Beyond summarized measures: Predictability of specific measures of simulated driving by specific physical and psychological measures in older drivers

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Older drivers

- An enormous increase in the older population
  - Increased life expectancy
  - Baby boom: 1946 - 1964

- An increase in active way of living

  ➔ An increase in the number of older drivers
Older drivers - continued

- Unfortunately, these older drivers (>70 years) are at a higher risk of a crash
  - Decreased number of kilometers driving
  - Increased frailty
  - Decline in functional abilities, e.g. cognitive, visual and motor abilities

- Decision for driving cessation is not easily made
  - Linked with isolation & depression
Older drivers - continued

- Assessing fitness-to-drive: Why do they fail to drive safely?
  - Age?
    - Alone, not an adequate predictor
    - Incorrect stereotype: Not all older drivers are unsafe drivers
  - Functional ability?
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Does age and/or functional ability predict driving performance of older drivers?

Analysis: ANCOVA
Participants

- Inclusion criteria:
  - Age: 70 years of older
  - No stroke past 4 months
  - Driver licence category B
  - Active car driving

- 78 volunteers, 47 persons remained in sample
  - Simulator sickness (N=22)
  - Outliers (N=9)

- Mean age = 76.21 years (st.dev.=5.66 years)
Procedure

- Off-road assessment → Two sessions:
  1. Neuropsychological testing battery
     → Jessa Hospital
  2. Driving simulator test
     → Transportation Research Institute (IMOB)
Assessment @ Hospital

- Measures of psychological and physical ability
  = Extensive neuropsychological testing battery: 16 tests
  → Combination of global and specific tests!

  - Cognition: working memory, processing speed, attention (e.g. divided), etc.
  - Motor: physical flexibility and balance
  - Vision: visual acuity
  - Knowledge: road signs
Driving simulator test: A medium-fidelity driving simulator (STISIM M400; Systems Technology Incorporated)

- Driving situations which are known to be difficult for older drivers:
  - Turning left at an unsignalized intersection
  - Giving way at an unsignalized intersection
  - Response to road hazards

- Different road types
- Different speed limits

→ 15.2 kilometers
Measures of simulated driving

- Mean speed
- Speed violations
- Standard Deviation of Lateral Position (SDLP)
- Gap acceptance
- Giving right of way
- Complete stop at a stop sign
- Following distance
- Detection of road hazard
- Reaction to road hazard
- Collisions
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Results

Age

Knowledge

Vision

Motor

Cognition

Mean speed

SDLP

Gap acceptance

Detection time

Giving way

Complete stop

Following distance

Collisions
Conclusions

- **Age alone** as a criterion is **not sufficient**

- Measures of **functional ability**
  - **Cognitive measures** (e.g. processing speed) are better predictors than physical measures (e.g. visual acuity)
  - **Specific measures** (e.g. divided attention, working memory) better predict than global measures (e.g. cognition: attention, memory, etc.)

- Knowledge of road signs does not predict driving performance
Conclusions - continued

- **Functional age** is more representative than chronological age

- Functional ability is associated with driving performance, even in the absence of diagnosed neurological disease!
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Screening

- Age criterion: not beneficial → stigmatization
- Current procedures: visual tests mandatory in many countries, while cognitive tests are not
- Physicians: Need of a simple but effective cognitive test → Trigger for a multi-dimensional screening

Assessment

- Driving test (in simulator or on road)
Implications - continued

- Intervention:
  ‘Get old folks off the road’ → ‘Help them keeping on the road’

  - Training tailored to the individual:
    - Driving functions e.g. turning left
    - Driving performance training
      - Computer
      - Simulator
      - On road

  - Neuropsychological functions e.g. executive control
    - Cognitive training
      - Computer
Thank you!

Questions?

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