A Harvard Medical School Special Health Report



Stretching

35 stretches to improve flexibility and reduce pain



In this report:

Stretches for overall flexibility

3 routines to reduce pain and stiffness

Stretches to improve sports performance

Stretching guidelines

Stretching safely

SPECIAL BONUS SECTION Warm-up routine for workouts



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Natalie Ramm, Harvard Health Publications Ph: 617.432.2876 natalie_ramm@hms.harvard.edu

Licensing, Bulk, and Corporate Sales Tonya Phillips, Belvoir Media Group Ph: 203-857-3148 tphillips@belvoir.com

Harvard Health Publications Harvard Medical School 10 Shattuck Street, 2nd Floor Boston, MA 02115-6011 www.health.harvard.edu

STRETCHING **SPECIAL HEALTH REPORT**

Medical Editor Lauren E. Elson, MD Physical Medicine and Rehabilitation Instructor, Harvard Medical School

Personal Trainer Josie Gardiner Master Trainer and Fitness Consultant

Executive Editor Anne Underwood

Writer Francesca Coltrera

Copy Editor Robin Netherton

Creative Director Judi Crouse

Production Manager Lori Wendin

Photographer Michael Carroll

Illustrator Scott Leighton

Published by Harvard Medical School Anthony L. Komaroff, MD, Editor in Chief Patrick J. Skerrett, Executive Editor

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Dear Reader,

Be flexible.

That two-word philosophy makes just as much sense whether you're craning your neck to see cars in the lane behind you, working on your golf swing, lifting a laundry basket, or trying to ease muscle kinks sparked by hours behind a desk. Virtually every activity you do relies on ease of motion.

Stretching can help in numerous ways. It can relieve back pain, stiff necks, and sore knees when tight muscles are to blame. If you're a runner, a tennis player, a golfer, a hiker, or a biker, the right stretching program can set you on a path toward better performance. And as you age, it can help keep you active and flexible, making it easier to accomplish innumerable everyday tasks involving walking, climbing stairs, or reaching. Equally important, it may also help you prevent life-altering falls, since flexibility and a good range of motion can affect your balance.

This report deflates some long-held myths. For example, contrary to popular belief, you should not do static stretches (in which you adopt and hold a position) before you exercise. Rather, you should do these when your muscles are warmed up—say, after 10 minutes on the treadmill or with a type of warm-up called dynamic stretching that increases the flow of blood and oxygen to muscles. (See the Special Section of this report, beginning on page 15, for instructions, or go to <u>www.health.harvard.edu/dynamic-stretches</u> for a video.) Surprisingly, rather than readying muscles for sports, static stretches do not improve athletic performance, but can actually undercut strength and power, possibly by affecting the ability of the muscle to store and swiftly release energy. Dynamic stretches are a better choice.

Whether you're an armchair athlete or a sports enthusiast, we've designed a variety of stretching routines to meet your needs. You can do them daily for 10 to 20 minutes to reap optimal results, or just two or three times a week to make progress. Before you plunge in, please check our safety tips (see "Safety first," page 6).

Then, get started. You have only your stiffness to lose.

Lauren Elson

Lauren E. Elson, M.D. *Medical Editor*

Jose Gardines

Josie Gardiner Master Trainer

Stretching: The basics

F or all too many Americans, stretching is an afterthought in their physical fitness routines—maybe never even making it onto the to-do list, despite the fact that people's bodies become less flexible as the years roll by. Or, if individuals do stretch, they often don't stretch all their muscle groups properly. They may even stretch in ways that could cause injury.

There is actually much more to know about stretching than you might imagine. This chapter examines the rationale for stretching, describes the major types of stretches, explains basic guidelines for stretching, and delves into the anatomy of a stretch. In later chapters, you'll find information about stretching to improve sports performance and to ease certain types of pain. And, of course, you'll find our stretching routines, along with instructions for each stretch. Whether you're hoping to relieve stiffness or improve sports performance, our routines can help. And there's no need to wrestle your body into positions worthy of Cirque du Soleil. While some poses designed for deep stretching require practice and patience, you'll find most of our stretches simple to do and, as a bonus, quite relaxing.

Stretching is a safe activity for healthy adults, and the exercises we've chosen for this report are designed for people at all levels of ability. If your health is compromised, however—perhaps by heart disease, diabetes, or joint or back problems—please read the chapter "Safety first" (see page 6) to determine your best course of action before jumping in.

Why should you stretch?

Stretching is useful at any age. For example, overly tight hamstrings (the three large muscles at the back of your thigh) can hamper basic movements like walking and running. Often, they're implicated in chronic low back pain. Among athletes, they may contribute to muscle strains, knee pain, and diminished perfor-



mance in sports. As you work your way up and down the body, many more examples come to mind. Tight ankle and calf muscles may turn a trip into a tumble. Tight arm and side muscles may interfere with any task or sport involving reaching. Tight neck muscles make it hard to look behind you.

As you age, stretching continues to be important, even if you're less active. Your joints become less flexible over time. Inflexibility puts a crimp in daily acts, making it harder to walk, raise your arms overhead, or turn your head while backing up the car. It undermines balance, too, which can cause life-altering falls. Our stretches can help with all these problems.

Types of stretches

Most of us have been doing stretches all our lives without thinking too much about them, so you may be surprised to learn that there are actually multiple types of stretches. For this report, we have chosen active and passive static stretches, plus dynamic stretches that can act as a warm-up for sports. These provide the simplest, safest route to flexibility for most people.

Static stretches

Static stretches, the most familiar type, involve adopting and holding a position that stretches a muscle or group of muscles. Static stretches can be active or passive.

- During an active static stretch, the muscle being stretched does the work of holding the position. Yoga poses like the cobra and downward dog illustrate this nicely.
- A passive static stretch depends on gravity or a prop—like a partner, barre, strap, or elastic band—to hold the muscle that is being stretched in place. For example, if you stand up straight and hinge forward at the hips, then hold the position, with your arms hanging down, that's a good illustration of a passive stretch.

Ballistic stretches

Many people try to go deeper into a stretch by adopting a stretch position, then bouncing to quickly extend muscle length and range of motion. Stretches like these are called ballistic stretches. Ballistic stretches trigger the stretch reflex—resistance prompted by specialized nerves, forcing a lengthening muscle to contract. Ballistic stretches can injure muscles, if the movements are not carefully controlled. Therefore, we do not recommend them and do not include any examples in this Special Health Report.

Dynamic stretches

Dynamic stretches also involve movement but do not carry the same risk of injury as ballistic stretches. Dynamic stretches often mimic a sports motion, such as a golf swing. They typically take specific muscles and joints through their full range of motion, from one position to another, many times. And they usually involve multiple muscle groups from various parts of the body.

Dynamic stretches like those in this report (see "Special Section: Warming up for sports with dynamic stretches," page 15), increase the range of motion at the joints and also help warm up the body, pumping more blood and oxygen to the muscles to help prepare them for a workout. Some experts note that dynamic stretches might more properly be called dynamic warm-ups, because they do not actually elongate muscles. However, they do loosen up the muscles, preparing them for more intense use.

Proprioceptive neuromuscular facilitation

Proprioceptive neuromuscular facilitation, or PNF, is favored by some exercise and rehabilitation experts, who believe it enhances range of motion more than other approaches to stretching. But unlike static

Beyond stretching

Flexibility is just one measure of a healthy exercise plan. Aerobic exercise and strength training are also important for a whole host of reasons. Regular exercise lowers your risk for early death, heart disease, stroke, type 2 diabetes, high blood pressure, high cholesterol, colon and breast cancers, and many other health problems. What's more, it eases depression and boosts mood, takes a load off aching hips and knees by strengthening supportive muscles, and helps prevent falls that can undermine independence in older adults.

The Physical Activity Guidelines for Americans from the U.S. Department of Health and Human Services recommend the following:

• Two-and-one-half hours (150 minutes) of moderateintensity aerobic activity (walking, biking, swimming, etc.) per week. If you prefer vigorous aerobic exercise, you can reduce the total to one-and-one-quarter hours (75 minutes) per week—or substitute an equivalent mix of the two. During moderate-intensity activity, such as a brisk walk, you are able to talk, but not sing; during vigorous-intensity activity, such as running, you can say only a few words without catching your breath. It's fine to split workouts into short chunks of time spread throughout the day—in fact, it's healthier than being sedentary for hours at a time (see "Calling all desk jockeys and geeks," page 10).

- In addition, you should do resistance exercises (using weights or resistance bands) for all major muscle groups two or three times a week, allowing 48 hours between sessions so that your muscles can recover.
- Finally, for older adults at risk for falling, the guidelines recommend balance exercises, yoga, or tai chi.

If you're wondering how to shoehorn all of this into a busy life, you'll be glad to learn that some forms of activity fulfill two requirements at once. Core work, for example, counts as both resistance exercise and balance training, and sometimes as stretching, all while helping to ward off sore backs and knees (see "Resources," page 36, to learn more about core exercises). stretches, which can be done safely by anyone, PNF requires a partner and advanced training.

PNF takes a two-step approach. It starts with isometric contraction of the opposing muscle, followed by a passive static stretch of the target muscle applied by a partner who focuses on moving a joint through its range of motion. (To do an isometric contraction, you press against an immovable object, like a partner, so that the muscle activates without lengthening or shortening.)

Because PNF stretches require a partner, plus the expertise to perform them safely without injuring yourself, we recommend that anyone interested in learning these stretches should work one-on-one with an experienced trainer or physical therapist.

How often—and how much should you stretch?

