



Exercise and Bone Health for Women: The Skeletal Risk of Overtraining

National Institutes of Health Osteoporosis and Related Bone Diseases National Resource Center

2 AMS Circle
Bethesda, MD 20892-3676

Phone: 202-223-0344
Toll free: 800-624-BONE
TTY: 202-466-4315
Fax: 202-293-2356

Website: <https://www.bones.nih.gov>
Email: [NIHBoneInfo@
mail.nih.gov](mailto:NIHBoneInfo@mail.nih.gov)

The NIH Osteoporosis and Related Bone Diseases National Resource Center is supported by the National Institute of Arthritis and Musculoskeletal and Skin Diseases with contributions from the National Institute on Aging, the National Institute of Diabetes and Digestive and Kidney Diseases, and the NIH Office of Research on Women's Health.

The National Institutes of Health (NIH) is a component of the U.S. Department of Health and Human Services (HHS).

December 2018

Are you exercising too much? Eating too little? Have your menstrual periods stopped or become irregular? If so, you may be putting yourself at high risk for several serious problems that could affect your health, your ability to remain active, and your risk for injuries. You also may be putting yourself at risk for developing osteoporosis, a disease in which bone density is decreased, leaving your bones vulnerable to fracture (breaking).

Why is missing my period such a big deal?

Some athletes see amenorrhea (the absence of menstrual periods) as a sign of successful training. Others see it as a great answer to a monthly inconvenience. And some young women accept it blindly, not stopping to think of the consequences. But missing your periods is often a sign of decreased estrogen levels. And lower estrogen levels can lead to osteoporosis, a disease in which your bones become brittle and more likely to break.

Usually, bones don't become brittle and break until women are much older. But some young women, especially those who exercise so much that their periods stop, develop brittle bones and may start to have fractures at a very early age. Some 20-year-old female athletes have been said to have the bones of an 80-year-old woman. Even if bones don't break when you're young, low estrogen levels during the peak years of bone building, the preteen and teen years, can affect bone density for the rest of your life. And studies show that bone growth lost during these years may never be regained.

Broken bones don't just hurt – they can cause lasting physical malformations. Have you noticed that some older women and men have stooped postures? This is not a normal sign of aging. Fractures from osteoporosis have left their spines permanently altered.

Overtraining can cause other problems besides missed periods. If you don't take in enough calcium and vitamin D (among other nutrients), bone loss may result. This may lead to decreased athletic performance, decreased ability to exercise or train at desired levels of intensity or duration, and increased risk of injury.

Who is at risk for these problems?

Girls and women who engage in rigorous exercise regimens or who try to lose weight by restricting their eating are at risk for these health problems. They may include serious athletes, “gym rats” (who spend considerable time and energy working out), and girls and women who believe “you can never be too thin.”

How can I tell if someone I know, train with, or coach may be at risk for bone loss, fracture, and other health problems?

Here are some signs to look for:

- Missed or irregular menstrual periods.
- Extreme or “unhealthy-looking” thinness.
- Extreme or rapid weight loss.
- Behaviors that reflect frequent dieting, such as eating very little, not eating in front of others, trips to the bathroom following meals, preoccupation with thinness or weight, focus on low-calorie and diet foods, possible increase in the consumption of water and other no- and low-calorie foods and beverages, possible increase in gum chewing, limiting diet to one food group, or eliminating a food group.
- Frequent intense bouts of exercise (e.g., taking an aerobics class, then running 5 miles, then swimming for an hour, followed by weight-lifting).
- An “I can’t miss a day of exercise/practice” attitude.
- An overly anxious preoccupation with an injury.
- Exercising despite illness, inclement weather, injury, and other conditions that might lead someone else to take the day off.
- An unusual amount of self-criticism or self-dissatisfaction.
- Indications of significant psychological or physical stress, including: depression, anxiety or nervousness, inability to concentrate, low levels of self-esteem, feeling cold all the time, problems sleeping, fatigue, injuries, and constantly talking about weight.

