It's nice to know that later this week, when I play soccer on Wednesday night and a round of golf on Sunday, I'll be following doctors' orders to keep my joints in shape. And because I've started doing some strengthening and stretching of my quads and calves, my knees will likely hurt less than they usually do after I walk 18 holes or run around on the pitch, chasing the ball.

Physicians, physical therapists and other experts agree that it's good to regularly pursue your activities of choice if you want to maintain the health of your knees, one of the most crucial joints for enjoying an active lifestyle throughout your life. But you should do it carefully, and according to a regular program that includes better preparing for the activities and sports you love.

It's also beneficial, according to various knee experts, to take simple steps such as maintaining a healthy weight (so there's less stress on the knee joints); avoiding heavy lifting; and climbing stairs by putting your full foot on the step and leaning the torso forward somewhat instead of keeping it upright. Leaning forward helps to better balance the
best regimen for knee health may vary based on considerations such as whether you're flat-footed or one leg is slightly shorter than the other, and also based on the particular sports and activities you engage in—and even more specifically, based on the positions you play in certain sports. But the tips below should help to get you on the right footing toward maintaining knee health and fitness throughout your life.

Be sure to consult a qualified health-care provider before embarking on any fitness program, to make sure the exercises are appropriate for your specific level of health and conditioning. For instance, some exercises should not be done by those with fragile bones. In addition, to ensure proper technique and form, it's generally a good idea to have exercises explained and demonstrated by an expert who can also help to make sure you are doing them correctly.

**Young Athletes**

Young people—especially those who are still growing—are susceptible to knee problems caused by overtraining or by not training properly. "It’s vitally important not to train past the body’s ability to take it," Scranton says.

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**Additional Resources**


- Information on topics ranging from adolescent knee pain to a knee-conditioning program, from the extensive patient-education website of the American Academy of Orthopaedic Surgeons: orthoinfo.org.


- Strength-training programs for home use, information specific to female athletes, Qigong ("cultivating energy") training for older adults, and much more, from the American College of Sports Medicine: acsm.org.

- Information on specific sports-related conditions and treatments, youth sports-injury prevention, patient info and more, from The American Orthopaedic Society for Sports Medicine: sportsmed.org.

- Emerging practices and other information from the National Athletic Trainers’ Association: nata.org.

- For additional information about women suffering from knee injuries at a higher rate than men: Warrior Girls: Protecting Our Daughters Against the Injury Epidemic in Women’s Sports, a book by Michael Sokolove, who is a contributing writer to The New York Times Magazine. —J.W.
Scranton, who is now the orthopedic consultant at Pro Sports Club in the Puget Sound region, cites potential growth plate injuries to younger kids who might be in the midst of a growth spurt when they’re training for sports. Overuse injuries and psychological burnout are other possible results of overtraining.

If you’re a young athlete, you should make sure to train specific muscles to protect the knee, but in a way that is appropriate for your sport, Scranton says, adding that in general, muscles should be trained for strength, agility, endurance and flexibility.

Your gender may also play a role in susceptibility to injury and how you should train. “In some studies, NCAA women athletes were four times as likely to experience an ACL [anterior cruciate ligament] tear as men of the same age playing the same sports,” says Dr. Charlie Peterson, an orthopedic surgeon and sports medicine specialist at Orthopedic Specialists of Seattle and Swedish Medical Center’s Orthopedic Institute in the Seattle area.

Researchers are still trying to figure out why women seem to be injured more frequently than men. The American Academy of Orthopaedic Surgeons suggests that contributing factors may range from differences in pelvis and leg alignment to differences in physical conditioning, muscular strength and neuromuscular control.

“Some factors at work here are correctable,” says Peterson. By strengthening and improved “recruiting” of the hamstring muscles, and by learning how to best jump and land, it’s possible to prevent some of these injuries, he says.

‘You should listen to your body, get good professional advice and begin training properly when young to set up a lifetime of proper training that will help you stay active when you get older.’

