ORIGINAL ARTICLE

The Nordic Stroke Driver Screening Assessment as predictor for the outcome of an on-road test

HELENA SELANDER¹, KURT JOHANSSON¹, CATARINA LUNDBERG² & TORBJÖRN FALKMER³

¹Department of Neurobiology, Care Science and Society, Karolinska Institutet, Stockholm, Sweden, ²Karolinska University Hospital, Traffic Medicine Centre, Stockholm, Sweden, and ³Rehabilitation Medicine, IKE, Faculty of Health Sciences, Linköping University, Sweden & School of Health Sciences, Jönköping University Sweden

Abstract

The use of the cognitive test battery Nordic Stroke Driver Screening Assessment (NorSDSA) has increased, sometimes as a stand-alone test to evaluate fitness to drive, also for non-stroke patients such as patients suffering from cognitive deficits/dementia, approaches that may be questioned. The objective of the study was to determine whether the NorSDSA could predict an on-road test result, for large sets of stroke (n=74) and cognitive deficits/dementia participants (n=116), respectively. The percentage of correctly classified was 62% for the stroke group and 50% for the cognitive deficits/dementia group. A discriminant analysis with pass/fail on the on-road test as grouping variable could classify 62% of the stroke participants and the cognitive deficit/dementia participants. Hence, the NorSDSA could not predict the outcome of the on-road test. Therefore, NorSDSA should not be used as a stand-alone test to determine the fitness to drive of individual participants. Also, its use with participants suffering from cognitive deficits/dementia appears to be less successful than for clients with stroke.

Key words: Cognitive deficits, dementia, driving assessment, NorSDSA, off-road test, stroke

Introduction

Driving is an important part of everyday life and represents independence (1). Activities, related to both work and social life, may be affected if a person can no longer drive (2). Medical conditions, for example dementia or stroke, often call into question a person’s fitness to drive, but the diagnosis alone cannot predict driving performance (3). In Sweden, the legal responsibility of determining whether a patient fulfils medical requirements for licence holding is limited to physicians (4). However, it has previously been shown that a medical assessment alone is insufficient to identify older patients who have an increased risk of crashes (5,6). Physical impairments can be compensated for by technical vehicle adaptations, but cognitive impairments may limit a person’s fitness to drive (7). To determine when a patient becomes unsafe as a driver can be difficult, especially since there are no specified guidelines regarding the appropriate assessment tools (4).

Either cognitive tests (off-road tests), simulators, or on-road driving tests, or combinations of these, are often used to assess cognitive function and driving performance. Many studies have been published on the determination of fitness to drive for different diagnostic groups (8–11). The focus has been on correlations between results on cognitive tests and on-road test outcomes, but there have been no clear-cut results. In addition, few of the cognitive tests have been specifically developed to assess fitness to drive. Some studies have had a limited number of participants while others have included mixed combinations of clients from varying diagnostic groups, although it is well known that there are substantial differences in the impairments caused by various medical conditions (12–15). On-road tests and simulators can contribute to driving assessments,
but for safety and monetary reasons, cognitive tests are often used in Sweden as stand-alone tests (16).

**Stroke Driver Screening Assessment**

The Stroke Driver Screening Assessment (SDSA) is a set of cognitive tests, developed in the United Kingdom to evaluate fitness to drive in stroke patients (14). The SDSA was designed and validated for stroke patients. It provides clinically useful information on cognitive functions that are relevant to the driving task, e.g. focused and sustained attention, mental speed, and the ability to attend to two visual dimensions at the same time. The SDSA has not proved to be a good predictor for other neurological conditions on its own, only in combination with other tests (17,18). The SDSA comprises the following test variables:

- **dot cancellation** (time in seconds);
- **dot cancellation** (errors, e.g. misses);
- **dot cancellation** (false positives);
- **directions** (maximum 32 points in 5 minutes);
- **compass** (maximum 32 points in 5 minutes);
- **road sign recognition** (maximum 12 points, counted after 3 minutes).