How often should you stretch? How long should you hold a stretch? And how many repetitions (reps) of each stretch should you do? A panel of experts convened by the American College of Sports Medicine (ACSM) reviewed a wide range of studies to answer such questions. While stretching has been studied much less rigorously than other forms of exercise and therefore the science is not as strong—the panel reached these conclusions:

- Healthy adults should do flexibility exercises (stretches, yoga, or tai chi) for all major muscletendon groups—neck, shoulders, chest, trunk, lower back, hips, legs, and ankles—at least two to three times a week.
- For optimal results, spend a total of 60 seconds on each stretching exercise. So, if you can hold a particular stretch for 15 seconds, repeating it three more times would be optimal. If you can hold the stretch for 20 seconds, two more repetitions would suffice. See also "Six questions (and answers) about stretching exercises," page 13.

The anatomy of a stretch

Stretching enhances flexibility by increasing range of motion—that is, the extent to which you can move a

joint in various directions as measured in the degrees of a circle. Basic boundary lines for range of motion are set by the inner workings of the joints involved and by muscle tension, which can be affected by scarring or even your habitual posture (passive factors), or by involuntary muscle spasms or purposeful muscle contractions (active factors).

To understand the elements that go into a stretch, it helps to know how joints, tendons, ligaments, muscles, and bones work collectively:

- Joints are the junctions that link bones together. The architecture of each joint—whether it acts as a hinge, pivot, or ball-in-socket—helps dictate the directions of movement allowed.
- **Tendons** are flexible cords of strong tissue that tether muscles to bones. The Achilles' tendon, a thick cord that fastens the two calf muscles to the heel bone, is one well-known example.
- Ligaments are tough, fibrous bands of tissue that bind bone to bone, or bone to cartilage, at a joint, allowing a safe range of movement. An example is the anterior cruciate ligament (ACL), one of five ligaments that collectively control knee movements. The ACL is responsible for keeping the knee joint from rotating too far or allowing your shin to move out in front of your thigh. As many sports enthusiasts know, some to their sorrow, the ACL is often injured in sports like soccer and skiing that demand forceful actions involving quick stops or turns.

When you stretch, you're targeting muscles and tendons rather than ligaments. Ligaments are not intended to be elastic. An overly stretchy ligament wouldn't provide the stability and support needed to help enforce a safe range of movement. And if overextended, ligaments may be sprained or torn. Muscle-tendon units, however, do have elastic properties that allow them to stretch, although not infinitely, of course—they can be strained or torn, too.

How a stretch starts (and stops)

Imagine that you could examine skeletal muscle as if peering through a microscope at increasing levels of magnification. First, you'd notice strands of tissue created by bundles of cells known as muscle fibers (see Figure 1, page 5). A single muscle fiber comprises simi-

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larly bundled filaments called myofibrils. Myofibrils can contract, relax, and lengthen. Each myofibril is built from tinier units called sarcomeres, which in turn are made up of overlapping thin and thick myofilaments.

Every move you make begins when lightningquick electrical signals skip down nerve pathways to a muscle and flip a cellular switch that releases calcium, signaling a particular muscle or group of muscles to contract. This prompts myofilaments to glide across each other, forcefully shortening sarcomeres.



Your muscles are tethered to bone by cords of tissue known as tendons. If you could look inside your muscles, you would find that they are composed of small bundles of muscle fibers, surrounded by connective tissue. One muscle may have 10,000 to more than a million muscle fibers. In turn, each muscle fiber consists of hundreds to thousands of tiny, interlocking strands called myofibrils. Each myofibril is composed of even smaller units called sarcomeres (not shown), which are composed of still smaller myofilaments (not shown). When you stretch, sarcomeres lengthen, creating less overlap between the myofilaments. This allows the muscle to lengthen. So, just what happens when you deliberately try to *stretch* a muscle? Sarcomeres lengthen, creating less overlap in those sliding myofilaments. This allows some muscle fibers to lengthen, too. When sarcomeres reach their limits, the tension on the muscle is transmitted to the tendon, which elongates, also.

Specialized nerves called proprioceptors assist in stretches by relaying information about joint angle, movement, and changes in muscle tension. Muscle spindles (also known as stretch receptors) are a type of proprioceptor sited near the ends of muscles. As a muscle stretches, so do its muscle spindles. This trips off reflexive resistance to the stretch that compels the lengthening muscle to contract. Known as the stretch reflex, that action helps block injuries that could be caused by stretching too far, too quickly. A sudden stretch triggers a more powerful muscle contraction than a slow stretch. If you try to quickly touch your toes, you may not be able to do it, but if you reach toward your toes as far as is comfortable, then hang for 15 to 30 seconds, your muscles will slowly lengthen, enabling you to get closer to your target. When you hold a stretch, the muscle gets used to this position, and the frantic signals that are initially released by the muscle spindles begin to diminish.

When tension in a stretched muscle reaches the attached tendon, a second type of proprioceptor, the golgi tendon organ, transmits signals to the spine that set off a lengthening reaction. This suppresses the stretch reflex contraction and causes the muscle to relax. Aside from physically lengthening the muscle, many experts note that the act of stretching boosts tolerance for moving to an end range of motion in a joint. This helps account for why you notice a difference when you perform a stretch like "Seated neck rotation" (see page 32) several times in one session. You'll notice you're able to turn farther with each repetition. The apparent gain from one session wouldn't be lasting, however.

Safety first

W hile it's tempting to skip right to the stretches, it's best to think about safety first. Read this chapter to decide whether you should check with a doctor before doing the stretches in this report. If you've recently had surgery, for example, you may need to limit the types of stretches you do.

Even if you have no health issues that limit your ability to stretch, you should read our "Six tips for safe stretches" (see page 7). These will help you make the best flexibility gains possible, while reducing the risk for injuries.

When to check with a doctor

Should you check with a doctor before starting a stretching program? If you are normally active, stretches should not pose a problem. But it's best to check in with a doctor first if any of the following conditions applies:

- You've had recent surgery. Depending on the type, extent, and location of the surgery, you may need to limit stretching of the involved area until the soft tissues are healed. Ask your surgeon if there are any stretches or other activities that you should avoid or modify temporarily.
- You've been experiencing significant pain. While stretches may help decrease soreness, you might find them difficult to carry out if you have sharp pain. Check with a medical professional before starting your program.
- You have a chronic or unstable health condition, such as heart disease, breathing problems, high blood pressure, or diabetes.

The Physical Activity Readiness Questionnaire (PAR-Q), a tool developed by the Canadian Society for Exercise Physiology, can help you determine whether you should talk to your doctor before embarking on, or ramping up, any fitness or flexibility program. You can find it at www.health.harvard.edu/PAR-Q. The basic form, "PAR-Q & You," covers people ages 15 to 69.

If you do need to speak to a doctor, bring, fax, or email descriptions of the stretches you plan to do and ask if you can safely undertake these. Your doctor may feel this is fine, or might wish to modify certain stretches or suggest substitutions. If necessary, your doctor can refer you to a physiatrist, a physical therapist, or another specialist for evaluation. Alternatively, he or she may recommend that you work out under the supervision of an experienced personal trainer or other professional.

A team approach

If you need to tailor our stretching programs to your needs, various health or fitness professionals can help. Here is a brief description of the skills offered by, and training required of, the different types of experts.

Physiatrists, also known as physical medicine and rehabilitation physicians, are board-certified medical doctors who specialize in treating nerve, muscle, and bone conditions. They are among the sports medicine

Warning signs

Generally speaking, stretching is a safe activity. However, you should call a doctor for advice if you experience any of these warning signs during or after any form of physical activity:

- ✓ sudden, sharp, or intense pain
- pain lasting one to two weeks (as distinct from delayed-onset muscle soreness, a response to working your muscles that usually peaks 24 to 48 hours after a workout, then gradually abates)
- dizziness; faintness; chest pain, pressure, heaviness, or tightness; or significant or persistent shortness of breath
- in hot, humid weather, signs of overheating, such as headache, dizziness, nausea, faintness, cramps, or palpitations.

specialists who can diagnose and treat conditions and injuries that affect how you move, such as back problems, knee or shoulder injuries, debilitating arthritis or obesity, and stroke. After developing a comprehensive plan of treatment, a physiatrist might provide injections or medications, if needed, and work with a physical therapist to design physical treatment plans. A physiatrist can tailor a program of exercises and stretches to enhance recovery after surgery or an injury, or help you work out despite pain or limited movement. He or she can also tell you whether certain types of flexibility exercises will be helpful or harmful given your specific health history.

Physical therapists (PTs) help people with health conditions or injuries affecting muscles, joints, bones, or nerves by providing hands-on treatment and individualized exercise programs to restore movement in painful or debilitating conditions, or after an injury. Their expertise can be valuable, for instance, if you have suffered a lingering sprain or are recovering from a hip replacement or heart attack. Some PTs specialize in sports medicine, orthopedics, cardiopulmonary rehabilitation, geriatrics, or other areas. After receiving a bachelor's degree, PTs must graduate from an accredited physical therapy program. Most accredited programs in the United States offer doctoral degrees. Additionally, physical therapists must pass a national exam given by the Federation of State Boards of Physical Therapy and be licensed by their state. Specialists complete advanced training and additional national exams to become board-certified.

Physical therapy assistants provide physical therapy under the supervision of a licensed PT. They must complete a two-year associate's degree, pass a national exam, and, in most states, be licensed.

Personal trainers are fitness specialists who can help ensure that you're doing stretches and exercises properly. While encouraging and motivating you, they can fine-tune your form. Personal trainers teach new skills, change up routines to beat boredom, and safely push you to the next level.

No national licensing requirements exist for personal trainers, although the National Commission for Certifying Agencies sets standards for the accrediting fitness organizations that train them.

Simple yoga breathing

Yoga breathing, or pranayama, is relaxing and meditative. Try practicing this beginner technique so you can apply it while holding yoga poses or other stretches.

Sit or lie down comfortably, resting your hands below your navel.

