



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 policy and community mobility programs (e.g., alternative transportation, walkable communities, education, and pedestrian programs) on the participation of the older adult?

Staplin, L., Gish, K. W., & Wagner, E. K. (2003). MaryPODS revisited: Updated crash analysis and implications for screening program implementation. *Journal of Safety Research*, 34, 389–397.

PROBLEM STATEMENT (JUSTIFICATION OF THE NEED FOR THE STUDY)

State the problem the authors are investigating in this study.

The researchers conducted this study in a national effort to reduce the high number of older driver crashes, injuries, and fatalities as well as establish guidelines to meet the impending increased societal need as the population ages.

RESEARCH OBJECTIVE(S)

List study objectives.

This study aims to follow up the existing data retrospectively and prospectively in an effort to answer the question: How much more likely is it that drivers will be involved in a crash if they fail a test than if they pass the test? Ultimately, the researchers are seeking support to establish policy recommendations for testing.

DESIGN TYPE:

Cohort study

Level of Evidence:

II

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.

Controlled/Purposive—Deliberate selection of individuals

Inclusion Criteria

- 55 years or older involved in the MaryPODS study
- MaryPODS study participants involved in “at fault” crashes between 1/5/01 and 12/26/01
- Licensed in the state of Maryland

Exclusion Criteria

Crashes coded as “not at fault” or “fault unknown”

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes

No

Attention

Yes

No A random selection of licensed residents of Maryland were recruited and asked to volunteer to participate in the study without any implications of their licensure status. Due to concerns about the generalizability of using a volunteer sample, an analysis was conducted specific to age and crash and violation history between the sample and those who declined to participate. There was no statistical significance between the groups, therefore it was felt that the sample was representative of the population.

Others (list and explain):

SAMPLE CHARACTERISTICS

N = 1876

% Dropouts

#/(%) Male

#/(%) Female

Ethnicity

Disease/disability diagnosis

NR = Not reported.

Check appropriate group:

<20/study group	20–50/study group	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

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

Brief Description	In the initial MaryPODS study, each participant completed a battery of clinical assessments that included: <ul style="list-style-type: none"> • Motor-Free Visual Perception Test (Visual closure subtest; MVPT) • Trail Making, Part B • Delayed Recall • Useful Field of View, subtest 2 • Rapid Pace Walk • Head-Neck Rotation This study continued to follow crash and violation history for 1 year subsequent to testing.
Setting	All testing was completed at the Motor Vehicle Administration (MVA) office in a private internal room. Each testing room contained 2 complete sets of testing equipment so more than 1 study participant could be tested at the same time.
Who Delivered?	All assessments were administered by Motor Vehicle Administration personnel who completed 2 days of training followed by an on-site observation to assure proper administration.
Frequency?	Testing was conducted in a single session. The study also included a review of crash and violation records from 1 year prior to testing and 1 year following testing.
Duration?	NR

Intervention Biases: *Explain, if needed.*

The responses in this section will be recorded as they pertain to testing.

Contamination

Yes

No

Co-intervention

Yes

No

Timing

Yes Each study participant was tested at different times of day, different times of the year, and possibly during different stages of illness such as a cold, which might cause fatigue. It is unknown whether the differences in timing impacted test results.

No

Site

Yes

✓ Study participants were tested at different MVA offices, some were tested alone, others tested with another participant being tested simultaneously, and some with personnel walking through the room during testing. There was no data collection as to the conditions of privacy and distractions during testing. It is unknown whether the difference in testing situations affected test results.

Finally, all testing was conducted at MVA offices. Although participation guaranteed no impact on the participant's license, the testing site may have been anxiety provoking, thus yielding different test results. This bias, if it existed, would have had the same effect on all participants.

No

Use of different therapists to provide intervention

Yes

✓ Test administrators were MVA personnel, without formal training in healthcare, testing, or measurements. Although all testers participated in the same training, without background training in assessments and administration, variations may have been present in test administration.

