



## AOTA Critically Appraised Topics and Papers Series

# Driving and Community Mobility for Older Adults

*\*A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

### CRITICALLY APPRAISED PAPER (CAP)

#### *Focused Question*

**What is the evidence for the effect of automobile-related modifications on the driving ability, performance, and safety of the older adult? Modifications include changes by the industry that enhance or hinder the driving ability, performance, and safety of the older adult.**

Laux, L. F. (1991). *Locating vehicle controls and displays: Effects of expectancy and age*. Washington, DC: AAA Foundation for Traffic Safety.

#### PROBLEM STATEMENT (JUSTIFICATION OF THE NEED FOR THE STUDY)

State the problem the authors are investigating in this study.

A study conducted in the 1970s researched expectancy on performance when locating vehicle controls and recommended that several controls should be in standard locations. In addition, the researchers found that older people took longer to find controls regardless of whether the controls were in expected locations or not.

#### RESEARCH OBJECTIVE(S)

List study objectives.

- Do drivers have strong expectancies or stereotypes for locations of controls and displays?
- Do older drivers have different expectancies or stereotypes for these locations than younger drivers?
- Do expectancies affect search and location time?
- Are older drivers slower compared to younger drivers when searching for controls when the control is not in the expected location?

#### DESIGN TYPE:

Randomized Mixed Factors Design

**Level of Evidence:**

I

Limitations (appropriateness of study design):

Was the study design type appropriate for the knowledge level about this topic? *If no, explain.*

Yes

No

**SAMPLE SELECTION**

How were subjects selected to participate? Please describe.

Convenience—volunteers

**Inclusion Criteria**

Older participants had to be active, living independently, and currently driving.

**Exclusion Criteria**

- Physically handicapped, visually impaired, or blind
- A score of more than 2 standard deviations below the mean of cognitive functioning

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes

No

Attention

Yes

No

Others (list and explain):

**SAMPLE CHARACTERISTICS**

N = 16 young and 22 older

% Dropouts

#/(%) Male  #/(%) Female

Ethnicity

Disease/disability diagnosis

NR = Not reported.

Check appropriate group:

<20/study group	20–50/study group <input checked="" type="checkbox"/>	51–100/study group	101–149/study group	150–200/study group
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Sample Characteristics Bias: *If no, explain.* If there is more than one study group, was there a similarity between the groups?

Yes

No

N/A

Were the reasons for the dropouts reported?

Yes

No

N/A

**INTERVENTION(S)**—Included are only those interventions relevant to answering the evidence-based question.

*Add groups if necessary.*

Group 1 and 2 (older and younger)

Brief Description	Driver expectancies for the location of 14 controls and 4 displays were assessed. Three cars that showed variability in control/display location were used to test how long drivers took to locate target controls and displays.
Setting	Trained in the subject's personal car and then assessment in the three experimental cars
Who Delivered?	4 experimenters were randomly allocated to each subject
Frequency?	Once
Duration?	Length of experiment

Intervention Biases: Explain, if needed.

Contamination

Yes

No

Co-intervention

Yes

No

Timing

Yes

No

Site

Yes

No

Use of different therapists to provide intervention

Yes  There were 4 experimenters testing, and subjects were randomly assigned to each one. A previous inter/intra-rater reliability test was not conducted, thus leaving opportunity for bias. However, a rigorously designed protocol with detailed experimenter instructions helped to reduce the bias

No

**MEASURES AND OUTCOMES**—Included are measures relevant to answering the focused question

Name of measure:

Driver expectancy survey

Outcome(s) measured (what was measured?):

The expectancy of where controls/displays in an unfamiliar car would be located

Is the measure reliable (as reported in article)?

Yes

No

NR

Is the measure valid (as reported in article)?

Yes

No

NR

How frequently was the measure used for each group in the study?

1 time prior to testing

Name of measure:

Length of time for driver location of control/display

Outcome(s) measured (what was measured?):

Control/display locating time (time from the appearance of an asterisk on the heads up display until the subject touched the device and said “there”)

Is the measure reliable (as reported in article)?

Yes

No

NR  However this was a previously designed method that may have reliability/validity issues reported in the past study

Is the measure valid (as reported in article)?

Yes

No

NR  However this was a previously designed method that may have reliability/validity issues reported in the past study

How frequently was the measure used for each group in the study?

This measure was taken every time a control/display item was requested (14 + 4 trials = 18).  
With the 3 different cars this measure was used a total of 54 times per subject.

### Measurement Biases

Were the evaluators blinded to treatment status? *If no, explain.*

Yes

No

Recall or memory bias? *If yes, explain.*

Yes

No

Others (list and explain):

Limitations (appropriateness of outcomes and measures) *If no, explain.*

Did the measures adequately measure the outcome(s)?

Yes

No

## **RESULTS**

List results of outcomes relevant to answering the focused question.

Include statistical significance where appropriate ( $p < 0.05$ ).

Include effect size if reported.

Across all controls/displays, there was a main effect of vehicle ( $p < .0002$ ) and age ( $p < .0001$ ) on control location time but no main effect of sex and no sex x age or sex x vehicle interaction.

Drivers have a strong location expectation for many controls, and the expectations mirror the most common locations found in vehicles. Some location expectancies have changed since the previous study, and some controls that changed location have “expectancy lag” (i.e., longer location time). Older drivers had the same expectancy locations. Location expectancies do affect location times when people drive an unfamiliar car. Older drivers were significantly slower in location about 30% of the controls. Average times to locate controls were significantly different.

Was this study adequately powered (large enough to show a difference)? *If no, explain.*

Yes

No

Were appropriate analytic methods used? *If no, explain.*

Yes

No

Were statistics appropriately reported (in written or table format)? *If no, explain.*

Yes

No

## CONCLUSIONS

State the authors’ conclusions that are applicable to answering the evidence-based question.

Older drivers were slower on controls/displays that they would likely not use or need in an everyday situation. Different displays and control layouts impose different attentional loads on drivers as they search for a control or display. Driving tasks already impose a substantial cognitive load on drivers, and minimizing the load of locating controls and displays is important, especially for older drivers. Standardization of controls/displays should be considered based on the increasing complexity of these devices and their potential to distract drivers from the driving task. This standardization has the potential to reduce the attentional demands required for two different stimuli (e.g., the driving task and location of a control).

Were the conclusions appropriate for the Study Design (Level of Evidence)? *If no, explain.*

Yes

No

Were the conclusions appropriate for the statistical results? *If no, explain.*

Yes

No

Were the conclusions appropriate given the study limitation and biases? *If no, explain.*

Yes

No

## IMPLICATIONS FOR OCCUPATIONAL THERAPY

This section provides guidance about clinical practice, program development, and other implications of the study findings as they relate to the focused question.

This study offers significant evidence that the location of controls should be standardized in order to reduce visual attention distractions from the driving task. Unfortunately, clinicians do not have control over this standardization process unless they participate in more research that convinces designers that uniformity is necessary for driver safety. Clinicians can, however, determine if control location time is affecting a client's ability to drive safely and employ techniques to increase driving safety (e.g., adaptive techniques or repetition for familiarization).

This work is based on the evidence-based literature review completed by Joseph M. Pellerito, Jr, MS, OTR with contributions from Stacey Schepens, OTR.

CAP Worksheet adapted from: Critical Review Form – Quantitative Studies ©Law, M., Stewart, D., Pollack, N., Letts, L., Bosch, J., & Westmorland, M., 1998, McMaster University. Used with permission.

For more information about the Evidence-Based Literature Review Project, contact the American Occupational Therapy Association, 301-652-6611, x 2052.



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