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TREADMILL IS A THREAD TO BOOST UP YOUR HOMEOSTASIS

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ABSTRACT

A treadmill is a device generally used for walking, running, or climbing while staying in the same place. Treadmills were introduced before the development of powered machines to harness the power of animals or humans to do work, often a type of mill operated by a person or animal treading the steps of a tread wheel to grind grain. In later times, treadmills were used as punishment devices for people sentenced to hard labour in prisons. The terms treadmill and tread wheel were used interchangeably for the power and punishment mechanisms. More recently, treadmills have instead been used as exercise machines for running or walking in one place. Rather than the user powering a mill, the device provides a moving platform with a wide conveyor belt driven by an electric motor or a flywheel. The belt moves to the rear, requiring the user to walk or run at a speed matching the belt. The rate at which the belt moves is the rate of walking or running. Thus, the speed of running may be controlled and measured. The more expensive, heavy-duty versions are motor-driven (usually by an electric motor). The simpler, lighter, and less expensive versions passively resist the motion, moving only when walkers push the belt with their feet. The latter are known as manual treadmills.

KEYWORDS: flywheels, walkers.

INTRODUCTION

Treadmills continue to be the biggest-selling exercise equipment category by a large margin. As a result, the treadmill industry has hundreds of manufacturers throughout the world.

William Staub, a mechanical engineer, developed the first consumer treadmill for home use. Staub developed his treadmill after reading the 1968 book, Aerobics by **Kenneth H. Cooper**. Cooper's book noted that individuals who ran for eight minutes four to five times a week would be in better physical condition. Staub noticed that there were no affordable household treadmills at the time and decided to develop one for his use during the late 1960s. He called his first treadmill the PaceMaster 600. Once finished, Staub sent his prototype treadmill to Cooper, who found the machine's first customers, including sellers of fitness equipment. Staub began producing the first home treadmills at his plant in Clifton, New Jersey, before moving production to Little Falls, New Jersey. Treadmills effectively burn fat by burning calories and increasing your heart rate, especially with varied workouts like incline training or High-Intensity Interval Training (HIIT), but diet and combining cardio with strength training are crucial for significant, lasting weight loss and reducing body fat. You can't outrun a poor diet, so managing calorie intake alongside treadmill exercise yields the best results for fat loss.[1]

Figure-1: Treadmill.

How Treadmills Help Burn Fat

Calorie Expenditure: Running or walking on a treadmill burns calories, creating the calorie deficit needed for fat loss.

Customizable Intensity: You control pace, incline, and duration, allowing for progressive overload (gradually increasing difficulty) for consistent calorie burn.

Interval Training: Alternating high-intensity bursts (running) with recovery periods (walking) boosts metabolism and fat burning.

Incline Workouts: Walking or running uphill increases intensity without needing high speeds, engaging more muscles and burning more fat.

FOR BEST RESULTS

Combine with Diet: Focus on a balanced diet, as exercise alone isn't enough; you must eat fewer calories than you burn.

Incorporate Strength Training: Building muscle through strength training increases your resting metabolism, helping you burn more calories even at rest.

Consistency is Key: Regular treadmill sessions, whether steady-state cardio or intervals, are vital.

Sample Treadmill Fat-Burning Techniques

Warm-up: 5-7 minutes of light walking.

Intervals: Alternate 1-2 minutes of fast running with 2-3 minutes of brisk walking.

Hill Training: Set a high incline and walk at a challenging pace.

Cool-down: 5 minutes of slow walking and stretching.

Treadmills offer great convenience (weather-proof, controlled environment, easy tracking) and cardiovascular benefits (heart health, calorie burn, endurance), with lower impact on joints than pavement; however, downsides include potential monotony, higher cost, less varied muscle engagement than outdoors (hamstrings, stabilizers), and the risk of improper form causing back pain.

Benefits of Treadmills: Convenience & Control: Run anytime, anywhere, without weather worries; easily adjust speed, incline, and duration for custom workouts.

Cardiovascular Health: Excellent for heart, lung, and endurance building, burning calories efficiently.

Figure-2: Parts of treadmill [Frame, Motor, Deck, Belts, Rollers, Lower Board & Incline Motor, Electronics, Biomechanics & Impact Control.]

