



Injury Prevention for Hillwalkers and Climbers

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Key Concepts on the Joint and Reasons for Common Injuries

Ankle Pain

Instability in the ankles due to injury old or new can increase the likelihood of re-injury. When a joint is injured the efficiency of the nerves signals from the joint to the brain are reduced. These nerves tell the brain where the joint is at any one time and the brain will then tell the muscles how to position the joint or when and how much to contract to hold you upright e.g. adapting the foot to walking over a twig or stone on the ground. The efficiency of this very high speed signal decreases with injury which means you are more likely to re-injury that joint again in the future.

To re-train this we do balance work standing on one leg. When you can do step one without losing balance and with your ankle staying steady then progress to the next level. This may take a few days/weeks.

Level 1: Stand on one foot with arms out and eyes open for 1 minute

Level 2: Stand on one foot with arms across your chest and eyes open for 1 minute

Level 3: Stand on one foot with arms out and eyes closed for 1 minute

Level 4: Stand on one foot with arms out and eyes closed for 1 minute

Repeat the above but standing on an unstable surface like a cushion or wobble board.

Knee Pain

Most knee pain is caused by an imbalance in the muscles around the knee and as we age, wear and tear within the knee joint. Proper alignment of the bones at the knee is essential to avoid knee pain. One of these bones links the knee to the hip (femur) and the other (tibia) links the knee to the ankle. Also we have to consider the kneecap (patella) in knee pain. It moves up and down in a groove on the thigh bone as we bend and straighten the knee. If it gets pulled off course it will rub off the sides of the groove causing pain. So any problems with the hip or ankle, or imbalances of muscles around the can affect the knee joint.

Helping knee pain from the ankle:

- Some people will find it necessary to wear arch supports, or orthotics in their shoes as excessive motion at the ankle when walking or running can lead to knee pain. This can be as simple as 'Super Feet' from outdoor shops, Dr.Scholl insoles for knee and back pain, or specialised orthotics which would be prescribed by a therapist.

Balancing the muscles around the knee

- Walking downhill tightens up the muscles on the front of the thigh (the quadriceps). If tight they pull on the kneecap causing it to rub in its groove leading to pain over the knee and just below the knee cap. Stretching the quadriceps can help this.

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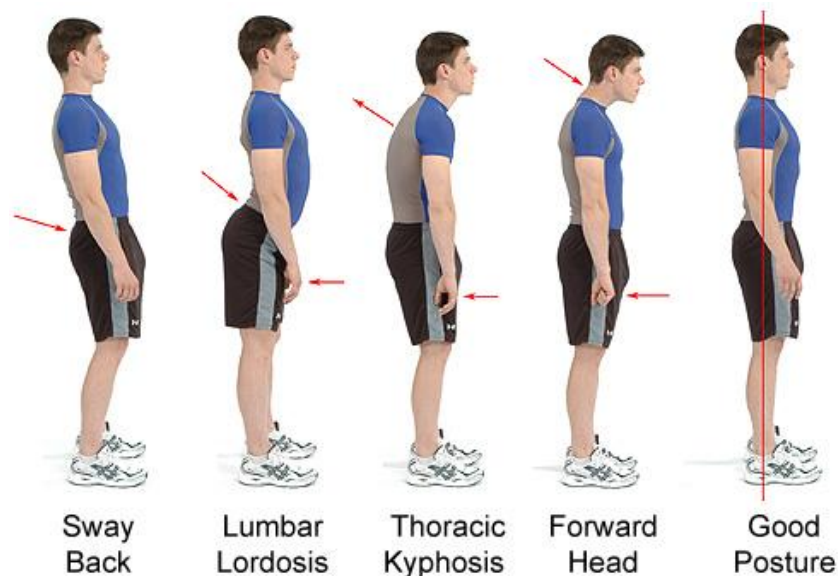
- There is a tendency for the outside of the thigh to tighten more than the muscle on the inside of the thigh. This can lead to them pulling the knee cap slightly more to the outside of its groove causing pain as you walk. To rebalance the knee cap we need to strengthen muscles on the inside of the knee.
- Finally the cause of 80% of knee pain has been found to be weak gluteals. Your gluteals control how much your knee dips inwards when walking. If they are weak, your knee will dip in more meaning the bones and kneecap are not aligned which causes pain. As women we are more likely do have knee pain due to the wider angle between our hips and knees which affects how they line up.

Back Pain

Back pain has numerous causes – pulled muscles, pelvic imbalances, disc pain, degeneration, joint pain, posture, ligaments. Generally after some treatment a course of strengthening exercises is prescribed to rebuild strengthen around the back and the core. The ‘core’ is the term used to talk about a corset of muscles around the spine which support it. Many studies have found that the core is weak in people with back pain. If it is weak it causes additional load to be taken by the spine and non core muscles leading to pain and dysfunction.

