more objective and sensitive manner. The present study used video telematics to examine relationships between VRDS performance and directly observed naturalistic driving.

Participants and Methods: 20 healthy adult drivers (ages 23-61, mean age=36; 75% women) completed a VRDS assessment that included 1) driving on a straight road, 2) following a truck on a highway, and 3) reacting to a child running into a street to retrieve a ball. Primary VRDS measures were 1) speed and lane management on the straight road; 2) speed and following distance management in the truck-following task; and 3) reaction time, stopping, and distance from the child in the child-ball task. Participants also completed 28 days of naturalistic driving with a video telematics platform in their vehicle. Driving events were detected automatically using accelerometer, GPS, and video data, and driving behaviors were coded by driving risk analysts. The primary naturalistic measure was the number of unsafe driving behaviors per hour driven; specific driving behaviors served as exploratory variables. We examined correlations between VRDS and naturalistic driving variables. Given limited statistical power, we reported correlations that were small-to-medium or greater (r>.2) in primary analyses and medium-to-large or greater (r>.4) in exploratory analyses.

Results: On average, drivers exhibited approximately one unsafe driving behavior per hour (M=0.9, SD=0.9, range=0.1-2.7). Common behaviors were failing to stop, unsafe following distance, speeding, and cell phone use. No collisions occurred. Average lane position in VRDS (specifically, leftward deviation from the center of the lane) was correlated with more real-world unsafe driving behaviors per hour (r=.35, p=.13), as were higher average straight road speed (r=.26, p=.27), greater straight road speed variability (r=.28, p=.24), and failing to stop for the child in the child-ball task (r=.22, p=.36). In exploratory analyses, failing to stop for the child was associated with real-world distracted driving (r=.45, p=.047), greater lane position variability in VRDS was associated with real-world unsafe following distance (r=.57, p=.009), and greater speed variability in VRDS was associated with real-world seat belt non-use/misuse (r=.49, p=.03).

Conclusions: The present findings provide preliminary evidence that VRDS variables are related to directly observed naturalistic driving, supporting the potential utility of VRDS as a sensitive, ecologically valid driving evaluation tool. As the present study used a small sample of healthy drivers, further research will explore this topic in larger samples and in clinical populations, such as acquired brain injury. Future work will also investigate whether incorporating VRDS with conventional driving evaluation tools (e.g., neuropsychological tests, behind-the-wheel assessments) can enhance the ability of clinical driving evaluations to predict real-world risky driving.

Categories: Teleneuropsychology/ Technology
Keyword 1: driving
Keyword 2: assessment
Keyword 3: technology
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88 REASmash: A serious game in immersive virtual reality for the evaluation of spatial and non-spatial attention impairments in post-stroke individuals.

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Objective: Stroke results in various cognitive and motor impairments. The most frequent cognitive problem is spatial and non-spatial attention, typically caused by unilateral brain lesion. Attention is typically assessed with several different paper-and-pencil tests, which have long been criticized for their lack of theoretical basis, their limited ecological validity to deficits experienced in daily life, and their lack of measurement sensitivity (Appelros et al., 2004; Azouvi, 2017). Here, our global aim was to develop an innovative integrative serious game in an immersive environment. The REASmash, combines the evaluation of spatial attention, non-spatial attention, and motor performance. We present the spatial and non-spatial cognitive attention evaluation results.

Participants and Methods: Eighteen first stroke individuals and 40 age-match healthy

controls were assessed on the REASmash. They were instructed to find a target mole presented amongst distractor moles. The stimulus array consisted of a grid of 6 columns and 4 rows of molehills, from which the target and 11, 17 and 23 distractors moles could randomly appear, in two search conditions (single feature condition and saliency condition). Responses were made with the ipsilesional hand for individuals with stroke and with the dominant hand for the healthy controls. Participants were evaluated also with two standardized clinical tests of attention; the hearts cancellation task of the Oxford Cognitive Screen, and the visual scanning subtest of the Test for Attentional Performance.

Results: Validation results showed significant and strong correlations between the REASmash and the two reference tests, with the REASmash showing high sensitivity and specificity (i.e., the correct identification of the post-stroke vs. control individuals). The REASmash also showed significant and strong test/re-test reliability. We additionally evaluated user experience using the UEQ, and the results showed excellent attractiveness and novelty, and good stimulation and efficiency.

Conclusions: In conclusion, the REASmash is a novel immersive virtual environment serious game that is valid, sensitive, and usable. It provides a new diagnosis measure spatial and non-spatial attention impairment.

Categories: Teleneuropsychology/ Technology
Keyword 1: stroke
Keyword 2: computerized neuropsychological testing
Keyword 3: neglect

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89 Performance and Usability of a Remote App-Based Assessment of Cognition Among Older Adult Mobile Game Players and Non-Players

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Objective: Mobile, valid, and engaging cognitive assessments are essential for detecting and tracking change in research participants and patients at risk for Alzheimer's Disease and Related Dementias (ADRDs). The mobile cognitive app performance platform (mCAPP) includes memory and executive functioning tasks to remotely detect cognitive changes associated with aging and preclinical Alzheimer's disease. This study assesses participants' comfort and subjective experiences with mCAPP as the potential utility and advantage of mobile app-based assessments for remote monitoring among older adults will depend upon usability and adoptability of such technology.

Participants and Methods: The mCAPP includes three gamified tasks: (1) a memory task involving learning and matching hidden card pairs ("Concentration") (2) a stroop-like task ("Brick Drop"), and (3) a digit-symbol coding-like task ("Space Imposters"). Participants included 37 older adults (60% female; age=72±4.4; years of education=17±2.5; 67% White) with normal cognition enrolled in the Penn ADRC cohort. Participants completed one baseline session of mCAPP in-person, followed by two weeks of at-home use with eight scheduled sessions. Information on prior experience with mobile technology and games was collected, and usability of mCAPP was measured at baseline and after 2-weeks of use with the IBM Computer Usability Satisfaction Questionnaire and the mHeath App Usability Questionnaire (MAUQ) respectively. Feedback on perceived difficulty, enjoyment, and likelihood to play mCAPP games again on their own was collected.

Results: Participants completed on average 11±4.9 sessions over 2 weeks, with each session lasting 11.5±2.5 minutes. 59% of participants reported using their mobile device to play games ("mobile game players"). Performance on mCAPP tasks was slower at baseline for non-players, with trend-level differences on higher-load blocks of Space Imposters (p=.057 and .059). No differences in game performance were seen between groups after playing 8 sessions at-home. There were no differences in usability of mCAPP between groups, with average usability 8.2±1.5 (IBM, 0-9 scale) at T1 and 6.2±0.8 (MAUQ, 1-7 scale) after completion of two weeks of at-home use