No

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

Name of measure:

Motor-Free Visual Perception Test (visual closure subtest)

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

Number correct out of 11

Is the measure reliable (as reported in article)?

Yes

No

NR

Is the measure valid (as reported in article)?

Yes

No

NR

✓ While the reliability and validity of this tool were not reported in this article, it should be noted that the tool used in this study is an older version of the test and not designed for separate subtest administration. Only the visual closure test plates from the original version of the MVPT were used in the MaryPODS study. The original version of the MVPT was validated and normed for administration on children and had 11 test plates in the visual closure subtest. At the time of this study the MVPT-R (revised edition) was being used clinically. Also at the time of this study, normative data up to age 90+ were being collected for the third edition of this tool, the MVPT-III. Currently the only edition of the MVPT available is the MVPT-III, which has 17 test plates in the visual closure subtest.

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

One time administration

Name of measure:

Trail Making test, Part B

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

Time to complete alternating number–letter paper/pencil task

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?

One time administration

Name of measure:

Useful Field of View, substest 2—divided attention

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

Fastest visual processing of a divided attention task measured in milliseconds

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?

One time administration

Name of measure:

Delayed Recall Test

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

Number correct out of 3

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?

One time administration

Name of measure:

Rapid Pace Walk

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

Completion time to walk 10 feet, turn around and return

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?

One time administration

Name of measure:

Head-Neck Rotation

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

Pass/fail to turn around while seated and read a clock

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?

One time administration

Name of measure:

Crash record

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

Review of state crash records, special note was made of nature of crash; at fault, not at fault, unknown

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?

One time review examining 1/5/01 through 12/26/01

Measurement Biases

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

Yes

No

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

Yes

No

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

Did the measures adequately measure the outcome(s)?

Yes

No

✓ As with many studies that use crashes as outcomes, a complete picture of the outcome is not captured in databases of reported crashes. The national and state databases, while very informative, are not complete in that they only contain reported crashes and/or fatalities. Many motor vehicle incidents indicative of performance are not reported due to lack of law enforcement jurisdiction, property damage to the driver's own property, arrangements set up between the drivers, or law enforcement leniency. Incidents occurring in parking lots; involving the driver's own property such as a garage door, mailbox, or garbage can; or simply not reported because the driver left the scene, will never be represented in the national or state databases. Therefore, the prevalence of outcome crashes is likely higher than data obtained from the existing databases.

RESULTS

List results of outcomes relevant to answering the focused question.

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

Include effect size if reported.

Motor-Free Visual Perception Test, Visual Closure Subtest: Using a cut-off point at the peak odds ratio score of 5 incorrect responses, the odds ratio is 3.6 and the chi-square is $X^2(1) = 17.15, p < .001$.

Trail-Making Test, Part B: Using a cut-off point at the peak odds ratio score of 80 to 120 seconds, the odds ratio is 1.8 and the chi-square is $X^2(1) = 3.02, p < .08$. The cut-off score is represented by a range due to the bundling of data generated by a continuous variable.

Useful Field of View, subtest 2: Using a cut-off point at the peak odds ratio score of 225 to 275 milliseconds, the odds ratio is 2.23 and the chi-square is $X^2(1) = 7.99, p < .005$. The cut-off score is represented by a range due to the bundling of data generated by a continuous variable.

Delayed Recall: Using a cut-off point at the peak odds ratio score of 3 incorrect responses, the odds ratio is 3.34 and the chi-square is $X^2(1) = 9.15, p < .002$.

Rapid Pace Walk: Using a cut-off point at the peak odds ratio score 9.0 to 10.5 seconds, the odds ratio is 3.23 and the chi-square is $X^2(1) = 13.32, p < .001$. The cut-off score is represented by a range due to the bundling of data generated by a continuous variable.

Head-Neck Rotation: No cut-off score is used as this is a binary measure of pass/fail. One third of the drivers involved in a crash failed this test. The odds ratio is 2.01 and the chi-square is $X^2(1) = 3.05, p < .08$.