If you have back pain please consult a medical professional before undertaking these exercises.

Correct posture: how we sit and work may have a great bearing on our back pain. To prevent back pain in our sports and activities we need to address this. Incorrect posture causes some muscles to tighten up, others to weaken and excessive pressure to be put through the spine. Sometimes then a sporting or leisure activity can be the straw that breaks the camels back.



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Shoulder Pain

When we think of the shoulder we think of only where the arm bone meets the shoulder, what we forget is that the shoulder blade plays an important part in forming the shoulder joint and also ensuring the correct arm movement at the shoulder. Much of our shoulder problems are due to bad posture in particular tight pectorals in our chest and tight neck muscles at the sides of our neck, and weak muscles between our shoulder blades.



Stretching and Strengthening Exercises for Injury Prevention

Knee Exercises

Stretching

Stretch for Quadriceps

1. Stand on a stable surface near a wall or stable structure which you can hold on to for support if necessary
2. Bend the knee of the thigh to be stretched and grasp the foot with the hand
3. Bring the foot towards the buttocks until a mild stretch is felt in the front of the thigh. Hold the stretch for 30 seconds and repeat 3 times.

Note: aim to get the knee pointing to the ground; if your quads are tight you may not be able to achieve this at first.



Hamstring Stretch – Lying Down

For those with reduced flexibility in their back the stretch with the towel might be more suitable.

1. Lie on a firm surface face up
2. Bend the knee up and place a towel around the arch of the foot. Grasp the towel by the two ends
3. Using the towel draw the straightened leg towards the head until a mild stretch is felt in the back of the thigh. Hold the stretch for 30 seconds and repeat 3 times.

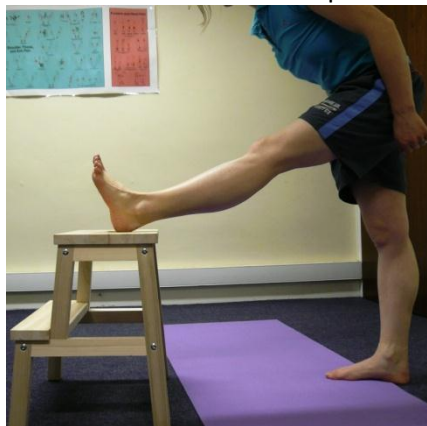


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Gluteus Maximus and Hamstring Stretch

1. Place the heel up on to a small step in front of the body
2. Keeping the leg as straight as is comfortable lean the body forward
3. A mild stretch should be felt in the back of the thigh (you may also feel a stretch into your calf)
4. Turn your foot to the left and right to target the different fibres of the hamstrings which you might feel as a stretch more to the inside or outside of the thigh depending on the position of your foot. Hold the stretch for 30 seconds and repeat 3 times.



Strengthening for the Knee

Squat

This can help strengthen the inside of the knee as well as the hamstrings and gluteals. Start with the wall squat and then progress to the two legged squat without the wall, before finally progressing to the single leg squat

Wall Squat

1. Stand up with your back against a wall or closed door
2. Put your feet out 1.5/2 feet (30-45cm) out away from the door
3. Keeping your back against the door slide down the door while bending your knees. Don't let your hips go below 90 degrees.
4. From this position slide back up to the starting position.
5. You should feel this in the front of your thighs. Build up to 3 sets of 10 repetitions

Notes on your form:

- Don't allow your knees to go past your toes, bring your feet further out from the wall/door to prevent this
- Try to keep the knee pointing forward, it should not dip excessively inwards over the arch of your foot when doing this exercise

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Two legged Squat

1. Stand with your feet hip distance apart
2. Squat down as if you were lowering into a chair.
3. Keep an eye on your knee. It should not dip inwards or outwards. You need to keep it straight- requires concentration
4. Do not allow the knee dip over the toes, to prevent this sit back more as if you were sitting into a chair.
5. You can hold on to a wall to help you get your balance and allow you concentrate on form instead. Build up to 3 sets of 10 repetitions

When you can to this advance to the one-legged squat



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Gluteal Exercises

Three exercises will be shown for the gluteals, the bridge, bridge with leg lift, and the side lying leg raise. The gluteus medius controls how much movement you have in the leg when running and cycling. When weak it can lead to a lot of inward hip movement which affects the alignment at the knee. Weakness in the gluteus medius has been found to be a cause of up to 80% of knee problems. These exercises are also important in the management of back pain.

