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A Visual Exploration of Walking in Mild Traumatic Brain Injury (mTBI)

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Title: Visual exploration during walking in people with mild traumatic brain injury

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Visual exploration of the environment is vital for safe and effective walking, and is influenced by cognitive load. Eye movement deficits can occur following mTBI and may impact visual exploration when walking, leading to issues with mobility. This study aims to examine visual exploration when walking under single and dual-task in mTBI and controls.

Sixteen people with mTBI (Age: 30.1 ± 12.8 yrs, days since injury: 39.5 ± 21.7) and 10 healthy controls (Age: 26.3 ± 5.2 yrs) walked for 1 minute while wearing a mobile eye tracker under single and dual-task conditions. The primary outcome was visual exploration measured by saccade frequency (sacc/sec). Secondary outcomes were saccade velocity and fixation duration.

Saccade frequency was slightly reduced in mTBI versus controls when walking and turning during dual-task (DT) (mTBI; DT walking: 1.1 ± 0.37 , DT turning: 1.2 ± 0.40 , control; DT walking: 1.2 ± 0.39 , DT turning: 1.4 ± 0.36). Saccade velocity, during static testing, was greater for controls during horizontal (HS) and vertical saccades (VS) (mTBI; static HS: 665.83 ± 51.13 , static VS: 611.06 ± 64.22 , control; static HS: 676.36 ± 61.44 , static VS: 640.61 ± 40.22). Fixation duration was greater for controls during dual-task turning (mTBI; DT walking: 0.152 ± 0.03 , DT turning: 0.148 ± 0.03 , control; DT walking: 0.151 ± 0.03 , DT turning: 0.172 ± 0.04).

These preliminary results indicate that visual exploration and other eye movement characteristics when walking may be impacted by mTBI. Future work will examine results in a larger cohort.