Sports medicine researcher Timothy Hewett, whose work has been supported in part by federal grants, recommends neuromuscular training of the hip, trunk and knee, via exercises such as drop jumps, in which the person drops down on both feet from a height such as a foot-tall platform and seeks to rebound up as soon as possible, with brief contact with the ground. The drop jump is considered a plyometric exercise—one designed to increase muscle power. Plyometric exercises often feature motions that are part of sports such as basketball, tennis and skiing.

Exactly what you want your muscles to do matters, so training for a basketball player who needs explosive jumping force might...
be different than for a football lineman who needs pure power or a receiver who needs speed and the ability to suddenly cut left or right. In the past decade or so, teams for soccer, basketball and other sports have instituted ACL-protection exercises that recruit the different muscles appropriately.

Portland physical therapist Leo Sergeant points out the importance of breaking up the typical repetitions of an exercise, and working the muscles in different ways. "For example, during a squat, slowly lower the body and bend the knees for four seconds (isometric exercise); hold the bend for another four seconds (eccentric exercise); then extend the knees by quickly standing up again (concentric exercise). That way you are working the muscles through all phases of contraction."

When doing squats it's important to maintain good knee alignment and not squat more than 90 percent—essentially, don't flex the knees more than 90 degrees, according to many knee experts.

"Higher-level programs should always include plyometric exercises such as box jumps, jumping rope and squat jumps with proper form—including being aligned and not going too low in the squat—to help develop explosive power," Sergeant says.

He also recommends exercises such as single-leg half squats with your eyes closed, to develop balance, and core training to strengthen the abdominals, back extensor and hip muscles to provide a solid platform. Stand-up paddling, for example, or kneeling on hands and knees and then extending one leg behind and raising the opposite arm forward and holding are good core strengtheners.

Other tips include having a year-round program for strength, agility and flexibility training; maintaining proper hydration and nutrition; avoiding soreness brought on by overtraining (be sure your regimen includes aspects such as a five-minute cool-down jog and fluid replacement); avoiding becoming muscle bound (in which muscles become enlarged and tense as a result of overexercising, and lose elasticity, which can set you up for muscle pulls or joint injuries); and being careful about playing while injured.

"You should listen to your body, get good professional advice and begin training properly when young to set up a lifetime of proper training that will help you stay active when you get older," says Derek Spinney, physical therapist and director of rehabilitation services at Eisenhower Medical Center in Rancho Mirage, California.

Midlife Recreationists

According to Scranton, the Pro Sports Club orthopedic consultant, most athletes peak just before age 30, at which point the body goes into a slow decline, losing speed, becoming less flexible, etc. As that happens, conditioning becomes even more important. Scranton says, noting that 60 percent of knee stability comes from muscle strength, and this is a time when muscles first begin to atrophy.

In addition to a regular strengthening program, middle-aged recreationists need to warm up and stretch before even slightly vigorous activity, he says. Joints and muscles stiffen as people age, with balance and flexibility fading fast if steps aren't taken to prevent it. And static stretching—in which you hold a position for many seconds without moving—isn't necessarily good, he says. He recommends that you gently jog or ride a bike for five to six minutes and then do dynamic stretches—with movement—such as arm swings and toe touches.

And although in your 20s you might have been able to shoot baskets or play golf after months of not pursuing your pastime of choice, Scranton says that protracted inactivity sets you up for an injury.
Inactivity also leads to demineralization of bones and loss of mobility in joints. So in addition to warming up and stretching right before any activity, you will want to pursue a regular program of activity and exercise. For middle-aged sports and recreation enthusiasts to avoid getting hurt, “there can be no off-season,” Scranton says.

In case you’re concerned about how much ongoing effort it will take just so you can safely shoot hoops every once in a while or pedal your mountain bike to the store, Scranton recommends walking as “the poor man’s way to fitness.”

“A brisk walk can burn almost the same amount of calories as a jog, and repetitively loads and unloads the joints, and cartilage requires this kind of motion for nutrition,” he says.

“A new form of exercise in many fitness centers is called TRX,” he adds. “TRX consists of an exercise regimen using adjustable hanging straps. You can do push-ups from the straps, pull-ups, ab and core work, squats, and you can use resistance bands to work the quads and abductors, as well.”

In addition, yoga at least once a week is good for maintaining flexibility at this point in life, he says, recommending yoga and exercise classes for active adults.

