The NORDIC PAIR Leaflet

A new hip or knee:
How to become physically active

PAIR Physical Activity after hip or knee Replacement

NTNU | Norwegian University of Science and Technology

university of groningen

University Medical Center Groningen

This leaflet was created for people with hip- or knee replacement surgery and consists of recommendations for how to stay active after the post-surgery rehabilitation. The information is based on best available knowledge in line with WHO recommendations for physical activity, impact of body weight, tailored exercise programs, and what sports/activities are recommended for people with a new hip or knee. Physiotherapists and other health care professionals working with these patient groups may use this leaflet in the transition from rehabilitation to everyday life.

The leaflet is a part of the PAIR European project (PAIR research group, Erasmus project nr. 613008-EPP-1-2019-1-IT-SPO-SCP), and was made in collaboration between the Norwegian University of Science and Technology (NTNU) and University Medical Center Groningen (UMCG) by:

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Part of this leaflet is based on the book "Hoe wordt u weer lichamelijk en sportief actief" (A new hip or knee: How to get physically active again) [1]

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The importance of a physically active lifestyle

As a result of your hip or knee replacement, you can and should become physically active again. Being physically active is one of the most important things you can do for your health and fitness. Regular physical activity has been shown to reduce the risk of chronic conditions (including cardiovascular disease, high blood pressure, colon cancer, overweight/obesity, adult-onset diabetes (diabetes mellitus type II), osteoporosis and depression).

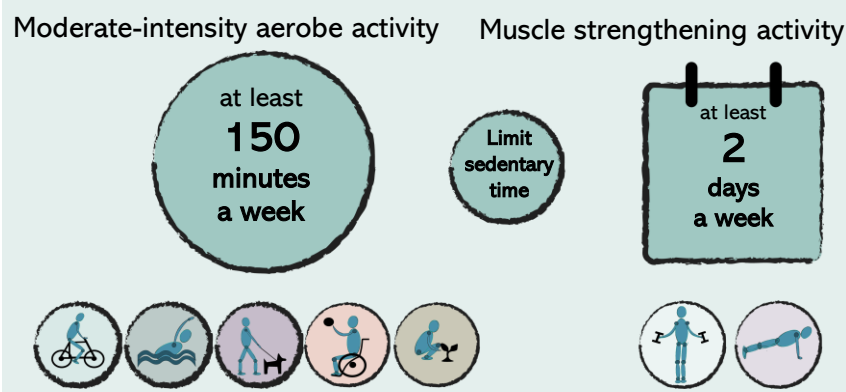
Fitness is the extent to which you can perform activities of daily living. Aging is associated with a decline in physical fitness. However, by exercising enough you can slow down this decline. There are additional benefits specifically for people with a hip or knee replacement. Physical activity has a positive effect on the ingrowth of the prosthesis and has a positive effect on balance and muscle strength. A fall can lead to fractures and loosening of the prosthesis, with all the associated consequences. Better balance and more muscle strength can reduce the risk of falling. Another advantage is that physical activity improves bone density (quality of the bone) and possibly ensures that the prosthesis stays in the bone better. Muscle strength and adequate movement control will improve loading of the joints and fall prevention.

- Regular physical activity has been shown to reduce the risk of chronic conditions
- Physical activity has a positive effect on the ingrowth of the prosthesis
- Physical activity reduces the risk of falling
- Fitness is the extent to which you can perform activities of daily living
- Aging is associated with a decline in physical fitness, and exercise can slow down this decline
- Overweight has a negative effect on health, and causes more wear of the prosthesis

How active can I be?
National health institutes recommend at least 150 minutes per week of moderate-intensity physical activity, such as walking and cycling, spread over several days. Longer, more frequent and/or more intensive exercise provides additional benefits in terms of fitness and health.

In addition to 150 minutes per week of moderate-intensity physical activity, muscle strengthening activities at least twice a week are recommended (such as climbing stairs, standing up from a sitting position and strength training). For the older adults, balance training is recommended in addition. To improve strength, flexibility, and coordination, it is good to perform endurance sports activities in which these qualities can be trained (such as cycling, swimming, hiking and Nordic walking). Consult with your physiotherapist what kind of activity you should perform, and how much you should do. Finally, avoid sitting still. Try to alternate sitting still for long periods of time with physical activity. The guidelines describe the minimum level of activity, more is better.

