**Research Notes**

Efficacy of a movement control injury prevention programme in adult men’s community rugby union: a cluster randomised controlled trial - Matthew J Attwood,1,2 Simon P Roberts,1 Grant Trewartha,1 Mike E England,3 Keith A Stokes1

* The **control programme** included dynamic stretching and non-targeted resistance exercises presented in a similar progressive format to the intervention.
* Programmes recommended 5–10 min of small-sided games after which the main content lasted 15 min.
* The **control programme** followed a raise, activate, mobilise and potentiate format incorporating whole-body dynamic stretching and resistance exercises, such as partner grappling, front planks, press-ups and sprint drills, before finishing with high-intensity running exercises.
* The **intervention warm-up** incorporated balance/proprioceptive exercises, resistance and perturbation exercises and sport-related landing, cutting and plyometric exercises. Proprioception and balance exercises progressed through alterations including the use of upper-limb movement, performing the exercises with eyes closed and thus removing the visual component to balance and by perturbations in frontal and sagittal planes. Dynamic stability exercises targeting upper and lower limbs progressed in load by altering the number of sets and reps, intensity and by variations in the directions of movement. Resistance exercises progressed in duration or intensity as well as by altering the type of muscle contraction to include isometric, concentric and eccentric muscle activity. Landing, cutting and plyometric exercises varied phase to phase but reflected sport-specific skills such as jumping to catch a high ball and progressed in difficulty. Variations included progressing from a single cutting manoeuvre to a cut, spin and accelerate movement pattern. Plyometric exercises progressed through each of the phases beginning with lower-load doublelegged tasks to high-load single-legged tasks. Throughout the **intervention warm-up**, there was a consistent theme of quality of movement control and body alignment for delivery agents to feedback to the. The **intervention** finished with the same high-intensity shuttle running exercises as the control programme.
* These exercises were included based on existing evidence that isometric neck exercises increase neck strength in male rugby players and that higher neck strength is suggested to decrease head accelerations during rugby collision events associated with concussion. For amateur rugby, this finding is very encouraging in the context of a proposed link between concussion sustained during a playing career and deficits in cognitive functioning in later life.
* A likely beneficial reduction of 40% was found for targeted lower-limb injury incidence for the **intervention group** over control group (3.3 vs 5.2 injuries/1000 player match-hours). The **intervention programme** incorporated lower-limb balance, proprioception and movement control exercises similar in nature to exercises in FIFA 11+,32 indicating that this approach is also efficacious for reducing injury in rugby, despite the high proportion of contact-related injuries.
* 20% reduction (RR, 0.8; 90% CI 0.6–1.0) in lowerlimb injury incidence and a likely beneficial 50% reduction (RR, 0.5; 90% CI 0.3–1.0) in knee injuries. Given that ~50% of all community rugby injuries are lower-limb injuries,11 our findings support the completion of these lower-limb exercises as part of a warm-up before training and matches.
* Performing at least one movement control session per week led to reduced injury rates.
* Lower-limb injury, head and neck injury and concussion were reduced, but shoulder injuries were increased in the **intervention** group undertaking exercises during warm-ups at training and before matches.
* The injury prevention exercise programme should be performed prior to training and matches in all adult men’s rugby union.
* Given the evidence for the efficacy of this and similar injury prevention exercise programmes, practitioners should consider the content of the ‘warm-up’ and consider employing the principles of these exercise programmes regardless of which sport they are working in.
* The FIFA 11+ program reduced injury by 32% and 72%

Superior compliance with a neuromuscular training programme is associated with fewer ACL injuries and fewer acute knee injuries in female adolescent football players: secondary analysis of an RCT - Martin Hägglund,1 Isam Atroshi,2,3 Philippe Wagner,4 Markus Waldén3,5

