Please find below the results of your literature search request.

If you would like the full text of any of the abstracts included, or would like a further search completed on this topic, please let us know.

We’d appreciate feedback on your satisfaction with this literature search. Please visit http://www.hello.nhs.uk/literature_search_feedback.asp and complete the form.

Thank you

### Literature search results

<table>
<thead>
<tr>
<th>Search completed for:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Search request date:</td>
<td>17 January 2011</td>
</tr>
<tr>
<td>Search completion date:</td>
<td>21 January 2011</td>
</tr>
<tr>
<td>Search completed by:</td>
<td>Richard Bridgen</td>
</tr>
</tbody>
</table>

#### Search details

Patients affected by stroke or other neurological conditions who want to continue to drive. Validity and reliability of the Rockwood Driving Assessment.

NHS Evidence; TRIP Database; Cochrane Library; AMED; BNI; CINAHL; EMBASE; MEDLINE; PsychINFO; Google Scholar

**Database search terms**: stroke; STROKE; STROKE PATIENTS; “cerebrovascular accident”; TIA; “transient ischaemic attack”; “transient ischemic attack”; “neurological condition”; “multiple sclerosis”; MS; MULTIPLE SCLEROSIS; dementia; alzheimer*; AIDS DEMENTIA COMPLEX; exp DEMENTIA, SENILE; exp DEMENTIA, PRESENILE; epilepsy; exp EPILEPSY; “parkinson” disease; exp BRAIN DISEASES; exp CHOREA; exp BASAL GANGLIA CEREBROVASCULAR DISEASE; dystonia; “huntington disease”; DYSTONIA; “motor neurone disease”; MND; “motor neuron disease”; “chronic fatigue syndrome”; CFS; ME; “myalgic encephalomyelitis”; COGNITION DISORDERS; neuro*; AUTOMOBILE DRIVING; driving; car ADJ2 driving; automobile ADJ2 driving; assess*; test*; examination; rockwood driving battery; RDB; NEUROPSYCHOLOGICAL TESTS; rockwood; “cognitive battery”; VISUAL PERCEPTION; “executive function”; “praxis skill”; “cognitive test”; “cognitive assessment”; “cognitive examination”

**Google search string**: (“car driving” OR “fitness to drive” OR "automobile driving") and (rockwood OR neuropsychological OR cognitive) (stroke OR "cognitive impairment" OR dementia or alzheimer OR "neurological condition")

#### Summary

There is very little research on the Rookwood Driving Battery. See research papers 9, 12 and 13. I have also researched the components of the Rockwood battery to give you an indication of the reliability and validity of visual perception, executive function and praxis skill, and included other neuropsychological and cognitive tests as background and to help you form a judgement about the Rockwood Driving Battery.
Guidelines

Canadian Medical Association
CMA Driver's Guide: Determining Medical Fitness to Operate Motor Vehicles
See sections 7 and 10.

Department of Transport
At a glance guide to the current medical standards of fitness to drive 2010
See chapters 1 and 4.
Fitness to drive: a guide for health professionals 2006
See section 10..

Evidence-based reviews

Clinical utility of office-based cognitive predictors of fitness to drive in persons with dementia: a systematic review 2008
Without validated cut-off scores, it is impossible to employ tests in a standardized fashion in front-line clinical settings. This study identified a research gap that will prevent the development of evidence-based guidelines.

Cochrane Database of Systematic Reviews
Driving assessment for maintaining mobility and safety in drivers with dementia 2009
In an area with considerable public health impact for drivers with dementia and other road users, the available literature fails to demonstrate the benefit of driver assessment for either preserving transport mobility or reducing motor vehicle accidents.

Published research

1. Examining the relationship between cognition and driving performance in multiple sclerosis.

Author(s): Schultheis MT, Weisser V, Ang J, Elovic E, Nead R, Sestito N, Fleksher C,Millis SR

Citation: Archives of Physical Medicine & Rehabilitation, 01 March 2010, vol./is. 91/3(465-473), 00039993

Publication Date: 01 March 2010

Abstract: OBJECTIVE: To identify cognitive predictors of driving performance after multiple sclerosis (MS). DESIGN: Prospective design examining predictive value of cognitive measures on driving performance. SETTING: All data were collected in an outpatient research setting and an outpatient driver rehabilitation program. PARTICIPANTS: Participants were community-dwelling persons (N=66) with clinically defined MS (86% relapsing-remitting, 14% progressive) with a mean age of 43.47 years. All were active drivers who met vision requirements established by their respective states, and none required adaptive driving equipment. INTERVENTION: Not applicable. MAIN OUTCOME MEASURES: Participants were administered a comprehensive neuropsychologic assessment and a clinical behind-the-wheel (BTW) driving evaluation. Additional measures of driving performance included history of traffic violations and collisions (since MS onset). RESULTS: Logistic regression indicated that information processing speed (Symbol Digit Modality Test [SDMT]) was the strongest predictor of BTW performance. A logistic regression revealed that the strongest predictors of collision and violation frequency were visuospatial learning and recall (7/24 Spatial Recall Test [SPART 7/24]). CONCLUSIONS: These findings indicate that information processing and visuospatial skills are predictive of driving performance among persons with MS. These measures (SDMT and SPART 7/24) may serve as screening methods for identifying the
potential impact of cognitive impairment on driving. Furthermore, the findings raise questions regarding the appropriateness of the BTW evaluation to evaluate driving difficulties accurately among individuals with MS. Copyright © 2010 by the American Congree of Rehabilitation Medicine

Source: CINAHL


Author(s): Stapleton T, Connelly D

Citation: Topics in Stroke Rehabilitation, 01 January 2010, vol./is. 17/1(58-68), 10749357