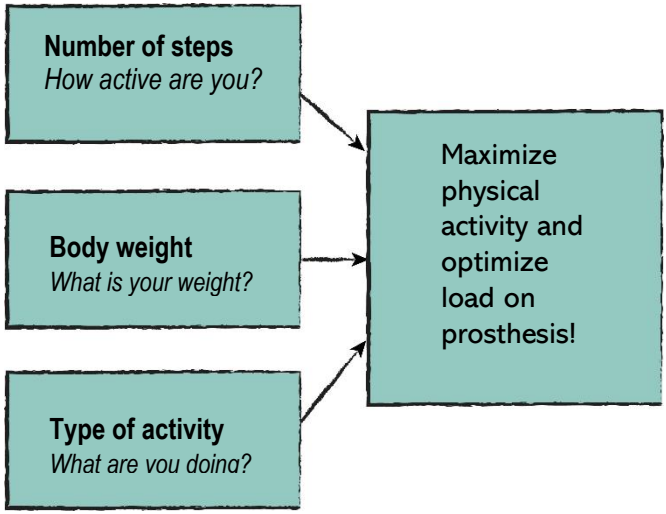
How much activity do I need?



- Engage in moderate-intensity physical activity for at least 150 minutes a week. Longer, more frequent and/or more intensive exercise gives extra health benefits
- Perform muscle strengthening activities at least twice a week combined with balance exercises
- Ideally, choose a type of endurance training that also challenges flexibility, balance and coordination

What kind of leisure time and sports activities can I do?

Being physically and sports active also has many advantages for someone with a hip or knee prosthesis. The prosthesis is constructed to withstand normal physical activity. You may therefore without risk participate in sports provided that you have sufficient movement control and balance to do so safely. This leaflet instructs you in exercises with emphasis on movement control and balance in order to keep the load on the joint to a minimum while being active.



To ensure that your hip or knee prosthesis continues to function as long and as well as possible, it is important to always ask the following questions when choosing physical and sporting activities: How taxing is the activity? The following general advice can be given with regard to physical and sporting activity with a hip or knee prosthesis: After approximately 3 to 6 months, a hip or knee prosthesis allows normal loading and physical activity. Get active but guard your own limits and don't overload yourself and your artificial joint. Choose an activity that places little peak load on the joint and with which you already have some experience. Activities where there is a risk of falling (e.g. contact and game sports), high impact (jumping), twisting or high force from the side should be avoided. Finally, ensure variety of activities. See the last pages in this leaflet for an overview of recommended sports activities.

- Being physically and sports active has many advantages for someone with a hip or knee prosthesis
- Choose a variety of activities that you master and where you have good movement control
- Avoid activities with high peak load on the prosthesis such as jumping and excessive running on hard surfaces
- Use good shoes for stability and cushioning soles

How can I adopt a physically active lifestyle?

It is not always easy to integrate physical and sports activities into everyday life. Therefore, find an activity that you find enjoyable and that you have experience with. In the long run, 'quiet endurance sport' is the most suitable sport, that is, sports activities that you can sustain for a long time with little strength and speed (for example: walking, hiking, Nordic walking, cycling, swimming, and rowing) can be practiced into old age. Learn to deal with limitations. Limitations can be the result of aging and diseases/disorders. Sporting activities are