The test takes approximately 30 minutes to perform. To predict on-road performance, four of these scores, namely **Dot cancellation** (time and false positives), **Compass** and **Road sign recognition** (3 min), are entered into an equation derived from a discriminant function analysis providing a SDSA score (19). The score predicts pass or fail on an on-road test and can be used to recommend whether or not stroke patients have the cognitive abilities needed for safe driving (19). The SDSA score is set in such a way that a positive value gives a pass result and a negative value gives a fail result. The higher the value, the stronger the prediction. The model has also been validated in an experimental study to compare its predictive power by a general practitioner (6). The SDSA could correctly predict the outcome variable, i.e. the outcome of the on-road test, of 81% of the stroke participants. Test–retest reliability has been investigated (20). Twenty-six stroke participants were tested on two occasions six weeks apart. There were some improvements on **Dot cancellation** and **Road sign recognition**, but no patient improved from a “fail” to a “pass” on the on-road test. In a study by Radford and Lincoln (19), the SDSA was shown to be sensitive to impairment of executive abilities and attention.

For Sweden, and Norway, there is a Nordic version of the SDSA, called the Nordic Stroke Driver Screening Assessment (NorSDSA) (21). Some changes to the test material have been made to adapt it to traffic conditions in the Nordic countries. In addition, the possibility of extending the response time on **Road sign recognition** to five minutes was introduced because clinical experience showed that many older patients needed additional time for this subtest. In a validation study, 97 stroke participants participated from Sweden and Norway (21). Using the discriminant function from the English SDSA, less than 70% were correctly classified. Therefore, a new discriminant analysis was made for the NorSDSA, correctly classifying 78% of the participants. The result of this new discriminant analysis was that the calculation of the global outcome changed, with regard both to the subtests used and the weighting for each subtest.

**On-road test**

The results from cognitive tests can help a clinically trained assessor to identify which skills require specific observation during a subsequent on-road evaluation (22). An assessor who has observed a patient during off-road testing is also better prepared for possible incidents during the road test and able to interpret and evaluate driving errors. Although on-road testing is often seen as the gold standard, the outcome is nevertheless subjective, based on each evaluator’s own judgement. Different protocols for on-road tests have been developed to aid in the observation and evaluation of participants’ actual driving performance (8,23–25). However, depending on the background of the assessor (e.g. occupational therapist or driving instructor) and the assessment protocol being used, the on-road test’s validity may be questioned, which, in turn, suggests that it has low reliability (26). On-road tests actually have strong face validity, but may very well lack construct validity. In clinical practice, however, the chief merit of an on-road test is that it makes it possible to determine whether or not any cognitive impairment detected by cognitive testing may be compensated for by the satisfactory driving skills of (usually) experienced drivers. Furthermore, on-road evaluations are also important for the patients’ experience of face validity of the test procedure (27).

In Sweden, the NorSDSA has become more commonly used (16) and is sometimes used as a stand-alone test to evaluate fitness to drive, also for non-stroke patients such as patients suffering from cognitive deficits/dementia, approaches that may be questioned. Hence, the objective of the present study was to determine whether the NorSDSA could predict an on-road test result for large sets of stroke participants.
participants and cognitive deficits/dementia participants.

Material and methods

Patients

The data were collected over a three-year period at a driving assessment unit in Sweden and consist of the test results from all patients, hereafter referred to as participants, who completed a neuropsychological assessment and an on-road assessment. The inclusion criteria in the present study were results from both the NorSDSA and the outcome of the on-road test. However, two stroke and three cognitive/dementia participants did not complete the entire NorSDSA. For example, they only fulfilled the Directions and Compass tests and thus did not obtain any total score from the equation. In total, 195 participants were included in the study and selected from a database. Of those, 76 had sustained a stroke (68 men, mean age 65.3, SD = 9.8, range 43–85 years). They were all examined at least six months after their stroke. A total of 119 participants had cognitive deficits/dementia (100 men, mean age 72.2, SD = 9.3, range 47–88 years). The participants had been assessed during the course of standard clinical evaluation of fitness to drive, which included a medical assessment, examinations of visual acuity and visual fields, a neuropsychological assessment (including the NorSDSA), and an on-road test. Demographic characteristics, medical information, and outcome of the on-road test are presented in Table I.