* The anterior cruciate ligament (ACL) injury rate is more than twofold higher in female football players than in their male counterparts12and adolescent females are especially at risk.
* In total, 47 acute knee injuries in 46 players (7 ACL injuries in 7 players) in the **intervention group** and 47 acute knee injuries in 44 players (14 ACL injuries in 14 players) in the **control group** were included.
* At player compliance level, the players in the high-compliance tertile had an 88% reduction in the ACL injury rate compared with the low-compliance tertile (table 2). Consistently, the intermediate-compliance and high-compliance tertiles had rate reductions between 72% and 90% for severe knee injuries and acute knee injuries compared with the low-compliance tertile. The adjusted analyses for the secondary outcomes gave similar results (data not shown). Similar or lower injury rates were seen in the control group compared with the low-compliance tertile at player compliance level.
* In the main cluster RCT, we reported a 64% lower overall ACL injury rate in the **intervention group** compared with the **control group.**
* Worth noting is that players in the low-compliance tertile in the current study had higher injury rates than the control group players. A possible explanation is that low-compliant players represent a sample of players with low motivation to physically prepare for sports and/or participated in teams in which the coach had lesser interest in preventive training, which could lead to increased injury rates.
* This study shows that effective prevention of acute knee injury is associated with high individual player compliance to NMT.
* Female adolescent football players with high compliance with a 15 min warm-up neuromuscular training (NMT) programme had signiﬁcantly reduced rates of ACL injury, severe knee injury and any acute knee injury compared with players with low compliance.
* Players with low compliance with the NMT programme had similar or even higher knee injury rates than players in the control group receiving no intervention.

<http://www.fifa.com/development/medical/index.html>

* 80% injuries in players under 24
* 44% injuries in players under 15
* Injury rates in the women’s game tend to be higher for anterior cruciate ligament (ACL) injuries and concussions.