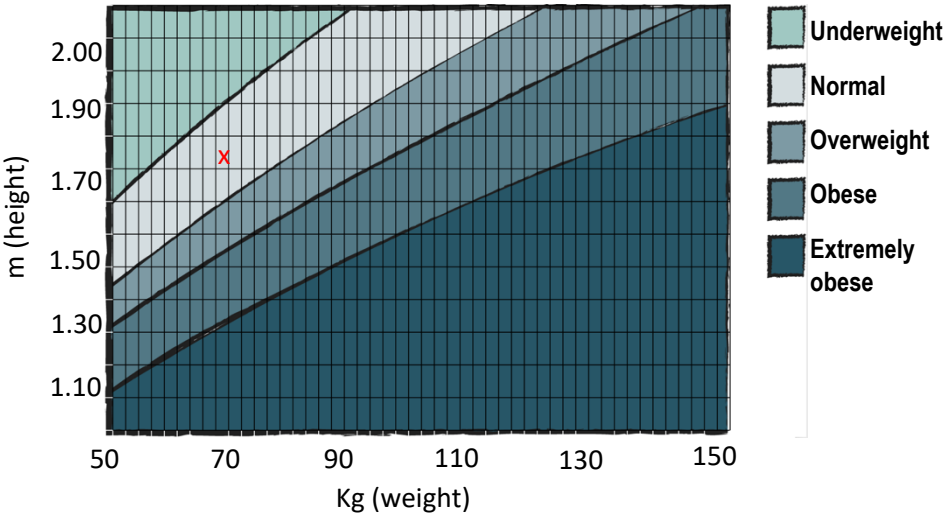
an excellent mean of coping with limitations. Finally, sporting activities that you undertake together with others are generally maintained longer and experienced as more enjoyable than activities that you do alone.

- Choose an activity that you find enjoyable and that you feel you have mastered to some degree
- In the long run, “quiet endurance sport” is the most suitable sport
- Sporting activities that you undertake together with others are generally maintained longer and experienced as more enjoyable

The importance of a healthy weight

It is important to keep a healthy weight, as it has many health benefits. A consequence of being overweight is that a new joint is unnecessarily heavily loaded, which will cause more wear on your prosthesis. A good lifestyle with a healthy diet and regular physical activity is important to promote health and prevent overweight. Overweight occurs when energy intake (through food) is higher than energy expenditure (through physical activity). For more information, visit your national health service provider. When are you at a healthy weight?

- When overweight, a new joint is unnecessarily heavily loaded, which will cause more wear and tear of the prosthesis
- When overweight, it is important to reduce body weight, and in any case prevent the weight from increasing further



The Body Mass Index (BMI) shows the ratio between your weight and height calculated as your weight in Kg divided by your height in meters squared (example: 90 / (1,9 x 1,9) = 90 / 3,61 = 24,9 Kg/m^2). A healthy weight is when your BMI is between 18.5 and 25 Kg/m^2, overweight if the BMI is between 25 and 30 Kg/m^2. As soon as the BMI rises above 30 Kg/m^2, we speak of obesity (seriously overweight) and from 40 Kg/m^2 onwards it is morbidly obese (sickly overweight). Using the figure above, you can estimate your BMI (your height and body weight). If your height and weight is in the light blue zone, e.g. 173 cm and 72 kg (red cross), your BMI is normal.

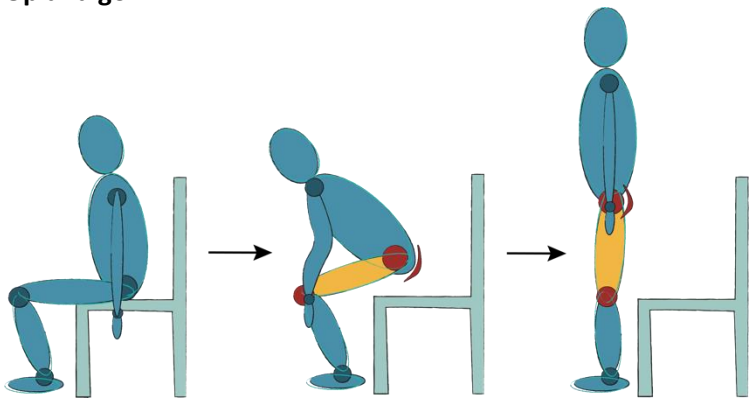
Suggested strength and balance exercises

After the rehabilitation period, it is important to maintain and further develop the function of your legs. Specific exercises that target strength, balance and coordination in both legs can improve your overall physical function and help your transition into a more physically active lifestyle and sporting activities. Good balance and strength in your legs will also help prevent falls. Good strength and adequate movement control will protect the joint. Before ending the rehabilitation period, your physiotherapist should help you manage some of the following exercises. These exercises are easy to follow, do not require any special equipment, and can easily be done at home. For optimal results, they should be performed 2-3 times per week, and be integrated as part of your habitual physical activity. Consult with your physiotherapist on which program suits you the best. Program 1 is less demanding than Program 2.