How can I make needed changes to improve my bone health?

If you recognize some of these signs in yourself, the best thing you can do is to make your diet more healthful. That includes consuming enough calories to support your activity level. If you’ve missed periods, it’s best to check with a doctor to make sure it’s not a sign of some other problem and to get his or her help as you work toward a healthier balance of food and exercise. Also, a doctor can help you take steps to protect your bones from further damage.

“I was training really hard – all the time. Finally, my parents made me quit the cross country team...I was eating almost nothing, training with a stress fracture...I trained even when my body ached. I thought the pain, the headaches, and the missed menstrual periods were normal. I thought that was how a ‘champion’ was supposed to feel and train. I was proud of myself for being so thin and disciplined, and losing all the ‘baby fat’ I had carried throughout junior high school. My friends all said, ‘Gosh, you have lost so much weight!’ But I wasn’t in control. After my parents made me quit the team and took me to get help, I realized that my training regimen was not normal or healthy. I realized that I was hurting myself, and that I did not have to be obsessive about my weight, eating habits, and exercise in order to be attractive. I still exercise now, and I watch what I eat, but I am much more relaxed, healthier (my doctor says!), and happier. I have more energy – and more fun. I don’t have to set any records anymore, and I am a champion anyway!”

—An athlete who recovered from problems associated with overtraining and missed periods.

What can I do if I suspect a friend may have some of these signs?

First, be supportive. Approach your friend or teammate carefully, and be sensitive. She probably won’t appreciate a lecture about how she should be taking better care of herself. But maybe you could share a copy of this fact sheet with her or suggest that she talk to a trainer, coach, or doctor about the symptoms she’s experiencing.

My friend drinks a lot of diet sodas. She says this helps keep her trim.

Girls and women who may be dieting often drink diet sodas rather than milk. Yet, milk and other dairy products are a good source of calcium, an essential ingredient for healthy bones. Drinking sodas instead of milk can be a problem, especially during the teen years when rapid bone growth occurs. If you (or your friend) find yourself drinking a lot of sodas, try drinking half as many sodas each day, and gradually add more milk and dairy products to your diet. A frozen yogurt shake can be an occasional low-fat, tasty treat. Or try a fruit smoothie made with frozen yogurt, fruit, or calcium-enriched orange juice.

For fitness instructors and trainers

It's important for you to be aware of problems associated with bone loss in today's active young women. As an instructor or trainer, you are the one who sees, leads, and perhaps even evaluates the training sessions and performances of your clients. You may know best when something seems to be amiss. You also may be the best person to help a zealous female exerciser recognize that she is putting herself at risk for bone loss and other health problems and that she should establish new goals.

Trainers and instructors also should be aware of the implicit or explicit messages they send. Health, strength, and fitness should be emphasized, rather than thinness. Use caution when advising female clients to lose weight. And, if such a recommendation is deemed necessary, knowledgeable personnel should offer education and assistance about proper and safe weight management. As an instructor or trainer, it's best to maintain a professional rapport with your clients, so they can feel comfortable approaching you with concerns about their exercise training programs, appropriate exercise goals and timelines, body image and nutrition issues, as well as more personal problems regarding eating practices and menstruation.

My coach and I think I should lose just a little more weight. I want to be able to excel at my sport!

Years ago, it was not unusual for coaches to encourage athletes to be as thin as possible for many sports (e.g., dancing, gymnastics, figure skating, swimming, diving, and running). However, many coaches now realize that being too thin is unhealthy and can negatively affect performance. It's important to exercise and watch what you eat. However, it's also important to develop and maintain healthy bones and bodies. Without these, it will not matter how fast you can run, how thin you are, or how long you exercise each day. Balance is the key!

I'm still not convinced. If my bones become brittle, so what? What's the worst thing that could happen to me?

Brittle bones may not sound as scary as a fatal or rare disease. The fact is that osteoporosis can lead to fractures. It can cause disability.

