**I Have a Hard Time Walking in a Straight Line**

**Gait Disorders in Older Adults**

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**Gait disorders encompass a number of issues, including slowing of gait speed and loss of smoothness, symmetry, or synchrony of body movement.**

For older adults, walking, standing up from a chair, turning, and leaning are necessary for independent mobility. Gait speed, chair rise time, and the ability to do tandem stance (standing with one foot in front of the other—a measure of balance) are independent predictors of the ability to do instrumental activities of daily living (eg, shopping, traveling, cooking) and of the risk of nursing home admission and death.

Walking without assistance requires adequate attention and muscle strength plus effective motor control to coordinate sensory input and muscle contraction.

**Pearls & Pitfalls**

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| * Gait speed, chair rise time, and the ability to do tandem stance are independent predictors of the ability to do instrumental activities of daily living and of the risk of nursing home admission and death. |

**Normal Age-Related Changes in Gait**

Some elements of gait normally change with aging; others do not.

**Gait velocity** (speed of walking) remains stable until about age 70; it then declines about 15%/decade for usual gait and 20%/decade for fast walking. Gait velocity is a powerful predictor of mortality—as powerful as an older person's number of chronic medical conditions and hospitalizations. After age 75, slow walkers die ≥ 6 years earlier than normal velocity walkers and ≥ 10 years earlier than fast velocity walkers. Gait velocity slows because older people take shorter steps at the same rate (cadence). The most likely reason for shortened step length (the distance from one heel strike to the next) is weakness of the calf muscles, which propel the body forward; calf muscle strength is substantially decreased in older adults. However, older people seem to compensate for decreased lower calf power by using their hip flexor and extensor muscles more than young adults.

**Cadence** (reported as steps/minute) does not change with aging. Each person has a preferred cadence, which is related to leg length and usually represents the most energy-efficient rhythm. Tall people take longer steps at a slower cadence; short people take shorter steps at a faster cadence.

**Double stance time** (ie, time with both feet on the ground during ambulation—a more stable position for moving the center of mass forward) increases with age. The percentage of time in double stance goes from 18% in young adults to ≥ 26% in healthy older adults*. Increased time in double stance reduces the time the swing leg has to advance and shortens step length. Older people may increase their double stance time even more when they walk on uneven or slippery surfaces, when they have impaired balance, or when they are afraid of falling. They may appear as if they are walking on slippery ice.*

**Walking posture** changes only slightly with aging. Older adults walk upright, with no forward lean. However, older people walk with greater anterior (downward) pelvic rotation and increased lumbar lordosis. This posture change is usually due to a combination of weak abdominal muscles, tight hip flexor muscles, and increased abdominal fat. Older people also walk with their legs rotated laterally (toes out) about 5°, possibly because of a loss of hip internal rotation or in order to increase lateral stability. Foot clearance in swing is unchanged with advancing age.

**Joint motion** changes slightly with aging. Ankle plantar flexion is reduced during the late stage of stance (just before the back foot lifts off). The overall motion of the knee is unchanged. Hip flexion and extension are unchanged, but the hips have increased adduction. Pelvic motion is reduced in all planes.

**Abnormal Changes in Gait**

**Causes**

A number of disorders can contribute to dysfunctional or unsafe gait. They particularly include

* Neurologic disorders
* Musculoskeletal disorders (eg, [spinal stenosis](https://www.merckmanuals.com/professional/musculoskeletal-and-connective-tissue-disorders/neck-and-back-pain/lumbar-spinal-stenosis))

Causative neurologic disorders include [dementias](https://www.merckmanuals.com/professional/neurologic-disorders/delirium-and-dementia/dementia), [movement and cerebellar disorders](https://www.merckmanuals.com/professional/neurologic-disorders/movement-and-cerebellar-disorders/overview-of-movement-and-cerebellar-disorders), and [sensory or motor neuropathies](https://www.merckmanuals.com/professional/neurologic-disorders/peripheral-nervous-system-and-motor-unit-disorders/hereditary-neuropathies). One study compared the smoothness of gait in older adults with and without cognitive impairments and found that, in addition to the known changes in gait speed and stride length, older adults with early cognitive impairment are more likely to have important reductions in smoothness of gait ([1](https://www.merckmanuals.com/professional/geriatrics/gait-disorders-in-older-adults/gait-disorders-in-older-adults#v54069896)).

**Manifestations**

There are many manifestations of gait abnormality. Some help suggest certain causes. Video demonstrations of selected abnormal gaits are available from the [NeuroLogic Exam website](http://neurologicexam.med.utah.edu/adult/html/gait_abnormal.html" \t "_blank).