Publication Date: 01 January 2010

Abstract: Purpose: Practice in the area of predriving assessment for people with stroke varies, and research findings are not always easily transferred into the clinical setting, particularly when such assessment is not conducted within a dedicated driver assessment programme. This article explores the clinical predriving assessment practices and recommendations of a group of Irish occupational therapists for people with stroke. Method: A consensus meeting of occupational therapists was facilitated using a nominal group technique (NGT) to identify specific components of cognition, perception, and executive function that may influence fitness to return to driving and should be assessed prior to referral for on-road evaluation. Standardised assessments for use in predriving assessment were recommended. Results: Thirteen occupational therapists participated in the NGT meeting. Strongest consensus emerged for the inclusion of cognitive components of attention and speed of processing; perceptual components of spatial awareness, depth perception, and visual inattention; and executive components of planning, problem solving, judgment, and self-awareness. Consensus emerged for the use of the following standardised tests: Behavioural Assessment of Dysexecutive Syndrome (BADS), Test of Everyday Attention (TEA), Brain Injury Visual Assessment Battery for Adults (biVABA), Rivermead Perceptual Assessment Battery (RPAB), and Motor Free Visual Perceptual Test (MVPT). Conclusion: Tests were recommended that gave an indication of the patient's underlying component skills in the area of cognition, perception, and executive functions considered important for driving. Further research is needed in this area to develop clinical practice guidelines for occupational therapists for the assessment of fitness to return to driving after stroke.

Source: CINAHL

3. Occupational therapy practice in predriving assessment post stroke in the Irish context: findings from a nominal group technique meeting.

Author(s): Stapleton T, Connelly D

Citation: Topics in Stroke Rehabilitation, January 2010, vol./is. 17/1(58-68), 1074-9357;1074-9357 (2010 Jan-Feb)

Publication Date: January 2010

Abstract: PURPOSE: Practice in the area of predriving assessment for people with stroke varies, and research findings are not always easily transferred into the clinical setting, particularly when such assessment is not conducted within a dedicated driver assessment programme. This article explores the clinical predriving assessment practices and recommendations of a group of Irish occupational therapists for people with stroke.METHOD: A consensus meeting of occupational therapists was facilitated using a nominal group technique (NGT) to identify specific components of cognition, perception, and executive function that may influence fitness to return to driving and should be assessed prior to referral for on-road evaluation. Standardised assessments for use in predriving assessment were recommended.RESULTS: Thirteen occupational therapists speed of processing; perceptual components of spatial awareness, depth perception, and visual inattention; and executive components of planning, problem solving, judgment, and self-awareness. Consensus emerged for the use of the following standardised tests: Behavioural Assessment of Dysexecutive Syndrome (BADS), Test of Everyday Attention (TEA), Brain Injury Visual Assessment Battery for Adults (biVABA), Rivermead Perceptual Assessment Battery (RPAB), and Motor Free Visual Perceptual Test
CONCLUSION: Tests were recommended that gave an indication of the patient's underlying component skills in the area of cognition, perception, and executive functions considered important for driving. Further research is needed in this area to develop clinical practice guidelines for occupational therapists for the assessment of fitness to return to driving after stroke.

Source: MEDLINE


Author(s): Classen S, McCarthy DP, Shechtman O, Awadzi KD, Lanford DN, Okun MS, Rodriguez RL, Romrell J, Bridges S, Kluger B, Fernandez HH

Citation: Traffic Injury Prevention, December 2009, vol./is. 10/6(593-8), 1538-9588;1538-957X (2009 Dec)

Publication Date: December 2009

Abstract: PURPOSE: To determine the correlations of the Useful Field of View (UFOV), compared to other clinical tests of Parkinson's disease (PD); vision; and cognition with measures of on-road driving assessments and to quantify the UFOV's ability to indicate passing/failing an on-road test in people with PD.METHODS: Nineteen randomly selected people with idiopathic PD, mean age = 74.8 (6.1), 14 (73.7%) men, 18 (94.7%) Caucasians, were age-matched to 104 controls without PD. The controls had a mean age of 75.4 (6.4), 59 (56.7%) men, 96 (92.3%) Caucasians. Both groups were referred for a driving evaluation after institutional review board approval.RESULTS: Compared to neuropsychological and clinical tests of vision and cognition, the UFOV showed the strongest correlations (r > .75, p < 0.05) with measures of failing a standardized road test and number of driving errors. Among PD patients, the UFOV Risk Index score of 3 (range 1-5) was established as the optimal cutoff value for passing the on-road test, with sensitivity 87 percent and specificity 82 percent, AUC = 92 percent (SE 0.61, p = .002). Similarly, the UFOV 2 (divided attention) optimum cutoff value is 223 ms (range 16-500 ms), sensitivity 87.5 percent, specificity 81.8 percent, AUC = 91 percent (SE 0.73, p = .003). The UFOV 3 (selected attention) optimal cutoff value is 273 ms (range 16-500 ms), sensitivity 75 percent, specificity 72.7 percent, AUC = 87 percent (SE 0.81, p = .007).CONCLUSION: In this pilot study among PD patients, the UFOV may be a superior screening measure (compared to other measures of disease, cognition, and vision) for predicting on-road driving performance but its rigor must be verified in a larger sample of people with PD.

Source: MEDLINE

Full Text:
Available in fulltext at EBSCO Host

5. Identifying at-risk older adult community-dwelling drivers through neuropsychological evaluation.

Author(s): Zook NA, Bennett TL, Lane M

Citation: Applied Neuropsychology, October 2009, vol./is. 16/4(281-7), 0908-4282;1532-4826 (2009 Oct)

Publication Date: October 2009

Abstract: This study examined the predictive validity of widely utilized neuropsychological tests, the Cognitive Behavioral Driving Inventory (CBDI) and the Useful Field of View (UFOV), to predict driving abilities in a community-dwelling older adult population. Thirty-nine older adults were given the test battery and an on-the-road driving test. Results indicated that while performance on both the CBDI and UFOV was significantly predictive of driving performance, neuropsychological tests of executive function, memory, and visual perception were more predictive of on-the-road driving ability. These results suggest that standard neuropsychological assessment may be able to identify mild cognitive impairment as it relates to at-risk driving in a community-dwelling older adult population.

