Review Question
What is the evidence for the effect of interventions to address cognitive and visual function, motor function, driving skills, self-regulation/self-awareness, and the role of passengers and family involvement in the driving ability, performance, and safety of the older adult?

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Guided Research Process
• Updating of:
  • AOTA collaboration
    — Marian Arbesman, PhD, OTR/L
    — Deborah Lieberman, MHSA, OTR/L, FAOTA
  • Focused on Level I—III studies published between 2005 and 2012

Search Process & Results
• 47 articles flagged for full review
• 27 articles met criteria – several articles reported on more than one intervention approach

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<th>LEVELS of EVIDENCE</th>
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<tbody>
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<td>Education</td>
<td>7</td>
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<td>13</td>
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<td>3</td>
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<td>On-Road Training</td>
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Significance of the Review Question
• As drivers age, their potential of dying in a traffic crash increases.
• Occupational therapy practitioners promote healthy aging by encouraging older drivers to monitor their driving health and address physical and/or cognitive changes resulting from aging, injury, or disease.
• Occupational therapy interventions for older drivers address cognition, vision, motor, and driving skills; self-regulation; and driver and family education to improve driving ability, performance, and safety.

Results – Education
• Classroom Educational Sessions Alone:
  — Improved drivers’ knowledge (Narudi, 2007; Level II; limited evidence)
  — Did not significantly change driving habits (Jones et al., 2011; Level I; moderate evidence)
• Classroom Educational Sessions Combined with On-Road Training – strong evidence:
  — Improved driving knowledge and on-road driving performance (Bedard et al., 2008; Level I; Korner-Bitensky et al., 2009; Level I; Marottoli, Van Ness et al, 2007; Level I)
  — Significantly reduced unsafe driving actions in certain areas of a road test (Bedard et al., 2008; Level I; Marottoli et al., 2007; Level I)
  — No studies provide evidence of reduce crashes (Korner-Bitensky et al., 2009 Level I)

Results – Education
• Imposed Driving Restrictions:
  — Resulted in safety profiles similar to ‘safe’ drivers, good compliance with restrictions, and no incidents of reported traffic violations or crashes (Freund & Petrakos, 2008; Level III; limited evidence).
• CarFit Educational Program:
  — 60 – 70% of participants implemented one or more vehicle adjustments (Gaines et al., 2011; Level I; Stav, 2010; Level IV; limited evidence).
Results – Education

**Education for Drivers with Disabilities:**
- **Stroke:** Combination of in class and on-road training significantly increased traffic theory knowledge and driving performance (Sundstrom et al., 2006; Level I; limited evidence).
- **Low Vision:** Systematic review found limited evidence that education improved drivers’ self-awareness and improved performance but did not reduce crashes (Strong et al., 2008; Level I).

**Education for Caregivers of Drivers with Dementia:** (Stern et al., 2008, Level I; moderate evidence)
- Caregivers demonstrated greater self-efficacy,
- Discussed driving cessation or limitations with driver, and
- Were more aware of, and likely to use, cessation agreement form

Results – Cognitive Perceptual Training

**Drivers with Low Vision:**
- Systematic review found limited evidence of the effectiveness of biotic telescopic lens or visual field enhancement systems (i.e., prisms) on driving performance of individuals with low vision (Strong et al., 2008; Level I).

**Drivers with Stroke:**
- Systematic review found UFOV training improved on-road performance in drivers with right hemisphere strokes (Strong et al., 2008; Level I).
- Dynavision Light Training Board did not significantly improve on-road driving performance of drivers 1 month post-stroke (Crotty & George, 2009; Level I; moderate evidence).