FIFA

* “The 11” should be performed in every training session after a warm-up and stretching of all the important muscle groups. Precise performance of the exercises is important in order to ensure their effect. The sequence of exercises should be followed. Before each match, a shortened version (only exercises 4, 5, 8) of “The 11” should be carried out.
  1. The Bench - Strengthens the core muscles to increase core stability.
     + Starting position: Lie on your stomach and support upper body with your arms. Place your feet vertical to the ground.
     + Action: Lift your stomach, hips and knees so that your body forms a straight line, from your shoulders to your heels, parallel to the ground. Elbows should be directly under your shoulders. Tighten your abdominal muscles and buttocks. Pull your shoulder blades towards the centre of your back so that your shoulder blades are level with your back. Lift your right leg a few centimetres from the ground and hold this position for 15 seconds. Return to the starting position, relax and repeat the exercise with your left leg.
     + Repetitions: Perform 1 - 2 times for each leg.
     + The Bench Strengthens the core muscles to increase core stability.
     + Important: · Your head, shoulders, back and pelvis are in a straight line. · Your elbows are directly under your shoulders. · Don’t tilt your head backwards. · Don’t let your stomach drop. · Don’t move your hips upwards. · When lifting your leg, don’t let your pelvis tilt to the side.
  2. Sideways Bench - Strengthens the lateral abdominal muscles to increase core stability.
     + Starting position: Lie on one side. Support your upper body with one arm so that your elbow is vertically under your shoulder and your forearm is on the ground. Bend your bottom knee to 90°. When viewed from above, your shoulders, elbow, hips and both knees should form a straight line.
     + Action: Lift your top leg and hips until your shoulder, hip and top leg are in a straight line, parallel to the ground. Hold this position for 15 seconds. Return to the starting position, relax and repeat the exercise on your other side.
     + Repetitions: Perform twice on each side.
     + Sideways Bench Strengthens the lateral abdominal muscles to increase core stability.
     + Important: · When viewed from the front, your upper shoulder, hips and upper leg are in a straight line. · Your elbow is directly under your shoulder. · When viewed from above, the shoulders, elbow, hips and both knees are in a straight line. · Don’t rest your head on your shoulder. · Don’t let your hips drop. · Don’t tilt your upper shoulder, hips, pelvis or legs forwards or backwards.
  3. Hamstrings - Strengthens the hamstrings
     + Starting position: Kneel on the ground with your upper body straight. Your knees and lower legs should be hip-width apart. Cross your arms in front of your body. Have a partner pin your ankles firmly to the ground with both hands.
     + Action: Slowly lean forward keeping your upper body and hips straight. Your thighs, hips and upper body should stay in a straight line. Try to hold this straight body alignment as long as possible. When this body position can no longer be maintained by the hamstrings then use both hands to control your fall.
     + Repetitions: Perform 5 times.
     + Hamstrings Strengthens the hamstrings.
     + Important: · Your partner must keep your ankles firmly on the ground. · Your upper body, hips and thigh should be in a straight line. · Don’t bend at your hips. · Don’t tilt your head backwards. · Perform the exercise slowly at first, but once you feel more comfortable, speed it up.
  4. Cross-country Skiing - Strengthens the leg muscles.
     + Starting position: Stand on your right leg and let your other leg hang relaxed. Bend your knee and hips slightly so that your upper body leans forward. When viewed from the front, the hip, knee and foot of your supporting leg should be in a straight line.
     + Action: Flex and extend the knee of your supporting leg and swing your arms in opposite directions in the same rhythm. Flex your knee as much as possible, but keep weight balanced on the entire foot. On extension, never lock your knee. Keep pelvis and upper body stable and facing forwards.
     + Repetitions: Perform 15 times on right leg, then 15 times on left leg.
     + Cross-country Skiing Strengthens the leg muscles.
     + Important: · When viewed from the front, the hip, knee and foot of your supporting leg should be in a straight line. · Keep your upper body and pelvis stable and facing forward. · Keep your pelvis horizontal and don’t let it tilt to the side. · Balance your weight across the whole foot. · Don’t let the knee of your supporting leg buckle inwards. · Never let your knees meet.
  5. Chest-passing in Single-leg Stance - Improves coordination and balance; strengthens the leg muscles.
     + Starting position: Face a partner at a distance of 3 metres away, each of you standing on your right leg. Knees and hips should be slightly bent. Keep your weight on the ball of your foot or lift your heel from the ground. When viewed from the front, the hip, knee and foot of your supporting leg should be in a straight line.
     + Action: Throw a ball back and forth: when standing on right leg, throw with left arm and vice versa. Catch the ball with both hands, and throw it back with one hand. The quicker the exchange of the ball, the more effective the exercise.
     + Repetitions: Perform 10 times on right leg, then 10 times on left leg.
     + Chest-passing in Single-leg Stance Improves coordination and balance; strengthens the leg muscles.
