CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

Transitions and Community Participation following Stroke

Table 3: Assessment Tools for Pre-Driving Screening and Research Correlating Tools with Driving Risk

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on Behalf of the Canadian Stroke Best Practice Recommendations
Transitions and Community Participation following Stroke Writing Group

Table 3: Assessment Tools for Pre-Driving Screening and Research Correlating Tools with Driving Risk

Data was aggregated by the Toronto Rehabilitation Driving Best Practice Group under the leadership of Geoff Law OT Reg. (Ont) with the contributions from student occupational therapist Luisa Cao. Current document was summarized by Debbie Hebert OT Reg. (Ont).

<table>
<tr><th>Assessment/ Domain</th><th>Cut-Off Scores Correlated with Driving Risk/Return to Driving and Patient Populations</th><th>References</th></tr>
<tr>
<td>Dynavision

Domain:
visual scanning, peripheral visual awareness, visual attention, visuomotor reaction time, execution of visuomotor response sequence, basic cognitive skills (short term memory), and physical and mental endurance

Administration Time 15 – 20 min.</td>
<td>The following Dynavision tests were used in the research to determine fitness to drive:
<table>
<tr><th>Test Mode</th><th>Pass Criterion based on a pass/fail “behind the wheel test”</th><th>Accuracy In predicting outcome</th><th>False Positives</th><th>False Negatives</th></tr>
<tr><td>Mode A 60 sec.</td><td>50 responses/min</td><td>66%</td><td>4%</td><td>30%</td></tr>
<tr><td>Mode B 60 sec. with 1 sec. light speed</td><td>40 responses/min.</td><td>68%</td><td>4%</td><td>28%</td></tr>
<tr><td>Mode B 60 sec. with on sec. light speed presented every 5 sec.</td><td>30 responses/min.</td><td>68%</td><td>4%</td><td>28%</td></tr>
<tr><td>Mode A 4 min.</td><td>195 responses/4 min.</td><td>75%</td><td>7%</td><td>18%</td></tr>
<tr><td>Mode A 60 sec. + Mode A 4 min</td><td></td><td>77%</td><td>7%</td><td>16%</td></tr>
</table>
</td>
<td>Klavora, P., Gaskovski, P., Martin, K., Forsyth, R.D., Heslegrave, R. J., Young, M., et al. (1995). The effects of Dynavision rehabilitation on behind-the-wheel driving ability and selected psychomotor abilities of persons after stroke. The American Journal of Occupational Therapy, 49, 534-542.

Klavora, P., Gaskovski, P., & Forsyth, R. (1995). Test-retest reliability of three Dynavision tasks. Perceptual Motor Skills, 80(2), 607-610.

Klavora, P., Heslegrave, R.J., & Young., M. (2000). Driving skills in elderly persons with stroke: comparison of two new assessment options. Archives of Physical Medicine & Rehabilitation, 81(6), 701-705.

Vrkljan, B.H., McGrath, C.E., & Letts, L.J. (2011). Assessment tools for evaluating fitness to drive: A critical appraisal of evidence. Canadian Journal of Occupational Therapy, 78(2): 80-96.</td>
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<tr>
<td>Motor Free Visual Perceptual Test (MVPT) Domains:
visual perceptual skills, including spatial relations, visual discrimination, figure-ground, visual closure, and visual memory (McCane, 2006).</td>
<td>The use of the MVPT to inform ability to return to driving depends on the version used.
The original version of MVPT, which is no longer commercially available, has the greatest amount of research evidence and at one time was considered the most predictive test of on-road performance (Bouillon, 2006). Findings linking MVPT performance with fitness to drive are inconsistent (Dickerson, 2014) and should not be used as a sole screening tool (Korner-Bitensky, 2000). Note: Positive predictive value was also found to vary with hemisphere</td>
<td>Ball, K., Roenker, D., Wadley, V., Edwards, J., Roth, D., McGwin, G., . . . Dube, T. (2006). Can high-risk older drivers be identified through performance-based measures in a department of motor vehicles setting? J Am Geriatr Soc, 54(1), 77-84.

Bouillon, L., Mazer, M., & Gelinas, I. (2006). Validity of the Cognitive Behavioral Driver’s</td>
</tr>
</table>

lesioned with the right hemisphere lesions having greater accuracy than the left hemisphere lesions (Mazer, 1998).

