

Working toward stronger bones with exercise

December 18 2012, by James Fell

If you're going to fall and break something, you should at least have a good story to tell.

I have broken nine bones. No, I was not abused. Some stories are better than others. The last [bone](#) I broke, the ulna in my left arm, involved a ski jump. Good story, except for the part about me being left-handed.

The goal for most people is to keep bones intact. For aging populations, exercise is a critical component of strengthening bones to preventing fractures.

If you move a lot, lift heavy things, walk, jog, cycle, jump, dance, Pilate, hike or ski, then your muscles and connective tissues will be stronger and more functional. You'll be more flexible, coordinated and agile.

Aye, but here's the rub.

Exercise puts you at greater risk. Sure, you're stronger and more coordinated, but the person going out for daily jogs is more likely to go flying after slipping on something than the person who sits all day. Your ability to stay upright increases, but the risk that you could fall increase too. It's a Catch-22.

Just do whatever you want.

Psych! I'm not letting you off that easy, because exercise increases [bone density](#) and, more importantly, [bone strength](#).

Many studies show the effect of exercise on bone adaptations. The 2008 textbook "Essentials of [Strength Training](#) and Conditioning" shows a picture of how additional downward [gravitational force](#) affects the skeleton.

Consider your [femur](#) (thighbone). Imagine you put a bunch of extra weight on your back and move around, and up and down. That extra downward force causes the bone to bend from the weight. When that happens, previously dormant things called osteoblasts migrate toward the bone when it bends, and they lay down collagen fibers. These [collagen fibers](#) mineralize, and that yields new [bone growth](#). Fantastic!

That's the theory, but there isn't a lot of consensus in the research about what this means for the [average person](#). I did some digging, and discovered that when it comes to the effect of exercise on the bone health of aging populations, Wendy Kohrt is the expert.

I started off by asking her if resistance training actually increases bone density.

"It can happen," said Kohrt, who is a professor of geriatric medicine at the University of Colorado. She explained that we can't say with absolute certainty it happens in humans, but the indications are that it does.

What I found most enlightening about my conversation with Kohrt, who has written numerous scientific studies on the subject, is it's not just weightlifting that can reap bone benefits.

"Forces can be introduced to the skeleton in two ways," she said. "Ground reaction force" is the effect of your body contacting the ground, which includes walking, running and jumping. Resistance training (weightlifting), by comparison, involves "joint reaction force," "which is muscle pulling on bone," Kohrt explained.

She said most of the research focused on the effect of resistance training on bone formation, "But studies comparing resistance training with endurance exercise show no evidence one is better than the other. A vigorous endurance program - running, jogging, doing stairs, plyometrics, etc. - can have similar increases in bone density."

And in some cases, endurance can be better for older populations, at least to start, because the most beneficial [resistance training](#) exercises, such as squats, can be a challenge.

So what are the benefits of exercise on new bone development?

"We generated increases in the neighborhood of 2 percent," Kohrt said. That sounds ... pathetic. But wait!

Kohrt explained exercise elicits similar bone growth improvements as do medications, but the true difference lies not in the increase in bone density, but in bone strength. With drugs, it's a 1 to 1 ratio. If you increase density 2 percent, you increase strength 2 percent. With exercise, and this is being conservative, it's a tenfold difference. Kohrt explained a 2 percent increase in bone mass can translate into a 20 percent increase in bone strength, and perhaps as much as 40 percent.

It's important to note these are animal studies, because, well ... they needed to break the bones to find out how strong they are. Not many people volunteer for those kinds of studies.

"When you exercise, the stresses only occur in the regions of the skeleton that experience that stress," Kohrt explained. Drugs aren't targeted, but if there are specifically weak areas of your skeleton, you can give them extra attention via focused training. That's good.

Kohrt spoke of epidemiological studies on actual people. "Almost all

studies found the most physically active people had a 40 percent less risk of hip fracture than the least active ones." So even doing dangerous things on slippery surfaces, they're still at less risk of needing that bionic hip than those who sit around.

Kohrt explained you'll see more results as you ramp up the intensity of you workout. Running and jumping is going to do more than walking, and heavier lifting will generate a better result than lighter loads. "We start people off with moderate lifting, but work them up to where they can only lift it 6 to 8 times and then are fatigued," she said. Less important is volume; 75 minutes of vigorous or 150 minutes of moderate [exercise](#) is enough. "The bottom line is anything is better than nothing."

"I recommend they engage in a variety of activities," Kohrt told me. "People become unidirectional as they age." Instead, they need to move in multiple directions, carefully pushing the limits of twisting, turning and lunging to keep the entire system strong.

And less breakable.

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