     + Important: · When viewed from the front, the hip, knee and foot of your supporting leg should be in a straight line. · Keep your upper body and pelvis stable and facing forward. · Keep your pelvis horizontal and don’t let it tilt to the side. · Keep your hips and the knee of your supporting leg always slightly bent. · Don’t let your knee buckle inwards. · Keep your weight on the ball of your foot or lift your heel fully off the ground.
  6. Forward-bend in Single-leg Stance - Improves coordination and balance; strengthens the leg muscles
     + Starting position: As for Exercise 5, face partner at a distance of 3 metres away, each of you standing on your right leg.
     + Action: As for Exercise 5, throw ball back and forth but before throwing back, touch the ball to the ground without putting weight on it.
     + Repetitions: Perform 10 times on right leg, then 10 times on left leg.
     + Forward-bend in Single-leg Stance Improves coordination and balance; strengthens the leg muscles.
     + Important: · When viewed from the front, the hip, knee and foot of your supporting leg should be in a straight line. · Keep your pelvis horizontal and don’t let it tilt to the side. · Keep your hips and the knee of your supporting leg slightly bent throughout. · Don’t let your knee buckle inwards. · Keep weight only on the ball of your foot, or lift your heel fully off the ground. · When touching the ground with the ball, don’t place your weight on the ball.
  7. Figure-of-eight in Single-leg Stance - Improves coordination and balance; strengthens the leg muscles.
     + Starting position: As for Exercise 5, face partner at a distance of 3 metres away, each of you standing on your right leg.
     + Action: As for Exercise 5, throw ball back and forth but before throwing back, swing the ball in a figure-of-eight through and around your legs: first around your supporting leg with your upper body leaning forward, and then around your other leg while standing as upright as possible.
     + Repetitions: Perform 10 times on right leg, then 10 times on left leg.
     + Figure-of-eight in Single-leg Stance Improves coordination and balance; strengthens the leg muscles.
     + Important: · When viewed from the front, hip, knee and foot of your supporting leg should be in a straight line. · Keep your pelvis horizontal and don’t let it tilt to the side. · Keep your hips and the knee of your supporting leg slightly bent throughout. · Don’t let your knee buckle inwards. · Keep weight only on the ball of your foot, or lift your heel fully off the ground. · Your upper body should move down and up substantially during this exercise.
  8. Jumps over a Line - Improves jumping power and technique
     + Starting position: Stand with feet hip-width apart, about 20 centimetres to the side of a line. Bend your knees and hips slightly so that your upper body leans forward a little. When viewed from the front, the hip, knee and foot of each leg should be in a straight line. Arms should be slightly bent and close to the body.
     + Action: Jump with both feet, sideways over the line and back, as quickly as possible. Land softly on the balls of both feet with slightly bent knees.
     + Repetitions: Jump 10 times side to side, then 10 times forwards and backwards over the line.
     + Important: · When viewed from the front, your hips, knees and feet should form two, parallel lines. · Keep your hips and knees slightly bent throughout. · Never let your knees meet and don’t let them buckle inwards. · Push off both feet and land on the balls of both feet. · Land softly with your knees bent to cushion impact. · Never land with extended knees or on your heels. · A soft landing and quick take-off are more important than the height of the jump.
  9. Zigzag Shuffle - Improves coordination and jumping technique.
     + Starting position: Stand at the start of the zigzag course (6 marks set 10 x 20 metres), with legs shoulder-width apart. Bend your knees and hips so that your upper body leans substantially forward. One shoulder should point in the direction of movement.
     + Action: Shuffle sideways to the first mark, turn so that your other shoulder points to the next mark and complete the zigzag course as fast as possible. Always take-off and land on the balls of your feet.
     + Repetitions: Complete the course twice.
     + Zigzag Shuffle Improves coordination and jumping technique.
     + Important: · Always keep your upper body leaned forward with your back straight. · Keep your hips and knees substantially bent. · Push off and land on the balls of both feet. · Land softly with your knees bent to cushion impact. · Keep knees ‘soft’ throughout and don’t let them buckle inwards. · Never land with extended knees or on your heels.
  10. Bounding - Improves jumping power and technique.
      + Starting position: Stand on your take-off leg with your upper body upright. The arm on the take-off leg side should be in front of your body. When viewed from the front, the hip, knee and foot of your take-off leg should be in a straight line.
      + Action: Spring as high and as far as possible off your take-off leg. Bring the knee of your trailing leg up as high as possible and bend the opposite arm in front of your body when bounding. Land softly on the ball of your foot with a slightly bent knee.
      + Repetitions: Cover a distance of 30 metres twice.
      + Bounding Improves jumping power and technique.
      + Important: · When viewed from the front, the hip, knee and foot of your take-off leg should be in a straight line. · Bring your trailing leg and the opposite arm up in the front of your body when bounding. · Land on the ball of your foot and with your knee bent to cushion impact. · Don’t let knee buckle inwards during take-off or landing. · Never land with extended knees or on your heels.