Source: MEDLINE
6. Neuropsychological tests and driving in dementia: a review of the recent literature.

Author(s): Silva MT, Laks J, Engelhardt E

Citation: Revista Da Associacao Medica Brasileira, July 2009, vol./is. 55/4(484-8), 0104-4230:0104-4230 (2009 Jul-Aug)

Publication Date: July 2009

Abstract: INTRODUCTION: Neuropsychological tests measure several aspects of cognition and are useful to evaluate elderly drivers with cognitive impairment. However, there is no consensus on a standard battery of tests that could accurately predict safe driving. OBJECTIVE: The aim of this study is to review specific neuropsychological measures that may be useful to predict driving competence of demented individuals. METHOD: To address neuropsychological tests used for dementia and the ability to drive, the authors searched for the keywords dementia, Alzheimer's, drive, driver, drivers, driving, tests, neuropsychological, and assessment, in Medline, PubMed, ISI and SciELO databases seeking articles from 2000 to 2008. RESULTS: From 131 articles, 27 met the inclusion criteria. Porteus Maze, Clock drawing, Trail B, UFOV and NAB Tests were found to be the most relevant neuropsychological measures for the evaluation of fitness to drive. CONCLUSION: Porteus Maze, Clock Drawing, Trail B, UFOV and NAB tests highlight visuospatial attention demands and/or executive function. Those and other visuospatial and executive measures may be useful to predict driving competence of demented individuals.

Source: MEDLINE

7. Performance in normal subjects on a novel battery of driving-related sensory-motor and cognitive tests.

Author(s): Innes CR, Jones RD, Anderson TJ, Hollobon SG, Dalrymple-Alford JC

Citation: Behavior Research Methods, May 2009, vol./is. 41/2(284-94), 1554-351X;1554-351X (2009 May)

Publication Date: May 2009

Abstract: Currently, there is no international standard for the assessment of fitness to drive for cognitively or physically impaired persons. A computerized battery of driving-related sensory-motor and cognitive tests (SMCTests) has been developed, comprising tests of visuoperception, visuomotor ability, complex attention, visual search, decision making, impulse control, planning, and divided attention. Construct validity analysis was conducted in 60 normal, healthy subjects and showed that, overall, the novel cognitive tests assessed cognitive functions similar to a set of standard neuropsychological tests. The novel tests were found to have greater perceived face validity for predicting on-road driving ability than was found in the equivalent standard tests. Test-retest stability and reliability of SMCTests measures, as well as correlations between SMCTests and on-road driving, were determined in a subset of 12 subjects. The majority of test measures were stable and reliable across two sessions, and significant correlations were found between on-road driving scores and measures from ballistic movement, footbrake reaction, hand-control reaction, and complex attention. The substantial face validity, construct validity, stability, and reliability of SMCTests, together with the battery's level of correlation with on-road driving in normal subjects, strengthen our confidence in the ability of SMCTests to detect and identify sensory-motor and cognitive deficits related to unsafe driving and increased risk of accidents.

Source: MEDLINE

8. Driving assessment for maintaining mobility and safety in drivers with
dementia.

Author(s): Martin AJ, Marottoli R, O'Neill D

Citation: Cochrane Database of Systematic Reviews, 01 March 2009, vol./is. /1(0-), 1469493X

Publication Date: 01 March 2009

Abstract: Background:

Source: CINAHL

Full Text:
Available in fulltext at Wiley

---


Author(s): Rees J, McKenna P, Bell V, Skucek E, Nichols E, Fisher P

Citation: British Journal of Clinical Psychology, 01 June 2008, vol./is. 47/Part 2(139-151), 01446657

Publication Date: 01 June 2008

Abstract: Objectives. The current study aimed to obtain older adult normative data on a neuropsychological battery in relation to functions underlying driving ability. The effect of age on performance on the battery was previously unknown; normative data revision was necessary to enable more appropriate use of the battery with older clients.

Source: CINAHL

Full Text:
Available in fulltext at EBSCO Host

---


Author(s): Lincoln NB, Radford KA

Citation: Multiple Sclerosis, January 2008, vol./is. 14/1(123-8), 1352-4585;1352-4585 (2008 Jan)

Publication Date: January 2008

Abstract: Cognitive impairments resulting from multiple sclerosis (MS) may affect driving performance. The purpose was to determine whether cognitive tests predict safety to drive in people with MS. Participants were recruited from people referred to Derby Regional Mobility Centre for assessment of their fitness to drive. They were assessed on tests of cognitive abilities related to driving including: the Stroke Drivers Screening Assessment, Paced Auditory Serial Addition Test, Stroop, Motor Impersistence and Adult Memory and Information Processing Battery (AMIPB). Participants’ safety to drive on the public road was tested by an approved driving instructor blind to the results of the cognitive assessment. There were 34 participants with MS, 17 were men, mean age 46 (SD 10.4) years. Safe and unsafe drivers were compared. Significant differences were found on tests of executive function (Road Sign Recognition, P<0.01), visual memory (Design Learning Interference, P<0.05) Information Processing (AMIPB Task A, P<0.05 and B, P<0.05), concentration (Dot Cancellation false positive errors, P<0.01) and visuospatial abilities (AMIPB Figure copy). An equation was generated using discriminant function analysis with an overall predictive accuracy of 88% (Sensitivity for pass 90%, Specificity 90%). Cognitive abilities were predictors of safety to drive in people with MS.

