

**Reply to: “Diagnostic test accuracy of the Montreal Cognitive Assessment in the detection of post-stroke cognitive impairment under different stages and cutoffs: a systematic review and meta-analysis”**

(April 2018, Volume 39, Issue 4, pp 705 – 716)

Elise T Milosevich<sup>1</sup>, Sarah Pendlebury<sup>2</sup> & Nele Demeyere<sup>1</sup>

<sup>1</sup> Department of Experimental Psychology, University of Oxford, Oxford, United Kingdom

<sup>2</sup> Centre for Prevention of Stroke and Dementia, Nuffield Department of Clinical Neurosciences, John Radcliffe Hospital, and the University of Oxford

Correspondence to:

Elise Milosevich

Department of Experimental Psychology, University of Oxford

New Radcliffe House

Oxford

OX2 6AE

Tel: +44 (0)1865 271340

Email: [elise.milosevich@psy.ox.ac.uk](mailto:elise.milosevich@psy.ox.ac.uk)

Keywords: Cognitive, Stroke, Post-stroke cognitive impairment, Cognitive assessment, Neuropsychology, OCS, MoCA, MMSE

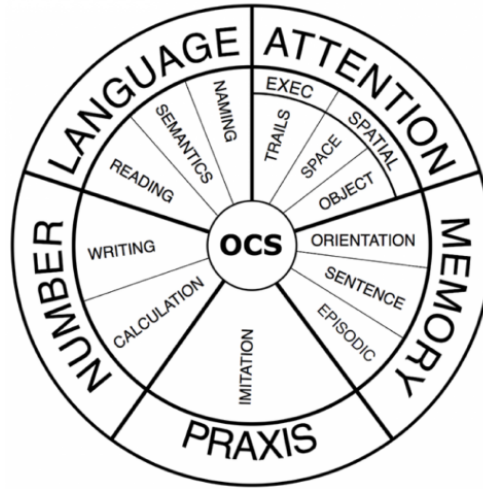
Dear Editor-in-Chief,

We read the review by Shi et al. [1] with interest and agree that early detection of post-stroke cognitive impairment (PSCI) is very important, both for clinicians and patients since accurate detection of cognitive deficits post-stroke can facilitate appropriate rehabilitation and discharge planning. The authors aimed to systematically review the literature to identify and quantify studies reporting the diagnostic accuracy of the Montreal Cognitive Assessment (MoCA) [2] in stroke survivors, assess the sensitivity and specificity of the MoCA, provide optimal cutoffs, and compare the MoCA with other available screening tools. These aims together with the suggestion at the start of the discussion that 'a brief and sensitive screening tool is urgently needed', prompted us to highlight a significant oversight. The Oxford Cognitive Screen (OCS) [3] was specifically developed as a brief cognitive screen for use post-stroke and although the OCS was used in the study by Mancuso et al cited in the review [4], the key study comparing the OCS with the MoCA in a sample of 200 acute stroke survivors [5] is not included. This is surprising given that the review inclusion criteria encompassed observational studies in stroke patients which assessed PSCI by the MoCA with a neuropsychological evaluation as the reference standard.

The OCS was specifically designed as a brief neuropsychological battery for the stroke population, with tasks which are inclusive for, and unconfounded by, aphasia and neglect. It provides a domain-specific cognitive profile post-stroke, summarizing performance across five cognitive domains (Fig. 1). The OCS has been translated and re-normed in seven other languages (see [www.ocs-test.org](http://www.ocs-test.org) under translations). Its design is predicated on the recommendations by the National Institute for Health and Care Excellence (NICE, 2013), stating that acute cognitive assessment after stroke should include the assessment of attention, memory, spatial awareness, apraxia and perception [6]. The OCS is also recommended in the Royal College of Physicians National Clinical Guideline for Stroke as a standardized screening tool [7].

# OCS

## Oxford Cognitive Screen



Copyright © Oxford University Innovation, 2014. All rights reserved.

Figure 1. The Oxford Cognitive Screen (OCS) returns a visual snapshot of the patient's cognitive profile.

Whilst we agree with Shi et al.'s [1] conclusion that the MoCA and to a lesser extent the Mini-Mental State Exam (MMSE) [8] are useful brief screening tools for PSCI, neither of these assessment tools are stroke-specific. Both are unable to fully identify domain-specific cognitive deficits, which are highly prevalent in acute stroke [4,5], though the MoCA is more sensitive than the MMSE to cognitive profile differences between clinic-pathologic groups [10]. In addition, the Addenbrooke's Cognitive Examination-Revised (ACE-R) [11] does not appear to add significantly to the information contained in the MoCA [12]. In a cross-sectional study of a consecutive sample of 200 patients within three weeks of stroke, Demeyere et al. [5] compared the MoCA with the OCS and found that overall the OCS was more sensitive in detecting impairments than the MoCA, with several people scoring in the normal range demonstrating stroke specific deficits. The OCS detected impairments including neglect, apraxia and reading/writing ability not identified by the MoCA that may be important in guiding rehabilitation and demonstrates the value of cognitive profiling. In addition, patients who were unable to complete the MoCA or failed due to language deficits were able to demonstrate preserved cognitive domain functions outside the language domain.