<https://www.webmd.com/men/features/seven-most-common-sports-injuries#1>

* The seven most common [sports injuries](https://www.webmd.com/fitness-exercise/rm-quiz-sports-injury-savvy) are:
  1. [Ankle sprain](https://www.webmd.com/fitness-exercise/what-is-an-ankle-sprain)
     + Most athletes have experienced a [sprained ankle](https://www.webmd.com/pain-management/sprains-and-strains-10/slideshow-care-guide), which typically occurs when the foot turns inward. This turning stretches or tears the ligaments on the outside of the [ankle](https://www.webmd.com/fitness-exercise/picture-of-the-ankle), which are relatively weak.
     + With an ankle sprain, it’s important to [exercise](https://www.webmd.com/fitness-exercise/ss/slideshow-7-most-effective-exercises) to prevent loss of flexibility and strength — and re-injury. [You](https://www.webmd.com/men/You) can ask your doctor or physical therapist to help you know what kinds of exercise you should do.
  2. Groin pull
     + Pushing off in a side-to-side motion causes strain of the inner thigh muscles, or groin. “Hockey, soccer, football, and baseball are common sports with groin injuries,” says Royster.
     + Compression, ice, and rest will heal most groin injuries. Returning to full activity too quickly can aggravate a groin pull or turn it into a long-term problem.
  3. Hamstring strain
     + Three muscles in the back of the thigh form the hamstring. The hamstring can be over-stretched by movements such as hurdling — kicking the leg out sharply when running. Falling forward while waterskiing is another common cause of hamstring strains.
     + “Hamstring injuries are slow to heal because of the constant stress applied to the injured tissue from walking,” says Royster. “Complete healing can take six to 12 months.” Re-injuries are common because it's hard for many guys to stay inactive for that long.
  4. [Shin splints](https://www.webmd.com/fitness-exercise/shin-splints)
     + Pains down the front of the lower legs are commonly called “shin splints.” They are most often brought on by running — especially when starting a more strenuous training program like long runs on paved roads.
     + Rest, ice, and over-the-counter pain medicine are the mainstays of treatment.
  5. [Knee injury](https://www.webmd.com/fitness-exercise/guide/knee-ligament-injuries): ACL tear
     + The anterior cruciate ligament (ACL) holds the leg bone to the [knee](https://www.webmd.com/pain-management/knee-pain/picture-of-the-knee). Sudden “cuts” or stops or getting hit from the side can strain or tear the ACL. A complete tear can make the dreaded “pop” sound.
     + Always, if you suspect an [ACL injury](https://www.webmd.com/a-to-z-guides/tc/anterior-cruciate-ligament-acl-injuries-topic-overview). ACL tears are potentially the most severe of the common sports injuries. “A completely torn ACL will usually require surgery in individuals who wish to remain physically active,” says Royster.
  6. Knee injury: Patellofemoral syndrome — injury resulting from the repetitive movement of your kneecap against your thigh bone
     + Patellofemoral syndrome can result from the repetitive movement of your kneecap (patella) against your thigh bone (femur), which can damage the tissue under the kneecap. Running, volleyball, and basketball commonly set it off. One [knee](https://www.webmd.com/pain-management/knee-pain/rm-quiz-know-your-knees) or both can be affected.
     + Patience is key. Patellofemoral pain can take up to six weeks to clear up. It's important to continue low-impact exercise during this time. Working out the quadriceps can also relieve pain.
  7. [Tennis elbow](https://www.webmd.com/pain-management/tennis-elbow) (epicondylitis)
     + Repetitive use of the elbow — for example, during golf or tennis swings — can irritate or make tiny tears in the elbow's tendons. Epicondylitis is most common in 30- to 60-year-olds and usually involves the outside of the elbow.
     + Epicondylitis can usually be cleared up by staying off the tennis court or golf course until the pain improves.
* Sprains are injuries to ligaments, the tough bands connecting bones in a joint. Suddenly [stretching](https://www.webmd.com/fitness-exercise/features/how-to-stretch) ligaments past their limits deforms or tears them. Strains are injuries to muscle fibers or tendons, which anchor muscles to bones. Strains are called “pulled muscles” for a reason: Over-[stretching](https://www.webmd.com/fitness-exercise/video/gym-smarts-stretching-hamstrings-calves) or overusing a muscle causes tears in the muscle fibers or tendons.
* Every [workout](https://www.webmd.com/fitness-exercise/default.htm) should start with a gentle warm-up to prevent common sports injuries, says Margot Putukian, MD, director of athletic medicine at Princeton University.
* You can limit swelling and start healing faster after common sports injuries by using the PRICE principle:
  1. P — protect from further injury  
     For more severe injuries, protect the injured area with a splint, pad, or crutch.
  2. R — restrict activity  
     Restricting activity will prevent worsening of the injury.
  3. I — apply ice  
     Apply ice immediately after a common sports injury. “Ice is the miracle drug” for sports injuries, says Putukian. “It's an anti-inflammatory, without many side effects.” Use ice for 20 minutes every one to two hours for the first 48 hours after the injury. Don't use heat during this time — it encourages swelling and inflammation.
  4. C — apply compression  
     Compression with an elastic bandage will help reduce swelling.
  5. E — elevate the injured area  
     Elevating the injured area above the [heart](https://www.webmd.com/heart/picture-of-the-heart) will also reduce swelling.