Imagine having so many spine fractures that you've lost inches in height and walk bent over. Imagine looking down at the ground everywhere you go because you can't straighten your back. Imagine not being able to find clothes that fit you. Imagine having difficulty breathing and eating because your lungs and stomach are compressed into a smaller space. Imagine having difficulty walking, let alone exercising, because of pain and misshapen bones. Imagine constantly having to be aware of what you are doing and having to do things so slowly and carefully because of a very real fear and dread of a fracture – a fracture that could lead to a drastic change in your life, including pain, loss of independence, loss of mobility, loss of freedom, and more.

Osteoporosis isn't just an "older person's" disease. Young women also experience fractures. Imagine being sidelined because of a broken bone and not being able to get those good feelings you get from regular activity.

Eating for healthy bones

How much calcium do I need? It's very important to your bone health that you receive adequate daily amounts of calcium, vitamin D, phosphorus, and magnesium. These vitamins and minerals are the most influential in building bones and teeth. The chart below will help you decide how much calcium you need.

Where can I get calcium and vitamin D? Dairy products are the primary food sources of calcium. Choose low-fat milk, yogurt, cheeses, ice cream, or products made or served with these choices to fulfill your daily requirement. Three servings of dairy products per day should give you at least 900 mg (milligrams) of calcium. Green vegetables are another source. A cup of broccoli, for example, has about 136 mg of calcium.

Recommended calcium intakes

Age	mg/day
9 to 13 years old	1,300
14 to 18 years old	1,000
19 to 30 years old	1,000

Source: Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, 2010.

Milk and dairy products. Many great snack and meal items contain calcium. With a little planning and “know-how,” you can make meals and snacks calcium-rich!

- **Milk.** Wouldn't a tall, cold glass of this refreshing thirst quencher be great right now? If you're concerned about fat and calories, choose reduced-fat or fat-free milk. You can drink it plain or with a low- or no-fat syrup or flavoring, such as chocolate syrup, vanilla extract, hazelnut flavoring, or cinnamon.
- **Cheese.** Again, you can choose the low- or no-fat varieties. Use all different types of cheese for sandwiches, bagels, omelets, vegetable dishes, pasta creations, or as a snack by itself!
- **Pudding (prepared with milk).** You can now purchase (or make from a mix) pudding in a variety of flavors with little or no fat, such as chocolate fudge, lemon, butterscotch, vanilla, and pistachio. Try them all!

- **Yogurt.** Add fruit. Eat it plain. Add a low- or no-fat sauce or syrup. No matter how you choose to eat this calcium-rich food, yogurt remains a quick, easy, and convenient choice. It's also available in a variety of flavors. Try mocha-fudge-peppermint-swirl if you're more adventurous at heart and vanilla if you're a more traditional yogurt snacker!
- **Frozen yogurt (or fat-free ice cream).** Everybody loves ice cream. And now, without the unnecessary fat, you can enjoy it more often! Mix yogurt, milk, and fruit to create a breakfast shake. Have a cone at lunchtime or as a snack. A scoop or two after dinner can be cool and refreshing.

What are other sources of calcium? Many foods you already buy and eat may be “calcium fortified.” Try calcium-fortified orange juice or calcium-fortified cereal. Check food labels to see if some of your other favorite foods may be good sources of calcium. You also can take calcium supplements if you think you may not be getting enough from your diet.

The National Institutes of Health (NIH) Osteoporosis and Related Bone Diseases National Resource Center acknowledges the assistance of the National Osteoporosis Foundation in the preparation of this publication.

For your information

For updates and for any questions about any medications you are taking, please contact the U.S. Food and Drug Administration toll free at 888-INFO-FDA (463-6332) or visit its website at <https://www.fda.gov>. For additional information on specific medications, visit Drugs@FDA at <https://www.accessdata.fda.gov/scripts/cder/daf>. Drugs@FDA is a searchable catalog of FDA-approved drug products.

NIH Publication No. 18-7890