



RETRO RUNNING – A TREND IN THE PHYSICAL TRAINING OF THE MILITARY

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Running is one of the simplest and most practical ways to keep your body fit. Retro running is an excellent way of training that must be introduced in the process of systematic physical training of the military, being remarkable for the development of the conditioned and coordinative abilities necessary to improve their physical performance. It will develop the cardiovascular system, tone the muscles and strengthen the bones and ligaments throughout the body.

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There are many types of running practiced by the military, regardless of their level of fitness. These have emerged over time, following a process called generically *trial and error*, which involves discovering the best way to achieve a desired result or a correct solution by trying one or more ways and means and by scoring / eliminating errors or causes of failure. If you want to get the best results from the workouts you use, you will need to try to use all these types of running. You can diversify them according to your preferences, combining two or more in one workout, but in the end and performed separately in their basic form, these types of running will help you become a better runner.

Retro running has a number of significant applications in military physical activity, both as a system of action in military physical education sessions and as a tool for recovery in the management of various lower limb injuries. Retro running is a powerful sport-specific training tool. The military must be able to move quickly and resolutely, using all means of running. Training programs, such as shuttle running exercises, in which the soldier has to move back and forth at high speed in a short period of time, are effective in developing retro running skills.

Incorporating retro running into an interval or intermittent running program has a positive effect on both the musculoskeletal system and the cardiovascular system. In addition, retro running stimulates the fast-twitch fibers present in the

muscles of the lower limbs, suitable for explosive movements, based on strength and power. Through its research programs, sports science confirms that the introduction of new movements that are a variation of regular training, tend to reduce the likelihood of injuries during physical training.

At first glance it seems an unusual form of movement, but running backwards is more used than it seems. In fact, there are many sports (such as football, handball, basketball, etc.) that use it in daily training programs, especially in the sequence of preparing the body for effort. Referees are also the ones who use retro running very often during a match, because they have to be constantly facing the player who has the ball.

Retro running – let us try to run back and forth

Retro running, also known as back running or reverse running, is simply a backward run. It is not as well-known as barefoot running (also called natural running) and should not be confused with the running in which retro footwear is used, which takes over the lines and style of the past decades and has become widely used in recent years. By learning to systematically alternate running back and forth in your training, you will gain several benefits, such as reducing the aggressive impact that normal running has on your joints.

The pioneers in this new training method were the Americans. At the beginning of the last century, big names in American sports, such as William Muldoon (Greco-Roman wrestling champion, pillar of New York sport for over 50 years), Gene Tunney (professional boxer) or step dancer Bill Robinson (who was claimed to be able

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to run back faster than most men could normally run) used backstroke in their fitness programs. But this method gained full recognition, gaining some popularity among athletes only in the 80's. During this period, the Gray Institute specializing in research, development and innovation in applied functional science, used the technique of walking and running backwards for physical recovery of the sick. Professor Barry Bates was among the first to publish his research, mentioning some of the benefits that this running technique brings to the human body (University of Oregon 2022). Dr. Robert K. Stevenson published a book on the subject for the general public (Stevenson, 2014), and the Frenchman Christian Grolle tried, in his writings, to convince athletes and coaches of the many benefits of this type of running (Grolle, Carole, Ahau and Christian Ahau 2009).

Retro running is a skill that needs to be learned, and when you are able to understand the biomechanics of this way of running, you will be able to evaluate your own style of running and observe other ways to improve it. Using the retro running technique, you should move while keeping the lower limbs parallel to the direction of travel, and the shoulders and head should be twisted (left or right) to see the surface to be run, even if the experienced retro runners get to perform this movement very rarely. Because the head is facing forward, in running back a runner will see very little of what is on the ground in his path. Unlike normal running, if you stumble, it is much more difficult to recover or cope with a fall on your back. Turning your head while running can generally eliminate visual impairment, although this limits speed and can cause tension in the neck. Exercising backwards by performing specific movements of the arms and legs during exercise (such as crab walking, backward running, crawling back, etc.) can help prevent injuries that can occur in the event of a back fall. Today, retro running has become a well-established discipline, thanks to teams of researchers who have demonstrated the validity of its safe practice (Technogym 2022).

To demonstrate the effectiveness of retro running, a research study conducted by the University of Milan found that in retro running there is more pushing force (when detached from the ground) and less braking force (when landing on the ground), which has a positive impact on the joints.