Source: MEDLINE

Full Text:
Available in fulltext at EBSCO Host

---

11. Visual and cognitive predictors of driving safety in Parkinson’s disease
patients.

Author(s): Amick MM, Grace J, Ott BR

Citation: Archives of Clinical Neuropsychology, November 2007, vol./is. 22/8(957-67), 0887-6177;0887-6177 (2007 Nov)

Publication Date: November 2007

Abstract: This study assessed the clinical utility of contrast sensitivity (CS) relative to attention, executive function, and visuospatial abilities for predicting driving safety in participants with Parkinson's disease (PD). Twenty-five, non-demented PD patients completed measures of contrast sensitivity, visuospatial skills, executive functions, and attention. All PD participants also underwent a formal on-road driving evaluation. Of the 25 participants, 11 received a marginal or unsafe rating on the road test. Poorer driving performance was associated with worse performance on measures of CS, visuospatial constructions, set shifting, and attention. While impaired driving was associated with a range of cognitive and visual abilities, only a composite measure of executive functioning and visuospatial abilities, and not CS or attentional skills, predicted driving performance. These findings suggest that neuropsychological tests, which are multifactorial in nature and require visual perception and visual spatial judgments are the most useful screening measures for hazardous driving in PD patients.

Source: MEDLINE

12. Assessing capacity in a neuropsychology service: The Rookwood Protocol

Author(s): Gerhand S., McKenna P.

Citation: Clinical Psychology Forum, September 2007, vol./is. /177(32-36), 1747-5732 (Sep 2007)

Publication Date: September 2007

Abstract: This article describes the approach towards assessment of capacity that has been developed in the Neuropsychological Rehabilitation Unit at Rookwood Hospital, Cardiff, South Wales.

Source: EMBASE

13. Fitness to drive following cerebral pathology: the Rookwood Driving Battery as a tool for predicting on-road driving performance.

Author(s): McKenna P, Bell V

Citation: Journal of Neuropsychology, March 2007, vol./is. 1/Pt 1(85-100), 1748-6645;1748-6645 (2007 Mar)

Publication Date: March 2007

Abstract: The use of neuropsychological testing to determine fitness to drive in people with neuropathology is likely to be an increasingly attractive alternative to on-road testing for many candidates for assessment. The Rookwood Driving Battery has been shown to have good predictive value for determining some who are likely to fail an on-road test in early studies. This study replicated earlier research by examining the predictive value and theoretical validity of the battery on a larger sample of 391 participants, as well as extending earlier analysis by examining the effect of older age (over 70 years) and the interaction between age and pathology on battery and on-road performance. The battery demonstrated good positive and negative predictive values for predicting on-road performance. There were significant effects of older age on both the Rookwood Battery performance and the on-road test, with older adults performing significantly poorer on both. There was no interaction between age and pathology on the Rookwood Battery but on-road age interacted with some pathologies to produce significantly poorer performances. Furthermore, correlation and regression analysis indicate that the battery is a powerful instrument that encompasses tests of core neuropsychological functions needed for driving.

Source: MEDLINE

**Author(s):** Uc EY, Rizzo M, Anderson SW, Sparks J, Rodnitzky RL, Dawson JD

**Citation:** Annals of Neurology, 01 October 2006, vol./is. 60/4(407-413), 03645134

**Publication Date:** 01 October 2006

**Abstract:** OBJECTIVE: To assess the ability for visual search and recognition of roadside targets and safety errors during a landmark and traffic sign identification task in drivers with Parkinson's disease (PD). METHODS: Seventy-nine drivers with PD and 151 neurologically normal older adults underwent a battery of visual, cognitive, and motor tests. The drivers were asked to report sightings of specific landmarks and traffic signs along a four-lane commercial strip during an experimental drive in an instrumented vehicle. RESULTS: The drivers with PD identified significantly fewer landmarks and traffic signs, and they committed more at-fault safety errors during the task than control subjects, even after adjusting for baseline errors. Within the PD group, the most important predictors of landmark and traffic sign identification rate were performances on Useful Field of View (visual speed of processing and attention) and Complex Figure Test-Copy (visuospatial abilities). Trail Making Test (B-A), a measure of cognitive flexibility independent of motor function, was the only independent predictor of at-fault safety errors in drivers with PD. INTERPRETATION: The cognitive and visual deficits associated with PD resulted in impaired visual search while driving, and the increased cognitive load during this task worsened their driving safety. Ann Neurol 2006.

**Source:** CINAHL

15. Validity of the Cognitive Behavioral Driver's Inventory in predicting driving outcome.

**Author(s):** Bouillon L, Mazer B, Gelinas I

**Citation:** American Journal of Occupational Therapy, July 2006, vol./is. 60/4(420-7), 0272-9490:0272-9490 (2006 Jul-Aug)

**Publication Date:** July 2006

**Abstract:** OBJECTIVE: This study seeks to (a) compare Cognitive Behavioral Driver's Inventory (CBDI) scores for clients who passed and failed a driving evaluation and for diagnostic groups (left cerebrovascular accident [CVA], right CVA, traumatic brain injury [TBI], and cognitive decline); (b) determine sensitivity, specificity, and positive and negative predictive values of the CBDI; (c) compare validity of the CBDI with other tools; and (d) identify factors associated with outcome. PARTICIPANTS: This historical cohort study included clients with neurological conditions who completed a driving evaluation. MEASURES: CBDI, Motor-Free Visual Perception Test (MVPT), Bells test, and driving results were extracted from the charts. RESULTS: Mean CBDI (p < 0.0001) and MVPT (p < 0.0001) scores were significantly worse for those failing compared to passing the driving evaluation. Sensitivity of the CBDI was 62%, specificity was 81%, positive predictive values were 73%, and negative predictive values were 71%. Results varied according to diagnostic group. CONCLUSIONS: The CBDI is not sufficiently predictive of outcome to replace a driving evaluation, and is predictive only for clients with R-CVA and TBI. Evaluation of driving should vary according to diagnosis.

**Source:** MEDLINE

**Full Text:**
Available in fulltext at Ovid

16. Can high-risk older drivers be identified through performance-based measures in a department of motor vehicles setting?

