Watch your step—blur affects stepping accuracy in older adults

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Visual blurring—like that produced by bifocals or multifocal lenses—may cause errors in foot position when walking. And that could contribute to the risk of tripping and falling in older adults, suggests a study in the June issue of *Optometry and Vision Science*, official journal of the American Academy of Optometry.

The effects of blur on stepping accuracy are greatest when the person is looking ahead of where he or she is stepping, according to the study by Alex A. Black, BAppSc(Optom), PhD, and colleagues of Queensland University of Technology, Brisbane, Australia. They believe that blur and gaze position may be key factors affecting the risk of falls—especially in "challenging environments where precision stepping is required."

Blur When Looking Ahead Through Bifocals May Affect Risk of Falling

Nineteen older adults (average 72 years) with normal vision were studied while performing a series of "precision stepping tasks." The subjects performed the tasks while fixing their gaze on a target footprint, or 30 to 60 centimeters (one to two feet) ahead of the target. Gaze position was performed by an eye-tracking device.

The subjects were also tested while wearing either their normal glasses or glasses producing blurred vision. The amount of blur was similar to

that caused by looking at a distance through the "reading lens" of a pair of bifocals or multifocal ("progressive") lenses. Stepping accuracy was measured precisely using digital photography.

The participants made larger foot placement errors, and varied more in step position, when they were looking ahead of the stepping target. Visual blurring also led to increased stepping errors and variability.

The errors were greatest with the combination of blurred vision and looking ahead, especially when looking two feet ahead of the target. Blur resulted in significant "understepping" errors—that is, the foot falling short—when the subjects' gaze was directed beyond the target.

Visual blur and gaze position may contribute to the risk of falling in older adults. Blurred vision from wearing bifocals or progressive lenses may further contribute to the risk of falling—especially in the lower part of the field of view. Nearly all middle-aged and older adults need this type of vision correction due to aging-related vision changes (presbyopia).

While the stepping errors measured in the study were relatively small, Dr. Black and coauthors note that the risks could be greater in situations where foot placement is critical for safety—"such as when negotiating stairs or uneven pavements, where even small errors in foot position may be enough to instigate a trip or fall."

Especially for older adults at high risk of falling, the results serve as a reminder to "watch their step". Dr. Black and colleagues write, "Our findings...support the benefits of gaze training to maintain gaze position on stepping locations when undertaking precision stepping tasks and to improve stepping accuracy and minimize the risk of slips and trips." The researchers also suggest that some patients might benefit from single-vision prescription glasses to be worn while walking—particularly for

active older adults.

"Falls for the elderly can be quite serious in consequence, so adopting strategies for avoiding falls is very important," comments Anthony Adams, OD, PhD, Associate Editor of *Optometry and Vision Science*. "Our authors highlight the difficulty that bifocal and multifocal prescription glasses may create for the elderly, particularly if they gaze past the stepping point."

More information: Alex A. Black et al. Effect of Gaze Position and Blur on Stepping Accuracy in Older Adults, *Optometry and Vision Science* (2016). DOI: 10.1097/OPX.0000000000000831

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