Version	Study	Suggested cut-off scores	Positive Predictive Value/ Negative Predictive Value	Time cut - off scores
MVPT	Bouillon et al.,2006; Korner-Bitensky et al.,2000; Mazer et al., 1998)	≤ 30 = needs further driving evaluation	86.1%/58.3 %	
	Oswanski, 2007 (older drivers)	≤ 32 = needs further driving evaluation		> 6.27s = predicts on-road failure Pass on road = 7.1 +/- 6.5; Fail on road = 10.6 +/- 5.5
	Ball et al., 2006	≤ 32 = older drivers 78+ years as likely to be involved in at-fault crashes.		
	Bouillon et al., 2006			>6.11 sec fail on road test Pass on road = 4.63 mean (2.30 SD); Fail on road = 6.11 mean (2.45 SD)
MVPT-3 (Third Ed.)	Gibbons, et. al., (2017)	> 57 = predicts on-road test pass		

Inventory in predicting driving outcome. *American Journal of Occupational Therapy*, 60(4), 420-427.

Dickerson, A.E., Meuel, D.B., Ridenour, C.D., & Cooper, K. (2014). Assessment tools predicting fitness to drive in older adults: A systematic review. American Journal of Occupational Therapy, 68, 670-680.

Gibbons, C., Smith, N., Middleton, R., Clack, J., Weaver, B., Dubois, S., & Bedard, M. (2017). Using serial trichotomization with common cognitive tests to screen for fitness to drive. American Journal of Occupational Therapy, 71

Korner-Bitensky, N.A., Mazer, B.L., Sofer, S., Gelina, I., Meyer, M.B., Morrison, C., …& White, M. (2000). Visual testing for readiness to drive after stroke: A multicenter study. American Journal of Physical Medicine & Rehabilitation, 79(3): 253-259.

Mazer, B., Korner-Bitensky, N.A., & Sofer, S. (1998). Predicting ability to drive after stroke. Archives of Physical Medicine & Rehabilitation, 79(7), 743-749.
-3
McCane, S. (2006). Test review: Motor-Free Visual Perception Test. Journal of Psychoeducational Assessment, 24(3): 265-272.

Oswanski, M.F., Sharma, O.P., Raj, S.S., Vassar, L.A., Woods, K.L, Sargent, W.M., & Pitock, R.J. (2007). Evaluation of two assessment tools in predicting driving ability of senior drivers. American Journal of Physical Medicine & Rehabilitation, 86(3): 190-199.

		< 41 = predicts on-road test failure			Schurr, Stephanie. *Driving After Stroke: Clinical Use of Pre-Driving Screen Data.* http://tbrhsc.net/wp-content/uploads/2017/01/S.Schurr-Driving-and-Stroke-OutPatient-Clinic.pdf accessed Jan 25, 2019
MVPT – 4 (Fourth Ed.) For those using this test version, a conversion method of equating these score to MVPT – 3 scores was suggested Shurr et al. (2019)		≥ 38 – fit to drive 19-37 = "grey zone" ≤ 18 + unfit to drive			

- MVPT and Trail Making B, poor performance on both tests 22 times more likely to fail on-road evaluation (Mazer, 1998)

Trail Making Test A – (TMT-A)and B (TMT-B)

Domains:
TMT-A: visual scanning, planning and motor processing speed (Roy & Molnar, 2013)
TMT-B: visual scanning, planning, processing speed and attention/cognitive flexibility (Roy & Molnar, 2013)

This test has been highly correlated with driving performance. Time and errors both correlate with driving after stroke (Marshall et al., 2007). At an earlier point in time, the combination of the MVPT and the TMT-B resulted in the most predictive model: poor performance on both tests = 22x more likely to fail on-road evaluation (Mazer, 1998). There is however, a large amount of variability in determining in cut-off points. A conservative estimate from the data below would be a 3 min or 3 error cut-off. It is suggested that there shouldn't be strict adherence to a cut-off, but instead considering performance on Trails B in the context of how a person scores on other measures. It has also suggest that method of establishing the cut-off is important. Those established based on on-road performance vs. crash history may be more directly related to a screening process

- Note: Several published guidelines have recommended use of the TMT-B to assess driving safety. TMT-A may also be used to discriminate between safe and potentially unsafe cognitively impaired older drivers (Lee & Molnar, 2017). See chart below:

Author	Cut-off indicating needs further Driving Evaluation	Strength of association	Method of Evaluation
Bedard et al., 2008	TMT-A: >48 sec = indicative of unsafe driving TMT- B: >39.5 sec = needs further driving evaluation	PPV: 60.3%, NPV: 57.6%	Statistical correlation and ROC curve analysis for

Bedard, M., Weaver, B., Darzins, P., & Porter, M.M. (2008). Predicting driving performance in older adults: we are not there yet! *Traffic Injury Prevention, 9*(4): 336–41.