**Author(s):** Ball KK, Roenker DL, Wadley VG, Edwards JD, Roth DL, McGwin G Jr., Raleigh R, Joyce JJ, Cissell GM, Dubé T

**Citation:** Journal of the American Geriatrics Society, 01 January 2006, vol./is. 54/1(77-84), 00028614
Publication Date: 01 January 2006

Abstract: OBJECTIVES: To evaluate the relationship between performance-based risk factors and subsequent at-fault motor vehicle collision (MVC) involvement in a cohort of older drivers. DESIGN: Prospective cohort study. SETTING: Motor Vehicle Administration (MVA) field sites in Maryland. PARTICIPANTS: Of the 4,173 older drivers invited to participate in the study, 2,114 individuals aged 55 to 96 agreed to do so. These analyses focus on 1,910 individuals recruited through MVA field sites. MEASUREMENTS: Gross Impairment Screening Battery, which included Rapid Pace Walk, Head/Neck Rotation, Foot Tap, Arm Reach, Cued Recall, Symbol Scan, Visual Closure subtest of the Motor Free Visual Perception Test (MVPT), Delayed Recall, and Trail Making Test with an Abbreviated Part A and standard Part B; Useful Field of View (UFOV((R))) subtest 2; a Mobility Questionnaire; and MVC occurrence. RESULTS: In drivers aged 55 and older with intact vision (20/70 far visual acuity and 140 degrees visual field), age, sex, history of falls, and poorer cognitive performance, as measured using Trails B, MVPT, and UFOV subtest 2, were predictive of future at-fault MVC involvement. After adjusting for annual mileage, participants aged 78 and older were 2.11 as more likely to be involved in an at-fault MVC, those who made four or more errors on the MVPT were 2.10 times as likely to crash, those who took 147 seconds or longer to complete Trails B were 2.01 times as likely to crash, and those who took 353 ms or longer on subtest 2 of the UFOV were 2.02 times as likely to incur an at-fault MVC. Older adults, men, and individuals with a history of falls were more likely to be involved in subsequent at-fault MVCs. CONCLUSION: Performance-based cognitive measures are predictive of future at-fault MVCs in older adults. Cognitive performance, in particular, is a salient predictor of subsequent crash involvement in older adults. High-risk older drivers can be identified through brief, performance-based measures administered in a MVA setting.

Source: CINAHL

Full Text: Available in fulltext at Ovid

Available in fulltext at EBSCO Host

Available in print at Lincoln County Hospital Professional Library

Available in print at Pilgrim Hospital Staff Library

17. Neuropsychological assessment of geriatric driving competence.

Author(s): Bieliauskas LA

Citation: Brain Injury, 01 March 2005, vol./is. 19/3(221-226), 02699052

Publication Date: 01 March 2005

Abstract: Primary objective: To review of studies that focus on the assessment of driving competence among the elderly who are at increased risk of being involved in automobile crashes. The current status of neuropsychological testing as a predictor of driving safety in this population is critically evaluated.

Source: CINAHL

Full Text: Available in fulltext at EBSCO Host

18. Driving scenes test of the Neuropsychological Assessment Battery (NAB) and on-road driving performance in aging and very mild dementia.


Citation: Archives of Clinical Neuropsychology, March 2005, vol./is. 20/2(209-15), 0887-6177;0887-6177 (2005 Mar)

Publication Date: March 2005

Psychological Assessment Resources, Inc.) measures several aspects of visual attention thought to be important for driving ability. The current study examined the relationship between scores on the Driving Scenes test and on-road driving performance on a standardized driving test. Healthy participants performed significantly better on the Driving Scenes test than did very mildly demented participants. A correlation of 0.55 was found between the brief, office-based Driving Scenes test and the 108-point on-road driving score. Furthermore, the Driving Scenes test scores differed significantly across the driving instructor's three global ratings (safe, marginal, and unsafe), and results of a discriminant function analysis indicated that the Driving Scenes test correctly classified 66% of participants into these groups. Thus, the new NAB Driving Scenes test appears to have good ecological validity for real-world driving ability in normal and very mildly demented older adults.

Source: MEDLINE

19. The use of a cognitive battery to predict who will fail an on-road driving test.

Author(s): McKenna P, Jefferies L, Dobson A, Frude N

Citation: British Journal of Clinical Psychology, September 2004, vol./is. 43/Pt 3(325-36), 0144-6657;0144-6657 (2004 Sep)

Publication Date: September 2004

Abstract: OBJECTIVES: There is a growing need to find a valid and reliable neuropsychological battery to screen out those people who are clearly unsafe to drive following brain injury or pathology, and thus alleviate the need to refer for an on-road assessment. Copyright 2004 The British Psychological Society DESIGN: A battery of cognitive tests fine-tuned for their relevance to driving was examined in terms of its sensitivity and specificity for predicting who would fail an on-road test following brain injury or pathology. Copyright 2004 The British Psychological Society METHOD: Performance on the battery was compared to the results of an on-road driving test in a consecutive series of 142 clients referred to a driving assessment centre following brain injury or pathology. The group represented diverse neurological conditions which affect brain functioning. Copyright 2004 The British Psychological Society RESULTS: The overall accuracy rate of the battery in predicting a fail on-road was 92% and in predicting a pass on road was 71%. It was more accurate for those under 70 with 100% accuracy in predicting a fail on-road and 85% accuracy in predicting a pass on-road, but less accurate for those aged 70 or above with 85% accuracy in predicting a fail on-road and 37% accuracy in predicting a pass on-road. Copyright 2004 The British Psychological Society CONCLUSION: The battery is a useful tool in helping to determine whether someone is safe to drive following brain injury but needs to be used with far more caution for the older driver. Copyright 2004 The British Psychological Society

Source: MEDLINE

Full Text: Available in fulltext at EBSCO Host

20. Maze test performance and reported driving ability in early dementia.

Author(s): Ott BR, Heindel WC, Whelihan WM, Caron MD, Piatt AL, DiCarlo MA

Citation: Journal of Geriatric Psychiatry & Neurology, September 2003, vol./is. 16/3(151-5), 0891-9887;0891-9887 (2003 Sep)

Publication Date: September 2003

Abstract: A battery of standard neuropsychological tests examining various features of executive function, attention, and visual perception was administered to 27 subjects with questionable to mild dementia and compared to a 4-point caregiver rating scale of driving ability. Based on the results of this study, a computerized maze task, employing 10 mazes, was administered to a second sample of 40 normal elders and questionable to moderately demented drivers. Comparison was made to the same caregiver rating scale as well as to crash frequency. In the first study of neuropsychological tests, errors on Porteus Mazes emerged as the only significant predictor of driving ability in a stepwise regression analysis.
In the follow-up study employing the computerized mazes, all 10 mazes were significantly related to driving ability ratings. Computerized tests of maze performance offer promise as a screening tool to identify potential driving impairment among cognitively impaired elderly and demented drivers.

