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Explainer: why does our balance get worse as we grow older?

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All of us have taken a tumble at some point in our lives. But as we grow older, the risks associated with falling over become greater: we lose physical strength and bone density, our sense of balance deteriorates and we take longer to recover from a fall. Alarmingly, this process begins around the age of 25. The reasons for this are varied and complex, but by understanding them better, we can find ways to mitigate the effects of old age.

The first thing to know is that the human body is inherently unstable, with a small base relative to its height. Maintaining an upright position and moving from place to place while staying balanced is a continual challenge for our bodies. Our success depends on the well-being and integration of many different systems within our bodies.

There are three main systems that provide us with the sensory information about our bodies and the surrounding environment that we need to maintain balance. These are the visual (eyes), vestibular (inner ear and semi-circular canals) and somotosensory (sensation feedback from joints in ankles, knees, spine and neck) systems. To maintain balance, our brains must rapidly and continuously integrate and then process the sensory information received from these systems, and this integration is often worse in older people who are prone to falls.

This unconscious process prompts finely tuned, co-ordinated responses from our motor and muscle systems. These responses are produced as a result of planned and unplanned challenges to our stability – such as bending over to tie your shoelace, or recovering from a playful push from a friend – which make up our everyday movement patterns.

Taking a tumble

Falls occur when the demands on postural control exceed our bodies' capabilities. This might happen when your body's pattern of movement is interrupted or suddenly changed by an unexpected hazard – for instance, when you trip over. Or, it could happen when your body is displaced beyond its support base and your attempt to correct the displacement is delayed, inadequate or inaccurate – for example, when you're pushed forcefully.

Falls are more likely to occur as you get older. With age and inactivity, the unconscious processes your brain goes through to help you balance may not integrate as well or as quickly as they used to – in other words, your cognitive abilities decline. As a result, maintaining balance and preventing harmful falls may require ever greater mental focus and prove more fatiguing. Poorer cognition can also limit your ability to multitask: the "stops walking when talking" phenomena, which you may have observed among your elderly relatives, reflects this difficulty.

Another result of ageing is that the quality of the information provided by your visual, vestibular and somotosensory systems declines. Your eyesight gets worse, with increased susceptibility to glare and poor depth perception. This can lead you to misinterpret the lay of the land, or misjudge distance, which can cause a fall.

The normal sensory feedback from your joints to the brain is reduced by swollen feet and ankles and poor flexibility. Diseases in weight-bearing joints, such as arthritis, may cause errors in foot placement, while distorted or painful feet and poorly-fitted shoes can pass misleading information to the brain about the nature of your contact with the ground when you're walking.

Vestibular abnormalities such as vertigo or inner ear infections are causes of dizziness, which can also increase the risk of a falls. Certain medications which are commonly prescribed among the older population – such as aspirin, quinine, and some antibiotics and diuretics – can lead to problems in vestibular function.

All these age-related changes increase the likelihood of a fall, as you're faced with planned or unplanned challenges to your balance during day-to-day life. But with all of these extra concerns, there's a risk that older people will to descend into a vicious spiral of inactivity: many of these "ageing" changes to the body are accelerated by sedentary behaviour, which in turn leads to a greater reduction in strength and balance, loss of bone and an increased risk of falls.

Never too late

The good news is, that it is possible to break this vicious circle and slow the process of deterioration, improve strength and balance and reduce the risk of future falls by being active.

We should all aim to be active every day and build up to 150 minutes of moderate exercise a week, which should make you feel slightly out of breath and a bit warmer. This time can be accumulated in ten-minute bursts. At least two of these short bursts should build strength and balance: examples include lifting weights, yoga, Tai Chi, Otago or postural stability classes, bowls and dancing. And it's important to check that the instructor is trained to teach older adults if the person is new to exercise.

That being said, of the trials of exercise programmes aimed at reducing falls as many have failed as have succeeded. The greatest relative effects of exercise on fall rates were seen in programmes that included in excess of 50 hours (either an hour a week for a year or twice a week for a 6 month period), together with challenging balance exercises in which people aimed to stand with their feet closer together or on one leg, minimise use of their hands to assist with balancing, and practice controlled movements of increasing sway over time.

It's never too late to start. By concentrating on forms of exercise that challenge strength and balance, we can help maintain our bodies' complex balancing systems, and confine the time we become dependent on others to a short period at the end of our lives.

Ageing **Balance** **Healthy ageing** **Cognitive decline** **Active ageing**