Classen, S., Wang, Y., Crizzle, A.M., Winter, S.M., & Lanford, D.N. (2013). Predicting older driver on-road performance by means of the Useful Field of View and Trail Making Test Part B. *American Journal of Occupational Therapy, 67*(5): 574–582.

Devos, H., Akinwuntan, A.E., Nieuwboer, A., Truijen, S., Tant, M., & De Weerdt, W. (2011). Screening for fitness to drive after stroke: A systematic review and meta-analysis. *Neurology, 76*(8), 747-756.

Dickerson, A.E., Meuel, D.B., Ridenour, C.D., & Cooper, K. (2014). Assessment tools predicting fitness to drive in older adults: A systematic review. *American Journal of Occupational Therapy, 68*, 670-680.

			Driving Performance
Classen et al.	TMT- B: >106 sec predictive of poor on-road performance	PPV: 80%, NPV: 48.1%	On-road
Devos et al.	TMT- B: >90 sec predictive of unsafe driving	PPV: 69%, NPV: 52%	Unsafe driving
Gibbons et al.	TMT-A ≥ 69= Pass ≤ 25 Fail (100% sensitivity) TMT-B ≥178 = Pass (100% sensitivity) ≤ 80 Fail (100% sensitivity) (see chart p.5 for tri-chotomization))		In-clinic assessment and On-road
National Highway Traffic Safety Admin (2003) Authors Staplin, L , Lococo, K.H., Gish, K. w., Decina , L. E.	TMT- B: >80 sec indicative of an "early warning" (prevention measure) of unsafe driving of unsafe driving. Score of 180 sec indicate an "immediate danger" (intervention measure)		Crash Risk
Mazer et al. 1996	TMT-A: ≥ 1 error = needs further driving evaluation TMT- B: ≥3 errors = need for driving evaluation	p<.01, PPV = 85.2%, NPV = 48.1%	On-road
Papandonatos et al., 2015 (older adults)	TMT-A: > 48 sec = indicative of unsafe driving TMT-B 108sec = indicative of unsafe driving		On-road

Gibbons, C., Smith, N, Middleton, R., Clack, J., Weaver, B., Dubois, S., and Bédard, M.I (2017) Using Serial Trichotomization With Common Cognitive Tests to Screen for Fitness to Drive The American journal of occupational therapy : official publication of the American Occupational Therapy Association, 71(2): 1-8

Lee, L. & Molnar, F. (2017). Driving and dementia: Efficient approach to driving safety concerns in family practice. *Clinical Review, 63*(1): 27-31.

Marshall, S.C., Molnar, F., Man-Son-Hing, M., Blair, R., Brosseau, L., Finestone, H.M., … & Wilson, K.G. (2007). Predictors of driving ability following stroke: A systematic review. *Topics in Stroke Rehab, 14*(1):98-114.

Mazer, B., Korner-Bitensky, N.A., & Sofer, S. (1998). Predicting ability to drive after stroke. *Archives of Physical Medicine & Rehabilitation, 79*(7), 743-749.

National Highway Traffic Safety Administration. (2003). *Model driver screening and evaluation program: final technical report. Volume 2: Project summary and model program recommendations* (DOT HS 809 582), Washington, DC: U.S. Department of Transportation.

Papandonatos, G.D., Ott, B.R., Davis, J.D., Barco, P.P., & Carr, D.B. (2015). Clinical utility of the Trail-Making Test as a predictor of driving performance in older adults. *Journal of the American Geriatrics Society, 63*(11): 2358-2364.

