



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.

Sayer, J. R., Mefford, M. L., Flannagan, M. J., & Sivak, M. (1999). The effects of hydrophobic treatment of the driver-side window and rearview mirror on distance judgment (Report No. UMTRI-99-22).

PROBLEM STATEMENT (JUSTIFICATION OF THE NEED FOR THE STUDY)

State the problem the authors are investigating in this study.

The application of hydrophobic treatment to a vehicle windshield has previously been shown to improve driver visual performance through improved visual acuity and reduced response times, particularly for older drivers. The two most common causal factors in lane change crashes have been reported to be that the driver did not see the vehicle or misjudged the gap. Older drivers are more likely to be responsible for in-merge and lane change crashes.

RESEARCH OBJECTIVE(S)

List study objectives.

To investigate the potential benefits of using hydrophobic treatment on the driver-side window and exterior rearview mirror.

DESIGN TYPE:

Randomized Mixed Factors

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

- Men and women
- Younger and older
- Other details were not reported

Exclusion Criteria

NR

NR = Not reported.

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes

No

Attention

Yes

No

Others (list and explain):

SAMPLE CHARACTERISTICS

N = 24 (12 older and 12 younger)

% Dropouts

#/(%) Male

#/(%) Female

Ethnicity

Disease/disability diagnosis

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
-----------------	---	--------------------	---------------------	---------------------

Sample Characteristics Bias: *If no, explain.*

If there is more than one study group, was there a similarity between the groups?

Yes

No

Were the reasons for the dropouts reported?

Yes

No

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	Intervention included 8 distances of a target vehicle beside the subject’s vehicle, with 4 experimental vehicle conditions using hydrophobic treatment (untreated mirror/untreated window, untreated mirror/treated window, treated mirror/untreated window, and treated mirror/treated window). During all trials, water was being sprayed on the windows to simulate rain.
Setting	Laboratory
Who Delivered?	2 experimenters
Frequency?	3 trials of each of the 8 distances for the 4 experimental vehicle conditions
Duration?	NR

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

No

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

Name of measure:

Distance estimation

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

Distance estimation to a target vehicle viewed through the driver-side window and exterior rearview mirror.

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?

96 distance estimations were made

Measurement Biases

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

Yes The nature of the subjects (i.e., young and old) unmasked which group they were in. However, the report of distance given by the subjects was objective and could not be altered by the experimenter.

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.

The effect of actual distance was significant ($p < .001$). Neither participant age nor sex was significant, but there was a tendency for older participants to provide distance estimates that were shorter than the younger participants. Drivers tended to report shorter distance estimates when the driver-side window received the treatment; however, this difference was not significant. There was also a nonsignificant tendency to report slightly shorter distance estimates when the treatment was used on the mirror. There was a nonsignificant tendency for hydrophobic treatment of the driver-side window to result in shorter distance estimates for the older group.

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

Yes

No

✓ This study only had 12 participants in each age group. Tendencies were reported but the researchers acknowledged that more research is necessary for stronger evidence supporting use of the hydrophobic treatments.

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

Yes

✓ Researchers utilized a repeated measures ANCOVA for all independent variables.

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.

The effect of actual distance on distance estimation was to be expected based on previous distance perception research. Additional research efforts should be focused on examining the potential for a safety benefit of hydrophobic treatment on windows specifically for older drivers. Application of hydrophobic treatment to the driver-side window for younger participants, or to the rearview mirror for either age group, resulted in essentially no change in distance estimates.

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.

Occupational therapists are often asked for advice as to whether aftermarket additions to a motor vehicle will improve driving performance. This study indicates that there is no benefit to hydrophobic treatment.

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.



Copyright 2007 American Occupational Therapy Association, Inc. All rights reserved.
For personal or educational use only. All other uses require permission from AOTA.
Contact: copyright@aota.org