Static Bridge

1. Lie on your back with knees bent and feet flat on floor. Ensure head is in line with the spine
2. Raise your back off the floor supporting your weight through your feet and shoulders. Do not lean on the arms
3. Check that your hips are level and the right one is not tilted towards the ground – place your hands on your hip bone to check. If they are not level contract your gluteals to level your hips.
4. Hold for 15 seconds then relax. Repeat 6 times – giving a total of 1.5 mins. Gradually hold each contraction for longer until you can keep your pelvis level for 1.5 mins



Bridge with Leg Lift – requires concentration

Do this when you can do the static bridge for 1 minute while keeping the hips level.

1. Adopt the bridge position.
2. Watch the pelvis and try to keep the pelvis level i.e. don't let it sag on one side. Contracting your gluteals will prevent this from happening. Lift one leg off the floor keeping the pelvis level
3. Return the foot to the floor. This is one repetition. Build up to 3 sets of 10 repetitions on each side



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Sidelying leg raises for Gluteus Medius

1. Lie on your side with the side to be strengthened on top
2. Bend the lower leg slightly at the hip and knee for stability
3. Bring the leg **backwards**
4. Slowly raise the upper leg until 3-4 inches over the hip
5. From this position slowly lower and raise the leg (1 repetition)

Build up to 3 sets of 10 repetitions.

Note: place your hand on the gluts above where your back pocket would be. You should feel the contraction here as you raise your leg upwards. If you don't move the leg **backwards** until you feel the contraction in this area. **Keeping the leg behind you** is an important part of this exercise. Add ankle weights to make this exercise harder if necessary.



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Back Exercises

Stretching

Stretch for hip flexors

The stretch should be felt at the front of the hip and down into the top the thigh.

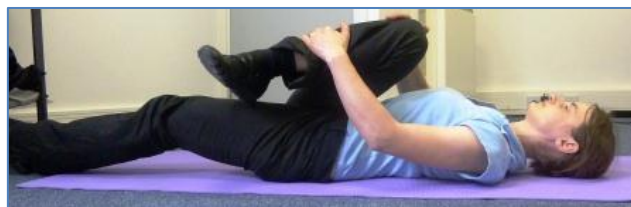
1. Kneel on the knee of the side to be stretched. Put the other foot out in front of you
2. Lean the hips forward and bring the shoulders backwards
3. A stretch should be felt at the top of the thigh. Raise your arms over the head to get a better stretch if necessary. Rest your knee on a cushion should kneeling on one knee causes discomfort.
4. Hold the stretch for 30 seconds and repeat 3 times.



Gluteal Stretch – lying down version

See diagram for an indication where you may feel this stretch.

1. Lie on your back
2. Bend the right leg and draw the right knee on the side to be stretch towards the LEFT (i.e. opposite) shoulder
3. Additional stretch can be added by holding the right ankle and pulling it gently towards the head. Hold for 30 seconds and repeat 3 times on each side



These muscles can also be stretched in a seated position but the lying down version is more useful for those who are flexible as not everyone can get into the seated position. Avoid the seated version if you have reduced mobility in your back or hip.

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Gluteal Stretch - sitting version

1. Sit up straight on a chair with feet flat on the floor
2. Place the ankle of the side to be stretched on the opposite knee. A stretch may be felt in the gluteal region on doing this.
3. Lean the upper body forward to increase the stretch if needed.
4. Hold the stretch for 30 seconds, then return to normal seated position. Repeat 3 times on each side



Knee to Chest – stretches out the lower back

1. Lie on your back on a firm surface
2. Hug one knee to your chest and hold it for 30 seconds
3. Repeat on the opposite side and do it three times on each side



Strengthening

Also incorporate the gluteal strengthening exercises in the knee section to help prevent against back pain.

Drawing in Manoeuvre (DIM) or also called engaging the core

Put the drawing in manoeuvre (DIM) in place before moving positions e.g. standing up, and when walking around to help support the lower back. Do this as much as you can to strengthen the core.

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1. Take a breath in
2. Contract your pelvic floor
3. On exhaling, draw your navel backwards towards the spine and up towards the ribs
4. Continue to breath normally while holding this contraction

Note: while performing the contraction make sure arms, neck and legs are fully relaxed

To advance the DIM, do the **clock exercise** as a method to gain control of your core strength – try draw your navel up towards your rib cage (12 o'clock), then down towards the ground (6 o'clock), back to the middle and then to the left and right. (3 & 9 o'clock)

The Plank

1. Lie face down on mat resting on the forearms, palms flat on the floor
2. Push off the floor, raising up onto toes and resting on the elbows, with elbows directly under the shoulder. (see 2nd picture below)
3. Keep your back flat, in a straight line from head to heels. Make sure your pelvis does not sag.
4. Continue to breath normally
5. Hold this position for the required length of time then relax back onto the floor. Build up to holding this for 60 seconds

Note: this exercise can be done from the knees (as per diagram on the left) to make it easier.