The illustrations show how to perform the exercises. The muscle groups that the exercise specifically targets are yellow and/or marked with a red crescent. The joint that these are controlling is red, e.g. thigh muscles and hip joint.

Exercise Program 1

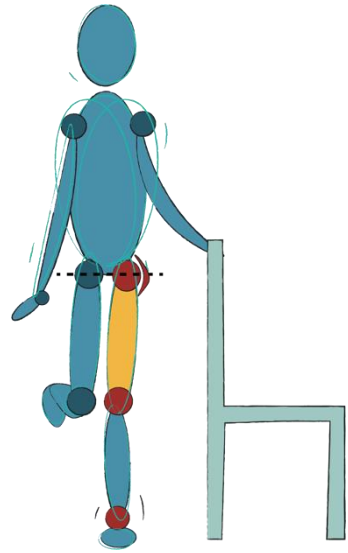
Up and go



How: -Sit upright on the edge of a chair
-Your toes should be pointing straight forward, and your knees kept aligned with your toes
-Bring your upper body forward and stand up fast in a controlled manner, fully extend your knee and hip
-Sit down slowly
-Perform 10 times in 3 sets with 20 seconds rest between sets

Why: During this exercise you are strengthening the muscles in your buttocks and your thighs. You are also challenging your balance. To make the exercise easier and safer if your balance is insecure, place one foot in front of the other. Alternate between sets.

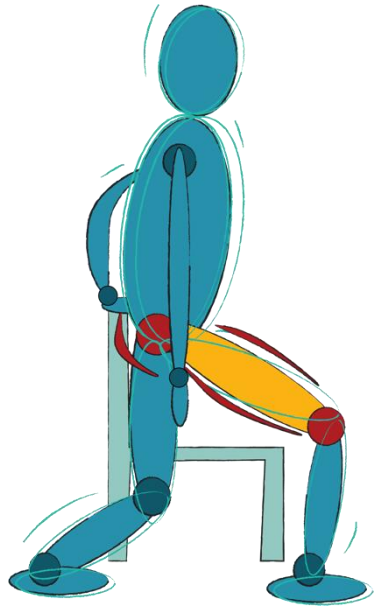
Stand on one leg



How: -Stand upright. Use a chair or the kitchen table as support, but as little as possible
-Keep your body straight, and your stance- leg extended with a straight knee and hip, keeping the hips aligned horizontally
-Hold your position and keep your balance for 10 seconds
-Perform 3 times on each leg

Why: -During this exercise you are training your balance
- You are at the same time strengthening the muscles in your buttocks, hip, thigh, and ankle in the stance leg, that´s why it is important to follow the instructions above!
-The ability to stand on one leg is important for many daily activities and for your balance

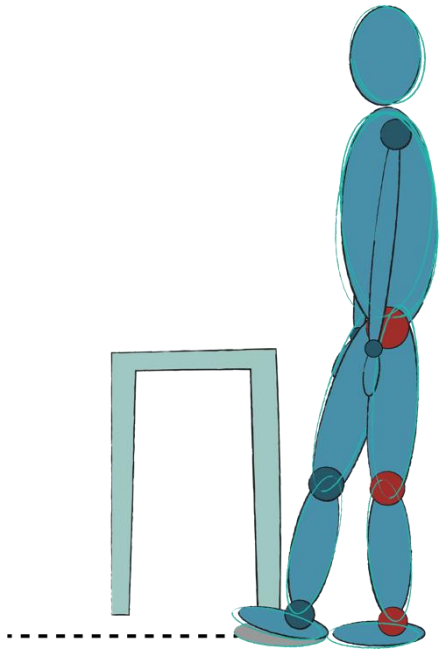
Lunges



How: -Stand with your legs together, use a chair or kitchen table for support if needed
-Take a long step forward and move your body over your forward leg
-Make sure that your toes are pointing forward and keep your knee aligned with your toes
-Push with the front leg back to your original position
-Perform 10 times on each leg in 3 sets with 20 seconds rest between sets