Lower Impact: Cushioned belts reduce stress on ankles and knees compared to concrete.
Safety: Eliminates risks from uneven sidewalks, traffic, or trails, notes Spine-health and Seattle Spine Surgery.
Tracking: Built-in monitors for heart rate, steps, and calories help track progress.
Mental Boost: Can watch TV, listen to music, and reduce stress, say Healthline and Seattle Spine Surgery.

Disadvantages of Treadmills
Monotony: The unchanging scenery and motion can be boring for some users, according to Healthline and YouTube.
Less Muscle Engagement: The belt's propulsion means less hamstring, glute, and stabilizer activation compared to running outdoors, notes Nike and Health.
Cost & Space: Can be expensive to buy and takes up significant room.
Potential for Pain: Incorrect posture or high incline can strain the back; Calo and Nike suggest adding incline (1.0) to mimic outdoors.
Noise: Treadmills can be loud, potentially affecting others, notes YouTube.

How to Maximize Treadmill Use
Increase Incline: Set incline to 1% to better match outdoor running effort.
Incorporate Intervals: Use speed and incline changes for varied, effective workouts.
Engage Core: Focus on proper form to stabilize, or use weights for upper body, say Nike and YouTube.

The treadmill's inventor depends on its purpose
Treadmill Developers: Sir William Cubitt designed the first modern penal treadmill in 1818 for prisoners, while American engineer William Staub created the first affordable home treadmill, the PaceMaster 600, in the late 1960s, inspired by Dr. Kenneth Cooper's fitness book.

- For Punishment (Early 1800s): **Sir William Cubitt**: [Sir William Cubitt FRS (9 October 1785 – 13 October 1861) was an English civil engineer and millwright]. A British engineer who saw idle prisoners and devised a large, wheel-like machine with steps for them to climb, generating power for tasks like grinding grain.
- For Home Fitness (Late 1960s): **William Staub**: [William Edward Staub (November 3, 1915 – July 19, 2012) was an American mechanical engineer who invented and developed the first consumer treadmill for home use, the PaceMaster 600, during the late 1960s]. A mechanical engineer who read Dr. Kenneth H. Cooper's book Aerobics and built the first mass-produced home treadmill, the PaceMaster 600, to make exercise accessible.
- Other Key Developments: **Dr. Robert A. Bruce**: [Robert Arthur Bruce (November 20, 1916 – February 12, 2004) was an American cardiologist and a professor at the University of Washington. He was known as the "father of exercise cardiology" for his research and development of the Bruce Protocol.

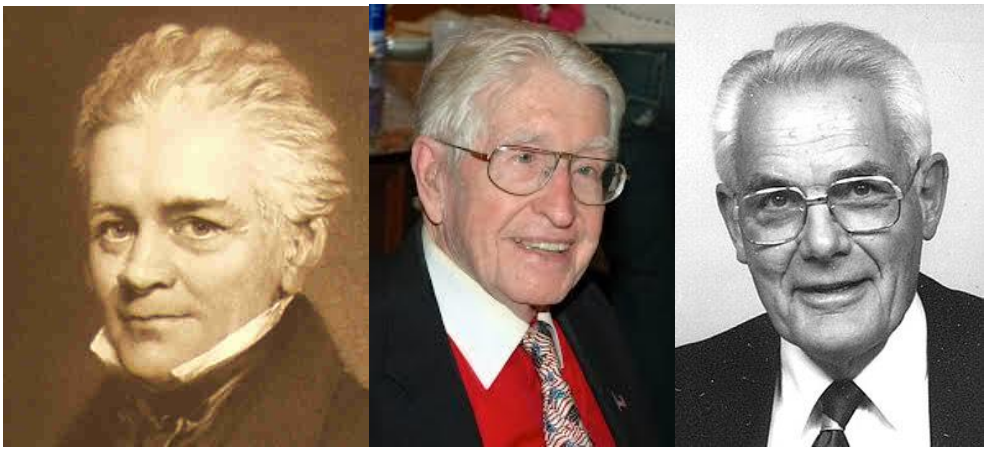

Figure-3: Treadmill developers.

