

Module 3

Mobility

Introduction

Physical fitness is more than just endurance or muscular strength. It is a complex latticework of many interrelated factors, each important in its own way. One of these factors is flexibility – perhaps the most neglected aspect of many fitness programmes. Flexibility training is being increasingly recognised as crucial for complementing muscular strength, building efficiency and coordination and preventing injuries.

Flexibility, mobility and suppleness all mean the range of limb movement around joints. Mobility is the ability to perform a joint action through a range of movement. In any movement there are two groups of muscles at work:

- antagonistic muscles which cause the movement to take place
- antagonistic muscles which oppose the movement and determine the amount of mobility.

Mobility plays an important part in the preparation of athletes by developing a range of movement to allow technical development and assisting in the prevention of injury.

Overview of the mobility module

In this module Brian Mackenzie looks at how you can develop your flexibility and mobility, with articles providing:

- an overview of the types of stretching
- exercise for the upper body
- exercises and drills targeted at conditioning the legs
- examples of dynamic stretching and mobility exercises, which could form part of the warm-up programme in a training session

- examples of static stretching and mobility exercises which could form part of the cool-down programme at the end of a training session.

The articles in this module are applicable to most sports.

What types of stretching are there?

The various techniques of stretching may be grouped as static, ballistic and assisted. In both static and ballistic exercises the athlete is in control of the movements. In assisted, the movement is controlled by an external force which is usually a partner.

Static stretching

Static stretching involves gradually easing into the stretch position and holding the position. The amount of time a static stretch is held may be anything from six seconds to two minutes. Often in static stretching you are advised to move further into the stretch position as the stretch sensation subsides.

Dynamic or ballistic stretching

Ballistic stretching involves some form of rapid movement into the required stretch position. Where the event requires a ballistic movement, then it is appropriate and perhaps necessary to conduct ballistic stretching exercises. Start off with the movement at half speed for a couple of repetitions and then gradually work up to full speed.

Assisted stretching

Assisted stretching involves the assistance of a partner who must fully understand what their role is – otherwise the risk of injury is high. A partner can be employed to assist with partner stretches and proprioceptive neuromuscular facilitation (PNF) techniques.

Partner stretching

Your partner helps you to maintain the stretch position or to ease into the stretch position as the sensation of stretch subsides. You should aim to be fully relaxed and breathe easily throughout the exercise. Partner-assisted stretches are best used as developmental exercises, with each stretch being held for 30 seconds.

PNF technique

1. Move into the stretch position so that you feel the stretch sensation.
2. Your partner holds the limb in this stretched position.
3. You then push against your partner by contracting the antagonistic muscles for six to 10 seconds and then relax. During the contraction your partner aims to resist any movement of the limb.
4. Your partner then moves the limb further into the stretch until you feel the stretch sensation.
5. Go back to step 2. (Repeat this procedure three or four times before the stretch is released.)

Which method is best?

Static methods produce far fewer instances of muscle soreness, injury and damage to connective tissues than ballistic methods. Static methods are simple to carry out and may be conducted virtually anywhere. For maximum gains in flexibility in the shortest possible time, PNF technique is the most appropriate. Dynamic (ballistic), slowed controlled movements through the full range of the motion will reduce muscle stiffness. Where the technique requires ballistic movement, ballistic stretches should be employed.

In what order should you use the mobility methods?

When conducting mobility exercises it is recommended to perform them in the following order: static, assisted and then dynamic.

When should they be performed?

Mobility exercises could be part of:

- the warm-up programme
- a stand-alone unit of work

It is considered beneficial to conduct mobility exercises as part of the warm-down programme but this should not include ballistic exercises as the muscles are fatigued and more prone to injury. Static exercises are recommended as they relax the muscles and increase their range of movement.

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Upper body conditioning

One of the most common sites of injury is the lower back. Injury in this region can be as a result of muscular imbalance, weak or inflexible muscles or poor posture. It makes sense, therefore, to identify a session that will work all these areas and develop the right level of conditioning for injury prevention.

The exercises

Detailed below is a session of eight exercises. The exercises are to be performed *slowly* and *smoothly* and at no time should you be out of breath.

Sit-ups (upper abdominals)

- lie on your back with your legs bent, knees together and feet flat on the floor
- rest your hands on your thighs
- sit up until the palms of your hands touch your knees
- return to the starting position
- perform the movements in a slow, controlled fashion.

