

Naturalistic driving study investigates self-regulation behavior in early Alzheimer's disease

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Driving is a complex task that involves perceptual, motor and cognitive abilities. These abilities may be affected in early Alzheimer Disease (AD) patients. Nevertheless, they continue to drive for more years than people with other dementia syndromes perhaps because of a deficit in self-awareness that prevents them from perceiving their driving difficulties and adapting accordingly. The purpose of the present pilot study was to closely examine the self-regulation behavior of older individuals with AD using a naturalistic driving approach.

In order to explore AD and healthy older drivers, a video recording device was placed behind the rear-view mirror of each driver's vehicle. Twenty [patients](#) with early-stage Alzheimer's disease and twenty-one healthy older adults were included in the study. Two expert psychologists assessed driving performance using a specially designed Naturalistic Driving Assessment Scale (NaDAS), paying particular attention to self-regulation behavior (capacity to adapt driving speed, respect safe distances, change lanes correctly, and appropriately anticipate or plan actions. All critical safety events (accident, near-accident, incident) were also recorded.

The results showed that self-regulation behavior was poorer in AD patients than in healthy older drivers. Lower self-regulation reflects a reduced capacity to adapt driving speed, ensure safe distances, change lanes, and appropriately anticipate or plan actions. Moreover, AD

patients experienced twice as many [critical events](#) as healthy older drivers. Several naturalistic driving studies have demonstrated that the number of critical events is associated with accident risk. Interestingly, two thirds of critical events were considered "unaware" events, which means the driver was observed to have no clear reaction during the critical event. AD patients who exhibited the worst self-regulation had the most critical events. This relationship between a high number of critical events and poorer self-regulation behavior has not been demonstrated previously.

One limitation of this study is the sample size. However, studies of naturalistic driving generally have low numbers of participants. Moreover, researchers took into account and analyzed the full recordings of each participant, unlike many prior studies that only analyzed samples from recordings. Investigators could have used an automated analysis method, such as those used in recent naturalistic driving studies that actively used objective outcomes that are not reliant upon raters. However, since automatic detection is performed based on behavioral responses and facial expressions, numerous critical events, especially unaware critical events, for which no behavioral reaction is visible, could go unnoticed.

Future deployment of assistance systems in vehicles should specifically target tactical components in order to help drivers suffering from cognitive deficits. It would be interesting to study how these systems are perceived by older [drivers](#). Test systems could be integrated by manufacturers into driving simulators.

More information: Laurence Paire-Ficout et al, Naturalistic Driving Study Investigating Self-Regulation Behavior in Early Alzheimer's Disease: A Pilot Study, *Journal of Alzheimer's Disease* (2018). [DOI: 10.3233/JAD-171031](https://doi.org/10.3233/JAD-171031)

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