<http://www.medbroadcast.com/condition/getcondition/sports-injuries>

* Sports injuries are most commonly caused by poor training methods; structural abnormalities; weakness in muscles, tendons, ligaments; and unsafe exercising environments.
* The most common cause of injury is poor training. For example, muscles need 48 hours to recover after a workout.
* Increasing exercise intensity too quickly and not stopping when pain develops while exercising also causes injury.
* Overuse injuries are caused by repeated, microscopic injuries to a part of the body.
* Many long distance runners experience overuse injuries even after years of running.
  + For road runners, the surface is hard and sometimes uneven, and the running movements are repetitive. In addition, there are usually both up- and downhill elements, and these increase the stress on tendons and muscles in the lower leg.
* People who play racquet sports tend to injure their upper body.
  + The need to firmly grasp the racquet and the shock of impact with the ball can cause various injuries to the tendons of the wrist and elbow, such as "tennis elbow," which may extend into the muscles of the forearm. In addition, the human arm really isn't designed to handle strenuous activity above the head. Tennis is a leading cause of rotator cuff (shoulder joint) tendinitis. This is potentially one of the most difficult sports injuries. If you continue to play tennis when you have a sore shoulder, the rotator cuff tendons can fray or tear and may require surgery.
* Shin splints:
  + Shin splints have a number of causes and may occur on the outside or the inside of the shin. With anterolateral shin splints, pain around the front of the shin starts immediately when your heel strikes the ground awkwardly. In posteromedial shin splints, the pain is felt on the inner part of the shins and is worse when you stand on your toes. If you keep running on a regular basis when you have a shin splint, the pain tends to spread toward the knee. Tests are often required to understand the exact nature and cause of shin splints.
* Achilles tendinitis:
  + The Achilles tendon (the tough sinew that attaches the calf muscle to the back of the heel bone) is most likely to be damaged if you participate in running or jumping sports. The injured Achilles tendon feels tender when squeezed between the fingers. Pain is usually at its worst in the morning and improves with walking. Vigorous exercise will increase the pain for a bit, then improve it. However, you should never exercise a damaged Achilles tendon without the supervision of a sport medicine physician or therapist, or until it's healed.
* Lumbar strain:
  + The standard weightlifter's injury can also occur in sports that involve sudden twisting of the back, such as golf and baseball. Sudden lower back pain appears with twisting or lifting. It may seem fairly minor for an hour or two, but carrying on the exercise will usually bring a sudden deterioration with extreme pain and back spasms.
* Lateral and medial epicondylitis:
  + More commonly known as backhand and forehand tennis elbow. Backhand tennis elbow can also occur with overuse of a screwdriver, but tennis may be more problematic because not only are you gripping hard, but there are also repetitive shocks being transmitted to the flexed wrist tendons. Forehand tennis elbow is also common in golfers, baseball players, and people who have to lug heavy suitcases around. You feel pain when you flex the wrist backward (lateral tendons) or forward (medial tendons).
* Metatarsal stress fracture:
  + The second to fourth toes are vulnerable to breakage if you push off with your toes when sprinting or running long distances. Army cadets doing running and marching drills are likely to suffer stress fractures during training camps. Dancers and gymnasts experience stress fractures because of frequent jumping. The front of the foot starts hurting during exercise, and the pain usually stops when you finish. With each subsequent bout of exercise, the pain appears earlier and earlier, and gets steadily worse. The fracture can take up to 3 months to fully heal.
* RICE principle:
  + Rest
    - stops new injury and bleeding.
  + Ice
    - eases pain and reduces inflammation by constricting the blood vessels.
  + Compression
    - limit the amount of swelling and fluid accumulation around the injured area.
  + Elevation
    - limit the amount of swelling and fluid accumulation around the injured area.
* If there's some other exercise you can perform that doesn't stress your injured part, you can do that to remain fit, but don't try to use the injured part until healing is well along.
  + Then you can start light exercises to get it back in shape. In the long run, you may want to exercise it more to make it stronger, in order to prevent repeat occurrences. A doctor or physiotherapist might recommend specific exercises to strengthen particular muscles and tendons.
* There are two ways you can prevent sports injuries.
  + One is by using the right equipment. This means properly-fitting, sport-specific shoes and may mean orthotics (shoe inserts) to control excessive movement of the foot. Orthotics may reduce the width of your footwear, so you may need new shoes. Helmets, face masks, and protective padding made to regulation and worn as instructed prevent many serious sport injuries.
  + Correct technique is important to prevent injury. For example, tennis players should avoid racquets with excessively narrow shafts and try to perform backhand and forehand shots with their whole arm and shoulder rather than just the wrist. Racquet strings shouldn't be too tight. Wet, heavy balls are more likely to cause problems, as is hitting the ball off-centre.
  + The second way of preventing injury is by warming up and cooling down with adequate stretching. The best medical evidence suggests that warming up definitely makes the muscles stronger and more injury resistant. Stretching improves muscle performance but not injury resistance, so it is most effective after exercise. Don't stretch so far that it becomes painful. Cooling down may help prevent dizziness from blood pooling in dilated (widened) leg veins, but it doesn't help muscle soreness the next day, which is caused by injury to the fibres.