Back arches (back)

- lie on your front with your legs crossed at the ankles, keeping your feet firmly anchored to the floor
- keep your hands and arms straight out in front of you
- raise your upper body off the floor, keeping your neck in line with your spine
- hold for one second and then slowly lower to the floor.

Reverse curl (lower abdominals)

- lie on your back with your legs bent, knees together and feet flat on the floor
- curl up your legs and buttocks off the floor
- return to the starting position
- perform the movements in a slow controlled fashion.

Hip and leg raise (gluteals and hamstrings)

- lie on your back with knees bent, feet flat on the floor
- place your hands by your side
- raise hips and straighten one leg, then hold for a second before lowering
- repeat with the other leg.

Transversus abdominis (abdominal)

- place yourself in the kneeling position with your hands on the ground
- hips directly above the knees

- shoulders directly above the hands
- keep the spine in a natural position
- relax the abdominal muscles and let the tummy sag down
- gently pull your tummy button and the area below it towards your spine
- hold for 10 to 15 seconds and then relax.

Short sit-ups (hip flexors and abdominals)

- lie on your back with knees bent, feet flat on the floor
- rest your hands lightly on the side of your head (not the back of your neck)
- raise your body so that your upper body is at a 30 to 40-degree angle with the floor
- hold for one second before coming down slowly.

Back extensions (back)

- sit on the floor with legs bent, feet flat on the floor
- position your hands on the floor behind you to take some of the weight
- raise your body off the floor so that your body is parallel with the floor
- hold for one second and slowly lower.

Twisted curl (oblique abdominals)

- lie on your back with your legs bent, knees together and feet flat on the floor
- place the left ankle on the right knee with the left knee pointing away
- curl the right shoulder up to the left knee
- keep lower back on the ground
- return to the starting position
- perform the movements in a slow controlled fashion
- repeat with the other leg and shoulder.

How many and how often?

Start at one set of 10 repetitions. Each week increase the number of repetitions by two. When you reach 20 repetitions increase the number of sets by one and start again at 10 repetitions. The exercises should be performed two or three times a week and be incorporated into your training schedule.

Before you start

Prior to starting any training programme, it is recommend that you have a medical examination to ensure that it is safe for you to do so.

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Leg conditioning

Introduction

This section of the Mobility module identifies general and specific exercise programmes to develop the legs. To gain any real benefit it requires at least 16 weeks of continuous exercise.

General drills

The following drills should be performed over 20 to 30m. Start with two sets and increment in steps of 10m per two weeks. When you get to 30m add an extra set and start again at 20m. Perform the drill, jog for 20m and walk back – five minutes' recovery per set.

- walk on toes
- walk on heels
- bum kicks with high knee
- skip with high knees
- jog with high knees
- skips for height
- side strides.

Specific drills

The following plyometric drills should be performed six to 10 times. Start with two sets and increment in steps of two repetitions per week. When you get to 10 repetitions add an extra set and start again at six repetitions. Perform the drill, jog for 20m and walk back – five minutes' recovery per set.

- bounds
- bunny hops for distance
- bunny hops with high knee for height
- single leg hop with high knee.

Specific exercises

The following exercises should be performed for 30 to 60 seconds. Start with two sets and increment in 10-second steps. When you get to 60 seconds, add an extra set and start again at 30 seconds – 30 seconds' recovery between each exercise and five minutes per set:

- single leg squat
- legs forward astride squat
- single leg squat hops
- legs forward astride jump squat - swapping leg positions
- skipping or bounce on toes
- running step-ups onto a bench
- astride jumps onto a bench
- sideways hopping over six-inch hurdle.

Multi-gym exercise

The following exercises should be performed using weights of 60% of your maximum for the exercise – alternate with an upper body exercise. Start at two sets of 10 repetitions, increment by two repetitions each week. When you get to 16 repetitions, add an extra set and start again at 10 repetitions – 30 seconds' recovery per rep and five minutes' recovery per set:

- standing heel raise
- sitting hamstring curls
- sitting leg press
- lying reverse hamstring curls
- half squats
- step-ups.

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Dynamic stretching exercises

Overview

The following are examples of dynamic stretching and mobility exercises, which could form part of the warm-up programme in a training session. The dynamic exercises you incorporate into your warm-up programme should be appropriate to the movements you would experience in your sport/event. In all the exercises breathe easily while performing them.

