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# Face masks, vision, and risk of falls

## Slowing down may be safer than looking down

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Public health experts and international organisations increasingly recommend wearing masks to help limit the spread of covid-19.<sup>1</sup> Safe and comfortable use of masks is therefore essential to maximise adoption and compliance. Formal guidance and associated media coverage have focused on discomfort and communication issues,<sup>2</sup> with little attention paid to the effect of wearing masks on risk of falling. Although guidance recommends that older adults wear masks because they are an at risk group, it is this population for whom the effects of masks on walking safety are likely to be most pronounced.

Aside from obstructing vision for glasses wearers (by causing spectacles to fog up), face masks invariably block parts of the lower peripheral visual field, even in people who do not wear glasses. Visual information from the lower peripheral field is important for detecting and avoiding nearby hazards, and for placing our steps safely.<sup>3</sup> Wearing a face mask reduces the wearer's opportunity to use this important sensory information during walking and may therefore increase the chance of tripping or falling.<sup>3,4</sup> Evidence exists that multifocal glasses (which similarly obstruct lower visual field, through blurring) can reduce safety when negotiating obstacles and stairs.<sup>5,6</sup>

It might seem logical to advise people to look down at their feet more often while wearing a face mask. This would provide the visual information that they would normally obtain through lower peripheral vision when looking ahead. Indeed, such advice is beginning to emerge.<sup>7</sup> While intuitive, we argue that this advice is flawed. To understand why, it is important to consider the two functions for which vision is used when walking.

### Don't look down

Firstly, vision is used to detect obstacles and plan a safe walking route,<sup>8</sup> especially in older adults.<sup>9</sup> Looking down more often makes it more difficult to plan ahead. Recent research using eye tracking technology shows that older adults make greater stepping errors when looking down towards their feet compared with when looking ahead and visually previewing potential trip hazards.<sup>10</sup>

Secondly, maintaining balance requires visual information (particularly from the periphery) to be integrated with other sensory inputs. This is facilitated by minimising head and eye movements during walking, to provide a stable visual "anchor" that serves as the predominant source of sensory information for regulating balance. Using vision in this manner is particularly important for older adults.<sup>11</sup> Looking down more often is in direct conflict with this strategy. It could even cause serious

instability as it requires frequent and large amplitude movements of the head and eyes,<sup>12</sup> which could lead to a mismatch between visual and vestibular feedback.

In short, a recommendation to simply "look down" when wearing a mask may paradoxically impair stability by disrupting the finely tuned system through which vision is used to maintain walking safety. This will affect not only older adults, but anyone for whom balance is particularly reliant on vision, such as people with Parkinson's disease<sup>13</sup> or diabetic sensory neuropathy.<sup>14</sup>

How can we minimise the effects of masks on walking safety? It is important to ensure that the mask fits tightly around the nose and cheeks. As well as minimising the risk of transmission of covid-19,<sup>1</sup> a tight fit will reduce the visual obstruction and minimise fogging of spectacles. In future it may be possible to obtain tailor made masks with optimal shape and fit that combine comfort with minimal visual field loss. In the meantime, spectacle wearers might borrow anti-fogging strategies from swimmers—a drop of washing-up liquid, for example.<sup>15</sup>

At risk groups should be advised to "take their time" rather than "look down." Specifically, people should take their time before starting to walk and then walk more slowly. This will ensure that they have enough time to detect upcoming trip hazards and plan a safe route.<sup>10,16</sup> Slowing down will also reduce the need for large, rapid head and eye movements while walking. Slower walking speed may have its own disadvantages, such as increased gait variability and less intense physical activity. But given the risks associated with looking down more or making no adjustment, slowing down is likely to be the least risky strategy.

Wearing masks is essential during the covid-19 pandemic, especially for at risk groups such as older adults. Mitigating the potential effects on walking safety is important to maximise use of masks and reduce the likelihood that people will avoid activities for which masks are required. Further research should be done to evaluate a range of safety strategies, including advice to slow down and use of transparent masks, to facilitate evidence based public health advice.

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