Why: -During this exercise you are training your balance and all the muscle strength in your legs, buttocks and hips

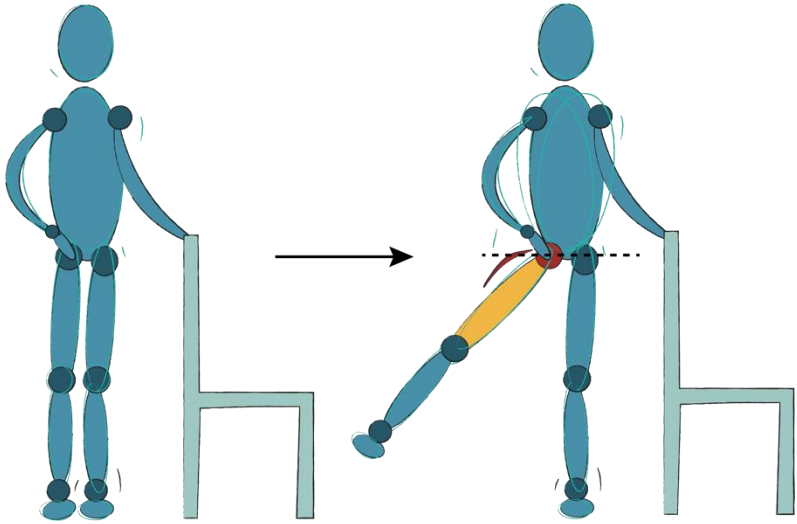
Walking on a line



How: -Stand upright beside a kitchen table or a wall
-Put one foot directly in front of the other and walk 10 steps in a straight line
-Look forward and keep your balance
-Turn around and walk 10 steps back to your original position
-Repeat 3 times

Why: -During this exercise you are training your balance and coordination

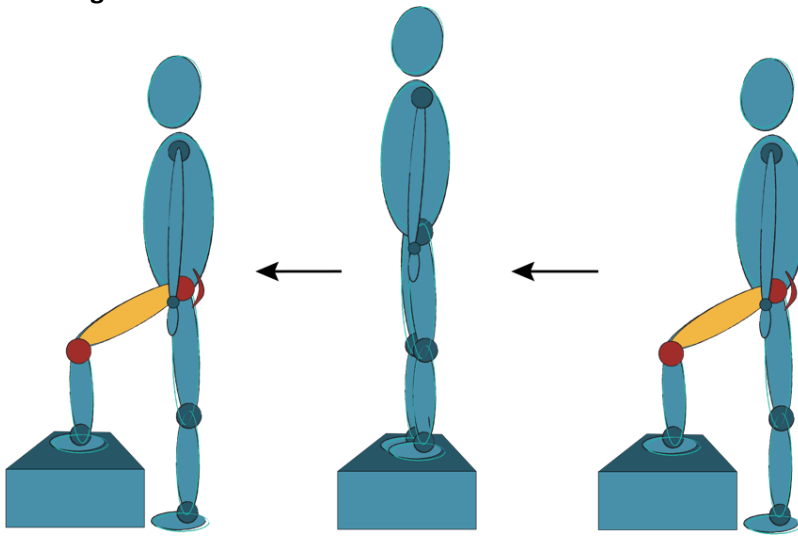
Standing hip abduction



How: -Stand upright by a chair or kitchen table, make sure that your toes are pointing straight forward
-Keep your leg extended and move your heel to the side and backwards
-Keep your back straight, and do not lean to the side
-Perform 10 times on each leg in 3 sets, with 20 seconds rest between sets

