MASKING A RISK

Could Wearing a Face Covering Play a Role in Slip, Trip, and Fall Claims?

By Dr. Angela Levitan

Most of us take walking for granted, much like many of us are now taking facial coverings for granted while out and about. The question becomes, is there any potential interaction between the two? On the surface, many would say, "no," but let's take a look at the science.

Walking is a task that generally requires a low level of mental and physical workload. Human walking, or gait, entails the bipedal, biphasic cyclic movement of the lower limbs to cause forward propulsion of the center of mass of the human body. Gait is broadly divided into two phases: swing and stance, with those phases delineated by heel contact and toe-off. The gait cycle typically commences at heel contact, which begins the stance phase of the leading limb, and, more specifically, the double stance phase where both feet are on the ground. As the gait cycle progresses, the opposite foot lifts off of the ground at toe-off and swings forward. Toe-off of the trailing limb begins the single support phase of the leading foot. After toe-off, the trailing limb swings forward and becomes the leading limb as the cycle repeats.

Human gait needs to be monitored constantly to ensure a smooth transition between different steps. For most, visual information is acquired and used in a feed-forward mode to plan and initiate changes in the gait patterns to maintain a synchrony of actions for the process

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to effectively happen smoothly. While scanning the environment, visual input provides environmental information at a distance and information about self-motion through the environment.

Research has shown that, while walking, individuals who are reasonably scanning the environment have a central field of view approximately six-to-14 feet ahead. When head movement is minimized, the horizontal field of view is approximately 60 degrees, with rotation of the head increasing it to 110 degrees. Eye movements can increase the horizontal field of view an additional 15 degrees. When approaching and overcoming an obstacle, a person's gaze is intermittently focused on the obstacle and beyond the obstacle, utilizing both the central field of vision and peripheral vision.

Negotiating obstacles like elevation changes or steps requires an individual to observe, perceive, and react to the environment. Classically, visual information is taken in by the subject, which is then used to determine how to modify one's gait and initiate any changes she sees as necessary when approaching an obstacle. This information is used to determine the appropriate limb movement and foot placement.

Primarily, the swing-phase trajectory of the limb, after toe-off, is modified to avoid obstacles on the ground, select alternate foot placement, or adjust for changes in elevations. Thus, environmental information has to be seen and sampled at least one step before the changes in the normal swing-limb trajectory are initiated in order to successfully implement an adaptive strategy to negotiate an obstacle.

Negotiating an obstacle is more demanding on the motor-control system than avoiding it. Research has shown that although safe negotiation of the physical environment during gait utilizes the entire visual field, the information provided from the lower visual field (LVF) is most predominately used for last-minute updating during the approach of the obstacle. Heel clearance and pre-landing kinematic (i.e. movement) parameters are determined using LVF information acquired in the penultimate step during the approach to an obstacle or step, with information related to foot placement before the obstacle or step being the most salient. Scientific research has shown that LVF occlusion during the gait cycle can have a significant impact on foot placement, foot clearance, and other kinematic measures.

Impediments in the LVF obstruct visual-position awareness of the lower limbs relative to the obstacle. Research regarding obstacle crossing has found that direct visual information regarding the lower limb and the limb's position in the environment is important for the control of the swing-limb trajectory, as visual obstruction of the lower limb results in placing the foot farther away from the obstacle, biases the swing limb upwards, and decreases precision control of the swing limb. These adaptations are conservative and protective measures to prevent the foot from coming into contact with the obstacle. Visual cues within the environment that help identify the location of the obstacle were found to be more relevant for controlling lead- and trail-foot placement as compared to visual information regarding the location of the lower limbs.

The LVF is typically used in an online manner to control and update final foot placement, and without such control, uncertainty regarding foot placement causes toe clearance to be increased. Altered or obstructed vision in the LVF generally increases toe clearance in the lead and trailing legs, increases stepping time, and increases vertical forces during a step-down task. Changes during step up suggest a more conservative adaptation, while increased forces during step down suggest a reduced level of control.

WHERE DO MASKS COME IN?

It is all too often that, during a slip, trip, or fall, a causative factor is that the individual often claims not to have seen the condition or to have misstepped due to improper placement of her foot. Fundamentally, from a human factors' perspective, a person's ability to safely navigate her environment requires an adequate degree of cognitive attentiveness and entails an integration of sensory cues that include a visual element to develop a mental construct of the environment and evaluate any potential hazards, which includes identifying changes in the pedestrian walkway, including obstacles and changes in elevations (e.g. steps).

Typically, the visual sensory input is the primary sensory input of this process. Obstructions to the lower visual field have been shown to decrease task performance and visual distortion of ground-level objects is associated with increased fall rates. Thus, as the science has shown, vision is a key element to one safely walking through their environment.

Due to the COVID-19 pandemic and its related health guidelines, many people are performing tasks wearing a face covering. Depending upon the style of face covering and how it is being worn, it is certainly foreseeable that the face covering could obscure a part of the lower visual field.

While it has yet to be determined how this will affect claims, including those involving slips, trips, and falls, it is known that the lower visual field is a key component used by individuals to safely walk in a given environment, and it is also known that many people will be wearing facial coverings. Therefore, to properly evaluate a future slip, trip, and fall claim, it will be important to document whether the claimant was wearing a face covering and, if so, what type. ■