Current research work detailed in *Medicine & Science in Sport and Exercise* 33(3), pp354–358, and *Journal of Strength and Conditioning Research*, vol 15 (1), pp98–101, suggests that the use of dynamic stretches – slow controlled movements through the full range of motion – are the most appropriate exercises for the warm-up. By contrast, static stretches are more appropriate for the cool-down.

The exercises

Joint rotations

From a standing position with your arms hanging loosely at your sides, flex, extend, and rotate each of the following joints:

- fingers
- wrist
- elbows
- shoulders
- neck
- trunk and shoulder blades
- hips
- knees

- ankles
- feet and toes.

Neck mobility

- flexion/extension: tuck your chin into your chest, and then lift your chin upward as far as possible – six to 10 repetitions
- lateral flexion: lower your left ear towards your left shoulder and then your right ear to your right shoulder – six to 10 repetitions
- rotation: turn your chin laterally towards your left shoulder and then rotate it towards your right shoulder – six to 10 repetitions.

Shoulder circles

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- raise your right shoulder towards your right ear, take it backwards, down and then up again to the ear in a smooth action
- repeat with the other shoulder.

Arm swings

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- keep the back straight at all times
- overhead/down and back: swing both arms continuously to an overhead position and then forward, down, and backwards – six to 10 repetitions
- side/front crossover: swing both arms out to your sides and then cross them in front of your chest – six to 10 repetitions.

Side bends

- stand tall with good posture, feet slightly wider than shoulder-width apart, knees slightly bent, hands resting on hips
- lift your trunk up and away from your hips and bend smoothly first to one side, then the other, avoiding the tendency to lean either forwards or backwards
- repeat the whole sequence 16 times with a slow rhythm, breathing out as you bend to the side, and in as you return to the centre.

Hip circles and twists

- circles – with your hands on your hips and feet spread wider than your shoulders, make circles with your hips in a clockwise direction for 10 to 12 repetitions; then repeat in a counter-clockwise direction
- twists – extend your arms out to your sides and twist your torso and hips to the left, shifting your weight on to the left foot; then twist your torso to the right while shifting your weight to the right foot – 10 to 12 repetitions on each side.

Half-squat

- stand tall with good posture, holding your hands out in front of you for balance
- now bend at the knees until your thighs are parallel with the floor
- keep your back long throughout the movement, and look straight ahead
- make sure that your knees always point in the same direction as your toes
- once at your lowest point, fully straighten your legs to return to your starting position
- repeat the exercise 16 times with a smooth, controlled rhythm
- breathe in as you descend, and out as you rise.

Leg swings

- **flexion/extension** – stand sideways-on to the wall
- weight on your left leg and your right hand on the wall for balance
- swing your right leg forward and backward
- 10 to 12 repetitions on each leg
- **Cross-body flexion/abduction** – leaning slightly forward with both hands on a wall and your weight on your left leg, swing your right leg to the left in front of your body, pointing your toes upwards as your foot reaches its furthest point of motion
- then swing the right leg back to the right as far as is comfortable, again pointing your toes up as your foot reaches its final point of movement
- 10 to 12 repetitions on each leg.

Lunges

- stand tall with both feet together (starting position)
- keeping the back straight, lunge forward with the right leg approximately 100 to 150cm
- the right thigh should be parallel with the ground and the right lower leg vertical
- spring back to the starting position
- repeat with the left leg
- 12 to 16 repetitions on each leg.

Ankle bounce

- **double leg bounce** – leaning forward with your hands on the wall and your weight on your toes, raise and lower both heels rapidly (bounce)
- each time, lift your heels one to two inches from the ground while maintaining ground contact with the ball of your feet
- 12 to 16 repetitions
- **single leg bounce** – leaning forward with your hands on a wall and all your weight on your left foot, raise the right knee forward while pushing the left heel towards the ground

- then lower the right foot to the floor while raising the left heel one or two inches
- repeat in a rapid, bouncy fashion
- 12 to 16 repetitions on each leg.

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Static stretching exercises

Overview

The following are examples of general static stretching and mobility exercises that could form part of the cool-down programme at the end of a training session. The aim is to relax the muscles and facilitate an improvement in maximum range of motion. In all exercises, breathe easily while performing them and hold the static stretches for 20 seconds.