2 Tune in to the way you breathe. Inhale and exhale naturally through your nose for a few minutes, noticing the slight rise and fall of your hand. Consider the way the air feels as it enters and exits your nostrils.

3 Start to count silently forward (one, two, three...), then backward (...three, two, one), as you breathe in and out.

4 Gradually make each exhalation twice as long as each inhalation. Focus on breathing slowly and smoothly, humming each time you exhale. The slight vibration is very soothing.

Two well-respected organizations that offer certification and programs of study for personal trainers are the American College of Sports Medicine (ACSM) and the American Council on Exercise (ACE); others include the National Council on Strength and Fitness (NCSF), the National Strength and Conditioning Association (NSCA), and the National Academy of Sports Medicine (NASM). All fitness organizations have different requirements for training and expertise. Some trainers specialize in working with particular populations—for example, athletes or older adults—and may have taken courses and possibly certifying exams in those areas.

Six tips for safe stretches

Everyone—with medical conditions or not—should use these tips to help protect muscles and joints while ensuring flexibility gains.

Warm up first. Much like taffy, muscles stretch more easily when warm. Our dynamic stretches (see page 17) can act as a warm-up for static stretches, or you can do static stretches after sports, exercise, or even marching in place with arms swinging for five minutes or dancing to a few songs. Moist heat packs or a warm shower are effective first steps, too.

Feel no pain. Stretch only to the point of mild tension, never to the point of pain. If a stretch hurts, stop immediately! Reset your position carefully after checking the instructions, then try again. With time and practice, your flexibility will improve.

Pay attention to posture and good form. Posture counts whether you're sitting, standing, or moving (see "Calling all desk jockeys and geeks," page 10). Good form translates to better gains in flexibility and less likelihood of injury when stretching tight muscles. Photos of stretches tell only part of the story, so read instructions carefully to get form right.

Focus on the muscle being stretched. You'll notice that one side of your body often is tighter than the other. Work on balancing this over time.

Breathe. Breathe comfortably while stretching, or use yoga breathing (see "Simple yoga breathing," page 7).

Practice often. You'll make the best gains if you stretch frequently—daily, or on as many days of the week as possible. At the very least, aim to do stretches two or three times a week. ■

Stretching to ease pain

A rthritis, stiff backs, and sore knees are three common problems that can sap joy from life. But stretching can help, when tight muscles are to blame. Doctors and physical therapists often prescribe stretching as part of a treatment plan to help maintain or reclaim abilities and ease discomfort.

Even if you don't have a medical condition, you may be suffering from tight muscles that keep you from feeling your best. They can pull your body off-kilter, and long hours spent at a desk—or staring down at tablet screens may cause pain, too. Thus, this chapter touches on posture tips and ergonomics, as well.



have osteoarthritis, a degenerative joint disease that affects almost 27 million Americans. Osteoarthritis of the hip or knee, for example, responds well to activities performed in a heated pool, such as stretching and aerobics. (Check with the Arthritis Foundation to see if exercise classes in heated pools and geared to people with arthritis are available in your area. See "Resources," page 36.)

Stretches can also help people with rheumatoid arthritis improve their range of motion in damaged joints.

If you do have arthritis, get advice from your doctor about the right combination of activities,

weight loss, medication, and assistive devices, such as canes or walkers designed to take weight off affected joints. Stretching to ease stiffness—along with resistance exercises to build or maintain strength in muscles that support key joints—are likely to be high on the list. (See "Stretches for overall flexibility," page 18, and "Stretches for desk jockeys and geeks," page 19, for examples of stretches that are helpful.)

These tips can help make your stretching routine easier:

Warm up thoroughly. You may need extra warmup time. Try a slow, gentle version of our dynamic stretch warm-up (see page 17). Most of these can be done in a chair, if necessary. A hot shower or bath, a heated pool, or even warm compresses or a heating pad can also warm up stiff joints before you stretch.

Stretch during your least painful time of day. Morning won't work for some people. Choosing a window of time after pain relievers take hold can help make stretching easier.

Arthritis

Thinkstock

When movement is painful, it's natural to limit it. Yet if you keep an arthritic joint bent rather than moving it through its range of motion, you allow muscles to stiffen in that position. Over time, the muscles actually shorten, curtailing range of motion and prompting other problems.

For example, arthritis pain and decreasing flexibility make walking harder and may throw off your gait and balance, leading to falls. If you walk less, you burn off fewer calories, too, and weight may creep up, placing ever-greater stress on hip and knee joints. This can actually worsen arthritis and its consequent pain. And of course, you sacrifice the health benefits of regular walking, including improved cardiovascular and bone health.

Nipping a cycle like this in the bud is one potential benefit of a stretching program for people who

Adapt stretches. Use pillows or rolled towels to help limit your range of motion in the stretches. Choose seated stretches, if necessary.

Expect some discomfort. While we encourage everyone to stretch only to the point of mild tension, not pain, some discomfort is to be expected with arthritis. Try the two-hour rule: if discomfort following stretches or other activities lasts longer than two hours, or is more severe than your usual pain, step your routine down. Try doing fewer reps and holding

stretches for less time. As stretching becomes easier, gradually step it up again.

Back pain

A lack of flexibility in key muscles is one source of back pain. Two well-known culprits are tight hip flexors (a muscle group that helps you raise your knees and bend at the hip) and tight hamstrings (three strong muscles at the back of your thighs that help you bend your

Calling all desk jockeys and geeks: Stretching to ease neck and shoulder pain

Any task that encourages you to sit in one position for long hours, perhaps staring at a computer screen or speaking on handheld phones, can wreak havoc on posture. Even enjoyable hours whiled away with an e-reader or a computer tablet may have that effect—and worse. A study from the Harvard School of Public Health, Brigham and Women's Hospital, and Microsoft showed that holding a tablet too low in your lap can force the small, interlocking bones at the top of the spine (the cervical vertebrae) and the neck muscles into an unnatural position, which may strain or aggravate muscles, nerves, tendons, ligaments, and spinal discs. Over time, poor posture chips away at the range of motion in your joints. The neck problems described in the study above—and repetitive stress injuries from tasks such as typing—may occur, too.

How can you limit the damage? The first step is simply to become aware of your posture. If you spend a lot of time on a handheld phone or using a desktop computer, laptop, or tablet, pause occasionally to take a mental snapshot of how your body is situated. Is your back curved? Shoulders hunched? Head bent downward? Chin jutting forward or head slumped toward one shoulder? Legs crossed, hiking one hip higher than the other?

Good ergonomics, regular posture checks, and flexibility exercises designed for the deskbound (see "Stretches for desk jockeys and geeks," page 19) can help correct these problems.

Ergonomics for computers, phones, and tablets

If you use a laptop or desktop computer:

- Choose a chair with good lumbar support, or place a pillow against the small of your back.
- Position the top of your monitor just below eye level. That helps whether you use a desktop or a laptop, notes Dr. Jack Dennerlein, principal investigator of the tablet study and an adjunct professor of ergonomics and safety at the Harvard School of Public Health. Use an external keyboard with a laptop, not the keyboard that's built in,

because the monitor is low and the keyboard is high.

- Sit up straight with your head level, not bent forward.
- Keep your shoulders relaxed and your elbows close to your body.
- Keep hands, wrists, forearms, and thighs parallel to the floor.

If you use a handheld phone:

- Avoid propping the phone between your head and shoulder.
- If you use a phone frequently, consider investing in a comfortable, hands-free headset. Depending on your needs, you can choose one equipped for Bluetooth or designed for use with cordless phones, landlines, or computers.

If you use an e-reader, iPad, or tablet:

- Buy a case that allows you to prop the device at a comfortable viewing angle, one that doesn't require you to bend your neck much.
- Take a break every 15 minutes. "Usually we tell people they should change their position every 15 minutes," says Dr. Dennerlein. "Just change your hands, shift your weight. Stand up or sit down."

Practice good posture

While you needn't walk around balancing a book on your head, practicing good posture pays many dividends. When you're standing, it trims your silhouette and projects confidence. It lessens wear and tear on the spine and helps you breathe deeply, so your body gets the oxygen it needs. Properly aligning your body during stretches, or other exercises, can net you greater gains and fewer injuries.

Good posture requires flexibility, because overly tight muscles pull your body off-kilter. Strong core muscles are essential to good posture, too. Your core is the sturdy central link between upper and lower body. It includes all the muscles from your thighs to the bottom of your breastbone (see "Resources," page 36, for information on core exercises to strengthen these muscles). knee and extend your leg behind you). For example, the psoas (a hip flexor that attaches to the spine) is sometimes at fault in low back pain. Much more rarely, an overly tight piriformis (a deep muscle in the buttocks) and a neighboring muscle called the quadratus compress or irritate the sciatic nerve, which threads between them. Known as piriformis syndrome, this prompts sciatica, a constellation of symptoms like pain, numbness, weakness, or tingling that may run from the lower back down the back of the leg and foot.

Simply practicing better posture a few times a day will help, as well. If possible, look in the mirror when doing a posture check until you get the hang of it. Whether you're standing or sitting, proper posture means

- chin parallel to the floor
- chest lifted
- shoulders even (roll them up, back, and down to help achieve this)
- arms at your sides, elbows relaxed and even with each other
- abdominal muscles pulled in
- hips even
- knees even and pointing straight ahead
- feet pointing straight ahead
- body weight evenly distributed on both feet when standing, or feet on the floor when sitting.

One more reason to take breaks

Occasional laps around the water cooler—the real one, not the virtual one—can be helpful to your health. No cooler nearby? Try taking breaks to do dynamic stretches (see page 17) or our "Stretches for desk jockeys and geeks" (see page 19). Aside from easing kinks in your neck and loosening tight chest and back muscles, spending fewer hours parked in one place is shown to have definite health advantages, even for people who get sufficient exercise.