<https://www.health24.com/Medical/Sports-injuries/Overview/causes-of-sports-injuries-20160329>

* Poor flexibility is another factor in unconditioned athletes behind a sports-related injury
* The best way to improve flexibility is through regular stretching exercises, either static or dynamic.
* A thorough warm-up is also essential to prepare the muscles and joints for exercise.
* **Overtraining**
  + Simply put, this is doing too much, too often with insufficient rest between. A lack of adequate recovery time coupled with amplified intensity of training is the most common cause of overtraining.
  + The best way to avoid overtraining is to ensure adequate rest between sessions.
* **Overuse**
  + [Repetitive strain](http://www.health24.com/medical/sports-injuries/Overview) injuries are caused by repeated actions which apply pressure to a certain group of muscles, joint or area of soft tissue.
  + They usually worsen over time and include injuries such as tennis elbow, golfer’s knee, thrower’s shoulder (impingement syndrome), plantar fasciitis and jumper’s knee (patellar tendonitis).
* **Improper warm-up**
  + Failure to perform a proper warm-up can put you at risk for injury as the muscles and joints are not prepared for exercise.  A warm-up is necessary to increase body temperature and circulation of blood to the muscles.
  + A 15-20 minute warm-up should include a combination of stretching and cardiovascular exercises to prepare the body for exercise, increases performance levels and helps to prevent injuries.

