

A balancing act

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(written by Deborah Ellison, PT)*

Balance is an extraordinary neuromuscular feat that younger people take for granted. Through the complex, automatic integration of several body systems, we are able to accurately sense where our bodies are positioned in space in relation to the earth and we can adjust the tension in the precise muscles needed to maintain safety and alignment, all without a thought. In older adults, however, the various body systems change with inactivity and age and the unconscious processes may not integrate as well or as quickly. Maintaining balance and preventing falls can become problems that require ever-increasing focus and fatiguing, conscious effort. This article addresses how aging affects the body systems involved in balance.

Older adults and falls

For older adults, loss of balance and the ensuing falls are a widespread problem with serious physical and psychological consequences. The leading cause of injury in this population are falls (that) result in fractures, dislocations, sprains and deep, slow-to-heal bruises. Twenty-five percent of hip fracture patients never regain their previous level of independence; 10 percent die of fracture complications. Every year 30 to 50 percent of people over 65 years old sustain a fall; half of those who fall do so repeatedly. Even an occasional non-injury fall can have serious psychological impact and lead to increased fear of falling and muscular tension. These consequences can cause people to adopt "safer" postures (with larger bases of support and lower centers of gravity) and reduce their general activity. Such negative adaptations contribute to a downward spiral of decreasing sensory input, kinesthetic (body) awareness, mobility, flexibility and strength, and thus a lesser quality of life for older adults.

Risk factors for falling

Some disease processes, such as diabetes, greatly increase the risk of falling. However, many older adults who frequently lose their balance have no one particular illness or problem that can be identified as the cause of their falls. Instead, they often have many small problems, which combine to cause instability. Among the conditions that lead to falls in older adults are the following:

- sensory input (visual problems)
- tactile input (lack of feeling fingertips/soles of feet)
- sensory input from joints, ligaments & muscles

- gait abnormalities
- pain & postural changes
- decreased flexibility
- poor strength or endurance
- cognitive impairment
- medications
- environmental hazards

Changes in balance

Everyone sways slightly during quiet standing, but older adults – women in particular- sway more, especially during single-leg standing. As reflex postural preparations slow down, older adults respond less rapidly to an unexpected loss of balance. The result can be an overlap in the timing of reflexes and interference with voluntary responses. Consequently, the strategies older adults use to recover balance may be inefficient. For example, because of timing problems and perhaps a lack of strength and flexibility in the muscles and joints of the lower leg, older adults often rely more on the larger muscles of the upper leg and torso.

Changes in gait pattern may also affect balance. Older adults tend to step with their feet wider apart and spend more time in double-leg support, minimizing the time spent on one leg. Step length therefore decreases, and a more shuffling gait may result. When required to increase walking speed, older adults – perhaps because of balance issues and to avoid the single-leg stance as much as possible – increase their cadence (taking many little steps) rather than their step length; younger adults do the reverse. In addition, when older adults have disease processes such as peripheral neuropathy (secondary to diabetes or cardiovascular disease), arthritis or osteoporosis, they often change the way they walk to relieve stress and pain. Fortunately, **physically fit** older adults show fewer of these changes than their less active peers. Fitter seniors usually show the same balance recovery strategies as younger adults and are better at controlling their balance than their non-active peers. **Regular physical activity** seems to provide repeated opportunities to integrate balance systems. It appears, then, that deterioration of balance mechanisms may result more from **nonuse** than aging itself.

Arlana Taylor
Physical Therapist/Exercise Specialist