Why: -During this exercise you are strengthening muscles in your buttocks. These muscles are important for keeping your balance and prevent excess wear on your prosthesis
-You are at the same time strengthening the muscles of the buttock, hip, thighs, and ankle provided that you extend good in the knee and hip and keep the hip joints aligned horizontally

Walking Stairs

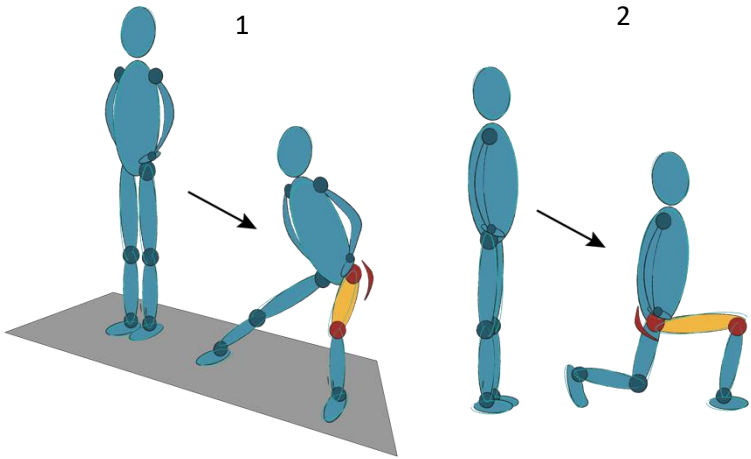


How: -Stand straight at the bottom of the stairs, use the handrail if needed
-Walk up the first step slowly while you keep your balance, keep your back straight and your knee aligned with your toes
-Fully extend your knee and hip, keeping hips horizontally
-Go backwards down the step slowly and controlled to your original position
-Repeat 10 times for each leg in 3 sets, with 20 seconds between sets

Why: -Walking stairs are an important daily activity, this exercise emulates the same movement
-This exercise strengthens all the muscles in your legs, hips, and buttocks

Exercise Program 2

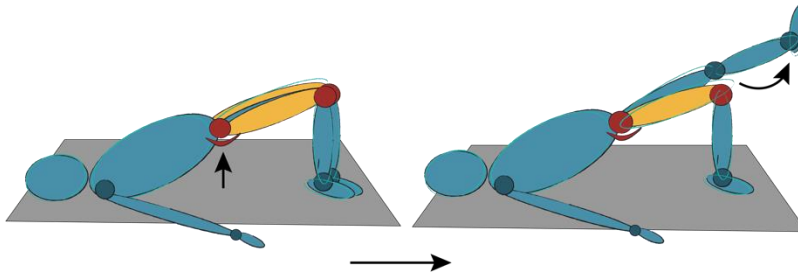
Fallouts



How: -These are two separate exercises. Stand with your hands on your hips. Lean your body to the side (nr 1) and forward (nr 2) and land on your leg. Keep your knee aligned over your toes, and your toes pointing forward
-Use your leg to push back to your original position
-Perform three sets of 10 repetitions on both forward and sideways fallout with 20 seconds rest between sets

Why: -These exercises will help you control your hip and knee joints and strengthen the muscles in your buttocks, hips, and thighs

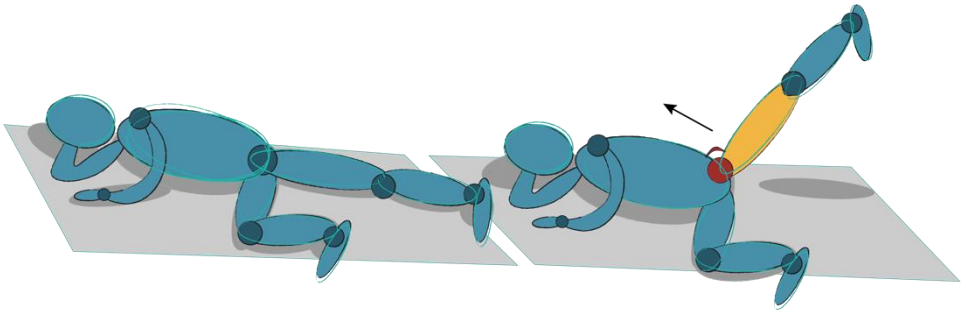
Single-leg hip thrust



How: -Lay down with your arms to the sides for support
-Use your other leg to push your hips upward
-Lift one leg with your knee extended
- Perform 5 times in 3 sets with 20 seconds rest between sets