**Loss of symmetry of motion and timing between left and right sides** usually indicates a disorder. When healthy, the body moves symmetrically; step length, cadence, torso movement, and ankle, knee, hip, and pelvis motion are equal on the right and left sides. A *regular* asymmetry occurs with unilateral neurologic or musculoskeletal disorders (eg, a limp caused by a painful ankle). Unpredictable or highly variable gait cadence, step length, or stride width indicates breakdown of motor control of gait due to a cerebellar or frontal lobe syndrome or use of multiple psychoactive medications.

**Difficulty initiating or maintaining gait** may occur. When patients first start walking, their feet may appear stuck to the floor, typically because patients do not shift their weight to one foot to allow the other foot to move forward. This problem may represent isolated gait initiation failure, [Parkinson disease](https://www.merckmanuals.com/professional/neurologic-disorders/movement-and-cerebellar-disorders/parkinson-disease), or frontal or subcortical disease. Once gait is initiated, steps should be continuous, with little variability in the timing of the steps. Freezing, stopping, or almost stopping usually suggests a cautious gait, a fear of falling, or a frontal lobe gait disorder. Scuffing the feet is not normal (and is a risk factor for tripping).

**Retropulsion** is walking backwards when initiating gait or falling backwards while walking. It may occur with frontal gait disorders, parkinsonism, [central nervous system syphilis](https://www.merckmanuals.com/professional/infectious-diseases/sexually-transmitted-infections-stis/syphilis), and [progressive supranuclear palsy](https://www.merckmanuals.com/professional/neurologic-disorders/movement-and-cerebellar-disorders/progressive-supranuclear-palsy-psp).

**Foot drop** causes toe dragging or a stepping gait (ie, exaggerated lift of the leg to avoid catching the toe). It may be secondary to anterior tibialis weakness (eg, caused by trauma to the peroneal nerve at the lateral aspect of the knee or a peroneal mononeuropathy usually associated with diabetes), spasticity of calf muscles (gastrocnemius and soleus), or lowering of the pelvis due to muscle weakness of the proximal muscles on the stance side (particularly the gluteus medius). Low foot swing (eg, due to reduced knee flexion) may resemble foot drop.

**Short step length** is nonspecific and may represent a fear of falling or a neurologic or musculoskeletal problem. The side with short step length is usually the healthy side, and the short step is usually due to a problem during the stance phase of the opposite (problem) leg. For example, a patient with a weak or painful left leg spends less time in single stance on the left leg and develops less power to move the body forward, resulting in shorter swing time for the right leg and a shorter right step. The normal right leg has a normal single stance duration, resulting in a normal swing time for the abnormal left leg and a longer step length for the left leg than for the right leg.

**Wide-based gait** (increased step width) is determined by observing the patient’s gait on a floor with 12-in (30-cm) tiles. The gait is considered wide based if the outside of the patient’s feet do not stay within the width of the tile. As gait speed decreases, step width increases slightly. Wide-based gait can be caused by cerebellar disease or bilateral knee or hip disease. Variable step width (lurching to one side or the other) suggests poor motor control, which may be due to frontal or subcortical gait disorders.

**Circumduction** (moving the foot in an arc rather than a straight line when stepping forward) occurs in patients with pelvic muscle weakness or difficulty bending the knee. Spasticity of the knee extensor muscles is a common cause.

**Forward lean** can occur with kyphosis and with [Parkinson disease](https://www.merckmanuals.com/professional/neurologic-disorders/movement-and-cerebellar-disorders/parkinson-disease) or disorders with parkinsonian features associated with dementia (particularly [vascular dementia](https://www.merckmanuals.com/professional/neurologic-disorders/delirium-and-dementia/vascular-cognitive-impairment-and-dementia) and [Lewy body dementia](https://www.merckmanuals.com/professional/neurologic-disorders/delirium-and-dementia/dementia-with-lewy-bodies-and-parkinson-disease-dementia)).

**Festination** is a progressive quickening of steps (usually with forward lean), whereby patients may break into a run to prevent falling forward. Festination can occur with [Parkinson disease](https://www.merckmanuals.com/professional/neurologic-disorders/movement-and-cerebellar-disorders/parkinson-disease) and rarely as an adverse effect of dopamine-blocking drugs (typical and atypical antipsychotics).