That's because extended periods of sitting contribute to heightened risks for heart disease, stroke, and type 2 diabetes, partly by affecting cholesterol levels, slowing glucose (sugar) clearance from the bloodstream, and reducing insulin sensitivity, according to a growing body of research. Sedentary habits inflate risk for an early death, too. In a 2012 study of more than 220,000 Australian adults ages 45 or older, mortality rose by 15% among those who reported sitting eight to 11 hours per day, and 40% among those who sat 11-plus hours per day, compared with people who sat less than four hours a day. Whether stretches will ease your low back pain depends on the cause of the pain. While muscle or bone conditions—for example, muscle tightness or spasms, or osteoarthritis—are most often the tinder that feeds flare-ups, back pain sometimes stems from injuries of the spinal discs or an illness, such as a urinary tract infection or appendicitis. Thus, proper treatment varies widely. If you find yourself afflicted by back pain, start by calling your doctor for advice on whether stretches are likely to help or hurt the underlying problem triggering your pain.

For many people, a combination of stretches (see "Stretches to relieve sore backs," page 19), posture adjustments, and gentle core exercises can help address the dual problems of muscle tightness and lack of core strength that often lead to lower back pain (see "Resources," page 36, for information on core exercises). Yoga and Pilates (both of which incorporate core work and stretching), and even a simple walking program, have all been found to ease chronic low back pain. However, studies tend to be small, so it's difficult to draw robust conclusions-especially when studies combine modes of therapy. For example, a 2012 study of 30 participants found that stretching the trunk and hamstring muscles relieved pain and reduced disability significantly-though not quite as much as a set of exercises that strengthened two groups of core muscles, the transversus abdominis girdling the midriff and the multifidus along the lower spine. Both programs required 30 minutes, twice weekly. But it's hard to base firm recommendations on a study with just 30 participants.

Knee pain

Sore knees can make climbing stairs difficult and knock sports entirely off your list of enjoyable activities. Even an evening stroll in the nicest weather may not seem like fun. Although arthritis may be one contributing factor, tight muscles and tendons frequently play into knee pain. Often, the problem is a muscle imbalance prompted by insufficient flexibility in one or more of these muscle groups: the quadriceps (the quartet of large muscles at the front of the thigh), the hamstrings (the trio of large muscles at the back of the

thigh), and the calf muscles (a duo known as the gastrocnemius and soleus).

The iliotibial (IT) band is another potential troublemaker. This thick cord of connective tissue extends from your hip bone down the outside of the thigh to the shin bone. When you bend a knee, the IT band slides over the outside knob of the thighbone. Thus, if it becomes inflamed, the outside of your knee hurts. In older people, iliotibial band syndrome usually occurs when a bad back or joint problem has thrown off gait. Runners who suddenly boost mileage and soccer players, cyclists, or skiers who overdo it are vulnerable, too. Failure to warm up properly, a tight IT band, or unequal leg lengths are other factors that may play a role.

Front-and-center knee pain that crops up during and after physical activities, or even after prolonged bouts of sitting, may be a sign of patellofemoral pain syndrome. Sports that require you to repeatedly put weight on a bent knee (such as running or basketball) can spark this problem. One underlying factor is muscle tightness and imbalance: tight hamstrings, calves, and hip muscles increase pressure between the kneecap and thighbone, while three muscles of the quadriceps pull the kneecap to the outside. If the innermost quadriceps muscle is relatively weak, or if the three outer ones are relatively tight, the kneecap may track improperly, rubbing every time the knee is bent.

If you do have knee pain, get advice from your doctor about the right combination of activities and treatments, which will depend on the problem diagnosed. Often, a well-rounded stretching routine will help relieve sore, stiff knees (see "Stretches to relieve sore knees," page 19, and the tips under "Arthritis," page 9). Backing off from aggravating activities for a while may be advisable. Your doctor or a physical therapist may also recommend doing exercises to strengthen the muscles that support the knee, and losing weight if you are overweight. Well-padded shoes with arch supports or orthotic inserts may be helpful, as may medication to ease pain and limit inflammation (especially if you have arthritis). In some cases, if conservative treatment has not restored comfortable movement, you may need knee replacement or surgery.

Six questions (and answers) about stretching exercises

B efore launching into a new activity, it's common to have some questions. Below are answers to six frequently asked questions about stretching.

1. How often do I need to stretch?

As with all types of exercise, you need to engage in stretching regularly in order to reap lasting benefits. If you only stretch occasionally, the effects are short-lived. One study found that the greatest increase in hamstring length occurred right after the stretch and began to diminish within 15 seconds, though there was a noticeable effect for up to 24 hours. A daily regimen will deliver the greatest gains, but typically, you can expect lasting improvement in flexibility if you stretch at least two or three times a week.

2. How long do I need to hold a static stretch?

Although opinion varies on this, the ACSM recommends holding a static stretch for 10 to 30 seconds. Research suggests the biggest change in muscle length takes place between 15 and 30 seconds.

How long you hold a static stretch helps dictate how many repetitions (reps) of the stretch you should do. The ACSM says 60 seconds of cumulative time per static stretch is optimal and recommends doing two to four reps to achieve this total time. So, if you can hold a particular stretch for 15 seconds, repeat it three more times. If you can hold the stretch for 30 seconds, one more rep would suffice.

3. Will stretching ward off or ease muscle soreness after exercise or sports?

Muscles taxed by physical activities often feel sore during the next day or two. This is normal. It's called delayed-onset muscle soreness. Usually it peaks 24 to 48 hours after a workout before gradually easing, then disappears entirely in another day or so. (By contrast, sudden, sharp, or long-lasting pain is not normal and should prompt you to call a doctor.)

Can stretching help reduce this soreness? A review of studies found that those who engaged in post-exercise stretching rated their discomfort a day after exercise at half a point lower, on average, on a 100-point scale than those who hadn't stretched. A large-scale study in the review showed an average four-point dip in soreness over one week for those who stretched before or after exercise. All in all, not a difference most of us would notice—though there are, of course, other reasons to stretch after exercising, including overall flexibility and the prevention of stiffness.

4. Can stretching help heal sports injuries?

After an injury, stretching may be recommended to lengthen tight muscles, gradually increase range of motion, or align collagen fibers to help a muscle heal properly. Stretching regimens appear to help speed rehabilitation of hamstring strains, for example, according to limited research. If you do get injured, a doctor or physical therapist should assess the problem



Most of our stretches require no equipment, but a few call for a chair, mat, pillows, or strap. For the "Full-body stretch with strap" (see page 29), you can use a small towel, belt, or even a dog's leash.

and prescribe the right blend of stretches, strength exercises, and other therapies, as needed.

5. What equipment will I need?

Most of our stretches require no equipment at all, which makes them very easy to do at your desk, home, or gym. For some of the stretches, however, you may want to use some easily found items:

Chair. Use a sturdy chair that won't tip over easily for most seated stretches. A plain wooden dining chair without arms or heavy padding works well. Do not use a desk chair with wheels!

Counter. While none of our stretches requires a counter, you may find it handy to hold on to one—or to the edge of a desk or back of a chair—for balance.

Mat. Choose a padded, nonslip mat for floor stretches. Thick carpet, towels, or a blanket will be fine in a pinch.

Pillows. A pillow or rolled towel can help you limit movement in certain stretches (for example, "Child's pose three ways," page 25, and "Full-body stretch with strap," page 29). This may be more comfortable for you and can make the stretch easier to do.

Stretch strap. Choose a cotton or nylon strap of six feet or longer to help you position your body during certain stretches, such as "Hamstring stretch with strap" (see page 28). A strap with a D-ring or buckle fastener on one end allows you to put a loop around a foot or leg and grasp the other end of the strap, rather than holding two ends of the strap. Straps with built-in loops are another option. You can buy either at a sporting goods store. Some stretches, such as the "Full-body stretch with strap" (see page 29) need

only a small strap. You can use a towel, the belt of a bathrobe, or even your dog's leash if a strap is not available.

6. What do the terms in the instructions mean?

The instructions for our stretching exercises include certain terminology that may be unfamiliar to you.

Repetitions (reps). Each rep is a single complete movement for one stretch. Do only as many reps as you can manage with good form. When this becomes easier, add another rep (up to the number specified) or hold the stretch longer (up to 30 seconds).

Hold. Hold tells you the number of seconds to pause while holding a stretch: 10 to 30 seconds is recommended.

Starting position. This describes how to position your body before starting the movement required for the stretch.

Movement. This explains how to perform one complete repetition correctly.

Tips and techniques. We offer a few pointers to help you maintain good form and reap the greatest gains from the stretch.

Neutral. Keeping the body in a neutral position is important for good form during some stretches. "Neutral posture" requires you to keep your chin parallel to the floor; your shoulders, hips, and knees at even heights; and your knees and feet pointing straight ahead. "Neutral alignment" means keeping your body in a straight line from head to toe except for the slight natural curves of the spine—that is, the spine isn't flexed or arched to overemphasize the natural curve of the lower back. ■

SPECIAL SECTION

Warming up for sports with dynamic stretches

hen done correctly, a warm-up enhances sports performance by helping you limber up and get blood flowing to your muscles. How best to align the stars in your favor? Current evidence suggests the type of stretches you do, and when you stretch, can help—or hurt.

Runners, for example, have long been known for warming up before sprints or marathons with a string of static hamstring and quadriceps stretches. New thinking advises skipping pre-sport static stretches, which have been shown to undercut performance in activities that require running,

jumping, and other explosive movements, possibly by affecting the ability of the muscle to store and swiftly release energy. A 2013 meta-analysis of over 100 studies on different types of athletes showed that doing static stretches before sports cut muscle strength by roughly 5% and explosive power by 2%. That's not a huge difference, but it's enough to affect performance. A separate weight-lifting study in *The Journal of Strength and Conditioning Research* found that participants lifted 8.3% less weight following static stretches compared with those who didn't engage in static stretches first. Their lower-body stability—which affects safety and form in an activity like weight lifting—was compromised, too.