On-road test

All participants drove cars with manual or automatic gear shifts (as chosen by the participants), equipped with a dual-brake system. Adaptations were also available to compensate for physical disabilities. The test ride required approximately 60 minutes, on the same standard route on public roads in a suburban district, with moderate demands and a diversity of intersections (n = 13), right (n = 15) and left turns (n = 16), directions signs (n = 14), and roundabouts (n = 9). All on-road driving tests were assessed by an occupational therapist (first author). She observed the quality of their performance, e.g. following instructions, planning, manoeuvring, lane positioning, obeying traffic rules, interaction with other road users, and their visual attention. The final outcome on the on-road driving test (pass/fail) was the result of a global impression of the participants’ performance, based on the frequencies and severity of observed problems. A driving instructor was responsible for specific instructions (directions to follow throughout the route) and security (by possible use of the dual controls). The instructor sat in the front passenger seat and the occupational therapist in the back seat to the right. For further analyses, these clinical on-road data were used. Since only one assessor performed all assessments, no reliability testing has been undertaken.

Statistical analyses

Statistical analyses were performed using SPSS® (version 15.0). A Kolmogorov-Smirnov test was used for test normal distribution. For normally distributed data Student’s t-test, one-way analysis of variance (ANOVA) with post hoc test Tukey HSD, and discriminant analyses were used. For data that did not fulfil this criterion and ordinal and categorical data, a Mann–Whitney U test, Kruskal-Wallis test, χ², and Fisher’s exact test and were used. For all tests, the α-level was set to 0.05. Sensitivity was calculated as the proportion of participants who failed the on-road test that was correctly classified by the NorSDSA, whereas specificity was calculated as the proportion of participants who passed the on-road test that was correctly classified by the NorSDSA. In order to establish the probability of the NorSDSA giving the correct classification into pass or fail, the positive predictive value (PPV) was calculated as the proportion of participants who were classified as “failed” by the NorSDSA that also failed the on-road test. The negative predictive value (NPV) was calculated as the proportion of participants who were classified as “passed” by the NorSDSA that also passed the on-road test. The term correctly classified refers to the percentage of all cases that were either correctly classified as “failed” or as “passed” by the NorSDSA.
Ethical considerations

The present study was approved by a local Ethical Committee in Stockholm, Sweden.

Results

Information on the test scores for the two outcome groups (pass/fail) for both groups are presented in Table II. For all variables, the best performance is seen in the pass groups, except for Dot cancellation (time) and Dot cancellation (false positives) in the Cognitive/Dementia group.

Stroke group

Within the stroke group, demographic variables were tested for possible differences between the Stroke pass and fail groups. No difference was found with regard to sex, educational level, and side of lesion, whereas age differed between the two groups. The Stroke pass group was on average 5.0 years younger than the Stroke fail group (63.5 years SD =10.2, versus 68.6 SD =8.3, t =2.2, p =0.033).

If the overall NorSDSA total score was used, with a cut-off point of 0, the sensitivity, i.e. correctly predicted fails, was 48% and the specificity, i.e. correctly predicted passes 76%. The percentage of correctly classified was 62%. In Figure 1, the results for stroke participants with regard to sensitivity, specificity, PPV, NPV, and correctly classified are shown by the level of the overall NorSDSA score.

As shown in Figure 1, among those who scored lower than 0 on NorSDSA, the share of correctly classified participants rose compared with the other participants.

All subtests of the NorSDSA were tested for normal distribution, except Dot cancellation (false positives) scores that were omitted from further analysis, due to the fact that false positives (n = 3) were found only in the Stroke fail group. Directions was not normally distributed. Hence, this variable was excluded from the subsequent one-way ANOVA analysis, showing that only Road sign recognition (3 & 5 min) differed between the Stroke pass group and the Stroke fail group (F =4.213, p =0.044 and F =8.489, p =0.005, respectively). The Stroke pass group scored on average 6.1 points (SD 2.1) on Road sign recognition (3 min), whereas the Stroke fail group scored on average 5.0 points (SD 2.5). The corresponding figures for Road sign recognition (5 min) were 7.2 (SD =2.1) and 5.7 (SD =2.1). Admittedly, Road sign recognition (3 min) and Road sign recognition (5 min) are not independent variables. Despite this fact, they were both included, in order to illustrate the magnitude of group differences between them. A subsequent Mann–Whitney U test showed no differences between the two groups with regard to the outcome on Directions.