Hip flexor Strengthening

1. Lie on your back with hips and knees bent and raised into the air as per the diagram. Draw in your core. (i.e DIM)
2. Slowly lower one leg 6 inches from the floor. Hold this for 2 second then return to the starting position
3. Build up to 10 repetitions on each side



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Side lying Superman (side lying plank)

1. Lie on your side, with a neutral spine and the head in a straight line with the spine
2. Place your elbow directly underneath the shoulder. Place your top leg on top of your bottom leg
3. Lift the pelvis off the floor and do not allow to sag. Support your weight through your shoulder and foot (as per picture on the right)
4. Hold for 10 seconds, relax, and repeat until 1.5 minutes are up. As you progress try to hold each contraction for 15 seconds before relaxing until you can do one 1.5min contractions. To advance the exercise add arm and leg movements or perform using a swiss ball.

Note: Try to maintain a straight back and avoid twisting the trunk. This exercise can also be done from the knees which is easier (picture on the left)





Shoulder Exercises

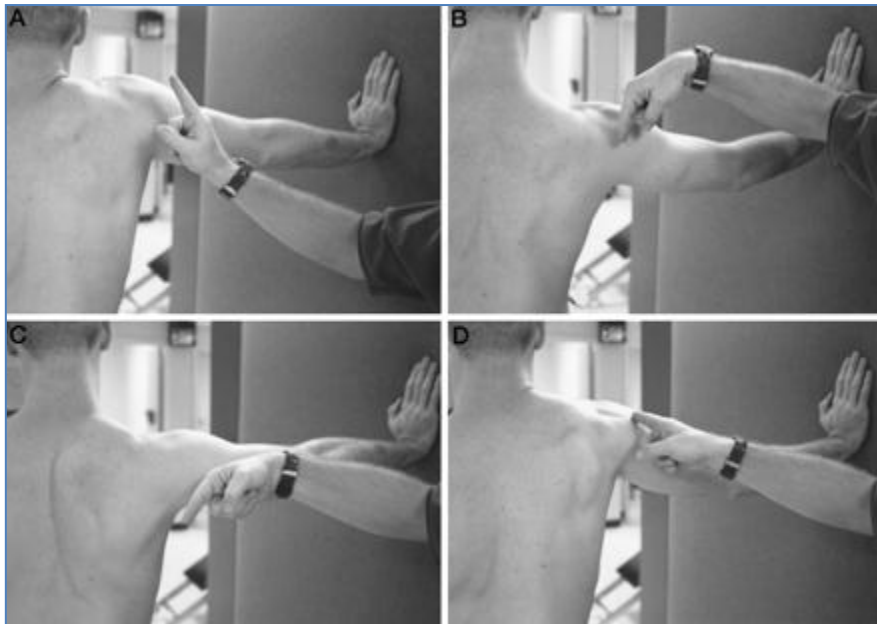
The Scapular Clock Exercise.

This exercise is recommended as your control of the shoulder blade movement could be improved. If your shoulder blade does not move properly it will impact the shoulder joint alignment. Start this exercise going to 12, 6, 9 and 3 o'clock. When you can do this easily add in the remaining clock numbers.

The movement should be smooth and done in one action. Do a number of repetitions daily.

Exercise

1. Move the shoulder to the 12 on the clock. Return to starting position
2. Move the shoulder to the six on the clock. Return to starting position
3. Move the shoulder to three on the clock. Return to starting position
4. Move the shoulder to nine on the clock. Return to starting position

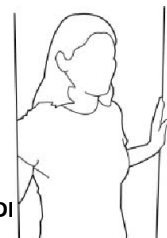


Stretching

Pec Stretch

Can be done off a wall or in a door frame. Hold each stretch for 30 seconds and repeat 3 times daily.

1. Stand between a door frame
2. Place both hands at on the doorframe. Adjust the height of the hands until you feel a stretch
3. Take a small step forward until you feel a mild stretch across your chest and arms. Hold the stretch for 30 seconds. Repeat 3 times.