How long you hold a static stretch and how many repetitions you do might make a difference as well. For instance, researchers measuring a vertical jump in one study learned that four repetitions of static stretches held for 15 seconds before the jump didn't dampen performance. However, six reps did. Only additional, rigorous research can confirm this, and teach us more about which

sports might be affected and exactly what to do.

Meantime, it seems apparent that holding static stretches multiple times for 30 seconds won't help your game—in fact, it's particularly detrimental to the hamstrings before a run, or calves before trying to jump. Instead, we recommend warming up muscles and bringing joints through



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a range of motion with dynamic movements, including dynamic stretches (see page 17). You can follow this warm-up with a brief static stretch, held for less than 30 seconds, to increase blood flow in select muscles. Unfortunately, however, there is no evidence showing whether this is helpful or harmful.

Generally speaking, it's best to do static stretches after exercise or at a separate time entirely. If your goal is to increase muscle length and enhance overall flexibility, do a full static stretch routine after your workout. See our table of stretches tailored to different sports on page 20.

Warming the muscles, "waking" the nerves

A burgeoning field of research suggests neuromuscular training (NT) may have a role to play in sports that require jumps, quick stops, and sudden shifts in direction, such as basketball, soccer, and skiing. Typically, this training amounts to a pregame warm-up involving stretching, strengthening, and balance exercises, plus drills designed to enhance agility and reinforce good form when stopping short, changing direction, and landing. The movement patterns chosen for neuromuscular training echo those used in a particular sport to facilitate coordination—or, as some trainers put it, movements that "wake up" the nerves and brain.

A 2012 review of studies in *BMC Medicine* found that consistently applying such strategies for three months or more reduced lower limb injuries in young, amateur, and female athletes and military recruits of both genders. According to one newer study, a neuromuscular warm-up program of six exercises done twice weekly successfully lowered the rate of ACL injuries in the knee in teenage girls playing club soccer in Sweden.

While this research is exciting, it's not clear if the benefits of these programs depend on the movements chosen (some of which could easily trip up less agile athletes and older adults), or the simple act of warming up well.

A dynamic stretch warm-up

Unlike many neuromuscular training programs for athletes, our dynamic stretch routine is designed for the widest possible audience. It moves your body in three ways: forward and backward, side to side, and through rotations. Our aim is to loosen up joints to increase your range of motion and warm up tissues throughout the body, which helps cells get the oxygen and energy demanded by any athletic endeavor. Common sense, as well as research, suggests a long, overly tiring warm-up routine saps strength you'll need for athletic performance. That's why our routine (see "Dynamic stretches," page 17) is short and simple.

Here's what to do:

- Perform each of the first six dynamic stretches 10 to 20 times, followed by four arm sweeps. During each dynamic stretch, go from smaller movements to larger movements, to gradually increase range of motion.
- Repeat this sequence of dynamic stretches for about five to eight minutes, rolling each stretch into the next one. Start over again as needed to fill the time you've allotted.
- If desired, you can add a sportsspecific move to the routine: for example, a golf or tennis swing, or a series of shallow to deeper jump squats to ready the body for basketball. If you do this, go slowly and deliberately through the first few reps, then pick up your pace, always focusing on correct form.
- If you have trouble with balance, you can put one hand on the back of a chair or a counter. It's even possible to do most of these movements while seated.

Once you're warmed up, it's time to play sports. ♥

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Warming up for sports with dynamic stretches | SPECIAL SECTION

Dynamic stretches

This routine will help you limber up for any sport and can serve as a warm-up. To see the complete sequence, go to www.health.harvard.edu/dynamic-stretches.



1. Shoulder rolls

Stand up straight with your feet hip-width apart and arms at your sides. Roll your shoulders up, back, and down. Your thumbs point forward as you start the move. Palms point forward, elbows slightly bent, as you finish each shoulder roll.



2. Overhead reach

Stand up straight with your feet hip-width apart. Reach toward the ceiling with your right arm, while shifting your weight from your right foot to your left foot and tapping the toes of the right foot. Repeat on the left.



3. Torso rotation with a reach

Stand up straight with your feet hip-width apart. Reach toward the left wall with your right arm and then the right wall with your left arm, while shifting your weight with each change of direction. Tap your toes with each shift.



4. Hamstring curls

Stand up straight with your feet hipwidth apart. Alternately bring your right foot, then your left foot, toward your buttocks. Press your arms backward as you do so.



5. Shallow side lunges Stand up straight with your feet in a wide stance, toes pointing forward. Alternate shallow side lunges to the right and the left, hinging forward at the hip and bringing both hands to your upper thigh on the lunge.



6. Knee lifts

Stand up straight, bringing your feet together. Lift your right knee and then your left knee, touching both hands to the knee being lifted. For a more challenging dynamic stretch, lift your knee high enough to grasp the top of your shin with your hands and pull your leg gently in toward your body, then release it.



7. Arm sweeps

Stand up straight with your feet together. As you inhale, sweep your arms out to the sides and up toward the ceiling. As you exhale, sweep your arms down to your sides.

Static stretches

n the following pages, you'll find 35 static stretches, arranged according to whether you do them on the floor, in a chair, or standing. You can do each group of stretches individually, or you can follow one of the four routines we've organized. The first one is a good, all-purpose routine for everyone. The next three are specially designed for people with low back pain (see "Back pain," page 10), sore knees (see "Knee pain," page 11), and stiffness from working on a computer or tablet (see "Calling all desk jockeys and geeks," page 10).

After those four routines, you'll find a chart that shows the best stretches for improving your game in a number of sports—running (or walking), golf, tennis, skiing, swimming, and biking (see "Stretching to improve sports performance," page 20).

The stretches themselves begin on page 22.

Four stretching routines

In these four routines, we've tried to target the stretches that are best for certain situations. However, you may need to tailor them further to suit your needs. If so, here are some tips:

- Some options will be easier for you, so you can increase or decrease the challenge. To increase it, try substituting a harder option (do a standing hamstring stretch, for example, instead of a seated one). To make the stretch easier, add a pillow or rolled towel or use a stretch strap.
- If doing the routine in a single session takes too much time or energy, break it into two sessions

(morning and evening, say, or alternating halfsessions two days in a row).

• If you just want to switch things up for the sake of variety, substitute an equivalent floor, seated, or standing stretch. For example, if the routine suggests a pretzel stretch, you can do either "Seated pretzel" or "Floor pretzel." If the routine suggests a hamstring stretch, you could choose "Hamstring stretch with strap," "Seated hamstring stretch," or "Standing hamstring stretch."

Stretches for overall flexibility

This is a great combination of stretches designed to ease tight muscles throughout your body and help you gradually work toward a full range of motion in your joints. If you have arthritis, you may need to modify these stretches (see our tips under "Arthritis" on page 9). Do these stretches daily, if possible—or at least two or three times a week. Over time, you'll notice real gains in flexibility and how easily you move around.

- 1. Floor hip flexor stretch (page 22)
- 2. Floor pretzel (page 23)
- 3. Double knee torso rotation (page 23)
- 4. Child's pose three ways (page 25)
- 5. Cat-cow (page 26)
- 6. Downward dog (page 26)
- 7. Hamstring stretch with strap (page 28)
- 8. Full-body stretch with strap (page 29)
- 9. Seated chest stretch (page 31)
- 10. Calf stretch (page 34)

Stretches to relieve sore backs

Aimed at loosening up tight muscles that often play a role in back pain, these stretches should be helpful for anyone who experiences occasional stiffness or backaches. Please read the sections on safety (see "Safety first," page 6) and back pain (see page 10) to decide if you should talk to your doctor before starting. Aim to do this routine five to six days a week. For variety, you may substitute the "Stretches for overall flexibility" (see page 18) on one or two of those days.

- 1. Knees to chest (page 22)
- 2. Floor pretzel (page 23)
- 3. Double knee torso rotation (page 23)
- 4. Butterfly (page 24)
- 5. Cobra (page 25)
- 6. Kneeling hip flexor stretch (page 27)
- 7. Hamstring stretch with strap (page 28)
- 8. Full-body stretch with strap (page 29)
- 9. Side stretch with strap (page 29)

Stretches to relieve sore knees

When tight muscles are causing sore knees, these stretches can help you feel less like the Tin Woodman after a rusting rain. Please read the sections on safety (see "Safety first," page 6) and knee pain (see page 11) to decide if you should talk to your doctor before starting. Aim to do this routine four to five times a week. For variety, you may substitute the "Stretches for overall flexibility" (see page 18) on one or two of those days.

- 1. Floor hip flexor stretch (page 22)
- 2. Floor pretzel (page 23)
- **3.** Single knee rotation (page 23)
- 4. Side-lying quadriceps stretch (page 27)
- 5. Kneeling hip flexor stretch (page 27)
- 6. Hamstring stretch with strap (page 28)
- 7. Inner thigh stretch with strap (page 28)
- 8. Outer thigh stretch with strap (page 29)

Stretches for desk jockeys and geeks

This routine is perfect anytime you want to relieve discomfort that stems from hours at a desk. It provides an excellent way to move toward better posture, too, especially if you're spending a bit too much time hunched over a laptop or tablet. All of these stretches can be done while seated.