Compared to normal running, in a retro run there are more muscle fibers involved that are subjected to less effort (with more energy consumption and less physical performance), but which are less prone to injuries (Cavagna, Legramandi and La Torre 2010, 339-346). Some athletes who are passionate about running also include the retro version in their training, because this way of running will improve their ability to run forward, being an effective aid for both conditioning and rehabilitation, being recommended for those with knee medical problems. A study conducted in 2012 showed that retro running has a lower impact on the knees and burns more calories when performed at a moderate and even tempo. Students at an American university who introduced their retro running to the training program, which they practiced for 15-45 minutes / three times a week / for six weeks, lost a percentage at the end of the experiment, namely 2.5% of body fat (Morton 2016, 149-152).

The human body is designed to move more efficiently forward rather than backward and the maximum speed of the retro runner cannot exceed 80% of the maximum normal running speed, even though investigations have suggested that runners perceive the same intensity of effort in both cases (Williams, 2020). If the goal of retro running is to improve your cardio fitness, a good indicator of your overall physical health, and a predictor of your long-term health, then this may be an important alternative running technique. Here are some of its benefits:

- *it improves posture.* Running with your back forward involves a natural change of posture, causing you to adopt a vertical posture (with your shoulders pulled back and your back straight), promoting realignment of the vertebrae and relieving pressure on the nerves, thus correcting posture during normal running;

- *the level of maximum aerobic capacity* (the maximum amount of oxygen that the body can use during exercise – VO_2Max) is about 20% higher than the anaerobic threshold of classical running;

- *weight loss results are better.* If the goal of your workout is to lose extra pounds, then retro running is the fitness regimen you have been looking for. It helps you burn about 30% more calories than normal running, with great effects on increasing your basal metabolic rate;

- *it reduces the impact with the ground* and, implicitly, the probability of injuries to the knee



joint (sprains, torn ligaments, meniscus injuries, dislocations, etc.). The running technique focuses on the heel that first comes in contact with the ground, while the knees act as shock absorbers. Retro running minimizes the transmission of the impact with the ground on the knee joint, allowing the development of muscles on its both sides, which will lead to strengthening the joint over time;

- *physical performance is improved.* When you run backwards, you need more physical effort in terms of movement, because it is more difficult to move from one point to another. This will increase cardiovascular and muscular endurance, two of the basic components of physical fitness that include flexibility, muscle strength and body composition, ultimately improving the body's overall endurance;

- *it reduces boredom.* Long distance running can be a tiring and tedious activity, and adding retro running to your workout can turn it into a fun, exciting and varied activity. To overcome the stagnation period or to get out of a runner's work routine, running back incorporates a new and varied element in every workout, especially if it is practiced in a group. Thus, you will have health benefits, and your mind will be busy throughout the running session;

- *it increases muscle mass.* Running backwards not only strengthens your muscles, but also makes certain muscles of the lower limbs (such as the calf, tibia and quadriceps and femoral muscles) more toned as you reach greater muscle strength;

- *it stimulates brain activity.* Any change in your daily workout routine by activating other muscle groups is good for your brain health, as it causes you to think differently and react differently;

- *it improves vision and peripheral vestibular sense.* Retro running involves movement that is partially independent of the perception of the path through sight, which allows the development of other senses (such as the auditory sense), although this will also help to improve the quality of vision and peripheral balance.

Running with backwards is a less natural movement, but it can be done with some speed after a few specific training sessions. At first, to get used to the sensation, it is recommended to start practicing reversing, which is relatively easy to perform, and then gradually increase the distance and speed of movement. Once you feel comfortable

with this, try an easy run. Every time you feel used to it, try to move a little faster or farther, and soon you will find it almost as comfortable to run backwards as you run forward. Looking where you are going during the retro runs is essential to stay on track and avoid injuries. But looking too much is not good either, because every time you look back you have to turn your head and body, and your posture will be compromised, having a negative impact on your retro running technique. The more you practice running backwards, the more confident you will become and the less you will feel the need to look back.

Starting this way of running in a safe area where the ground is level, such as an athletics track, is the perfect way to gain confidence in retro running, as there are fewer obstacles and there are color markers useful to help you stay in the right direction without having to constantly look behind you. To avoid this, you could easily run with a partner to guide you on the path, so that you can focus only on running. Another piece of advice, of course, is that you need to be careful when running backwards and practicing controlled falls (martial arts fall techniques, such as: falling backwards, falling sideways and rolling backwards). If you feel you are losing your balance, do not panic and try to land smart, cushioning the shock of the fall (remember the school of judo fall - ukemi), to disperse the impact with the ground and to protect the joints and head more affected by uncontrolled falls). Alternatively, you can wear a helmet if you are worried that you will fall or if you practice on hard surfaces or uneven terrain. Just like normal running, running on hills (uphill or downhill) can add an extra degree of difficulty (Marathon Handbook 2022).