**Sideward trunk lean** that is consistent or predictable to the side of the stance leg may be a strategy to reduce joint pain due to hip arthritis or, less commonly, knee arthritis (antalgic gait). In a hemiparetic gait, the trunk may lean to the strong side. In this pattern, the patient leans to lift the pelvis on the opposite side to permit the limb with spasticity (inability to flex the knee) to clear the floor during the swing phase.

**Irregular and unpredictable trunk instability** can be caused by cerebellar, subcortical, or basal ganglia dysfunction.

**Deviations from path** are strong indicators of motor control deficits.

**Arm swing** may be reduced or absent in [Parkinson disease](https://www.merckmanuals.com/professional/neurologic-disorders/movement-and-cerebellar-disorders/parkinson-disease) and [vascular dementias](https://www.merckmanuals.com/professional/neurologic-disorders/delirium-and-dementia/vascular-cognitive-impairment-and-dementia). Arm swing disorders may also be adverse effects of dopamine-blocking drugs (typical and atypical antipsychotics).

**SOURCE:** Merck Manual

<https://www.merckmanuals.com/professional/geriatrics/gait-disorders-in-older-adults/gait-disorders-in-older-adults>

**Why Can’t I Walk in a Straight Line?**

There are many medical reasons that result in difficulty walking in a straight line. These reason range vastly in seriousness. However, we will be discussing some of the main causes:

* Inner Ear (Vestibular) Disorders
* Neurological Disorders
* Nerve Damage
* Deconditioning
* Poor vision

**Inner Ear Disorders**

The inner ear, also known as the vestibular system plays an important role in balance. It senses important information with regards to motion, equilibrium, and spatial awareness. We have vestibular organs on each side of the head, and when both sides are functioning properly, they send symmetrical impulses. However, if one or both sides stop working correctly, problems can occur with relaying that sensory input to the brain.

Inner ear disorders usually cause issues with orientation. The most common disorder is called **Benign Paroxysmal Positional Vertigo (BPPV).** This type of disorder occurs when particles in our inner ear have moved into the wrong position. As a result, most people feel a sense of dizziness with certain head movements. This can be resolved with treatments at Physical Therapy.

Other disorders of the inner ear are caused by infection, which often require medications, and physical therapy to re-train the inner ear. This is also true of diseases of the inner ear, such as the well known Meniere’s Disease.

**Neurological Disorder**

If you feel unbalanced and can’t seem to walk in a straight line, it could be as a result of a more serious problem. This includes:

* **Stroke** – If the symptoms of dizziness and imbalance are sudden, and if you are also experiencing numbness, weakness, speech problems, or vision problems, go to the E.R. immediately.
* **Dementia** – This is a common cause of balance problems, as it is difficult for people to remember where they’re going, or what they are doing. This sudden disconnect leads to increased confusion, and an increased risk for falling.
* **Parkinson’s Disease** – This neurological condition results in changes in gait and balance. You may begin to have difficulty noticing how your body is positioned, and may, for example feel like you are standing straight, when you are actually leaning to the side, or backwards. As a result, you are more likely to loose your balance, trip and fall.

**Nerve Damage**

Nerve damage, or peripheral neuropathy, occurs when the nerves that send information between the brain and body are damaged. If the nerve damage is in the feet, or legs, this causes difficulty maintaining balance. Nerve damage is most commonly caused by **diabetes**, however it can also be the result of **infection, trauma, alcoholism, nutrient deficiencies, trauma, autoimmune diseases** and **medications**, such as side effects from **chemotherapy**. **Multiple Sclerosis** is another condition in which the central nervous system is impacted, with a a loss or balance and orientation being some of the first symptoms. This loss of balance is usually accompanied by blurry vision, and numbness on one side of the body.

**Deconditioning**

A regression in physical strength following decreased activity levels, or following a surgery also leads to a loss of balance. This tends to impact us most as we age, and naturally become less active.  However, it also impacts younger people who lead sedentary lifestyles, often those who also spend a lot of time working at a desk. With the resultant decreased strength of the legs and core, maintaining balance becomes more of  a challenge.

**Poor Eyesight**

Our visual system is one of our three main balance systems. This system interacts constantly with our vestibular system and with the positioning of our body. The vision plays a large role in balance by gathering spatial signals. If your find yourself unable to keep a steady gaze on things around you, it can result in imbalance. If you have not had your eyes checked in the last year, or if your prescription is not up to date, this can result in difficultly focusing and gathering accurate information from your surroundings. As a result, it is more difficult to keep your balance.

**SOURCE:** The Centers for Advanced ENT Care

<https://ent-md.com/news/why-cant-i-walk-in-a-straight-line/>