- 1. Seated overhead stretch (page 31)
- 2. Seated chest stretch (page 31)
- 3. Seated wrist stretch (page 31)
- 4. Seated hamstring stretch (page 32)
- 5. Seated ear-to-shoulder stretch (page 32)
- 6. Seated pretzel (page 33)
- 7. Seated rotation (page 33)
- 8. Standing quadriceps stretch (page 35)

Stretching to improve sports performance

Our sports stretches are designed to help you limber up the right muscle sets for the activities you love. Remember to do a dynamic stretch warm-up (see "Dynamic stretches," page 17) before you exercise in order to warm up muscles and wake up nerves by using movement patterns employed in particular sports. Do these static stretch routines after your activity, or at another time in your day, if you're concerned about top sports performance. It's fine to break your stretch routine into two sessions (morning and evening, say, or an alternating half-session every day), as long as you warm up muscles first. Practice your chosen routine at least three to four times each week. ♥

Table 1: Stretches for different sports						
FLOOR WORKOUT	Racquet sports	Golf	Walking or running	Swimming	Biking	Skiing
Floor hip flexor stretch (page 22)					00	
Floor pretzel (page 23)	0 *		ネ		00	*
Single knee rotation (page 23)			ホ		00	*
Double knee torso rotation (page 23)		Š				
Floor inner thigh stretch (page 24)			ホ		00	*
Butterfly (page 24)				2.		
Child's pose three ways (page 25)				2		
Kneeling hip flexor stretch (page 27)	5 *	Ň	ホ	20		*
Torso rotation on all fours (page 27)	5 *	Ň				
Full-body stretch with strap (page 29)				20		
Side stretch with strap (page 29)				2.		

SEATED WORKOUT	Racquet sports	Golf	Walking or running	Swimming	Biking	Skiing
Seated shoulder stretch (page 30)	с¥	*		æ		
Seated triceps stretch (page 30)	o 🄧			30		
Seated overhead stretch (page 31)		Ś		2	50	•
Seated chest stretch (page 31)	o 🄧	۲ ۲		30	50	•
Seated wrist stretch (page 31)	o 🄧					
Seated ear-to-shoulder stretch (page 32)				2		
Seated neck rotation (page 32)				2		
Seated pretzel (page 33)		Å				
Seated inner thigh stretch (page 33)	σ			30		
Seated rotation (page 33)		۲ ۶				

STANDING WORKOUT	Racquet sports	Golf	Walking or running	Swimming	Biking	Skiing
Calf stretch (page 34)	o 🌱	Å	ネ		50	٠ ۲
Soleus stretch (page 34)	۰*	*	ネ		50	**
Standing chest and shoulder stretch (page 35)	σ					
Standing quadriceps stretch (page 35)	۰*	3	ホ		00	¥.
Standing hamstring stretch (page 35)	σ	*	ホ		00	*

Floor stretches

hese 14 floor stretches are best performed on a cushioned mat, although a thick carpet or towels will do. If you find it difficult to lie on the floor, many of these stretches can be done while sitting on a chair.



1 Knees to chest

Primarily stretches the back

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your legs extended on the floor.

Movement: Relax your shoulders against the floor. Slowly bend your knees and pull them in toward your chest with your hands. Hold. Return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- When holding the stretch, remain as still as possible, without bouncing.
- Breathe comfortably.



2 Floor hip flexor stretch

Primarily stretches the front of the hip

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your legs extended on the floor.

Movement: Relax your shoulders against the floor. Bend your right knee. Rest your hands on the back of your thigh and pull your knee toward your chest. Flex your left foot and press the thigh and calf of that leg down toward the floor as you do so. Feel the stretch in the front of your left hip and top of your thigh. Hold. Return to the starting position and repeat with the other leg. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- When holding the stretch, remain as still as possible, without bouncing.
- Breathe comfortably.

Special thanks to Pilar Caso from the Baptiste Power Yoga Institute for demonstrating the yoga stretches. Master trainer Josie Gardiner modeled the floor stretches and standing stretches, while Dr. Lauren Elson demonstrated the seated stretches.



3 | Floor pretzel

Primarily stretches the buttocks, hip, and outer thigh

Reps: 2 Hold: 10–30 seconds

Starting position: Lie on your back with your right knee bent and foot on the floor. Rest your left ankle at the top of your right knee. Your left knee should point toward the wall. Grasp the back of your right thigh with both hands.

Movement: Keep your shoulders down and back, relaxing them against the floor. Slowly lift your right foot off the floor until you feel the stretch in your left hip and buttock. Hold. Return to the starting position. Repeat with your left knee bent and your right ankle resting on your left kneecap. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- If it's too hard to grasp your thigh with both hands, put a strap or small towel around the back of the thigh and hold both ends.
- Hold the stretch as still as possible without bouncing.

4 Single knee rotation

Primarily stretches the back, hip, and outer thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your legs extended on the floor.

Movement: Relax your shoulders against the floor. Bend your left knee and place your left foot on your right thigh just above the knee. Tighten your abdominal muscles, then grasp your left knee with your right hand and gently pull it across your body toward the right wall. Hold. Return to the starting position and repeat on the other side. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Try to keep both shoulders flat on the floor.
- To increase the stretch, look in the direction opposite to your knee.

5 Double knee torso rotation

Primarily stretches the back, chest, hip, and outer thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your knees bent and feet together, flat on the floor. Put your arms out comfortably to each side at shoulder level, palms up.

Movement: Tighten your abdominal muscles and lift both knees toward your chest, then lower them together to the left side on the floor. Keeping your shoulders relaxed and pressed into the floor, look in the opposite direction. Feel the stretch across your chest and torso. Hold. Bring both knees back to center and return your right foot, then your left foot, to the floor. Repeat in the opposite direction. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- If necessary, put a rolled towel between your knees to make this stretch easier.
- Try to bring both knees up into the fetal position. Ideally, keep them together throughout the stretch.





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6 | Floor inner thigh stretch

Primarily stretches the inner thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit on the floor with the soles of your feet together. Place your hands on your ankles. Let your knees fall apart toward the floor.

Movement: Hinge forward from your hips until you feel the stretch in your inner thighs. Hold. Return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your head and spine neutral and shoulders down and back throughout the stretch.
- One side is likely to be noticeably tighter. Focus on balancing the stretch.



7 Butterfly

Primarily stretches the shoulders and chest

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your knees bent and feet flat on the floor. Keeping your shoulders down and back, press them against the floor. Place both hands gently behind your head, elbows pointing toward the ceiling.

Movement: Slowly lower your elbows toward the floor to the point of tightness. Hold. Return to the starting position.

- When holding the stretch, stay as still as possible, without bouncing.
- If necessary, limit the stretch by placing a small pillow on either side of your shoulders and gently pressing into the pillows.
- You can do this stretch while seated, too.

8 Cobra

Primarily stretches the back and abdomen

Reps: 2–4 Hold: 5 yoga breaths or 10–30 seconds

Starting position: Lie on your stomach with your forehead on the mat and legs comfortably extended with toes pointed. Place your hands just below your shoulders, palms facing down and fingers together.

Movement: Press your palms against the floor to slowly lift your head, shoulders, and chest. Keep your elbows back and soft, and your head and neck in neutral alignment. Hold. Return slowly to the starting position.

Tips and techniques:

- Lift only to the point of mild tension. You should feel no pain in your lower back.
- Be careful not to lock your elbows while lifting upward.
- While holding, take full breaths by inhaling gently through your nose and lengthening the outbreath as you exhale through your nose.









9 Child's pose three ways

Primarily stretches the back, shoulders, and sides

Reps: 2–4 **Hold:** 5 yoga breaths or 10–30 seconds in each stretching position

Starting position: Position yourself on all fours, knees hip-width apart, big toes touching, and head and neck in neutral alignment.

Movement: This is a three-part stretch. Slowly drop your buttocks back toward your heels as you extend your hands in front of you and rest your forehead on the mat. Hold. Return to the starting position, then walk your hands diagonally out to the right and place your left hand on top of your right hand. Keeping your shoulders down and back, slowly drop your buttocks back toward your heels. Hold. Raise your buttocks up, then walk your hands diagonally out to the left and place your right hand on top of your left hand. Keeping your shoulders down and back, slowly drop your buttocks back toward your heels. Hold. Return to the starting position.

Tips and techniques:

- Rest your forehead on the mat when holding this stretch.
- Lower your buttocks only as far as feels comfortable. If necessary, place a pillow or towel between your thighs and calves to limit the stretch.
- While holding, take full breaths by inhaling gently through your nose and lengthening the outbreath as you exhale through your nose.





10 Cat-cow

Primarily stretches the back

Reps: 2–4 Hold: 5 yoga breaths or 10–30 seconds

Starting position: Position yourself on all fours, knees hipwidth apart. Align your shoulders over your wrists, and put your head and spine in neutral alignment.

Movement: Slowly arch your back upward like a scared cat as you exhale. Pull your belly button in toward your spine and tuck your chin. Hold. Slowly drop your belly, pull your shoulders back, and lift your head up to look forward as you inhale. Hold. Slowly return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- The slow movements of this stretch are like a wave of your spine.
- While holding, take full breaths by inhaling gently through your nose and lengthening the outbreath as you exhale through your nose.



11 Downward dog

Stretches the entire body

Reps: 2–4 Hold: 5 yoga breaths or 10–30 seconds

Starting position: Position yourself on all fours, hands shoulder-width apart, legs hip-width apart, and fingers extended.

Movement: Exhale as you lift your knees off the floor, straightening your legs without locking the knees until you are in an upside-down V. While maintaining a neutral neck and spine, align your ears with your biceps. Try to keep your weight evenly distributed between your hands and feet. Press your heels down toward the floor, if possible, while keeping your shoulders down and rolled back. Hold. Return to the starting position.

- Soften your elbows and keep your shoulders down and rolled back as you lengthen your spine. Brace your abdominal muscles throughout.
- If necessary, bend your knees slightly and let your heels come up off the floor.
- While holding, take full breaths by inhaling gently through your nose and lengthening the outbreath as you exhale through your nose.