		Roy, M., & Molnar, F., (2013). Systematic review of the evidence for Trails B cut-off scores in assessing fitness-to-drive. *Canadian Geriatrics Journal, 16*(3): 120-142. Tombaugh, T.N. (2004). Trail making Test A and B: normative data stratified by age and education. *Archives of Clinical Neuropsychology, 19*(2), 203-214.
Color Trails Test: Domains: selective attention, motor speed, visuospatial abilities, and executive functions (Elkin-Frankston et al., 2007) Similar to TMT, but involves alternation between numbers and two colors (1-pink, 2-yellow, 3-pink, etc.)	Evidence on predicting driving performance: - The CTT can be used as an alternative to the TMT to predict on-road performance. The CTT may be particularly useful for those individuals who are less familiar with the Latin alphabet (Elkin-Frankston et al., 2007) Suggested time cut-offs: - > 60s = predicts road test failure (Hartman-Maeir et al., 2008)	Elkin-Frankston, S., Lebowitz, B.K., Kapust, L.R., Hollis, A.M., & O'Connor, M.G. (2007). The use of the Color Trails Test in the assessment of driver competence: Preliminary report of a culture-fair instrument. *Archives of Clinical Neuropsychology, 22*(5): 631-635. Hartman-Maeir, A., Bar-Haim Erez, A., Ratzon, N., Mattatia, T. & Weiss, P. (2008). The validity of the Color Trail Test in the pre-driver assessment of individuals with acquired brain injury. *Brain Injury, 22*(13-14): 994-998.
Clock drawing test: **Domains:** visual-spatial construction, visual perception, and abstract conceptualization (Oswanski et al., 2007**)** **Currently, The Ontario Ministry of Transportation requires completion of a version of the Clock-Drawing Test as part of its Senior Driver Renewal Program that targets drivers aged 80 and older (Ontario Ministry of Transportation, 2017).**	Evidence on predicting driving performance: • The Clock Drawing Test is a significant predictor of seniors' driving capabilities (Oswanski et al., 2007) • Predicts on-road driving performance (Vanlaar et al., 2014) Suggested cut-offs: • Four Point Scale: ≤ 3/4 = need further driving evaluation (Oswanski et al., 2007) • Seven Point Scale: ≤ = Unfit to drive, ≥ Fit to drive (Gibbons, 2017) Methods of administration and scoring of Clock Drawing Test can vary. See *AMA Physician's Guide to Assessing and Counseling Older Drivers* found in the Candrive website for 1 method (Freund Clock Scoring) of administering and scoring The Clock Drawing Test: http://www.ama-assn.org/ama1/pub/upload/mm/433/phyguidechap3.pdf	American Medical Association. *AMA physician's guide to assessing and counseling older driver's.* http://www.ama-assn.org/ama/pub/physician-resources/public-health/promoting-healthy-lifestyles/geriatric-health/older-driver-safety/assessing-counseling-older-drivers.shtml Gibbons, C., Smith, N., Middleton, R., Clack, J., Weaver, B., Dubois, S., & B´edard, M. (2017). Using serial trichotomization with common cognitive tests to screen for fitness to drive. *American Journal of Occupational Therapy*, 71 Schurr, Stephanie. *Driving After Stroke: Clinical Use of Pre-Driving Screen Data.*

		http://tbrhsc.net/wp-content/uploads/2017/01/S.Schurr-Driving-and-Stroke-OutPatient-Clinic.pdf accessed Jan 25, 2019 Oswanski, MF. et. al. (2007). Evaluation of Two Assessment Tools in Predicting Driving Ability of Senior Drivers. *American Journal of Physical Medicine and Rehabilitation*, 86, 3. Vanlaar, W., McKiernan, A., McAteer, H., Robertson, R., Mayhew, D., Carr, D., …& Holmes, E. (2014). *A meta-analysis of cognitive screening tools for drivers aged 80 and over.* Ottawa, ON: Traffic Injury Research Foundation.
Useful Field of View (UFOV) Domain: Tests visual memory, visual attention, and divided attention with structured and unstructured components. The concept of "useful field of view" refers to the brain's ability to comprehend visual info with the head and eyes in a stationary position. This test is administered on a computer.	The UFOV is one of the most extensively researched and promising predictor tests for a range of driving outcomes measures, including driving ability and crash risk (Wood & Owsley, 2014). • Performance on the UFOV corresponds with crash history (Novack et al., 2006), future crashes (Owsley, 1994), and pass/fail on-road driving test (Myers et al., 2000; Novack et al., 2006; Stav et al., 2008) Suggested cut-off scores (UFOV-2): • ≥ 300 ms = need further driving evaluation PPV: 61.9% NPV: 86.1% (Bedard et al., 2008) • Drivers aged 75+: > 353 ms = 2x as likely to be involved in at-fault crashes (Ball et al., 2006)	Ball, K., Owsley, C., Sloane, M.D., Roenker, D.L., & Bruni, J.R. (1993). Visual attention problems as a predictor of vehicle accidents in older drivers. Investigative Ophthalmology and Visual science, 34, 3110-3123. Ball, K., & Owsley, C. (1993). The useful filed of view test: A new technique for evaluating age-related declines in visual function. Journal of the American Optometric Association, 64, 71-79. Ball, K., & Rebok, G. (1994). Evaluating the driving ability of older adults. The Journal of applied Gerontology, 13, 20-38. Ball, K.K., Roenker, D.L., Wadley, V.G., Edwards, J.D., Roth, D.L., McGwin, G., …& Dube, T. (2006). Can high-risk older drivers be identified through performance-based measures in a department of motor vehicles setting? Journal of the American Geriatrics Society, 54(1), 77-84.