Why: -This exercise will strengthen the muscles in your buttocks and the backside of your thigh, and in the extended leg also the hip muscles that lifts your leg and the thigh muscles that keeps the knee straight

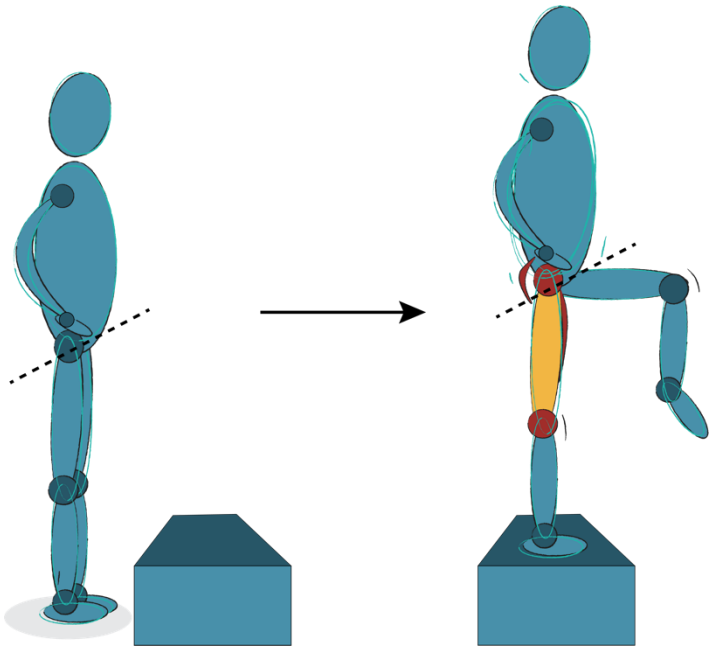
Hip abduction



How: -Lie on your side leaning a bit forward, bending the hip and knee in the lower leg resting on the floor
-Extend your upper knee and hip, and point your toes towards the floor
-Lift your upper leg while holding your knee and toes in the same position, the motion in the hip is up- and backward
- Perform 10 times in 3 sets on both sides, with 20 seconds rest between sets

Why: -This exercise strengthens the muscles in your buttocks and hips
-Strength in these muscles is important for joint control and stability essential for balance and protection of your joints

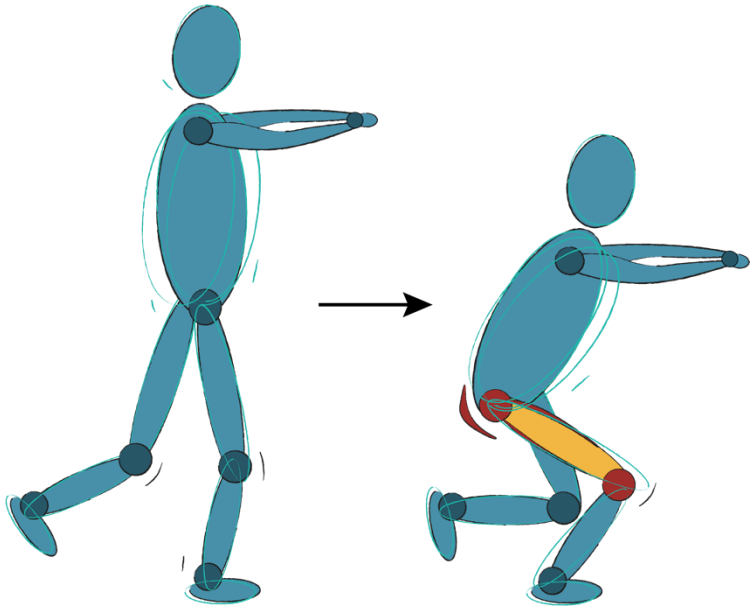
Step-up with knee raise



How: -Use stairs/step and walk up the step and raise and bend knee and hip in the other leg to 90°
-Hold your pelvis / hips leveled
-Keep this position for a few seconds and walk backwards down from the stair/step
- Perform 3 sets of 10 repetitions on each leg with 20 seconds rest between sets