<https://www.livestrong.com/article/526375-top-ten-causes-of-sport-injuries/>

* Overuse
  + Overuse or repetitive movements may be the number-one cause of sports injuries. Runners, swimmers and tennis players are particularly susceptible to overuse injuries, including tennis elbow, tendinitis, shin splints and shoulder impingement.
* Stops and Twists
  + Sports that incorporate quick stopping and twisting motions -- including basketball, gymnastics and soccer -- see a high number of knee and ankle injuries. Ankle sprains occur when an athlete rolls his foot and stretches the surrounding ligaments. The stabilizing muscles and cushioning cartilage around your knee, shoulder and other joints are prone to tearing from an uncontrolled twist or a sudden stop.
* New or Increased Activity
  + Starting a new activity or increasing your level of activity too quickly can also result in plantar fasciitis or lower back pain. If you have begun a new exercise or sport, previously unused muscles may be employed or you may increase the work of other muscles. A cramp is a common result of this.
* Fatigue
  + Tired muscles are a common cause of muscle pulls. Resting between activity is essential to preventing muscle pulls.
* Poor Warmup
  + Your elementary school gym teacher probably told you how important it is to stretch before any athletic endeavor, and he was right. Muscle cramping and pulls are often the result of jumping into an activity without properly easing the muscles into it. Warming up delivers blood and oxygen to the various muscles, allowing them to work more efficiently.

<https://www.nhs.uk/conditions/Sports-injuries/>

* Sports injuries can be caused by:
  + an accident – such as a [fall](https://www.nhs.uk/Conditions/Falls/Pages/Introduction.aspx) or heavy blow
  + not warming up properly before exercising
  + using inappropriate equipment or poor technique
  + pushing yourself too hard
* You can reduce your risk of getting injured by:
  + warming up properly before exercise – read more about [how to warm up before exercise](https://www.nhs.uk/Livewell/fitness/Pages/how-to-warm-up.aspx) and [how to cool down after exercise](https://www.nhs.uk/Livewell/fitness/Pages/how-to-stretch.aspx)
  + not pushing your body beyond your current fitness level
  + using the right equipment – for example, wearing running shoes for running, shin guards for football, and a gum shield for rugby
  + receiving coaching to learn correct techniques

<https://www.webmd.com/fitness-exercise/guide/workout-injuries-prevention-and-treatment#1>

* If you're a woman over age 55, check with your [health care](https://www.webmd.com/health-insurance/default.htm) professional before you start an [exercise program](https://www.webmd.com/fitness-exercise/fitness-a-to-z). Then you'll be sure you're healthy enough for working out. The same applies to a man over age 45 or a person with any medical condition.
* Warm-up and cool-down. Every workout should begin with a warm-up and end with a cool-down period. A warm-up helps your body get ready for exercise. It gradually increases your [heart rate](https://www.webmd.com/heart-disease/pulse-measurement) and loosens your muscles and joints. Some ways to warm up:
  + Ride an exercise bike
  + Jump rope
  + Jog in place for 5 to 10 minutes
* A cool-down after you work out is important to slowly bring your heart rate back to normal. Walking for 5 to 10 minutes after you work out is one way to cool down.
* Stretch. Do dynamic [stretching](https://www.webmd.com/fitness-exercise/features/how-to-stretch) before and after you work out. This will help increase flexibility. Research is conflicting as to whether it can also help prevent injury, It's best to stretch after you warm up and cool down.
* Ease into it. When you begin an exercise routine or start a new workout program, start slowly. Then gradually build up the intensity, duration, and frequency.
* Cross-train. Vary your workout. Don't overuse one set of muscles. Repeating the same muscle movements frequently can lead to overuse and repetitive-use injuries such as [shin splints](https://www.webmd.com/fitness-exercise/shin-splints) and tendinitis. Some ways to vary your workout:
* Run on Day One.
* Lift weights on Day Two.
* Swim or cycle on Day Three.
* Rest. Take 1 to 2 days off a week to rest. Rest days give your body a chance to recover between workouts. That can help prevent injuries.
* R: Rest the injury.
* I: Ice the injury to lessen swelling, bleeding, and [inflammation](https://www.webmd.com/arthritis/about-inflammation).
* C: Apply a compression bandage to minimize swelling.
* E: Elevate the injury, if possible, to reduce swelling.

<https://www.prevention.com/health/exercise-injuries-over-40>

* The downside to exercising after 40: You're more apt to walk away with aches, pains, and even serious injuries than you were when you were in your 20s and 30s.
* As you get older, your body just can't bounce back as quickly as it once did, so recovery takes longer.
* The fact is that exercise-related injuries are more common after age 40, so it’s important to moderate your physical activity—and build up to your optimum workout intensity