		Bedard, M., Weaver, B., Darzins, P., & Porter, M.M. (2008). Predicting driving performance in older adults: we are not there yet! Traffic Injury Prevention, 9(4): 336–41. Edwards, J.D., Ross, L.A., Wadley, V.G., Clay, O.J., Crowe, M., Roenker, D.L., & Ball, K.K. (2006). The useful field of view test: Normative data for older adults. Archives of Clinical Neuropsychology, 21(4): 275-286. Owsley, C., & Ball, K. (1993). Assessing visual function in the older driver. Clinics in Geriatric Medicine: Medical Considerations in the older driver, 9, 389-401. Myers, R. S., Ball, K. K., Kalina, T. D., Roth, D. L., & Goode, K. T. (2000). Relation of useful field of view and other screening tests to on-road driving performance. Perceptual & Motor Skills, 91: 279-290. Novack, T.A., Banos, J.H., Alderson, A.L., Schneider, J.J., Weed, W., Blankenship, J., & Salisbury, D. (2006). UFOV performance and driving ability following traumatic brain injury. Brain Injury, 20: 455-461. Stav, W.B., Justiss, M.D., McCarthy, D.P., Mann, W.C., & Lanford, D.N. (2008). Predictability of clinical assessments for driving performance. Journal of Safety Research, 39: 1-7. Wood, J.M., & Owsley, C. (2014). Useful Field of View Test. Gerontology, 60(4): 315-318.Owsley, C., Ball, K., McGwin, G. Jr., Sloane, M.E., Roenker, D.L., White, M.F., et

		al. (1998). Visual processing impairment and risk of motor vehicle crash among older adults. *Journal of the American Medical Association, 279*(14), 1083-1088.
Single-Letter Cancellation Test Domains: visual scanning and visual attention Administration time: <5 minutes Norms: 18–91 yrs	<u>Evidence on predicting driving performance</u>: • Single-Letter Cancellation Test is significantly associated with on-road test outcome (Mazer et al., 1998) <u>Suggested cut-off scores</u>: • ≥ 5 errors = 3x more likely to fail on-road test (Mazer et al., 1998) - PPV: 78.9% NPV: 44.6%	Mazer, B., Korner-Bitensky, N.A., & Sofer, S. (1998). Predicting ability to drive after stroke. *Archives of Physical Medicine & Rehabilitation, 79*(7), 743-749.
Bells Test: - **Domains: selective attention and visual scanning**	Evidence on predicting driving performance: • Bells Test is significantly associated with on-road test outcome (Mazer et al., 1998) Suggested cut-off scores: • ≥ 4 errors = predictive of unsafe driving (Mazer et al., 1998) - PPV: 77.8% NPV: 44.6%	Bouillon, L., Mazer, B., & Gelinas, I. (2006). Validity of the Cognitive Behavioural Driver's Inventory in predicting driving outcome. American Journal of Occupational Therapy, 60(4): 420-427. Mazer, B., Korner-Bitensky, N.A., & Sofer, S. (1998). Predicting ability to drive after stroke. Archives of Physical Medicine & Rehabilitation, 79(7), 743-749.
Cognitive Screening		
Mini-Mental State Exam Domains: Orientation to time and place, immediate recall, short-term verbal memory, calculation, language, and construct ability.	Current best practice suggests utilization of the MMSE with other tests to predict on-road performance as it is not adequate as a benchmark on its own (Hollis et al., 2015). <u>Suggested cut-off scores:</u> • ≤ 24/30 may indicate the presence of a cognitive impairment, but determining fitness to drive would require additional assessment (Molnar et al., 2009) • <20/30 = likely unsafe to drive (Molnar et al., 2009) If the MMSE has already been administered, and the clinician has concerns about driving capacity, a score of 24 would equate a score of 18 on the MoCA and could be used as a benchmark for driving risk (Hollis et al., 2015). However, <= 24 on the MMSE is not adequately sensitive to predict on-road performance.	Bedard, M., Weaver, B., Darzins, P., & Porter, M.M. (2008). Predicting driving performance in older adults: we are not there yet! *Traffic Injury Prevention, 9*(4): 336–41. Hollis, A.M., Duncanson, H., Kapust, L.R., Xi, P.M., & O'Connor, M.G. (2015). Validity of the Mini-Mental State Examination and the Montreal Cognitive Assessment in the prediction of driving test outcome. *Journal of the American Geriatric Society, 63*(5): 988-992. Molnar F.J., Byszewski, A.M., Rapoport, M., & Dalziel, W.B.. (2009). Practical experience-based approaches to assessing fitness to drive in dementia. *Geriatric and Aging, 12*(2): 83-92.