Results – Physical Fitness

**Short Term Home or Community Based Fitness Programs:**
- Physical tasks requiring simultaneous cognitive/perceptual skills improved simulator driving performance (Marmoleira et al., 2009; Level I; moderate evidence).
- Physical tasks mimicking driving using driving props improved self-reported driving skills and confidence (Caragata et al., 2009; Level I; limited evidence).
- Graduated exercise programs stabilized driving performance and resulted in fewer critical errors during on-road test 3 months post intervention (Marottoli, Allone et al., 2007; Level I; moderate evidence).
- No studies provide evidence of reduced crash risk (Kornr-Bitensky et al., 2009; Level I)

Results – Simulator Training

**Simulator Training with Active Personalized Feedback:**
- Improved identification of peripheral hazards at intersections during simulator drives (Romoser & Fisher, 2009; Level I; limited evidence).
- Improved perception of skills, receptiveness to changing driving behaviors, and performance of secondary tasks during real-world driving (Romoser & Fisher, 2009; Level I; limited evidence).

**Simulator Training with Drivers with Stroke – Strong Evidence:**
- Improved simulator-based driving performance (Strong et al., 2008; Level I).
- Immediate improvements in on-road driving performance maintained at 6 months (Akramuzzaman et al., 2005; Level I).
- Improved anticipation and perception of signs, visual scanning behavior and communication, quality of traffic participation, and left turns (Nex et al., 2009; Level I).

Results – On-Road Training

**Coaching During On-Road Training:**
- Focused on approaching and negotiating hazards to reduce crash risk significantly improved behaviors/ skills (Stanton et al., 2007; Level I; limited evidence).
- Distributed practice (6 observed drives lasting 45 minutes each over 8 to 12 weeks).

**On-Road Training Combined with Classroom Sessions – Strong Evidence:**
- Significantly increased road test scores and resulted in 36% fewer critical errors - predicted to equal 9.5% reduction in crash risk (Merrotolo, Van Nex et al., 2007; Level I).
- Instructor feedback during on-road training significantly reduced unsafe driving actions sustained 8-12 weeks post intervention (Bedard et al., 2008; Level I).
Results – On-Road Training

- **Simulator and On-Road Driving:**
  - Personalized feedback on peripheral hazard at intersections significantly increased secondary looks 35% in simulator drives and 37.9% in community drives (Romoser & Fisher, 2009; Level II; limited evidence).
- **Drivers with Strokes:**
  - Significantly improved driving performance and knowledge traffic theory with combination of on-road and classroom sessions (Soderstrom et al., 2006; Level II; limited evidence).

Limitations of Reviewed Studies

- **Sampling:** low number of participants in several studies; elimination of drivers with lower cognition; high drop-out rates in several studies; variability in length of time since stroke.
- **Interventions:** lack of detail of training programs; unclear which components of combined interventions were effective.
- **Outcomes:** self-report; limited or no long-term follow up; limited, police reported, or no crash data; unknown if some clinical improvements result in a meaningful change to real-world driving.

Implications for Practice

- Occupational therapy practitioners should consider the use of visual, cognitive, motor, and educational interventions when working with the older driver on community mobility issues:
  - Educational programs focused on awareness and self-regulatory behaviors
  - Computer-based speed of processing training
  - Hazard perception training
  - Personalized feedback on driving performance using video-taped drives
  - Simulator and on-road training with coaching and feedback on performance
- Physical fitness programs that simultaneously challenge cognitive perceptual skills may prolong driving years and delay cessation.

Implications for Education

- Educational curriculums should teach person-related driving interventions supported by evidence.
- OT/OTA students engaged in health promotion projects may focus on older driver safety through community CarFit events and exercise groups in senior centers.
- Caregivers can competently address issues of driving cessation with drivers with dementia after participating in psycho-educational support groups.

Implications for Research

- Need for continued efficacy studies on the ability of person focused interventions to:
  - Delay driving cessation (i.e., longitudinal studies),
  - Return drivers with injuries/illness to independent driving.
- Need for clarification of the type, combination, quantity, frequency, and duration of effective person-related interventions for driving.
- Need for reliable and valid outcome measures (i.e., standardized road tests, crash data, etc.).
- Need for efficacy evidence on person-related interventions to support advocacy for reimbursement of driving rehabilitation.