

## Q&A: Staying safe as we age—understanding falls in older adults

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Falls are a major concern for older adults and for those that love and care for them. They are a [leading cause of injury](#) for adults older than 65, according to the U.S. Centers for Disease Control and Prevention. More than a third of those who fell reported needing medical treatment or being benched from activity for at least a day.

What can those most vulnerable to falls do to better protect themselves?

Yaejin Moon, assistant professor of exercise science in Syracuse University's Falk College of Sport and Human Dynamics, is working to answer this question.

Moon's research focuses on improving mobility and reducing [fall-related injuries](#) in people with neurological disorders and [older adults](#). It aims to understand and prevent these injuries by analyzing real-life fall videos using [artificial intelligence](#), and will soon be further explored in publication in the journal *Scientific Reports*, currently under review.

Moon answers five questions below about why the elderly are more at risk of fall-related injuries and shares tips for safe-falling techniques. She is available for interviews. Video resources are also available demonstrating various types of falls and protection techniques.

## **Why are falls so dangerous for the elderly?**

Falls are particularly dangerous for the elderly due to their high frequency and severe consequences. The dangers of falling for older adults include serious injuries like hip and hand fractures, head trauma and even death.

The combined effects of loss of muscle, bone density, flexibility, and sensory and cognitive function pose a significant threat of falling for older adults. Specifically, the loss of balance due to a trip or slip can often be recovered by quick corrective actions that require fast and powerful muscle responses. However, weaker muscles make it harder to stay balanced and to perform these corrective actions in a timely manner.

Personally, I lost two of my grandparents due to fall incidents—one

suffered a hip fracture, and the other sustained head trauma. Both passed away after a year of hospitalization following their falls.

Additionally, falls often lead to decreased mobility, loss of independence and a significant decline in the overall quality of life. The constant fear and risk of falling can also result in anxiety and reduced activity levels, impacting the well-being of even those who haven't experienced a fall or have recovered from one.

## **What are you attempting to find with your research on falls by older and mobility-vulnerable populations?**

My research aims to deepen our understanding of daily movements—how we walk, stand and fall—specifically focusing on falls experienced by older adults in real-world scenarios. Traditionally, falls in older adults have been studied through recollection methods such as questionnaires or interviews, as it is not feasible to safely replicate fall accidents.

However, just as investigators analyze the black box data from car or airplane accidents to understand the causes and develop [preventive measures](#), my goal is to analyze real-life fall videos captured by [security cameras](#) in a long-term care facility.

With advancements in artificial intelligence, we can now automatically identify and analyze human movements captured in these videos. This approach allows us to move beyond the limitations of memory-based data collection, enabling us to develop fall prevention programs grounded in real accident evidence.

By comprehending the causes and mechanics of falls as they occur in everyday situations, I plan to create more effective interventions to

prevent injuries from falls in older and mobility-vulnerable populations.

## **What have been the most interesting aspects you've discovered in doing your research?**

I have interacted with diverse populations with movement disorders, including people with multiple sclerosis and stroke survivors. While falls are a major concern for these populations, a few participants mentioned that they are not afraid of falling because they know how to fall safely. I have also practiced [martial arts](#) for the past decade and learned safe falling strategies.

Rather than dismissing this as anecdotal, I designed a study to investigate whether older adults could learn a safe falling technique, specifically the "tuck-and-roll" strategy. This technique involves tucking the chin to prevent head injury and rolling along the back to dissipate impact energy.

To start the study, I measured how hard older adults hit the ground when they fell to the side on a crash mat. Then, participants learned the tuck-and-roll strategy for 30 minutes. Surprisingly, after this short training, older adults were able to learn the technique and reduced the impact force by 33%.

Additionally, even though they were only trained to fall on their right side, they could also perform the technique during left-side falls, an untrained direction. Remarkably, they retained this ability to land softly one week after the training.

## **Though your work is ongoing, how can this research help caregivers better protect or teach their loved ones about safe falling practices?**

First, it is crucial to prevent falls from occurring. Falls happen due to a combination of environmental, behavioral and physical factors. Creating a safe environment is essential. It's important to take necessary precautions like securing rugs and carpet edges with tape, placing handrails on both sides of staircases and installing grab bars in bathrooms next to toilets and bathtubs.

Additionally, ensuring all areas of the home (including hallways and staircases) are well-lit, wearing appropriate footwear and using mobility aids such as canes and walkers can help with fall prevention.

Regular exercise is vital for improving balance, strength and flexibility. Activities such as tai chi, yoga and strength training can be particularly beneficial. In the Syracuse community, several martial arts centers offer senior classes that teach safe falling techniques, which can be an excellent resource for older adults.

Considering the use of fall detection devices could be beneficial as well. Long periods of lying on the floor after a fall can increase the fatality of fall incidents. It's important for caregivers to be notified immediately if a fall occurs. Wearable devices or smart home systems can detect falls and alert emergency services or family members promptly.

## **Do you have a few tips or recommendations to better protect oneself if about to fall?**

In general, when you begin to fall, don't resist it by trying to stay rigid, as this can cause you to fall like a stick, which is the riskiest position. Instead, go with the fall by lowering your body into a squat position to reduce the distance to the ground and help control the fall.

According to my [systematic review paper](#) on safe landing strategies

during a fall, published in the *Archives of Physical Medicine and Rehabilitation* in 2017, safe falling techniques vary depending on the direction of the fall:

- **Backward Falls:** If you are falling backward, tuck your chin to your chest to prevent hitting your head and roll along your back with the fall.
- **Forward Falls:** If you are falling forward, use your arms and knees to break the fall. Try to land on your hands and knees to distribute the impact and protect your face and head.
- **Sideways Falls:** If you are falling sideways, rotate your body to land on the back of your body and roll with the fall. Remember to tuck your chin in to protect your head.

Provided by Syracuse University

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