Source: MEDLINE

21. Virtual reality and neuropsychology: upgrading the current tools.

Author(s): Schultheis MT, Himmelstein J, Rizzo AA

Citation: Journal of Head Trauma Rehabilitation, 01 October 2002, vol./is. 17/5(378-394), 08859701

Publication Date: 01 October 2002

Source: CINAHL

22. Development and assessment of a neuropsychological battery to aid in predicting driving performance.

Author(s): Szlyk JP, Myers L, Zhang YX, Wetzel L, Shapiro R

Citation: Journal of Rehabilitation Research & Development, 01 July 2002, vol./is. 39/4(483-495), 07487711

Publication Date: 01 July 2002

Abstract: Purpose. This study was conducted to select a neuropsychological battery that correlated with driving simulator skills, thus enabling practitioners to provide information to older patients and their families about driving risks. Methods. The study was conducted in two phases. In Phase 1, a survey inquiring as to the kinds of neuropsychological tests currently used to screen patients for driving was sent to 292 licensed neuropsychologists. Of these 292 surveys, 125 (43%) were returned. We used the responses to develop a battery of nine tests, including eight neuropsychological tests and one other cognitive measure: (1) the Seashore Rhythm Test, (2) Logical Memory (Immediate [I] and Delayed [II]) of the Wechsler Memory Scale-Revised (WMS-R), (3) WMS-R Visual Reproduction (Immediate [I] and Delayed [II]), (4) Trails A and B, (5) Digit Span, (6) Digit Symbol, (7) Block Design, (8) Visual Form Discrimination, and (9) a Zoo Map Test. The complete battery included 12 measures. In Phase 2, 22 licensed drivers were recruited ranging in age from 67 to 91 years (14 males and 8 females). The Mini-Mental Status Exam (MMSE) was administered to all subjects. Scores on this test served as a criterion cutoff for placement into a group of subjects with suspected dementia (Group 1, MMSE score below 25) or a group of control subjects (Group 2, with a MMSE score of 25 or above). None of the patients had any gross motor difficulties. Following screening, subjects were administered the neuropsychological battery, a driving simulator test, and a Driving Habits Interview. Results. Data revealed a significant difference between the performance of Groups 1 and 2 on the driving simulator test in two distinct areas, staying within one's lane boundaries and speed. The suspected dementia subjects had significantly more lane boundary crossings than the control subjects and drove at significantly slower speeds. Ten neuropsychological measures correlated with driving simulator performance. The number of lane boundary crossings correlated with the greatest number of neuropsychological tests, with more lane boundary crossings correlated with poorer performance on the neuropsychological tests. In particular, Trails A, Trails B, and Logical Memory (Immediate) correlated with the largest number of driving measures. Conclusion. Preliminary findings show that commonly used neuropsychological tests correlated with driving simulator skills as measured with a driving simulator. Because the driving simulator has been shown to be correlated with actual on-road driving, one may hypothesize that these neuropsychological tests may be predictive of on-road driving. This research is important in defining an appropriate battery to screen for driving skills in patients with known or suspected dementia.

Source: CINAHL

Full Text:

Available in fulltext at EBSCO Host
23. **Evaluation of car driving abilities.**

**Author(s):** Neuwirth W, Schuster B

**Citation:** Europa Medicophysica, 01 December 2001, vol./is. 37/4(209-213), 00142573

**Publication Date:** 01 December 2001

**Abstract:** In Austria and Germany the traffic psychology test battery has been officially recommended as an instrument to assess the abilities necessary for safe driving. The Reaction Test (RT) is used to measure reaction times for simple or multiple choice responses. Separate registration of reaction and motor times is possible. The Cognitrone (COG) Test form S1 is a general performance test for analyzing attention and concentration. The scoring program uses the data compiled to calculate a series of measures describing the speed, accuracy and consistence of a subjects performance. Test form S2 of the Visual Pursuit Test (LVT) is a visual perception test applied to analyze orientation and visual structuring in the sense of focussed purposeful perception. The Determination Test (DT) Test form S1 is applied to measure reactive capacity, check the ability to provide sustained multiple-choice responses to quickly alternating stimuli and to analyze attention deficit disorders. Test form S1 of the Tachistoscopic Traffic Perception Test Mannheim/ for Screen (TAVTMB), analyzes optical perception (visual perception performance) and speed of perception. The test Two-Hand Coordination (2HAND) analyzes two abilities: sensory-motor coordination between eye and hand and between the left and the right hand. The Standard Progressive Matrices Tests (SPM) is a non-verbal procedure for analyzing deductive reasoning. Normative data for the tests from a representative sample of the normal population is available. Tests such as COG and DT proved to be very sensitive to alcohol-related deterioration. Furthermore, in a multi-centric study, the whole range of the tests mentioned in the description above proved to distinguish between competent and less competent drivers as grouped according to a standardized driving sample. The authors of this study had also been able to demonstrate significant correlations among the various tests and peoples driving behavior. In a further study this test battery also proved to be able to distinguish among various classification groups for psychological testing (psychiatric and neurological subjects or subjects with a history of alcohol abuse) and a representative group of "normal persons". A comparison study was carried out to examine the relation between the test presentation on PC and the standard testing station of the ART90. Results indicate that the correlation between PC administration using the VTS and the ART90 is very high and significant at the 1% level. The AIRT90 has been used in Traffic Psychology for years. The described traffic psychological tests have been standardized according to the state of the art and validated under aspects of traffic safety.