Technically speaking, running backwards is a whole new kind of exercise for your body. You should definitely make sure that when you run backwards you will put the weight mainly on the front of the foot and the heels should almost never touch the ground when you run. It is also a good idea not to lift your feet too high from the ground, as this saves energy and does not put too much pressure on your hip and knee joints. Retro running, if done incorrectly, can quickly lead to stiff neck muscles. To avoid this, you should change your line of sight as often as possible, that is, alternately looking back over your left shoulder and over your

right shoulder. In this way, a good balance will be created and you will avoid neck pain at the end of the run.

The first step you need to take to start running backwards is, of course, to take a step back. But this is not enough, because running with your back is an unnatural activity, at least in the beginning, and it is necessary to use each part of the body very well in order to maintain a constant balance and to avoid falling. Therefore, it is very important to keep your back straight, not to bend your knees too much and to touch the ground more with the tip of your feet, which must always move in unison with your arms, as in a normal run. The movement of the arms is really essential, because in addition to maintaining balance, it contributes to increasing the propulsive force (at least as much as the legs). Once you have found your center of gravity, the second step is to get rid of the urge to turn around and look where you are going, which will allow you to run faster and be more stable (Cuore 2022).

Running backwards is a completely new form of exercise for most soldiers. So the most important thing is to start gradually. For example: at the beginning you can start with a 200-meter retro run, twice a week, during or at the end of an endurance run. Then this distance can be slowly increased by 100-200 meters every week. The immediate goal (medically established and certainly feasible) should be to be able to run at least 1000 meters backwards without muscle pain or anything like that (Thomas Dold 2022).

In 2005, a group of Austrian, German, Italian, Swiss, and French athletes formed the *International Retro Running Association (IRRA)* to promote this practice, which is still unknown to many, and to organize sports competitions. The first edition of the World RetroRunning Championship took place in Rotkreuz, Switzerland, in 2006 and had only 4 competition events (100 meters, 400 meters, 3,000 meters and the 4 x 100 meter relay), and since then they have been organized periodically, every two years. In addition to this world competition, the Retro Challenge is held every year (a circuit divided into twenty competitions that take place in different locations in Italy), Backwards Mile (an annual competition that takes place in Central Park in Manhattan, New York), the Championship Central America and more national races. Retro runners from all over the world gather at these competitions

to compete in back-running all traditional athletic distances (currently the events are: 100 meters, 200 meters, 400 meters, 800 meters, 1,500 meters, 3,000 meters, 5,000 meters, 10,000 meters, 4 x 100 meters and 4 x 400 meter relays, half marathon) (Wegner, 2010).

The rules of retro running are the same as those of the classic athletics events, very well known by those who work in the field of sports, plus some specific clarifications:

- before the start of a race, the ankles must be behind the line marking the starting line;
- for speed racing, the use of the block start is optional. It will be placed in the same way as in athletics, and when used, one leg should be supported only on the front support;
- in the same test, at the first wrong start the athlete in question receives only a warning, and at the second false start the athlete will be disqualified;
- the whole toe should be positioned at the back of the heel towards the heel while running;
- in tests where you do not run down the aisle, competitors who are moving faster than you must be allowed to overtake you, as a hindrance is prohibited;
- crossing the finish line is counted at shoulder level.

Reverse running is not a new concept, but it seems to be one of the biggest fitness trends, in a continuous increase in popularity, probably due to the benefits it offers to complete the classic running. In the pursuit of optimizing physical performance, athletes typically use a variety of training methods designed to reduce injuries and improve athletic performance. Running backwards, which has been used to prepare athletes for the requirements of the competition or in the programs of reintegration into the physical activity of those who return after an injury, is such a method.

Retro walking and running on the treadmill

Walking backwards on the treadmill or even running backwards on it offers multiple benefits to the body. In addition to the fact that this type of movement will tone your various muscle groups, it will also help you to improve your balance, and your heart rate will increase, making it a good option for interval training (Masumoto, Galor, Craig-Jones, Mercer 2019, 269-275).



If you exercise regularly, research has shown that running backwards can reduce the risk of injury and improve physical performance, as mentioned in the previous chapter. This works by developing strength, the ability to generate strength and speed and to coordinate movements (muscle strength), especially the muscles of the lower body, while also improving the ability to safely change direction and direction running (Uthoff, Oliver, Cronin, Harrison, Winwood 2018, 1083-1096).

If this is your first time running on a treadmill, then you need to start at a low speed. You may find that it is a challenge at first to just go the other way, and increase your speed in future training sessions as you begin to feel more comfortable.