The exercises

Chest stretch

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- hold your arms out to the side, parallel with the ground, and with the palms of the hand facing forward
- stretch the arms back as far as possible
- you should feel the stretch across your chest.

Biceps stretch

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- hold your arms out to the side, parallel with the ground, and with the palms of the hands facing forward
- rotate the hands so the palms face to the rear
- stretch the arms back as far as possible
- you should feel the stretch across your chest and in the biceps.

Upper back stretch

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- interlock your fingers and push your hands as far away from your chest as possible, allowing your upper back to relax
- you should feel the stretch between your shoulder blades.

Shoulder stretch

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- place your right arm across the front of your chest, parallel with the ground
- bend the left arm up and use the left forearm to ease the right arm closer to your chest
- you will feel the stretch in the shoulder
- repeat with the other arm.

Shoulder and triceps stretch

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- place both hands above your head and then slide both of your hands down the middle of your spine
- you will feel the stretch in the shoulders and the triceps.

Side bends

- stand tall, feet slightly wider than shoulder-width apart, knees slightly bent, hands resting on the hips
- bend slowly to one side, come back to the vertical position and then bend to the other side
- do not lean forwards or backwards.

Abdominal and lower back muscles

- lie face down on the ground in a prone position
- lift your body off the ground so that you are supported only by your forearms and toes; the elbows should be on the ground and almost directly below your shoulders; your forearms and hands should be resting on the ground, pointed straight ahead; toes and feet should be shoulder-width apart and your head in line with your spine
- contract your gluteus (bum) muscles gently – hold for 10 seconds
- lift your right arm off the ground, straighten it and point it straight ahead, holding it in the air for 10 seconds
- return to the starting position
- repeat with the left arm
- return to starting position
- lift your right leg off the ground and hold it there for 10 seconds (keep back straight)
- return to starting position
- repeat with left leg
- return to starting position
- lift your right arm and left leg simultaneously and hold them in position for 10 seconds
- return to starting position

- lift your left arm and right leg simultaneously and hold them in position for 10 seconds
- return to the starting position.

Hamstring stretch

- sit on the ground with both legs straight out in front of you
- bend the left leg and place the sole of the left foot alongside the knee of the right leg
- allow the left leg to lie relaxed on the ground
- bend forward, keeping the back straight
- you will feel the stretch in the hamstring of the right leg
- repeat with the other leg.

Calf stretch

- stand tall with one leg in front of the other, hands flat and at shoulder height against a wall
- ease your back leg further away from the wall, keeping it straight and press the heel firmly into the floor
- keep your hips facing the wall and the rear leg and spine in a straight line
- you will feel the stretch in the calf of the rear leg
- repeat with the other leg.

Hip and thigh stretch

- stand tall with your feet approximately two shoulder-widths apart
- turn the feet and face to the right
- bend the right leg so that the right thigh is parallel with the ground and the right lower leg is vertical
- gradually lower the body
- keep your back straight and use the arms to balance
- you will feel the stretch along the front of the left thigh and along the hamstrings of the right leg
- repeat by turning and facing to the left.

Adductor stretch

- stand tall with your feet approximately two shoulder-widths apart
- bend the right leg and lower the body
- keep your back straight and use the arms to balance
- you will feel the stretch in the left leg adductor
- repeat with the left leg.

Groin stretch

- sit with tall posture
- ease both of your feet up towards your body and place the soles of your feet together, allowing your knees to come up and out to the side
- resting your hands on your lower legs or ankles, ease both knees towards the ground
- you will feel the stretch along the inside of your thighs and groin.

Front of trunk stretch

- lie face down on the floor, fully outstretched
- bring your hands to the sides of your shoulders and ease your chest off the floor, keeping your hips firmly pressed into the ground
- you will feel the stretch in the front of the trunk.

Iliotibial band stretch

- sit tall with legs stretched out in front of you
- bend the right knee and place the right foot on the ground to the left side of the left knee
- turn your shoulders so that you are facing to the right
- using your left arm against your right knee to help ease you further round
- use your right arm on the floor for support
- you will feel the stretch along the length of the spine and in the muscles around the right hip.

Quadriceps stretch

- lie face down on the floor, resting your forehead on your right hand
- press your hips firmly into the floor and bring your left foot up towards your buttocks
- take hold of the left foot with the left hand and ease the foot closer to your buttocks
- repeat with the right leg
- you will feel the stretch along the front of the thigh.

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