“If you’ve played team sports, working out alone is not nearly as fun,” he says. “With a feeling of teamwork and camaraderie, you’re more likely to do it. And working out in classes also allows you to check your own condition against others, so you’ll know if you’re in shape relative to your peers in terms of strength or balance, and can put more focus on these areas.”

Physical therapist Leo Sergeant adds that cross-training is important for all athletes, whose bodies may need respite from a single type of rigorous activity such as running. Incorporating hiking or swimming days can keep you cardio-fit without placing the same stresses on the knees.

Also pay attention to repetitive actions that hurt, he says, and know your sport. Beware of squatting for too long if you’re a catcher in softball, and make sure to land with good knee alignment if you’re a volleyball player. Skiers taking on moguls should be certain to ski with soft knees, and allow the shape of the bump to shape their turns. And if your knees hurt from arthritis or an injury, many experts recommend wearing a protective ‘unloading’ brace that will take some of the stress off the joint.

Finally, proper diet and nutrition are essential for the middle-aged. “When a 50-year-old who is 5 feet 8 inches tall and weighs 250 pounds wonders why his knees are hurting, I tell him it’s like he’s walking around with a 100-pound backpack every day,” says Peterson, the orthopedic surgeon and sports medicine specialist at Orthopedic Specialists and Swedish Medical Center. “To maintain knee health in middle age,” he says, “number one: Retain a healthy body mass index (BMI). You’d be amazed at how much of a difference it makes. Dropping 20 to 30 pounds may solve a patient’s knee issues—it’s a huge thing.”

**Those in the Golden Years**

All the factors affecting knee health earlier in life may be exacerbated for older folks: Muscles may become more atrophied; balance and flexibility may decrease; and pain from arthritis or injuries may lead to deconditioning of surrounding muscles as people become less active.

Joint wear and tear, tendinitis and osteoarthritis are all common, says Sergeant, so people feel pain and consequently don’t move around as much, which is the opposite of what they should do. “Joints need movement, daily exercise and water to maintain blood flow and flexibility,” he says.

Derek Spinney, the physical therapist at Eisenhower Medical Center, advises that you get lingering pain checked out and talk to your health-care provider about what exercises and activities you can do. Strength and flexibility training are typically beneficial, and so is an appropriate level of challenge, whether that involves use of a gym machine, resistance bands or even your own body weight, he says. For example, going from sitting to standing in and out of a chair, or performing a wall slide (a modified squat with your back against a wall) uses your own body weight and gravity to provide resistance to strengthen your muscles.

Find a workout regimen that doesn’t over-stress or hurt the knee, such as light workouts with cuff weights; descending stairs and then walking up them backward; and aquatic exercise, which provides resistance but less stress.

To develop muscle strength, Spinney also recommends so-called “closed chain” activities, in which one foot at a time stays on the ground or another surface, or both feet stay on the ground. Examples include squats and step-ups/step-downs—motions used frequently in everyday activities.

Also, of course, be sure to maintain a healthy weight and proper nutrition.
“People need to be encouraged to be active, but don’t tear your body apart,” Spinney says. “It is critical that we stay active longer, and seek professional advice to determine the appropriate exercise/activity, frequency and intensity—especially with seniors.”

For people of all ages who do injure or have pain in their knees, the simplest immediate remedies often include RICE—rest, ice, compression and elevation. But be sure to consult a qualified health-care provider if there’s any question about whether the injury or pain could be more than minor and temporary.

The National Institutes of Health suggests calling your doctor if you cannot bear weight on your knee; you have severe pain, even when not bearing weight; your knee buckles, clicks or locks; your knee is deformed or misshapen; you have a fever, [and/or] redness or warmth around the knee, or significant swelling; you have pain, swelling, numbness, tingling or bluish discoloration in the calf below the sore knee; you still have pain after three days of home treatment.

No matter what age you are now, you can benefit from starting to take better care of your knee health, says Sergeant. “The earlier the better, but whenever you address knee health in life, it will help.”

Writer Jeff Wallach stays active in Portland, Oregon. This general-interest story is not meant to constitute medical advice: be sure to consult your own health-care providers for knee and other health recommendations.