Most treadmills have a relatively low starting speed (about 1 km/h), and in order to get a good posture and a technically correct joint movement, you need to start with the lowest possible speed. The moment you feel that you have adapted and you can easily maintain that pace, you will gradually increase your speed by 1 km/h. You should allow at least a few minutes for each speed of the treadmill before increasing to the next step, to allow the body to fully adjust to the pace, before increasing the intensity and asking it to move faster.

As you begin to move at higher speeds, you will probably feel that certain muscles are being used more intensely than you are physically stressed while moving forward. These include the quadriceps muscles (located in the front of the thigh, responsible for the extension of the knee and the flexion of the thigh), as well as the muscles of the hind leg (located behind the tibia, being responsible, in particular, for the flexion of the leg on the calf). Therefore, establish short series of retro walks when you start. Also, at the beginning it is better to vary either the duration of a series or the speed of movement, meaning you have to add intensity either going faster or more, but do not change both in the same training (Verywellfit 2022).

Of course, the side handles of the treadmill should be used at the beginning, the backwards being done with the hands supported by them, until the moment when you are sure enough that you can keep your balance. Walking backwards keeps the body active, requiring more abdominal and postural muscles to support the body in an upright position, and if they are not strong enough, you will risk falling off the treadmill. Also, the legs, hips, and muscles that control your ankles should work

harder to maintain a coordinated movement while walking or running backwards. So, if you notice a weakness in any of these areas, which could make you stumble, it would be advisable to continue using the handles. First use one hand for support, as an intermediate step in moving backwards, without the help of the side handles of the treadmill.

You do not have to spend a lot of time going back and forth to reap the benefits. Therefore, aim to include only a few sets of backtracking in a training session in which you use the treadmill. Even if your ability to perform coordinated and precise movements in time and space is a developed one, it is recommended to stop the strap and use the handles for balance, every time you want to turn to move in the opposite direction.

You can also change your routine when you turn your back on a treadmill by varying your inclination. As in the case of speed, start gradually, first tilting the treadmill to the lowest level, because going this way, you will probably feel a burning sensation in the thighs. As you get stronger and you start to feel comfortable, you can increase the inclination of the belt as well as the speed, but not both at the same time, because the probability of unbalancing increases considerably. Increase the tilt or speed at a time, so that you can return to the original settings if you think it is too much for you.

Another option would be to vary the position of the body while walking backwards on the treadmill. As you go back, lower your center of gravity so that you are in a partially squat position, with your back straight and your body leaning forward. This will increase the tension in the quadriceps muscles and, as a result, this activity should be limited to about 30-60 seconds and omitted if you have medical problems in your knees.

Once you get used to this backward movement, you may find that you are ready to run backwards on the treadmill. In the structure of the first training sessions, which include running backwards on the treadmill, it is recommended to alternate the periods of running backwards with those of walking forward (or light running forward) for a few minutes. If you notice that it is difficult to maintain your balance, slow down until you reach a pace that suits you. As your body adjusts, you can increase your speed to increase the intensity of the effort, and when you feel really comfortable, you can add a certain inclination to the treadmill.

Walking or running backwards can be used to diversify the daily routine of treadmill training sessions, being a recommended exercise for those with an average level of physical training and experience in exercising. If you are having fun and starting to feel the benefits of it, it may be easier for you to maintain this type of long-term workout, which will eventually lead to better results.

Conclusions

Any soldier who is seriously interested in improving their athletic performance, fitness and outlook on life would do well to look more closely at retro running and its benefits. Running backwards may seem like an unreliable method and a waste of time for exercise enthusiasts, but it is not a bad thing to introduce a little fun into the training sessions, and if the research done was correct, then this change of approach could it also boosts the physical performance of the military.

Given the rigors of military physical education, instructors are constantly looking for effective training strategies to improve the physical performance of the military, while minimizing the dynamic load on the joints. Retro running could be a means of aerobic, anaerobic and neuromuscular training that does not overload the tendons and ligaments as much as normal running. The purpose of this article is to show that reverse running is not the lifeline for injury prevention or athletic performance, but rather an alternative method available to those in the field.

Similar to other methodological procedures for the development of various forms of motor skills, retro running (endurance or speed) should be practiced and developed accordingly. Depending on the competence and training objectives of the military and the current stage of training, different modes of retro running can be used to apply the principles of variation, specificity and overload. The integration of retro running, as part of a general program of physical training of the military, offers a new stimulus that brings physiological adaptations, completing the capacity of physical effort, which serves to increase the variability of training and avoids the monotony of traditional training.

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