Montreal Cognitive Assessment (MoCA): **Domains:** attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation (Nasreddine et al., 2005).	While one study found that MoCA was predictive of fitness to drive, It is recommended to work best in combination with other cognitive tools and not as a stand-alone test. (Bowers et al., 2013; Esser et al., 2016; Kwok et al., 2015) Suggested cut-off scores: • < 25 = discriminate pass/fail on-road (Kwok et al., 2015) • ≤ 18 = should raise concerns about driving (Hollis et al., 2015) • < 12 = likely to fail (Esser et al., 2016) • ≥ 27 = pass, ≤16 fail (Gibbons et al, 2017)	Bowers, A.R., Anastasio, R.J., Sheldon, S.S., O'Connor, M.G., Hollis, A.M., Howe, P.D., & Horowitz, T.S. (2013). Can we improve clinical prediction of at-risk older drivers? *Accident Analysis & Prevention, 59*(2013): 537-547. Esser, P., Dent, S., Jones, C., Sheridan, B.J., Bradley, A., Wade, D.T., & Dawes, H. (2016). Utility of the MoCA as a cognitive predictor for fitness to drive. *Journal of Neurology, Neurosurgery, and Psychiatry, 87*(5): 567-568. Gibbons, C., Smith, N, Middleton, R., Clack, J., Weaver, B., Dubois, S., and Bédard, M.I (2017) Using Serial Trichotomization With Common Cognitive Tests to Screen for Fitness to Drive The American journal of occupational therapy : official publication of the American Occupational Therapy Association, 71(2): 1-8 Kwok, J.C,W., Gelinas, I., Benoit, D., & Chilingaryan, G. (2015). Predictive validity of the Montreal Cognitive Assessment (MoCA) as a screening tool for on-road driving performance. *British Journal of Occupational Therapy, 78*(2): 100-108. Nasreddine, Z.S., Phillips, N.A., Bedirian, V., Charbonneau, S., Whitehead, V., Collin, I., …& Chertkow, H. (2005). The Montreal Cognitive Assessment, MoCA: A brief screening tool for mild cognitive impairment. *Journal of the American Geriatric Society, 53*(4): 695-699.
Driving Batteries		
DriveABLE® Competence Screen Domains:	While recent evidence on the DriveABLE® tool supports its utility with regard to predicting on-road performance using its own standardized protocol, there	Vrkljan, B.H., McGrath, C.E., & Letts, L.J. (2011). Assessment tools for evaluating fitness to drive: A critical appraisal of

