Development of a Comprehensive Physical, Sensory, and Cognitive Assessment Battery for Driving Safety and Behavior
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Purpose

- Physical performance, frailty, and/or the presence of significant medical conditions may put individuals at risk for unsafe driving and even increase the likelihood of injury in the actual event of a crash (Ackerman et al., 2008; Edwards et al., 2009; McGwin et al., 2000).
- Although vision is thought to represent the major sensory input involved with driving, research on the relationship between visual function and driving outcomes is mixed (Anstey et al., 2005; McGwin et al., 2008).
- Some cognitive processes have been implicated in driving performance over others:
  - Processing speed/attention has been shown to predict at-fault crashes and on-road driving performance (Ball et al., 2006; Ott et al., 2008).
  - Executive function, particularly planning & judgment, has been shown to predict driving success (Ott et al., 2008; Snellgrove et al., 2005). It is also one of the first cognitive domains to decline with age and may not be fully developed in teens (Anstey et al., 2005).
  - Performance on assessments of visuospatial perception have been linked to on-road driving performance (Reger et al., 2004; Stapin et al., 2013).

We have developed a comprehensive physical, sensory, and cognitive assessment battery for use in the Senior and Adolescent Naturalistic Driving Study (SANDS).

We will use this battery to identify characteristics of at-risk teen and older adult drivers which predict real-world naturalistic driving outcomes.

Proposed Test Battery

- **Sensory Function**
  - Dot Motion
  - Far Visual Acuity
  - Contrast Sensitivity

- **Physical Performance**
  - Postural Sway Test
  - Turn 360
  - Functional Reach
  - Timed Up & Go

- **Cognitive Function**
  - Processing Speed/Attention
  - Executive Function
  - Visuospatial Perception/Planning

- **Physical & Psychological Health**
  - Health Inventory
  - Sleep Quality Inventory
  - Cognitive Activities Scale
  - Depression Scale
  - Personality Inventory

Discussion

- There is currently no standardized, agreed-upon combination of measurements for the prediction of driving outcomes.
- The strength of the SANDS testing battery is its inclusion of a diverse set of psychometrically sound assessments chosen to probe specific hypothesis about predictors of naturalistic driving outcomes.

Specifically:
- Well-validated and widely used physical performance measures tapping balance, flexibility, and agility.
- Well-validated measures of, not only basic visual sensation, but also visual-perceptual ability.
- Reliable and well-validated neuropsychological measures thought to tap cognitive domains specifically hypothesized to be involved in driving. More global cognitive inventories have been largely unsuccessful at predicting driving outcomes.
- Well-validated measures of health, sleep, cognitive engagement, emotional status, and personality traits. The relationship between psychological variables and driving has not been fully explored.

The SANDS project aims to identify a set of predictors highly sensitive to differentiation of driving outcomes among at-risk drivers.

Such a battery would be valuable in both clinical and regulatory settings and could even inform potential targets for intervention.

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