

## Fall Risk in Older adults: Posture, distractions, and statistics in multidisciplinary teams

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Falls are a very common problem in older adults. Understanding how humans maintain balance is an important task still needs much work. Understanding balance is requires a multidisciplinary approach, and studying the risk factors associated with falls offers students a way to see how different mechanical, motor, and cognitive functions play out in everyday life. To address the coming needs of the aging population, students need to be prepared to solve problems that involve mechanics, physiology, mathematics, statistics, and human behavior.

Using a force platform that measures forces and torques in 3 dimensions, we are able to track how the center of pressure shifts as the body sways. This motion can also be captured using camera based motion capture, or even a standalone accelerometer built into all smartphones.

This sway motion reveals a very interesting set of information. The simplest way to study this sway is to describe the overall fluctuation amplitude, which is associated with indoor fall risk in older adults. Applying a basic engineering model of a damped oscillator to the fluctuations, the stiffness and damping properties is associated with less risk of outdoor falls. Statistical and information properties of these fluctuations change with aging and disease, and when people are distracted by tasks that challenge the nervous system.

Students can easily measure and analyze these fluctuations in themselves and in the community, giving them the experience of applying the theoretical concepts in real life, as well as interfacing with the expertise of other disciplines.