Based on the above analysis, all normally distributed variables were entered into a subsequent discriminant function analysis as dependent variables and pass/fail on road test as grouping variable. By entering five variables, the requirement for performing a discriminant analysis, i.e. that the number of cases per outcome group should be at least five times as large as the numbers of examined dependent variables (28), was fulfilled. The discriminant analysis was significant (p =0.032), i.e. based on the criterion pass or fail. The analysis could classify 62% of the participants with stroke based solely on the result from the five variables:

Table II. Age, sex, and group means, standard deviations and 95% confidence interval of scores on the subtest of NorSDSA.

<table>
<thead>
<tr>
<th></th>
<th>Stroke pass group (n =50)</th>
<th>Stroke fail group (n =26)</th>
<th>Cognitive/Dementia Pass group (n =54)</th>
<th>Cognitive/Dementia Fail group (n =65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years: mean</td>
<td>64 (SD =10.2) 95%</td>
<td>69 (SD =8.3) 95%</td>
<td>70 (SD =9.8) 95%</td>
<td>74 (SD =8.3) 95%</td>
</tr>
<tr>
<td>Dot cancellation,</td>
<td>CI =61–66</td>
<td>CI =65–72</td>
<td>CI =67–72</td>
<td>CI =72–76</td>
</tr>
<tr>
<td>time (s) mean</td>
<td>514 (SD =129) 95%</td>
<td>514 (SD =128) 95%</td>
<td>534 (SD =148) 95%</td>
<td>503 (SD =132) 95%</td>
</tr>
<tr>
<td>Dot cancellation,</td>
<td>CI =461–533</td>
<td>CI =461–567</td>
<td>CI =493–574</td>
<td>CI =469–536</td>
</tr>
<tr>
<td>errors, mean</td>
<td>17 (SD =15) 95%</td>
<td>17 (SD =17) 95%</td>
<td>16 (SD =12) 95%</td>
<td>17 (SD =15) 95%</td>
</tr>
<tr>
<td>Directions, mean</td>
<td>CI =12–21</td>
<td>CI =17–31</td>
<td>CI =13–20</td>
<td>CI =14–21</td>
</tr>
<tr>
<td>Dot cancellation,</td>
<td>0.1 (SD =0.2) 95%</td>
<td>0.1 (SD =0.81) 95%</td>
<td>0.19 (SD =0.03–0.26)</td>
<td>0.08 (SD =0.27) 95%</td>
</tr>
<tr>
<td>false positives,</td>
<td>CI = –0.02–0.26</td>
<td>CI = –0.03–0.41</td>
<td>CI = –0.01–0.15</td>
<td>CI =0.01–0.15</td>
</tr>
<tr>
<td>Compass, mean</td>
<td>18 (SD =6) 95%</td>
<td>17 (SD =7) 95%</td>
<td>15 (SD =8) 95%</td>
<td>14 (SD =7) 95%</td>
</tr>
<tr>
<td>Road sign recognition, 3 min, mean</td>
<td>5.0 (SD =2.5) 95%</td>
<td>5.0 (SD =2.5) 95%</td>
<td>4.8 (SD =2.4) 95%</td>
<td>3.6 (SD =1.7) 95%</td>
</tr>
<tr>
<td>Road sign recognition, 5 min, mean</td>
<td>7.2 (SD =2.1) 95%</td>
<td>5.7 (SD =2.2) 95%</td>
<td>5.7 (SD =2.1) 95%</td>
<td>4.5 (SD =2.0) 95%</td>
</tr>
</tbody>
</table>
The standardized coefficients for canonical variables were 0.32 for Dot cancellation (time), for 0.70 Dot cancellation (errors), 0.06 for Compass, 0.17 for Road sign recognition (3 min) and, finally, −0.91 for Road sign recognition (5 min).

Cognitive deficits/dementia group

Within the Cognitive deficits/dementia group, demographic variables were tested for possible differences between the Cognitive deficits/dementia pass and fail groups. No difference was found with regard to educational level, whereas age and sex differed between the two groups. The Cognitive deficits/dementia pass group was on average 4.5 years younger than the Cognitive deficits/dementia fail group (69.8 years SD = 9.8 versus 74.3, SD = 8.3, t = 2.7, p = 0.009). In addition, women with Cognitive deficits/dementia were more often found in the Cognitive deficits/dementia fail group than men (63% of the women versus 53% of the men, $\chi^2 = 0.67, p = 0.042$).

