorous training increases bone density. One athlete she treated had bone so dense, “It was like drilling through a cement wall,” she says.

Trivellas says the benefits of strength training show up in recovery as well. After an injury, people with stronger muscle and bone often return more quickly to daily routines. They stay mobile and regain strength. Others have a harder time rebuilding, even when imaging looks similar. When these patients ask what might have changed the outcome, her answer is consistent: “Any sort of resistance training,” she says. “Heavier loads. Being more active day to day.”

What actually builds bone

For Dr. Ashley Katzenback, prevention conversations usually start with asking patients to describe their routines. Many say they walk regularly. That kind of movement has value, she says, but it does not always create enough force to change bone. "Bone only responds to load," says Katzenback, a doctor of physical therapy who practices on Cape Cod and in Plymouth, Massachusetts.

She explains it in physical terms: When a muscle contracts, it shortens and pulls on bone from both ends. That pull creates force. If the force is strong enough, the bone responds by laying down new bone. "If we pick up something heavy enough that we have to strain our muscle enough to pull on that bone, it's giving the bone a signal," she says. "I must do more work here." What counts as "heavy" depends on the person. For someone who has never lifted weights, 5 pounds may be enough. For someone else, it may take 50 or 60, she says.

Impact exercises can create that signal, too, Katzenback says. "If we jump and land, we give our bone a signal: 'I must do more work here,'" she says. "Jumping for two minutes a day, five days a week, is enough to build bone density."

How bone adapts with age

By midlife, the goal is different, says Dr. Scott Rand, a primary care sports medicine specialist at Houston Methodist Willowbrook Hospital. The body is no longer building bone at the same rate it once did, so the focus switches to maintaining what is there and slowing further loss. But bone remains active tissue, he says. It still breaks down and rebuilds in response to stress, but the balance changes with age.

Walking is often the recommended starting point, Rand says, particularly for people who have been less active. It is weight-bearing, accessible and easy to sustain. From there, adding resistance training builds on the base. Exercises that load the hips and spine, including movements like squats, place more force on bone and can strengthen those areas, Rand says.

Higher-impact activity creates a stronger signal. Running and jumping both increase the load placed on bone, but

not everyone can or should begin there. Bone responds within a range, Rand says. Too little stress allows it to weaken. Too much, especially when added quickly, can lead to injury. "You don't need to go as hard as possible," he says. "You need enough to get a response."

Why people don't do it

Knowing what helps is not the same as doing it. In clinic, Trivellas hears a common response from people who are in pain. "A lot of times you hear, 'If it hurts, don't use it,'" she says. But avoiding movement can backfire, she says. It can lead to further weakness, which makes everyday activity more difficult and more painful over time.

Other barriers are less physical. "It's just hard to be consistent," Trivellas says. People tell her they are too busy, too tired, or unsure where to start. Many expect a faster solution. "We live in a society that wants a pill for everything," Chander says. But bone health does not respond to shortcuts, he says. It's something that builds over years.

Even when people begin exercising, they often misjudge the balance between what's too little and what's enough, Rand says. He sees that pattern in runners who ramp up mileage too fast. Bone breaks down under repeated load and does not have time to rebuild. The result can be a stress fracture, one of the clearest signs that the system is out of balance.

What gets missed

Even when people are motivated to make changes, conversations about prevention do not always happen soon enough. In the doctor's office, time is one constraint. "Physicians just don't have enough time in their office to talk about preventive measures," Chander says.

He sees the downstream effect in the emergency department, where a fracture often becomes the first clear indication that someone has bone density loss. At that point, the focus is on treating the injury. Talking about why it happened and how to prevent the next one often comes later, if at all.

Current bone density testing guidelines recommend testing beginning at age 65 for many women, but bone loss can begin earlier, particularly during

Current guidelines recommend bone density screening for women age 65 and older



the transition into menopause. Chander says testing at a younger age can at least give people a baseline. "It'll give you a metric to follow."

Measuring progress takes time

For some clinicians, testing bone density earlier than 65 has real-life implications. Katzenback had her first bone density test at age 35 and it showed osteoporosis. Looking back, she had risk factors: As a young athlete, she had a history of stress fractures, did not get proper nutrition during training, and missed periods. She says those signals were easy to miss, though, because she had been on hormonal birth control. "I probably didn't develop great bone density to begin with," she says.

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Her diagnosis changed how she approached her own health. She increased her nutrition. She began lifting heavier weights, and she made sleep a priority. Katzenback is now 44 and her bone density has improved from osteoporosis to osteopenia, a less severe level of bone loss. She continues to get regular bone density scans. "It's going to continue to be a battle," she says. "But I'm going to continue to work on reversing it, because I know I can."

Katzenback's experience has also changed the way she approaches the people she treats. "We're not looking for perfection," she says. "There are going to be days that are hard, and that's OK. Let's aim for one day at a time." She focuses on sleep first, then nutrition, then exercise. "We can't keep push-

ing when there's nothing in the tank," she says. For people who do not know where to begin, she breaks it down even more. "Start by going for a walk," she says. "You don't have to do everything at once."

Lessons after a fall

Grufferman still thinks about that first fall. Not because it was dramatic. It wasn't. She fell while walking her dog, broke a bone, and was able to recover and get stronger. Nothing about it suggested a serious condition.

But there is another fall she thinks about too. Years later, her mother fell and broke her hip. She had surgery, moved into assisted living, and never returned home. She died about two and a half years later.

To Grufferman, those falls aren't isolated incidents; they're part of the same story. Grufferman's fall led to her osteoporosis diagnosis, some lifestyle changes, and improvement. Her mother's fall resulted in a major surgery and the permanent loss of her independence. "This is reality for many people who don't do anything to prevent it," she says.

She is no longer willing to put off prioritizing her health. Running, lifting weights, and paying attention to what she eats and how she recovers are all part of her daily routine now. "You have to do this for the rest of your life," she says. Her goal is not to undo everything that came before. She simply wants to stay strong enough to avoid the kind of fracture that limits how she lives.