**Source:** CINAHL

24. **The relationship between cognitive/neuropsychological factors and car driving performance in older adults.**

**Author(s):** De Raedt R, Ponjaert-Kristoffersen I

**Citation:** Journal of the American Geriatrics Society, 01 December 2000, vol./is. 48/12(1664-1668), 00028614

**Publication Date:** 01 December 2000

**Abstract:** OBJECTIVES: Because demographic changes produce a society with a growing number of older people, seniors constitute the fastest growing segment of car drivers. The objective of this research project was to identify cognitive factors related to driving problems in older adults. A top-down approach has been used, testing theory-driven hypotheses. DESIGN: Correlational study. SETTING: Fitness-to-Drive Assessment Centre of the Belgian Road Safety Institute. PARTICIPANTS: The research sample consisted of 84 car drivers aged over 65 years, who were referred for a general fitness-to-drive evaluation. MEASUREMENTS: The relations between seven specific neuropsychological tests and self-reported accidents were investigated. Furthermore, the relations between these same tests and a road test, independently assessed using a detailed evaluation grid, were analyzed in depth. These analyses were followed by stepwise multiple regression analyses. RESULTS: In a stepwise regression model, four neuropsychological tests could account for 64% of the variance of the score on the road test. Moreover, it could be
demonstrated that specific cognitive subskills share common variance with specific real-world situations. However, neuropsychological tests could explain only 19% of the variance of self-reported at fault car accidents. CONCLUSIONS: The initial results of this study indicate the relevance of a cognitive/neuropsychological approach to the driving ability of older people. However, the link with accident risk seems more complex. Consequently, neuropsychological screening procedures are in need of a broader perspective to prevent an overemphasis on unidimensional screening procedures focusing mainly on deficit and less on capacities for safe behavior.

Source: CINAHL

Full Text:
Available in fulltext at Ovid
Available in print at Grantham Hospital Staff Library
Available in print at Pilgrim Hospital Staff Library


Author(s): Korner-Bitensky NA, Mazer BL, Sofer S, Gelinas I, Meyer MB, Morrison C, Tritch L, Roelke MA, White M

Citation: American Journal of Physical Medicine & Rehabilitation, 01 May 2000, vol./is. 79/3(253-264), 08949115

Publication Date: 01 May 2000

Abstract: OBJECTIVE: The purpose of this study was to determine the ability of a visual-perception assessment tool, the Motor-Free Visual Perception Test, to predict on-road driving outcome in subjects with stroke. DESIGN: This was a retrospective study of 269 individuals with stroke who completed visual-perception testing and an on-road driving evaluation. Driving evaluators from six evaluation sites in Canada and the United States participated. Visual-perception was assessed using the Motor-Free Visual Perception Test. Scores range from 0 to 36, with a higher score indicating better visual perception. A structured on-road driving evaluation was performed to determine fitness to drive. Based on driving behaviors, a pass or fail outcome was determined by the examiner. RESULTS: The results indicated that, using a score on the Motor-Free Visual Perception Test of < or =30 to indicate poor visual-perception and >30 to indicate good visual perception, the positive predictive value of the Motor-Free Visual Perception Test in identifying those who would fail the on-road test was 60.9% (n = 67/110). The corresponding negative predictive value was 64.2% (n = 102/159). Univariate logistic regression analyses revealed that older age, low Motor-Free Visual Perception Test scores and a right hemisphere lesion contributed significantly to identifying those who failed the on-road test. CONCLUSIONS: The predictive validity of the Motor-Free Visual Perception Test is not sufficiently high to warrant its use as the sole screening tool in identifying those who are unfit to undergo an on-road evaluation.

Source: CINAHL

Full Text:
Available in fulltext at Ovid

26. Fitness to drive in older drivers with cognitive impairment.

Author(s): Withaar FK, Brouwer WH, van Zomeren AH

Citation: Journal of the International Neuropsychological Society, May 2000, vol./is. 6/4(480-90), 1355-6177;1355-6177 (2000 May)

Publication Date: May 2000

Abstract: This paper is a literature review on assessment of fitness to drive in older drivers with cognitive impairment. Early studies on dementia and driving generally failed to distinguish between safe and unsafe drivers on the basis of cognitive test performance. Predictive studies demonstrated that cognitively impaired persons as a group perform significantly worse than controls on both neuropsychological and driving measures. A high prevalence of cognitive impairment was found in groups of older drivers involved in traffic accidents.
accidents and crashes. However, a large range in neuropsychological test scores has been found. Low to moderate correlations could be established between neuropsychological test results and on-road driving performance, making it difficult to discriminate between cognitively impaired subjects who are fit or unfit to drive. The review concludes with a discussion of methodological difficulties in the field of dementia and driving, including participant selection, the choice of neuropsychological tests, and the operationalization of driving performance.

Source: MEDLINE

Google Scholar

The Rookwood Driving Battery and the older adult
P McKenna, J Rees, E Skucek, E Nichols, P Fisher… - 2005 - tris.trb.org
This study reviews and reports on progress to date of an ongoing study to collect norms from a representative sample of healthy older adults on the cognitive battery in order to address lack of age appropriate norms, and age-pathology interaction issues. The data for the study ...
Cited by 2 - Related articles - Cached - All 3 versions

The use of a cognitive battery to predict who will fail an on-road driving test
P Mckenna, L Jefferies, A Dobson… - British Journal of …, 2004 - ingentaconnect.com
... Correspondence should be addressed to Dr Pat McKenna, Rookwood Hospital, Fairwater ... head injury and dementia, equally presented but far fewer in number than the stroke patients ... associated with particular diagnostic groups, which highlights the need for a battery which is ...
Cited by 27 - Related articles - BL Direct - All 3 versions

"Can I drive, doctor?" LEAN thinking may help us answer the question
RH Thomas… - Practical neurology, 2009 - 171.66.125.86
... at http://www.mobility-centres.org.uk (accessed 3 Feb 2009).»: McKenna P.; Bell V. .. Neuro-Psychiatric Cognitive Battery Fitness to drive following cerebral pathology: The Rookwood Driving Battery as a tool for ... Prediction of driving after stroke: a prospective study, ...
Cited by 3 - Related articles - View as HTML - BL Direct - All 5 versions