In Figure 2, the results for Cognitive deficits/dementia participants with regard to sensitivity, specificity, PPV, NPV, and correctly classified are shown, by the outcome of the level of the overall NorSDSA score. If the overall NorSDSA score was used, with a cut-off point of 0, the sensitivity, i.e. correctly predicted fails, was 54% and the specificity, i.e. correctly predicted passes, 46%. The percentage of correctly classified was 50%, as shown in Figure 2.

As shown in Figure 2, the participants’ scores on NorSDSA had no impact on the share of correctly classified participants.

All subtests of the NorSDSA were tested for normal distribution, but Dot cancellation (errors), Dot cancellation (false positives), Directions, Compass and Road sign recognition (3 min) were not normally distributed. Hence, these five variables were excluded from the subsequent one-way ANOVA analysis, showing that only Road sign recognition (5 min) differed between the pass and fail Cognitive

Figure 1. Results for 74 of 76 stroke participants (two did not complete the entire NorSDSA).

Figure 2. Results for 116 of 119 cognitive deficits/dementia participants (three did not complete the entire NorSDSA).
deficits/dementia groups (F = 11.217, p = 0.001). The pass Cognitive deficits/dementia group scored on average 5.7 points (SD = 2.1), whereas their fail counterparts scored on average 4.5 points (SD = 2.0). A Kruskal-Wallis analysis with the five not normally distributed variables showed that only one variable was significantly different between the pass and the fail group: Road sign recognition (3 min). The pass Cognitive deficits/dementia group had significantly (χ² = 11.1, p = 0.001) higher scores on Road sign recognition (3 min) (median score = 5.0, mean score = 4.8, SD = 2.1) than the fail group (median score = 3.0, mean score = 3.6, SD = 1.7).

Based on the above analysis, the two normally distributed variables were entered into a subsequent discriminant function analysis as dependent variables and pass/fail on road test as grouping variable. The discriminant analysis was significant (p = 0.002) and could classify 62% of the participants with cognitive deficits/dementia. For the cognitive deficits/dementia group, the standardized coefficients for canonical variables were 0.41 for Dot cancellation (time), and 0.95 for Road sign recognition (5 min).

Discussion

The NorSDSA is used by many assessors to evaluate fitness to drive (16). Sometimes it is used as a stand-alone test. Furthermore, despite the fact that it was created for stroke patients, its use in other diagnosis groups is widespread (16). However, the results from the present study suggest that NorSDSA should be used neither as a stand-alone test, nor for patients with cognitive deficits/dementia or other patients not suffering from stroke, a statement further supported by other studies (17, 18).

In fact, fewer than two out of three stroke participants were correctly classified, as measured by the NorSDSA variables and the on-road test. The success of the subsequent discriminant analysis was equally limited. For the cognitive deficits/dementia group, though, the discriminant analysis could only classify substantially fewer than two out of three with the use of NorSDSA variables, and the percentage of correctly classified was the same as that of flipping a coin. Although related, sensitivity and specificity are, however, distinct and separate constructs (28), so the term correctly classified should not be interpreted as being equivalent to the predictive ability of the test. In the Lundberg et al. study (21), the discriminant analysis could classify a total of 78% of their participants with stroke, but specificity, i.e. correctly predicted pass participants, was superior to sensitivity, i.e. correctly predicted fail participants. Therefore, it is necessary to examine possible reasons accounting for the fact that the present study showed such substantially lower predictive validity for the NorSDSA on the outcome of an on-road test for the participants with stroke than in the Lundberg et al. study (21).

Overall, our participants did not differ with regard to the outcome on the on-road test. In the stroke group, about two-thirds passed, a figure not substantially different from the Lundberg et al. stroke participant study (21), whereas in the dementia/cognitive deficits group less than half passed. Furthermore, our participants did not differ with regard to sex, age, and educational level. For the stroke participants, side of lesion did not significantly predict driving outcome, a finding further supported by Mazer et al. (22). Hence, the studied stroke population should not be viewed as significantly different from the studied population in the Lundberg et al. study (21).

Instead, a possible reason for the low predictive value for the NorSDSA could actually be the outcome variable. With regard to the selection of participants for the on-road test, the classification of participants with regard to the outcome, and the circumstances under which the test took place, there is not complete comparability between the two studies.