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 The statistical analyses chosen were appropriate, although the number of crashes used as outcomes in this were reduced considerably from 103 crashes to 18 “at fault” crashes. The reduction was done by eliminating 28 crashes with drivers involved in other crashes in an effort to maintain the binary crash/no crash outcome, 1 alcohol-related crash, 38 “not at fault” crashes, and 18 “unknown fault” crashes. The designation of fault is made by the law enforcement officer on the scene and in some cases is arbitrary or biased toward protecting the older driver. In addition, one can argue that a driver with intact driving abilities should be able to avoid at least some crashes caused by other drivers through acute awareness of the driving environment and defensive driving. From an occupational performance perspective, the fault of an incident is irrelevant; rather, the person performing the activity should be in full command of the environment and performance. Therefore, the analysis should have included the 38 “not at fault” and the 18 “unknown fault” crashes in all of the analyses, which would yield different results. The presented results indicate the likelihood of a driver causing a crash rather than being involved in a crash, which is more important from an injury prevention perspective.

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 authors identified the predictive nature of a series of clinical screening tools in determining the risk for causing crashes as compared to a study conducted on the same participants with 1 less year of crash data. The authors concluded that some of the tools were more valuable in predicting crashes shortly after the tests were administered and presented decreasing predictability as time wore on, while others were predictive further out from the test date. The study did verify that some screening of older drivers may be helpful in predicting high-risk drivers. The authors recognized the limitations of the crash outcome and questioned the quality of crash data due the strict criteria for reporting a crash in Maryland (must involve a tow-away), variability in assignment of fault, and law enforcement leniency with older drivers.

The investigators in this study revealed that existing testing procedures (visual acuity and road sign recognition) in licensing offices are ineffective in predicting risk. They suggest implementing a multi-tiered system of screening and assessment, similar to California's system, which can effectively identify which drivers require further testing and who may benefit from remediation. The authors suggest that functional ability screening to promote driving health should be adopted not only by departments of motor vehicles, but also by the health care community.

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

Limitations (appropriateness of conclusions) *Explain, if needed.*

The conclusions were appropriate in that they suggest widespread implementation of screening systems rather than prescribing cut-off scores on specific tools.

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.

There are multiple implications of this study for occupational therapy practice. No clinical assessment tool is entirely predictive of driving performance or preventing crashes. Additionally, those tools that are predictive are not necessarily predictive over time. Therefore recommendations incorporating continuation of driving privileges should be made with caution and should include a stipulation that the recommendation is being made based on that day's driving performance and is not necessarily predictive of future driving.

The authors suggested that tiered screening programs by departments of motor vehicles are important in identifying drivers needing further investigation. Entities putting that recommendation into action will increase older driver exposure to some of the more popular screening tools, thus potentially leading to overuse and practice effects. The need for occupational therapists to understand the screening tools, expectations, and interpretation of results will increase as older drivers are referred to occupational therapists following questionable performance on a screen. The therapists must take into consideration which tools to include in the driver rehabilitation assessment battery so as not to repeat tools while still capturing the constructs that proved problematic during the screening process.

In terms of policy development, this study highlights the questionable nature of any screening tool to definitively identify high-risk older drivers. Occupational therapists working with state driver licensing agencies and medical review boards should stress the inability of any single test to determine driving safety and avoid inclusion of a strict cut-off score on any test into a state guideline.

Ultimately, the results of this study present increased practice opportunities for occupational therapists. Therapists will be needed to consult with physicians, area agencies on aging, senior centers, and departments of motor vehicles. The collaborative work with these entities will entail choosing screening tools; establishing referral pathways; and educating about older driver issues, red flags for referral to driving programs, and the impact of driving cessation. The results of this study identify more avenues to meet the community mobility needs of older adults.

This work is based on the evidence-based literature review completed by Wendy B. Stav, PhD, OTR/L, SCDCM

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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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