Finally, we agree with the authors' statement that there is no consensus regarding the gold standard assessment for cognition after stroke; different tools will satisfy different requirements. For example, the MoCA, (or other short tests) may be appropriate in the assessment of patients with mild cerebrovascular events (TIA and minor non-disabling stroke) [12], or in the detection of longer-term post stroke cognitive impairment when the number of survivors with severe stroke and problems interfering with the use of brief tests, is small [13]. Short screening tests including the MoCA may also help as an initial screening tool after acute stroke in pragmatic large-scale studies in predicting longer-term cognitive and functional outcome, or to guide need for further in-depth assessment [14,15]. In contrast, the OCS is more

appropriate for informing the management of patients with acute severe stroke who will require extensive rehabilitation. The OCS requires more resources than the MoCA or MMSE, including a brief video tutorial training, more extensive test materials, and its use should be targeted appropriately. Therefore, cognitive screening tests should be selected according to the available resources, expertise of the assessor, the characteristics of the patients being assessed and the desired cognitive information.

#### References:

1. Shi D, Chen X, Li Z (2018). Diagnostic test accuracy of the Montreal Cognitive Assessment in the detection of post-stroke cognitive impairment under different stages and cutoffs: a systematic review and meta-analysis. *Neurological Sciences*. 39:705-716
2. Nasreddine ZS, Phillips NA, Bedirian V et al. (2005). The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of American Geriatric Society*. 53:695-699
3. Demeyere N, Riddoch MJ, Slavkova ED et al. (2015). The Oxford Cognitive Screen (OCS): Validation of a stroke-specific short cognitive screening tool. *Psychological Assessment*. 27(3): 883–894
4. Mancuso M, Demeyere N, Abbruzzese L et al. (2018). Using the Oxford Cognitive Screen to detect cognitive impairment in stroke patients: A comparison with the Mini-Mental State Examination. *Frontiers in Neurology*. 9(101):1-9
5. Demeyere N, Riddoch MJ, Slavkova ED et al. (2016). Domain-specific versus generalized cognitive screening in acute stroke. *Journal of Neurology*. 263:306-315
6. National Institute for Health and Care Excellence (2013). Stroke rehabilitation in adults (Nice Guideline CG162). Available at: <https://www.nice.org.uk/guidance/cg162>
7. Rudd AG, Bowen A, Young GR, James MA (2017). National clinical guidelines for stroke: 5<sup>th</sup> Edition. *Clinical Medicine* (Royal College of Physicians, London). Available at: <https://www.strokeaudit.org/Guideline/Full-Guideline.aspx>
8. Folsetin MF, Folstein SE, McHugh PR (1975). Mini-mental state. A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*. 12:189-198
9. Nys GM, van Zandvoort MJ, de Kort PI et al., (2005). Restrictions of the Mini-Mental State Examination in acute stroke. *Archives of Clinical Neuropsychology*. 20:623-629
10. Pendlebury ST, Markwick A, de Jager CA et al. (2012). Differences in cognitive profile between TIA, stroke and elderly memory research subjects: a comparison of the MMSE and MoCA. *Cerebrovascular Diseases*. 34(1):48-54
11. Mioshi E, Dawson K, Mitchell J et al. (2006). The Addenbrooke's Cognitive Examination Revisited (ACE-R): a brief cognitive test battery for dementia screening. *International Journal of Geriatric Psychiatry*. 21:1078-1085
12. Pendlebury ST, Mariz J, Bull L et al. (2012). MoCA, ACE-R, and MMSE versus the National Institute of Neurological Disorders and Stroke-Canadian Stroke Network Vascular Cognitive Impairment Harmonization Standards Neuropsychological Battery after TIA and stroke. *Stroke*. 43:464-9.
13. Pendlebury ST, Klaus SP, Thomson RJ et al. (2015). Methodological Factors in Determining Risk of Dementia After Transient Ischemic Attack and Stroke: (III) Applicability of Cognitive Tests. *Stroke*. 46:3067-73
14. Godefroy O, Yaïche H, Taillia H, et al. (2018). GRECogVASC Study Group. Who should undergo a comprehensive cognitive assessment after a stroke? A cognitive risk score. *Neurology*. 20;91(21):e1979-e1987
15. Zietemann V, Georgakis MK, Dondaine T et al. (2018). Early MoCA predicts long-term cognitive and functional outcome and mortality after stroke. *Neurology*. 13;91(20):e1838-31850