12 | Side-lying quadriceps stretch

Primarily stretches the front of the thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your left side with your legs stacked and extended on the floor. Rest your left arm under your head.

Movement: Bend your right knee and bring your heel toward your right buttock, reaching back with your right hand to grasp your foot. Hold. Slowly return to the starting position. Turn onto your other side and repeat. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- If you have trouble reaching your foot, place a stretch strap around your ankle and gently pull the strap toward your buttocks.
- Breathe comfortably.





13 Kneeling hip flexor stretch

Primarily stretches the front of the hip and the sides

Reps: 2 Hold: 10–30 seconds

Starting position: Kneel with your hands at your sides.

Movement: Put your right leg in front of you with the knee bent at a 90-degree angle and foot flat on the floor. Place your hands on your right thigh for support. Lean forward, pressing into the hip of your left leg while keeping your right foot on the floor. Hold. Return to the starting position, then repeat with your left leg forward. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your head and spine neutral, your shoulders down and back, and your abdominal muscles tightened.
- Keep your pelvis tucked forward, rather than letting it tip back.

14 | Torso rotation on all fours

Primarily stretches the torso, arms, and sides

Reps: 2–4 Hold: 10–30 seconds

Starting position: Position yourself on all fours, aligning your arms and knees directly under your shoulders and hips.

Movement: Gently place your right hand behind your head. Slowly bring your right elbow down toward your left hand, then rotate your elbow up toward the ceiling. Hold. Return to the starting position. Repeat on the other side. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your head and spine neutral, shoulders down and back, and abdominal muscles tightened.
- Follow your elbow with your eyes as you rotate toward the ceiling.

Floor stretches using a strap

The strap used in these five stretches helps you position yourself correctly even if your muscles are tight. It allows you to limit a stretch by keeping the strap long or gently deepen a stretch as your body becomes more flexible by moving your grip up on the strap. As with all floor stretches, using a cushioned mat, or a thick carpet or towels, will help keep you comfortable.



1 Hamstring stretch with strap

Primarily stretches the back of the thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your right leg extended on the floor. Bend your left knee to place the stretch strap securely around your left foot. Hold the strap with both hands.

Movement: Flex the foot of your left leg and lift that heel toward the ceiling, straightening the leg as much as possible without locking the knee. As you do so, flex the foot of your extended right leg, pressing the thigh and calf down toward the floor. Gently pull on the strap to the point of muscle tightness. Hold. Return to the starting position. Finish all reps, then repeat on the other leg.

Tips and techniques:

- Stretch the leg that is raised toward the ceiling to the point of mild tension. You should not feel any pressure behind the knee.
- Place the strap in the middle of your foot to secure it safely.
- Breathe comfortably.



2 Inner thigh stretch with strap

Primarily stretches the inner thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your right knee bent and foot on the floor. Bend your left knee to place the strap securely around your left foot. As you extend your foot toward the ceiling, straighten your leg as much as possible without locking the knee. Keeping your shoulders down and pressing into the floor, hold both ends of the strap in your left hand. Place your right arm out to your side on the floor just below shoulder level.

Movement: Tighten your abdominal muscles and slowly lower your left foot out to the left to the point of tightness while keeping your hips pressed to the floor. Hold. Return to the starting position. Repeat on the other side. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain. You should not feel any pressure behind the knee.
- Focus on keeping both shoulders and hips evenly on the floor, and your shoulders down and back.
- Breathe comfortably.

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3 Outer thigh stretch with strap

Primarily stretches the buttocks, outer thigh, and back of the thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with your right knee bent and foot on the floor. Bend your left knee to place the strap securely around your left foot. Keeping your shoulders down and pressing into the floor, hold both ends of the strap in your right hand and place your left arm on the floor just below shoulder level.

Movement: Slightly bend your left knee and slowly pull your left leg across your body toward the right wall. Hold. Return to the starting position. Repeat on the other side. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- To increase the stretch, pull the leg across your body and then up toward the wall behind you.
- Breathe comfortably.



4 | Full-body stretch with strap

Primarily stretches the upper body, abdominal muscles, and lower body

Reps: 2–4 Hold: 10–30 seconds

Starting position: Lie on your back with both legs extended. Hold the strap shoulder-distance apart with both hands by your hips.

Movement: Slowly lift the strap up toward the ceiling, then over your head and back down toward the floor as you point your toes, keeping feet together. Hold. Return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- If you cannot comfortably bring your arms down to the floor when reaching overhead, try placing a pillow above your head and pressing the backs of your arms into it.
- Breathe comfortably.

5 | Side stretch with strap

Primarily stretches the sides, arms, and shoulders

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight on the floor with chest lifted, shoulders down and back, knees bent, and ankles crossed. Hold the strap in both

hands with your arms extended in a V shape.

Movement: Slowly lift the strap up toward the ceiling. Then lower your right hand to the floor near your right hip while continuing to hold the strap with your arms extended. Hold. Return to the starting position, then repeat to the left side. This is one rep.

- As you reach to one side during this stretch, press the opposite hip into the floor.
- Stretch to the point of mild tension, not pain.
- Breathe comfortably.



Seated stretches

Practically everyone can do these 11 seated stretches. They can be done virtually anywhere—at work, in a hotel, or at home—and are especially helpful if you have trouble balancing while standing or find our floor stretches too challenging. Many of these stretches are perfect for relaxing muscles that tense up during desk work.



1 Seated shoulder stretch

Primarily stretches the shoulder

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight on a chair. Put your left hand on your right shoulder. Cup your left elbow with your right hand.

Movement: Roll your shoulders down and back, then gently pull your left elbow across your chest as you extend your left arm. Hold. Return to the starting position, then repeat on the opposite side. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your shoulders down and back away from your ear during the stretch.
- Breathe comfortably.



2 Seated triceps stretch

Primarily stretches the back of the upper arm and the shoulder

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight with your arms at your sides.

Movement: Place your right hand on your right shoulder. Clasp your right elbow with your left hand. Keeping your shoulders down and back, lift your elbow up toward the ceiling to the point of tightness. Hold. Return to the starting position. Repeat on the other side. This is one rep.

- Stretch to the point of mild tension, not pain.
- Keep your head and spine neutral, shoulders down and back, and abdominal muscles tightened.
- Breathe comfortably.

3 | Seated overhead stretch

Primarily stretches the abdominal muscles and upper body

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight with your arms at your sides.

Movement: Interlace your fingers and rotate your palms so they face down. Keep your shoulders down and back as you lift your arms up toward the ceiling. Your palms should now be facing up. Hold. Slowly return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your shoulders down and back during the stretch.
- Breathe comfortably.



4 | Seated chest stretch

Primarily stretches the chest and shoulders

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight facing side-ways in a chair without arms.

Movement: Roll your shoulders down and back. Clasp your hands behind you. Gently lift your hands toward the ceiling to the point of



tightness. Hold. Slowly return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your shoulders down and back during the stretch.
- Breathe comfortably.

5 Seated wrist stretch

Primarily stretches the wrist and arm

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight in a chair. Put your left arm out in front of you, palm down.

Movement: This is a two-step stretch. Point the fingers of your left hand toward the ceiling. Place the palm of your right hand across your left fingers on the palm side. Gently press to increase the stretch, stopping if you feel any pain. Hold. Return to the starting position. Now bend your left hand at the wrist, pointing your fingers downward. Cup your right hand across the back of your left hand, then gently press to increase the stretch, stopping if you feel any pain. Hold. Finish all reps, then switch arms and repeat both steps on the other side.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- If this stretch is too difficult for you, perform circular motions with your wrists in both directions to help loosen the joint.
- Maintain neutral posture with your shoulders down and back.
- Breathe comfortably.

SEATED STRETCHES



6 Seated hamstring stretch

Primarily stretches the rear of the thigh

Reps: 2–4

Hold: 10-30 seconds

Starting position: Sit up straight near the front of a chair with your feet flat on the floor.

Movement: Extend your right leg straight in front of you with your heel grounded on the floor and your toes pointing toward the ceiling. Hinge forward from the hip, placing your hands on your left thigh for support. Keep your spine neutral. Hold. Return to the starting position. Repeat with your left leg. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain. You should not feel any pressure behind the knee or at your back.
- Keep your shoulders down and back. As you hinge forward, imagine your chin reaching toward your foot.
- Breathe comfortably.

8 Seated neck rotation

Primarily stretches the neck

Reps: 2-4

Hold: 10–30 seconds

Starting position: Sit up straight in a chair with your chest lifted, shoulders down and back, and chin parallel to the floor. Rest your hands on your legs.

Movement: Slowly rotate your head to the right. Hold. Return to the starting position. Finish all reps, then repeat on the other side.

Tips and techniques:

- Stretch to the point of mild tension, not pain. You should not feel any pain in your neck.
- Each time you rotate your head, choose a spot to focus on while holding. This spot should move noticeably as your range of motion improves.
- Breathe comfortably.

7 Seated ear-to-shoulder stretch

Primarily stretches the neck

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight near the front of a chair with your hands at your sides.

Movement: Roll your shoulders down and back. Use your right hand to clasp your left wrist behind your back at waist level.



Gently pull your left hand toward your right hip and drop your right ear toward your right shoulder. Hold. Slowly return to the starting position. Repeat on the other side. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain. You should not feel any pain in your neck.
- Keep your shoulders down and back.
- Breathe comfortably.



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9 | Seated pretzel

Primarily stretches the buttocks, hip, and outer thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight in a chair and rest your left ankle on your right knee. Place your hands on your thighs.

