



ADVANTAGES OF BODY-WEIGHT-SUPPORTED TRAINING

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Advantages of body-weight-supported training

Physical consequences of inactivity

The body is designed to be active and the amount of activity as well as which type of activity we do determines our physical skills. Strength, stamina, fitness, balance etc. forms the foundation of our physical skills and determines our basic physical condition. If the activity level is increased, the body adjusts to the new requirements over time. It is a well-known mechanism that we use structured when training.

However, if the activity level drops, the body also adjusts negatively – and this happens just after a few days. Unfortunately, the body is much faster to settle than to build up and the consequences of a few weeks' inactivity can take months to rebuild.

Age is of great importance in this context. The maximum pulse rate drops by approx. 1 beat per year as we grow older and our muscle mass gradually decreases from the age of 25 and decreases by approx. 1% per year from the age of 50. Fitness and strength therefore become gradually weaker and weaker as we grow older. Luckily, training has an effect no matter how old we are and everyone can become stronger and more enduring through training. As an example, a Danish study has shown that a group of women with an average age of 88 years became stronger by training their legs for 8 weeks. By strengthening the legs, the women's balance and gait was improved, and most importantly, they became more physically active in their everyday life.

When the basic physical condition is too low

All activity requires a certain physical condition and after a period of inactivity, this condition can become so weak, that it is not possible to i.e. get up from a chair or walk on stairs.

For young people who are generally in good shape, shorter periods of inactivity is no so critical. For older people, on the other hand, a weak basic physical shape can make it hard to get through everyday tasks. The consequence is that it becomes too big a hurdle to be active and therefore, the activity level decreases.

For elite athletes, even shorter periods of inactivity is a major problem. Even a small decrease of the basic physical condition means that it is not possible to maintain the high level achieved. It takes time and training to re-achieve this level.

Whether you are young, old or an elite athlete, the injury itself is not the only problem in a rehabilitation phase. Being inactive is just as big a problem.

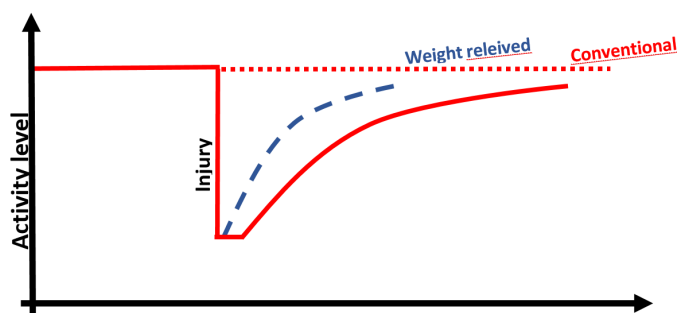
Primary and secondary consequences after injury

Consequences of injuries can be divided into primary and secondary consequences.

The primary consequences can be determined as the extent of injury, for example a sprain, knee injury, fracture or more critical injuries such as brain- or spinal cord injury.

The secondary consequences is when the activity level is decreased for a shorter or longer period of time. The most typical consequence is reduction of strength, fitness and endurance.

Both primary and secondary consequences can reduce physical skills. Therefore, it's important to begin rehabilitation as soon as possible post injury, in order to limit the consequences of inactivity. Not only does this save time and resources, it also improves independence and life quality. Weight relief has been developed for this purpose and has been used increasingly for the last 20 years. Initially, the target group was people with neurological consequences, but today the target group is expanded to all persons who have had an injury that reduces walking or running.



The advantage of body-weight-supported training is that rehabilitation can take place at an earlier stage, and thereby secondary consequences of inactivity are reduced and the rehabilitation period becomes shorter.

Definition of weight relief

Weight relief can be defined as relieving the user's body weight of the legs using a sling.

The amount of relief is stated as a percentage of the total body weight; if the person weighs 100 kg and is relieved by 20 kg., it is stated as 20% relief.

In English, weight relieved exercise is called "body-weight-supported training" or "partial body-weight-supported training". Almost all research concerning body-weight-supported training is performed on treadmill and therefore it is called "body-weight-supported treadmill training" (BWSTT) or "partial body-weight-supported treadmill training" (PBWSTT). If you want to find studies concerning this area, these English keywords will be the most useful. If you do not have access to databases, such as Medline, <https://scholar.google.dk/> is a great tool.

The relief is adapted to the user's individual needs and if the person is very weak or very heavy, a high weight relief will often be preferred. The most common is a weight relief of 10 and 30% of the user's body weight. Ideally, the weight relief should help the user walk as symmetrical as possible, and not having to use the arms as support.