Treadmills are excellent for health, offering significant benefits for cardiovascular fitness, weight management, blood sugar control, and mental well-being by strengthening the heart, burning calories, improving insulin sensitivity, and releasing mood-boosting hormones through consistent walking or running, all in a convenient, controlled environment. They help reduce risks for heart disease, diabetes, and high blood pressure, while also boosting endurance and cognitive function, making them suitable for most fitness levels.

Key Health Benefits
Heart Health: Strengthens the heart, improves circulation, lowers blood pressure, and reduces the risk of heart disease and stroke.
Weight Management: Burns fat effectively, aiding in weight loss and achieving a leaner body.
Blood Sugar Control: Improves insulin sensitivity, helping to manage diabetes.
Mental Well-being: Releases endorphins to reduce stress, anxiety, and depression, while improving sleep quality.
Endurance & Stamina: Builds stamina and muscle

tone, enhancing overall fitness.

Bone & Joint Health: Can be easier on joints than outdoor running due to shock absorption, and strengthens leg muscles (quads, calves, hamstrings).

Brain Health: Boosts oxygen to the brain, promoting better memory and cognitive function.

How It Works

Aerobic Exercise: Walking, jogging, or running elevates your heart rate, making your heart more efficient.

Controlled Environment: Offers convenience to exercise regardless of weather and allows precise control over speed, incline, and intensity.

Versatility: Can be used for steady-state cardio or High-Intensity Interval Training (HIIT) for varied results.

Considerations

Muscle Engagement: May use hamstrings less than outdoor running, as the belt helps propel you.

Boredom: Can become monotonous, so pairing with entertainment or varying workouts helps. In essence, a treadmill provides a safe, effective, and convenient way to achieve significant fitness and health improvements, from heart strength to mental clarity, making it a valuable tool for most people.

A treadmill mechanism: Uses a continuous conveyor belt, driven by an electric motor or flywheel, that moves backward, requiring the user to run or walk in place, with controls for speed and often incline via incline motors and screw drives; manual versions rely on user foot power and gravity for resistance, while motorized ones use a drive motor, control board, and various sensors for precise speed and incline adjustments, all mounted on a frame with front/rear rollers.

Core Components

- Frame: The structural base supporting all parts.
- Running Belt: A continuous loop of material over which the user walks/runs, moving from front to back.
- Rollers (Front & Rear): Cylinders that guide and tension the running belt.
- Drive Motor: (Motorized Treadmills) An electric motor that rotates the front roller to move the belt.
- Control Console: The interface with buttons, displays, and a "motherboard" (IF box) to control the motor.
- Incline Motor: (Optional) Adjusts the deck's angle, often using a screw mechanism for lifting.

How It Works (Motorized)

- User Input: You set speed or incline on the console.
- Signal to IF Box: The console sends signals to the motherboard (IF box).
- Motor Control: The IF box tells the drive motor (and incline motor) how fast to run or how high to lift the deck.
- Belt Movement: The drive motor turns the front roller, pulling the belt backward at the set speed.
- Incline Adjustment: An incline motor lifts or lowers the deck using a threaded rod (screw) and bracket system.

Manual Treadmills

- These lack a motor; the belt moves only when the user pushes it with their feet.
- Often curved, using gravity and friction for resistance, with one-way bearings for safety.

Key Mechanisms & Features

- Resistance: Magnetic resistance units can adjust magnets near a flywheel for non-motorized resistance.
- Safety: Key clips disconnect power; curved belts and handles add safety in manual models.
- Folding: Some have hydraulic or pneumatic systems to lift the deck for storage.

A treadmill works by using a moving belt that goes around rollers, creating a surface where you can walk, run, or climb in place; motorized versions use an electric motor to power the belt at a set speed, while manual ones rely on your own force to push the belt backward, with both requiring you to match the belt's speed to stay in place and get a workout. The speed and incline are adjusted via controls (or your own effort), and sensors track your pace and distance.[2]

