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UCT study links slower walking to cognitive decline in people living with HIV

How fast people living with HIV walk could provide important clues about their brain health, a University of Cape Town (UCT) study by the Department of Psychiatry and Mental Health's Neuroscience Institute has found. The research links slower walking speeds to poorer cognitive performance and identifies changes in brain connectivity that may help explain the relationship.

The research, published in the *Journal of NeuroVirology,* found that among people living with HIV (PLWH), slower walking speed was significantly associated with poorer overall cognitive performance and functioning, particularly in memory and motor skills. This relationship was linked to changes in the brain's frontoparietal network (FPN), a key network involved in executive functioning, attention and cognitive control.

The researchers found that PLWH who walked more slowly tended to have altered connectivity within this network, and these connectivity patterns were also associated with poorer executive function.

"Globally, a large proportion of the roughly 40 million people living with HIV experience some degree of cognitive impairment, which is often linked to greater aging in this clinical population. A substantial body of evidence also suggests that walking speed may serve as an informative and potentially clinically useful index of cognitive function in both the elderly and psychiatric patients," said Dr Jonathan Ipser from the Neuroscience Institute.

He said the research sought to test the hypothesis that gait speed is associated with cognitive function among middle-aged PLWH in a low-to-middle-income (LMIC) setting, and that this association is comparable to what is seen in much older healthy adults from the Global North.

"Finally, we sought to determine whether functional connectivity at rest for the frontoparietal cognitive control network has an impact on the relationship between walking speed and cognitive function in PLWH," said Ipser.

Thirty-nine participants were recruited for this study from a community health centre in Cape Town.

The researchers used statistical methods to compare PLWH in this sample with those without HIV. They examined how walking speed was linked to performance across different

areas of thinking and memory, and how these links related to communication within and between seven brain networks while participants were at rest.

To better understand why slower walking speed is linked to poorer cognitive functioning in PLWH, the researchers used resting-state functional magnetic resonance imaging (rs-fMRI). This brain imaging technique measures spontaneous fluctuations in blood oxygen levels, known as blood-oxygen-level-dependent (BOLD) signals, which reflect underlying neural activity. Unlike task-based scans, rs-fMRI records brain activity while participants are at rest, allowing researchers to examine how different brain regions communicate naturally.

By analysing these connectivity patterns, the study identified changes in the brain's frontoparietal network. These connectivity differences were associated with slower gait speed and poorer cognitive performance in PLWH, suggesting that altered brain network functioning may help explain the relationship between physical mobility and cognition in this population.

The findings suggest that HIV-related brain changes may contribute to both cognitive difficulties and reduced mobility, potentially reflecting accelerated ageing in this population. The authors conclude that a simple gait-speed test could serve as a practical, low-cost screening tool for identifying possible HIV-associated brain injury and neurocognitive impairment, especially in resource-limited settings.

"Based on our analyses, we found that slower walking speed was associated with poorer global neurocognitive function in our LMIC cohort, with this finding replicated in a larger public domain dataset. We also observed that connectivity within the FPN, and of the right inferior frontal cortex in particular, showed a HIV-specific relationship with both walking speed and executive function. Our findings indicate that a brief gait test may have potential as an early, low-resource indicator of HIV-associated brain injury in PLWH," said Ipser.

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