Conventional weight relief

If there is pain in one leg, you are most likely to put weight on the other leg. This also happens with a half-sided paralysis, where the paralyzed leg does not have enough strength and control, and most of the weight is put on the "good" leg. Both scenarios will result in a limp, which is the body's own way of relieving weight. After an injury, walking aids (i.e. crutches) are sometimes needed. These are also a type of weight relief and make it possible to get from A to B. The downside, however, is that it changes our way of walking (limping and asymmetrical) which later can be hard to change.

Modern weight relief

Today there are many different systems for weight relief and almost all of these systems are attached to a treadmill and can only be used for treadmill training. AlterG is an example of this. A few systems are suspended in a frame that can be moved around and used for floor exercise too, for example LiteGait. However, this system is very heavy to handle and move around. The company Hocoma has solved this with their self-propelled system, Andago. However, there are restrictions on maximum speed, it can not be used in combination with fitness equipment, the maximum person weight is 135 kg and the price is at the high end of weight relief systems. The most advanced and most expensive system today is probably Bioness Vector, which is self-propelled in a ceiling track. It can relieve weight through movement from laying to standing. All of these systems have different advantages and disadvantages, and some may be better for certain target groups than others.

Dynamic and static weight relief

While walking, the body's center of gravity moves up and down. If we are limping, i.e. from a half-sided paralysis or an acquired brain injury, the movement of the body's center of gravity will increase. Dynamic weight relief follows the body up and down with the same amount of weight relief, no matter how much the person moves. This makes the training feel more comfortable. If, on the other hand, a lift is used for the same purpose, it is a static weight relief. The lift can only be set to a fixed position, and therefore it will not follow the body's movement up and down. As the body moves up, the weight gain disappears, and when the body moves down, the weight gain increases. This will make the user feel uncomfortable. Since static weight relief varies depending on whether the body is up or down, the actual weight relief cannot be determined and it is therefore not possible to accurately increase or decrease the load over time.



Walking sling

Walking and especially running have many repetitions, and here it is important that the sling is comfortable, has a good fit and does not prevent the movement of arms and legs. In addition, the sling must be strong enough, if the user should fall. The amount of time spent taking the sling on and off is also important, as training time is often spent on this. Some slings can be put on while sitting, other only standing, and the choice of sling should be according to the user's needs.

In corporation with Center for Rehabilitation of Brain Injury in Copenhagen, Denmark, Winnicare Nordic has developed a sling for gait training, which can be put on both standing and sitting, and it is very comfortable for the user to wear. Winnicare Nordic is also currently working on a sports sling in corporation with "Danish Triathlete Association", which can be used for rehabilitation after sport injuries.

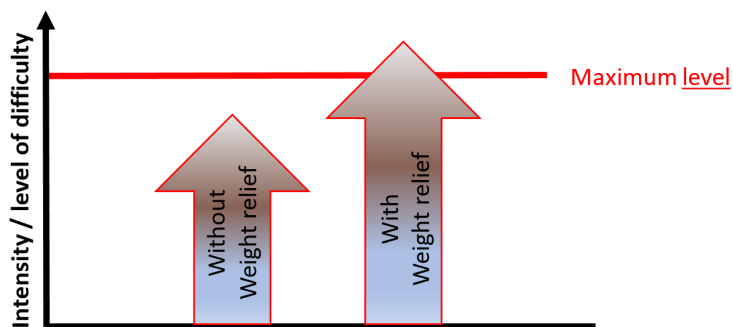
Safety

After an injury, the balance may be impaired for various reasons and there will always be a risk of falling. Exercise is most effective when it is intense and challenging, but then the risk of falling is also increased – especially if the user is also tired and/or weak.

Falling can not only cause further injuries for the user. Also, the therapist who will try to avert the fall is at risk.

Most weight relief systems "catch" the user, if he falls, which basically makes it impossible to fall. Because of this, the user and the therapist will not hold back when it comes to training and this enables the intensification of the training. The level of difficulty can therefore be set to the highest possible.

Another advantage is that it is possible to train more people at the same time, because it might not be necessary for the therapist to physically assist the user.



Without the safety of the weight relief, the level of difficulty will not come near maximum, because of the prevention of falling. If the user and the therapist are nervous of falling, this level can be very far from maximum. With the safety of the weight relief, however, the level of difficulty can be increased until the user falls and the level for most efficient training is found.

Ergo Trainer

The Ergo Trainer's body relief system ensures the patient a body-weight support throughout the entire training programme.

Approved for patients weighing up to 200 kg (440 lbs), the Ergo Trainer can relieve up to 85kg (187lbs) of the patient's body weight.

The dynamic arm on the Ergo Trainer determines a fall range of up to 55 cm. It allows for a wide range of additional therapy exercises, i.e. comprehensive overground exercises,

The Ergo Trainer is developed in corporation with Center for Rehabilitation of Brain Injury, Denmark. The body weight support system allows therapists to oversee and treat more than one patient at the time. As a result, the ratio of patients receiving treatment by a single therapist is positively increased.



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