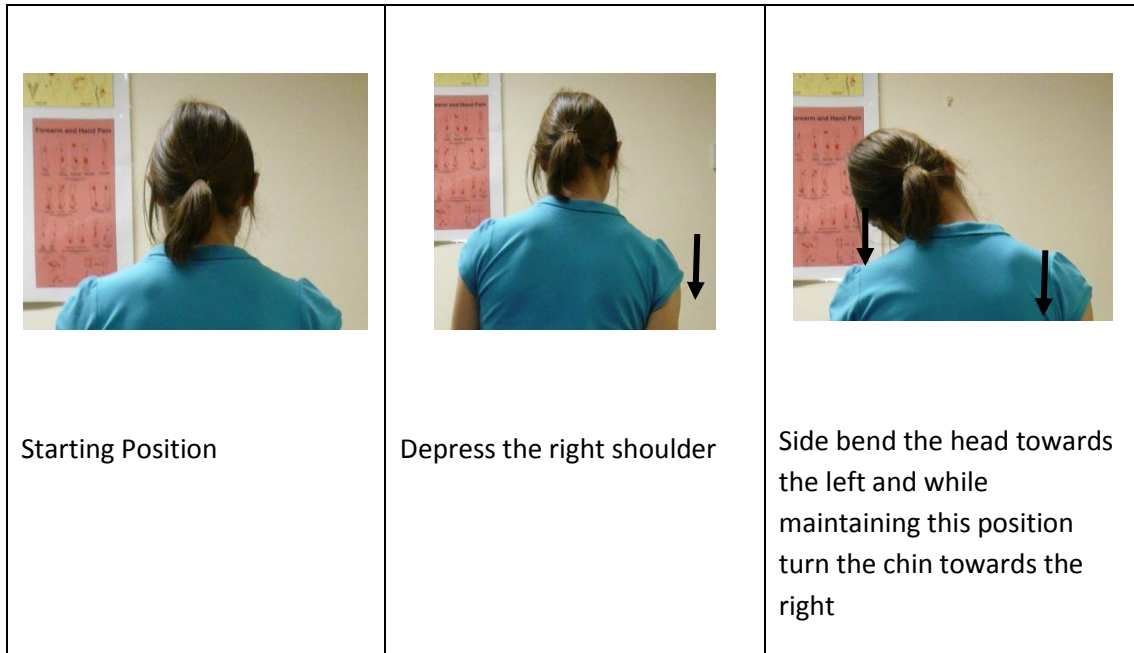


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Stretch for the right Trapezius (muscle at the side of the neck)

- Drop/depress the right shoulder towards the floor.
- Bring the chin to the chest. Bring your the ear towards the left shoulder, and turn the chin slightly towards the right.
- Hold the stretch for 10 seconds and repeat 3 times on each side.



Stretch for the Back of the shoulder

1. Lie on your side with the side to be stretched on the ground
2. Bring your elbow up in line with your shoulder with your hand pointing towards the air
3. Using your upper hand apply some over pressure to your arm on the ground pushing it gently forward towards the floor. Keep the elbow in line with the shoulder.
4. Hold this pressure for 30 seconds and repeat 3 times on each side. Do not do this stretch if it causes pain.



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Strengthening

The following exercises are prescribed to strengthen the musculature around the middle and lower shoulder blade to stop it winging out. Because these 3 exercises strengthen some shared areas they can be worked into a circuit of doing 10 repetitions of each to maintain shoulder blade strength and positioning.

Strengthening the Lower Trapezius

1. Lie face down with a pillow under your forehead to prevent your nose touching the ground. Bring the arms out so they 30° away from the head.
2. Raise the arms so they are level with the body. Feel the shoulder blade come closer together.
3. Slowly return to the starting position. This is one repetition, build up to 3 sets of 12 repetitions

Weights can be added to make the exercise more difficult. Try to keep your shoulders down as there can be a tendency to bring them up around the ears



Back Extensions

1. Lie with arms by your side face down
2. Squeezing your shoulder blades together lift your chest off the floor. Hold for 2 seconds and return to the starting position
3. Build up to three sets of 12 repetitions



Rhomboid and Middle Trapezius Strengthening – The ‘fly’

This is the exercise that can be done in a number of positions e.g. lying face down, standing with a weight in your hand and doing a movement like starting a petrol lawn mower, and standing holding each end of a short theraband between two hands. Choose the position that causes you the least neck pain.

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The aim is to squeeze the shoulder blades together and you need to concentrate on this movement when doing the exercise. The more we can link the shoulder girdle into movements when climbing the less strain the rotator cuff muscles will have to withstand while climbing.

The lying down version

1. Lie face down with your forehead resting on a rolled up towel so your nose does not touch the floor
2. Bring your arms out to your side - they can be bent at the elbow or level with your shoulders and straight (harder)
3. Squeeze your shoulder blades together while raising your arms upwards until level with the body. Return to starting position. This is one repetition, build up to 3 sets of 12 repetitions