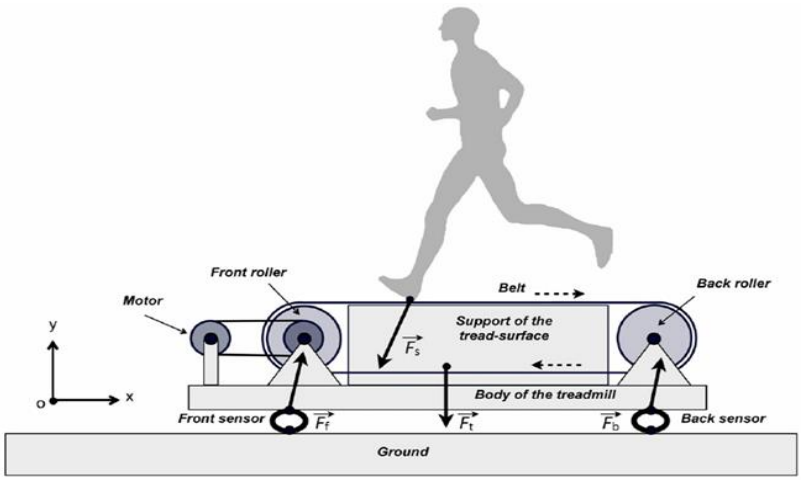

Figure-4: Mechanism of treadmill.

Motorized Treadmills (Electric)
Components: Have an electric motor, drive belt, rollers (front and back), a running deck, and a console.
Mechanism: When you press start, the motor turns the front roller, which pulls the running belt backward.
Speed Control: An electronic controller adjusts the motor's power to maintain your set speed, compensating for impact and ensuring a smooth surface.
Incline: An incline motor tilts the deck up and down for varied difficulty.

Manual Treadmills (Non-Motorized)
Mechanism: You generate the power. Pushing the belt with your feet makes it move backward, engaging more muscles.
Control: Your effort directly controls the speed; lean forward and push harder to speed up, or ease off to slow down.
Incline: Often have a fixed incline, and sometimes adjustable resistance, making them great for HIIT.

How You Use It
Start Safely: Begin on the side rails before stepping onto the belt.
Find Your Pace: Start walking slowly as the belt begins to move.
Adjust Speed: Use buttons (motorized) or your stride effort (manual) to match your desired speed.
Control Incline (Motorized): Use buttons to raise or lower the deck for hills.
Monitor Progress: The console shows time, distance, speed, and calories burned, often using your age, weight, and heart rate.

CONCLUSION

One of the most popular types of home exercise equipment is the treadmill, which provides a straightforward, efficient aerobic workout. For many, treadmills are a good choice to begin a new exercise routine because walking is well tolerated by most individuals regardless of fitness level and for most back conditions. As strength and endurance are developed, the treadmill can be used for jogging and/or for interval training.

Advantages to Using a Treadmill.
The treadmill is a relatively easy piece of exercise equipment to use. The treadmill has a predictable surface that is much easier to negotiate than sidewalks, curbs or trails and the risk of tripping is reduced. All aspects of the workout can be controlled by the user: speed, incline, warm up period, cool down period, and energy spend. Generally, users can design custom programs to fit the time they have to exercise. Multiple users can use the same equipment without adjusting the structure. Some treadmills have special features such as step counters and heart rate monitors so fitness progress can be tracked. Running on a treadmill generally burns calories faster than most other forms of in-home exercise, such as biking.

Treadmills are important for convenient, customizable, and low-impact cardio workouts that improve heart health, aid weight loss, build stamina, and boost mental well-being by releasing endorphins, all within a safe, controlled environment that reduces joint stress compared to outdoor running. They offer features like incline/speed control, calorie tracking, and consistent performance regardless of weather, making it easier to maintain an exercise routine for fitness, diabetes management, and stress relief. Users can do other things while on the treadmill, such as watch television or read, which for many can help keep the exercise interesting. If getting in shape and/or losing weight are primary concerns, treadmills might be the best machine to accomplish these objectives. In a recent study comparing exercise, users who felt that they had exercised equally strenuously on bikes and treadmills actually spent 25% more calories on the treadmill.

Disadvantages to Using a Treadmill: They can be expensive, with some models over $2000. The cushioned surface of the treadmill may still inflict too much of a jarring impact on the back or stress the hip, knee, and ankle joints. Testing the surface and rebound is critical. They can take up a lot of space. The more sophisticated treadmills take up a fair amount of space (up to 36 inches wide by 72 inches long) and generally do not fold up. Like other equipment with computerized programs and motors, maintenance of treadmills usually requires a professional. Some treadmills have loud motors that interfere with other activities near the equipment. Treadmills provide a limited kind of exercise - walking to running - so some people find treadmills boring after a while.

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