First, there is the possibility that there was more stringent patient selection in the present study. It is true that, also for the majority of the participants in the Lundberg et al. study (21), the recourse to an on-road test was mostly motivated by a remaining uncertainty after the clinical examinations. However, the present study is more recent, and the range of uncertainty may have become narrower, because clinical examiners have become more experienced with time. This means that the participants selected for the on-road test may have belonged to a subgroup of stroke drivers whose driving fitness is extremely difficult to determine on the basis of clinical tests alone. This also implies that results of the present study may not be possible to generalize to other, less specialized clinical settings.

Second, the on-road test in the present study was scored dichotomously as a global impression of the participants’ performance, an approach slightly different from that of the Lundberg et al. study. They used a classification comprising passes, borderline passes, and fails, to account for the fact that a substantial proportion of participants were able to pass the driving test after two attempts or more, sometimes after taking driving lessons. Lack of driving skill, rather than cognitive deficits, appeared to be a contributing factor to the initial fail result, a view that is supported by Söderström and co-workers (29) presenting evidence that the on-road test ride performance of older stroke participants did not
differ from that of healthy older drivers, and that the stroke group did benefit from driving lessons.

Third, many aspects of the on-road test were more standardized in the present study than in previous ones. The vehicles used constitute one aspect. In the Lincoln et al. study (12), the participants could choose to drive their own cars or a dual-controlled car. In the Lundberg et al. study (21), the majority of the participants drove their own cars, and others drove a dual-controlled car. In the present study, all participants drove a car provided to them with dual controls, which limits the number of confounding factors in the group comparisons.

However, there is evidence that adapting to an unfamiliar car represents an increased cognitive load (30) which adds to the likelihood that a cognitively impaired driver will fail an on-road test. Furthermore, there is a difference concerning the route. In the Lundberg et al. study, participants drove in Norway or Sweden, whereas in the present study all participants drove exactly the same route. Most importantly, however, the same assessor evaluated all participants in the present study, which enhances the reliability compared with studies using several assessors. In addition, the qualification of the assessor has varied in previous studies. In some cases, a driving instructor conducted the on-road test, while in others the on-road performance was evaluated by an occupational therapist alone or together with a driving instructor. Admittedly, this may be one additional factor accounting for the diverging results in different studies.

With regard to the assessor of the present study, a potential limitation should be noted, however. Although she did not herself participate in the off-road clinical evaluations, she did have full knowledge of the participants’ clinical results when performing the test rides. This may have constituted a bias, but the lack of relationships between the test results and the outcome of the on-road tests indicates that this was not the case.

When working with fitness-to-drive assessments, the goal is to identify unsafe, as well as safe drivers (4). NorSDSA has become a commonly used screening test for assessing fitness to drive and it has strong face validity. However, tempting as it may be to use NorSDSA as a stand-alone test for time and monetary reasons, such an approach may risk erroneous fitness-to-drive assessment of stroke patients. Based on the results of the present study, this statement holds true to an even higher degree with regard to patients with cognitive deficits/dementia. Furthermore, when a NorSDSA score is close to zero, a marginal change in one subtest may shift the final result from a pass to a fail, or vice versa. This is unfortunate and causes uncertainty.

In this study, specificity was substantially higher for the stroke group than sensitivity, which indicates that the test is apt to identify safe, rather than unsafe, post-stroke drivers. Nevertheless, not more than about two out of three safe post-stroke drivers were correctly identified. In contrast to the stroke group, sensitivity was higher for the cognitive deficits/dementia group than specificity, which indicates the opposite for this particular diagnosis group. Now, only about one out of two supposedly unsafe drivers were identified, which still leaves the assessor with a test providing inconclusive results. In addition, specificity was about as low as sensitivity. Most important, however, was the fact that the percentage of correctly classified was far too low for both patient groups to recommend the sole use of the NorSDSA as a substitute for an on-road test, at least in a highly specialized assessment unit.

Conclusions
The NorSDSA could not predict the outcome of the on-road test used in the present study, and—contrary to the current practice regarding fitness-to-drive assessments—should not be used for persons with cognitive deficits/dementia and used with great caution for persons with post-stroke conditions. Any decision about fitness to drive should not rely solely upon the results of NorSDSA.

Acknowledgements
The financial support for this study by the Swedish Road Administration is gratefully acknowledged.

References
8. Hunt LA, Murphy CF, Carr JM, Duchek JM, Buckles V, Morris JC. Reliability of the Washington University Road Test. A performance-based assessment for drivers with...