The relationship between neuropsychological functioning and driving ability in dementia: a meta-analysis
MA Reger, RK Welsh, GS Watson ... - NEUROPSYCHOLOGY- …, 2004 - apa.org
... of using cogni- tive testing to make recommendations about a patient's fitness to drive safely. Withaar, Brouwer, and Van Zomeren (2000) qualita- tively reviewed studies of neuropsychological functioning, on ... They concluded that, although participants with cognitive impairment ...
Cited by 82 - Related articles - View as HTML - BL Direct - All 10 versions

Predicting driving performance after stroke.
FM Nouri, NB Lincoln - British Medical Journal, 1993 - bmj.com
... n= 27) was tested on the stroke drivers screening assessment and scores from the three tasks were used to predict the likelihood of passing a road test. The subject's general practitioner was given the results of the cognitive tests with a recommenda- tion about fitness to drive. ...
Cited by 84 - Related articles - BL Direct - All 12 versions

Prediction of driving after stroke: a prospective study
AE Akinwuntan, H Feys, W De Weerdt… - … and neural repair, 2006 - nmr.sagepub.com
... Preditriving assessments that include off-road (visual and neuropsychological evaluations) and on-road tests are often ... Consequently, studies have focused on identifying only the visual, cognitive, and perceptual problems that affect fitness to drive after stroke.9-13 ...
Cited by 20 - Related articles - BL Direct - All 5 versions
The assessment of **fitness to drive** after a stroke: The Nordic Stroke Driver Screening Assessment

C Lundberg, G Caneman… - Scandinavian …, 2003 - Wiley Online Library
... Some of the measures used were well established **neuropsychological** tests, such as the ... are other **cognitive** functions that should be considered when assessing **fitness to drive** after a ... leading to a heterogeneity in the types and degrees of **stroke**-related **cognitive impairment**. ...

Cited by 41 - Related articles - BL Direct - All 4 versions

**Cognitive ability and driving after stroke**

FM Nouri, DJ Tinson… - Disability & Rehabilitation, 1987 - informahealthcare.com
... A recent study has shown that up to 76% of **stroke** patients admitted to hospital have a ... Due to the ambiguity of the Medical Aspects of Fitness to Drive, and the fact that GPs have little ... easily done in the doctor's surgery, but unfortunately the much wider area of **cognitive ability** is ...

Cited by 50 - Related articles - All 3 versions

Driving performance in persons with mild senile dementia of the Alzheimer type.

... based (road test) evaluations are necessary to properly determine driving skills at present, but attention and other **cognitive** screening measures ... Aged; Alzheimer Disease/psychology*; Automobile Driving*; Cognition; Female; Humans; Male; **Neuropsychological** Tests. ...

Cited by 167 - Related articles - BL Direct - All 5 versions

Driving scenes test of the **Neuropsychological** Assessment Battery (NAB) and on-road driving performance in aging and very mild dementia

LB Brown, RA Stern, DA Cahn-Weiner… - Archives of Clinical …, 2005 - Elsevier
... like color drawings of a visual perspective from behind the steering wheel of a car **driving** on a ... DeRaedt and Ponjaert-Kristoffersen, 2001 R. DeRaedt and I. Ponjaert-Kristoffersen, Short **cognitive/neuropsychological** test battery for first-tier **fitness-to-drive** assessment of ...

Cited by 24 - Related articles - All 14 versions

The assessment of **fitness to drive** in people with dementia

NB Lincoln, KA Radford, E Lee… - International journal of …, 2006 - Wiley Online Library
... 2003. The assess- ment of **fitness to drive**: the Nordic Stroke Driver Screening Assessment. ... **Neuropsychological** aspects of driving after a stroke – in the simulator and on the road. ... 1992. Validation of a **cognitive** assessment: predicting driving performance after stroke. ...

Cited by 11 - Related articles - BL Direct - All 5 versions

**Cognitive screening for the safe driving competence of older people with mild cognitive impairment** or early dementia

... for the development of appropriate europsychological assessment measures of **fitness to drive** (eg Dobbs ... So, although the utility of **neuropsychological** testing in identifying domain-specific ... is ongoing, an predicated on the simple reality that **cognitive impairment** affects behaviour ...

Cited by 10 - Related articles - View as HTML - All 8 versions

Concurrent validity of the **stroke** drivers screening assessment

KA Radford… - Archives of physical medicine and rehabilitation, 2004 - Elsevier
... Author Keywords: Automobile driving; Cerebrovascular accident; Cognition disorders; Rehabilitation; Stroke. ... derived from discriminant analysis, to provide an overall prediction of **fitness to drive**. ... Trail-Making Test (TMT), from the Halstead-Reitan **Neuropsychological** Test Battery ...

Cited by 22 - Related articles - All 4 versions

Confirmation of the accuracy of a short battery to predict **fitness-to-drive** of **stroke** survivors without severe deficits
In the one year period of this study, a total of 129 stroke survivors performed the visual, neuropsychological and on-road ... Fig. 1. Proposed algorithm for deciding fitness-to-drive after stroke in Belgium ... Validation of a cognitive assessment: predicting driving performance after stroke ...

Cognitive abilities as predictors of safety to drive in people with multiple sclerosis.

NB Lincoln... - Multiple Sclerosis, 2008 - msj.sagepub.com

... Rehabil 2002; 83: 1175–8. 7. Simms B, O'Toole L. The contribution of cognitive and visual ... 8. Schanke AK, Sundet K. Comprehensive driving assessment: testing and on-road evaluation of brain ... The assessment of fitness to drive in people with dementia ...

Predictors of fitness to drive in people with Parkinson disease


A short clinical screening battery that measures disease duration, contrast sensitivity, cognitive and motor functions can predict fitness to drive in people with Parkinson disease with a high degree of accuracy.