

# Falling During Walking

Ageing

Locomotion

Falling

Looking

## Age-related Changes in how the Brain Processes Vision

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### The Investigation

#### Objectives

Most falls in older adults occur during walking on a level surface. However, little is known about the mechanisms underlying age-related changes in walking characteristics.

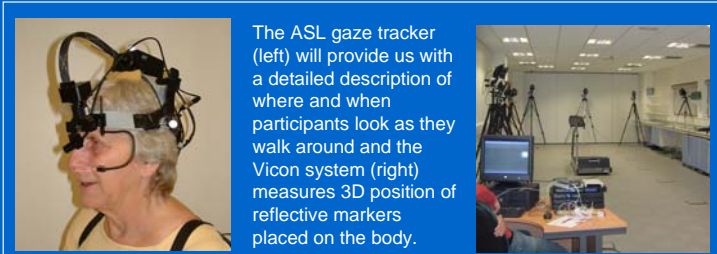
Previous research suggest that one contributing factor to age-related falls during walking is a decline in the ability of older adults' brains to process visual information describing environmental features e.g obstacles and safe places to step, and use this information to generate safe stepping movements. This study will be the first to examine how the brain's ability to use vision in this way is affected by ageing and factors associated with falls risk.

#### Plan

*High-risk older adults* characterized as having an increased risk of falling based on various clinical criteria, age-matched *low-risk older adults* and *healthy young* individuals will be asked to walk along a computer-controlled "intelligent walkway" which will control the appearance of stepping targets at various distances in front of the participants. We will manipulate both the amount of time participants will have to respond to the appearance of the target and the magnitude and characteristics of required step adjustments.

Foot placement accuracy and precision will be measured using a Vicon Motion Analysis System and gaze behaviour (i.e. where and when participants look) will be recorded using an ASL 500 gaze tracker. We predict that the stepping performance (accuracy and variability of foot placement) of high-risk older adults will be significantly worse than that of low-risk older adults and younger adults during trials in which only short periods of time are available to view the target prior to stepping adjustments (e.g. less than one second).

The results give an indication of the extent of differences between participant groups in the length of time they require looking at a stepping target in order for the brain to carry out effective visuomotor transformations needed to generate appropriate stepping adjustments.



The ASL gaze tracker (left) will provide us with a detailed description of where and when participants look as they walk around and the Vicon system (right) measures 3D position of reflective markers placed on the body.

### Potential Benefits

#### For older people

In the United Kingdom, approximately 30% of older adults living in the community fall each year. Falls are a major cause of disability and the leading cause of mortality due to injury among older adults aged over 75. The information gained from the study will be invaluable in contributing to our understanding of why people are more prone to falling with increasing age.

#### For society

Falls among older adults cost the government £981 million a year, researchers estimate. Almost 60% of the cost is borne by the NHS, with the remainder spent on long term care. Preventive measures must be introduced to protect older people and to reduce the financial toll on the NHS. The results of this study will inform the development of both diagnostic techniques to identify older adults at risk of falling and treatment and intervention programmes that promote safe looking and walking behaviour.



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