motor speed & control, visual attention, spatial judgement; executive function Computer-based tasks used in concert with on-road DriveABLE test Administration time: 50 minutes	is no evidence available in the peer-reviewed literature concerning its psychometric properties or validating its corresponding on-road evaluation (Vrkljan, McGrath, & Letts, 2011) <u>Suggested cut-off scores:</u> • The positive predictive validity of the DriveABLE® Office Competence Screen in identifying those who would fail the DriveABLE® Road Test was 97% (n = 32 of 33). - Negative predictive validity was 47% - The sensitivity was 76% with a specificity of 90% (Vrkljan, McGrath, & Letts, 2011)	evidence. *Canadian Journal of Occupational Therapy, 78*(2): 80-96.
Cognitive Behavioral Driver's Inventory (CBDI) Domains: cognitive and behavioural skills required for driving Administration time: 1–1.5 hours. Available at https://www.cbdionline.com/	CBDI involves a comprehensive protocol with strong psychometric to determine fitness to drive (Vrkljan, McGrath, & Letts, 2011) <u>Suggested cut-off scores:</u> • < 45/50 = predicts failures on-road (Bouillon et al., 2006) • PPV: 62% NPV: 83%	Bouillon, L., Mazer, B., & Gelinas, I. (2006). Validity of the Cognitive Behavioural Driver's Inventory in predicting driving outcome. *American Journal of Occupational Therapy, 60*(4): 420-427. Vrkljan, B.H., McGrath, C.E., & Letts, L.J. (2011). Assessment tools for evaluating fitness to drive: A critical appraisal of evidence. *Canadian Journal of Occupational Therapy, 78*(2): 80-96.
Vision Assessment		
Ministry of Transportation Requirements **Province specific websites** **http://www.mto.gov.on.ca/english/dandv/driver/medical-review/standards.shtml** **Canadian Council of Motor Transport Administrators**	<u>Vision Standards - Class G and M</u> "Ontario Regulation 340/94 (s. 18) requires that an applicant for or a holder of a Class G, G1, G2, M, M1 or M2 licence must have, •A visual acuity as measured by Snellen Rating that is not poorer than 20/50, with both eyes open and examined together with or without the aid of corrective lenses; and •A horizontal visual field of at least 120 continuous degrees along the horizontal meridian and at least 15 continuous degrees above and below fixation, with both eyes open and examined together" http://www.mto.gov.on.ca/english/dandv/driver/medical-review/standards.shtml In Ontario, a vision waiver can be applied for people seeking Class G licenses who lack 120 degrees of horizontal vision as long as certain	

	conditions are met.	
Sensori - Motor Assessment		
Range of Motion (ROM) & Strength	• Range of motion assessments should be made of any joints required to operate a vehicle for example neck, spine, upper and lower limbs. Restrictions and painful range of motion should be noted. • Strength of the muscle groups should also be assessed to determine any restrictions which might limit action • Potential ability to participate with of impaired limbs should be considered and need for devices or strategies anticipated identified.	
Sensation	• Somatosensory impairment of the limb should be assessed to determine ability of the limbs to move with adequate speed and strength with vehicle. Somatosensation of the in the foot and proprioception of the ankle/foot will be of particular interest for braking and acceleration. (Vrkljan et al., 2011)	Vrkljan, B.H., McGrath, C.E., & Letts, L.J. (2011). Assessment tools for evaluating fitness to drive: A critical appraisal of evidence. Canadian Journal of Occupational Therapy, 78(2): 80-96.
Gait and Physical Performance Tests	Rapid Pace Walk (Marottoli et al. 1994) in Mielenz et al., (2017) • > 7 seconds = Red Flag The Short Physical Performance Battery (Guralnik et al.,1994) in Mielenz et al., (2017) • associated with reduced driving exposure and increased cessation in older drivers	Guralnik JM, Branch LG, Cummings SR, Curb JD. Physical performance measures in aging research. J Gerontol. 1989;44(5):M141–6. Marottoli RA, Ostfeld AM, Merrill SS, Perlman GD, Foley DJ, Cooney LM. Driving cessation and changes in mileage driven among elderly individuals.J Gerontol. 1993;48(5):S255–60. Marottoli RA, Cooney LM, Wagner R,

		Doucette J, Tinetti ME. Predictors of automobile crashes and moving violations among elderly drivers. Ann Intern Med. 1994;121:842–6. Mielenz, T. J. Durbin,L.L., Cisewski,J., A., Guralnik,J. M. and Li, G. (2017). Inj Epidemiol. Published online 2017 May 8. doi: 10.1186/s40621-017-0110-2