Why: -This exercise strengthens muscles in you buttocks, hips, and thighs both in the stance leg and the leg that you lift
-It trains your ability to control the hip and knee for balance and optimal joint loading

Single-leg squat



How: -Stand on one leg and bend your knee and hip and extend your leg again. Use a chair or table for support if needed
-The lower you go, the harder the exercise is
-Perform three sets of 10 repetitions with 20 seconds rest between sets on each leg
-Make sure that you have very good control and that you do not go deeper than you are safely able

Why: -This exercise strengthens your buttocks, hips, and thighs
-Strength in these muscles and control of the knee and hips are important for balance and for protection of the joints

Appendix

Recommended and discouraged sports- hip prosthesis[2]

Sport	**Advice for persons with a hip prosthesis**	
	Younger than 65 years	*Older than 65 years*
Aerobics	Allowed with experience	Allowed with experience
Aqua fitness	Allowed	Allowed
Badminton	No advice	No advice
Basketball	Discouraged	Discouraged
Bicycling	Allowed	Allowed
Canoeing	Allowed with experience	Allowed with experience
Cross-country skiing	Allowed with experience	Allowed with experience
Cycling	Allowed with experience	Allowed with experience
Dancing	Allowed	Allowed
Fitness	Allowed	Allowed
Football-field	Discouraged	Discouraged
Football-hall	Discouraged	Discouraged
Physio fitness	Allowed	Allowed
Golf	Allowed	Allowed
Gymnastics	No advice	No advice
Handball	Discouraged	Discouraged
Hockey	No advice	Discouraged
Horseback riding	Allowed with experience	Allowed with experience
Ice skating	Allowed with experience	Allowed with experience
Jeu de boules (game of bowls)	Allowed	Allowed
Koersball (bowls)	No advice	No advice

Korf ball	Discouraged	Discouraged
Martial arts	Discouraged	Discouraged
Nordic walking	Allowed	Allowed
Rowing	Allowed with experience	Allowed with experience
Running	No advice	No advice
Running on a treadmill	No advice	No advice
Sailing	Allowed with experience	Allowed with experience
Skiing	Allowed with experience	No advice
Snowboarding	No advice	Discouraged
Squash	No advice	No advice
Surfing	No advice	No advice
Swimming	Allowed	Allowed
Table tennis	Allowed with experience	Allowed with experience
Tennis-singles	Allowed with experience	No advice
Tennis-double	Allowed with experience	Allowed with experience
Volleyball	No advice	Discouraged
Walking	Allowed	Allowed
Yoga/Tai-Chi	Allowed with experience	Allowed with experience

Recommended and discouraged sports- knee prosthesis[2]

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Dancing	Allowed	Allowed
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Squash	No advice	No advice
Surfing	Allowed with experience	No advice
Swimming	Allowed	Allowed
Table tennis	Allowed with experience	Allowed with experience
Tennis-singles	No advice	No advice
Tennis-double	Allowed with experience	Allowed with experience
Volleybal	Discouraged	Discouraged
Walking	Allowed	Allowed
Yoga/Tai-Chi	Allowed with experience	Allowed with experience

1. Stevens M, Seeber G, Scheek van den Akker I, Thölken S. Een nieuwe heup of knie: Hoe wordt u weer lichamelijk en sportief actief [A new hip or knee: How to get physically active again]. 2nd edition. Houten (NL): Bohn, Stafleu Van Loghum, 2020. ISBN: 978-90-368-2464-4.

2. Meester SB, Wagenmakers R, van den Akker-Scheek I, Stevens M (2018) Sport advice given by Dutch orthopaedic surgeons to patients after a total hip arthroplasty or total knee arthroplasty. PLoS ONE 13(8): e0202494. https://doi.org/10.1371/journal.pone.0202494