Movement: Keeping

your spine neutral, slowly hinge forward from your hips until you feel mild tension in your left hip and buttock. Hold. Slowly return to the starting position. Repeat with your right ankle on your left knee. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Keep your spine neutral, not rounded, and your shoulders down and back.
- Breathe comfortably, exhaling as you hinge forward.



10 Seated stretch

Primarily stretches the inner thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight near the front of a chair. Open your legs as far apart as possible, knees and toes pointed outward.



Place your hands on your thighs.

Movement: Keeping your spine neutral, hinge forward from the hips until you feel mild tension along your inner thighs. Hold. Return to the starting position.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- As you hinge forward, push your hands into your legs to increase the stretch.
- Breathe comfortably.

11 Seated rotation

Primarily stretches the back

Reps: 2–4 Hold: 10–30 seconds

Starting position: Sit up straight on a chair with your feet flat on the floor, hip-width apart, and your arms at your sides.

Movement: Slowly rotate your head and torso to the right side, placing your left hand on the outside of your right knee and your right hand next to your right hip. Hold. Slowly return to the starting position. Repeat to the opposite side. This is one rep.

- Stretch to the point of mild tension, not pain.
- As you rotate, keep your hips squared and facing forward.
- Breathe comfortably.



Standing stretches

hese five classic stretches enhance flexibility in key leg muscles and parts of the upper body. These stretches can help you walk, run, and reach more easily, which makes a difference in sports and daily tasks.

1 Calf stretch

Primarily stretches the calf, Achilles' tendon, and ankle

Reps: 2–4 Hold: 10–30 seconds

Starting position: Stand up straight. Hold the back of a chair or press your hands against a wall, arms extended at shoulder height.

Movement: Extend your right leg straight back and press the heel toward the floor. Allow your left knee to bend as you do so, while keeping that heel grounded on the floor. Hold. Return to the starting position, then repeat with your left leg. This is one rep.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- Hold a full-body lean from the ankle as you stretch.
- Maintain neutral posture with your shoulders down and back.

2 | Soleus stretch

Primarily stretches the soleus (deeper calf muscle) and Achilles' tendon

Reps: 2–4 Hold: 10–30 seconds

Starting position: Hold the back of a chair or press your hands against a wall, arms extended at shoulder height.

Movement: Extend your right leg straight back and press the heel toward the floor. Allow your left knee to bend as you do so, while keeping the heel grounded on the floor. Now bend your right knee as much as possible, pressing into the back heel. Hold. Return to the starting position. Finish all reps, then repeat with your other leg.

- Stretch to the point of mild tension, not pain.
- Maintain neutral posture with your shoulders down and back.
- Breathe comfortably.

3 Standing chest and shoulder stretch

Primarily stretches the chest, shoulders, and biceps

Reps: 2–4 Hold: 10–30 seconds

Starting position: Stand at arm's length away from a wall or a doorway, facing away from it. Extend your left arm and put your left hand on the wall, or the edge of the door frame, slightly below shoulder level, palm facing forward and touching the door frame. Keep your shoulders down and back.

Movement: Slowly turn your body to the right, away from the wall or door frame,

until you feel the stretch in your chest and shoulder. Hold. Return to the starting position. Finish all reps, then repeat on the other side.

Tips and techniques:

- Stretch to the point of mild tension, not pain.
- If the stretch is too difficult, lower your arm on the wall or door frame.
- Breathe comfortably.

4 Standing quadriceps stretch

Primarily stretches the front of the thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Stand up straight, feet together, holding the back of a chair with both hands.

Movement: Bend your right knee and reach back with your right hand to grasp your foot,

lifting it toward your right buttock. Keep your pelvis neutral. Hold. Slowly lower your foot to the floor. Switch position to repeat with your left leq. This is one rep.

Tips and techniques:

- Try to keep both knees together, with the bent knee pointing toward the floor.
- Stretch to the point of mild tension, not pain. If you have trouble grasping your foot, place a stretch strap around it to assist with the stretch.
- Breathe comfortably.

5 | Standing hamstring stretch

Primarily stretches the back of the thigh

Reps: 2–4 Hold: 10–30 seconds

Starting position: Stand up straight with your arms at your sides.

Movement: Extend your right leg straight in front of you, heel grounded on the floor and toes pointing to the ceiling. Place your hands on your upper thighs for support and hinge forward from the hip, keeping your spine neutral. Hold. Return to the starting position. Repeat with the other leg. This is one rep.

- Stretch to the point of mild tension, not pain. You should not feel any pressure behind the knee or at your back.
- Keep your shoulders down and back.
- Breathe comfortably.

Resources

Organizations

American Academy of Physical Medicine and Rehabilitation 9700 W. Bryn Mawr Ave., Suite 200 Rosemont, IL 60018 847-737-6000 www.aapmr.org

This is the professional organization for physiatrists—medical doctors trained in physical medicine and rehabilitation. A referral service on the website locates physiatrists state-by-state.

American College of Sports Medicine

P.O. Box 1440 Indianapolis, IN 46206 317-637-9200 www.acsm.org

ACSM educates and certifies fitness professionals, such as personal trainers, and funds research on exercise. A referral service on the website locates ACSM-certified personal trainers.

American Council on Exercise

4851 Paramount Drive San Diego, CA 92123 888-825-3636 (toll-free) www.acefitness.org

ACE is a nonprofit organization that promotes fitness and offers educational materials for consumers and professionals. The ACE website has a referral service to help locate ACE-certified personal trainers and a free video library of exercises.

Arthritis Foundation

1330 W. Peachtree St., Suite 100 Atlanta, GA 30309 404-872-7100 www.arthritis.org

This national nonprofit organization has local chapters in many states. The website has information on different forms of arthritis, pain control, treatments, alternative therapies, and other topics. Programs on walking, stretching, strengthening, and heated pool exercises geared to people who have arthritis are offered in many locales.

Harvard Special Health Reports

You can find additional exercise plans in these Special Health Reports from Harvard Medical School. To order, call 877-649-9457 (toll-free) or to go www.health.harvard.edu.

Better Balance: Easy exercises to improve stability and prevent falls

Suzanne Salamon, M.D., and Brad Manor, Ph.D. (Harvard Medical School, 2014)

This report explains health problems that may impair balance and prompt falls. It offers six complete workouts to strengthen muscles, boost confidence, and interrupt a downward spiral that can compromise independence. Includes personal safety and home hazards checklists to prevent falls and other injuries.

Core Exercises: Six workouts to tighten your abs, strengthen your back, and improve balance

Edward M. Phillips, M.D., Josie Gardiner, and Joy Prouty (Harvard Medical School, 2013)

The natural next step after mastering Gentle Core exercises (below), this report offers six additional core workouts with exercises that range from easy to quite challenging. Two workouts call for no equipment other than body weight, while the rest center on exercises done with a medicine ball, stability ball, or Bosu. All exercises can be tailored to make them easier or harder to do.

Gentle Core Exercises: Start toning your abs, building your back muscles, and reclaiming core fitness today Edward M. Phillips, M.D., and Josie Gardiner (Hanvard Medical School, 2013)

(Harvard Medical School, 2013)

Designed as a beginner program, this report offers two simple core workouts and gentle stretching routines. Includes easy exercises to do at the office.

The Joint Pain Relief Workout: Healing exercises for your shoulders, hips, knees, and ankles

Edward M. Phillips, M.D., Josie Gardiner, and Joy Prouty (Harvard Medical School, 2014)

The exercises in this report can help tame ankle, knee, hip, or shoulder pain. When practiced regularly, the workouts may permit people to postpone—or even avoid—joint surgery by strengthening supportive muscles and restoring flexibility.

Strength and Power Training: A guide for older adults Julie K. Silver, M.D.

(Harvard Medical School, 2013)

Weak muscles hasten the loss of independence as everyday activities become more difficult. Two weekly strength training workouts can help fortify muscles and bones, recouping losses linked to aging or inactivity.

Glossary

ballistic stretch: A bouncing movement used to quickly extend muscle length. These stretches carry the potential for injury if the movement is not carefully controlled.

cartilage: Tough, flexible tissue that cushions the intersection between bones.

dynamic stretch: A movement pattern intended to take specific muscles and joints through a full range of motion: a golf swing or knee lifts, for example. Sometimes called a dynamic warm-up.

extend: Straighten out a joint (for example, extending your arms means straightening your elbows).

flex: Bend a joint (for example, flexing your knee means bending your knee).

intensity: How hard you are exercising.

joint: A junction in the body where bones are linked together.

ligament: Tough, fibrous bands of connective tissue that bind bone to bone, or bone to cartilage, at a joint, allowing a safe range of movement.

neutral alignment: Keeping your body in a straight line from head to toe except for the slight natural curves of the spine.

neutral posture: Positioning your body with chin parallel to the floor; shoulders, hips, and knees at an even height; and

knees and feet pointing straight ahead, whether standing or seated.

proprioceptive neuromuscular facilitation (PNF): A two-step approach to stretching that starts with isometric contraction of the opposing muscle, followed by a passive static stretch of the target muscle applied by a partner who focuses on moving a joint through its range of motion. PNF requires expertise to do safely.

proprioceptor: A specialized nerve that assists in stretches by relaying information about joint angle, movement, and changes in muscle tension. One type of proprioceptor (a muscle spindle) helps trigger the stretch reflex; another (golgi tendon organ) triggers a lengthening reaction in muscles.

range of motion: The extent of movement in a joint and thus flexibility. This is measured in the degrees of a circle.

repetition: A single, complete performance of an exercise. Also called a rep.

static stretch: An exercise that involves holding a position that stretches a muscle to the point of tension. Static stretches can be active (the muscle being stretched does the work) or passive (a stretch strap, barre, or partner does the work).

tendon: A flexible cord of strong connective tissue that tethers muscle to bone.

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