




Letter to the Editor

How to choose the best criteria for mild cognitive impairment? When relevant information is missing

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Introduction

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I have read with much interest the work by Chang et al. (2024) recently published in the Journal of the International Neuropsychological Society, in which the predictive validity for incident dementia of four Mild Cognitive Impairment (MCI) definitions are compared. The authors report no statistically significant differences with regards to the Youden's Index or Hazard ratios, but differences were reported among the four approaches with regards to sensitivity and specificity to identify progressors. I found this work very interesting and timing, as the concept of MCI has evolved and so should the way objective cognitive impairment is identified in people with suspected cognitive impairment, since neuropsychologists know that obtaining one or more low scores is common when several measures are included in the neuropsychological battery (Brooks et al., 2008; Palmer, 1998). However, after my reading of the paper, I feel that some important information is missing in the work by Chang et al. (2024) that deserves some discussion. The authors identified progressors to dementia through a 2–7 years period, and then calculated sensitivity and specificity metrics for each MCI definition. However, what I think researchers or clinicians will find more useful is the predictive power of each definition to identify progressors, as there is no way of knowing who will progress to dementia upon neuropsychological assessment. Whilst sensitivity indicates the percentage of individuals who progress to dementia and were classified as

MCI at baseline, the Positive Predictive Value (PPV) represents the percentage of individuals classified as MCI at baseline who later progress to dementia (i.e., the risk of progression; Glaros & Kline, 1988). Tabulating the data reported in tables 1 and 3 in Chang et al. (2024) for the 2-year follow-up period, Table 1 shows the PPV and the Negative Predictive Value (NPV) for each MCI definition (with minor changes likely due to differences in decimal places). These data show that taking into account several low scores provides the highest PPV without compromising the NPV, with the *Number of Impaired Tests* (NIT) definition (Oltra-Cucarella et al., 2018) almost doubling (~11%) the other three definitions' PPV (~6%). Chang et al. (2024) accurately discuss the strengths and weaknesses of each MCI definition, but fail to add the important information reported here. The Petersen/Winblad criteria require only one low score, whereas the Jak/Bondi criteria include only six measures, which is uncommon in neuropsychological assessment. The NIT are more flexible as they can be calculated for a different number of measures in a battery or for different numbers of measures within a cognitive domain. I would recommend that researchers developing normative data for neuropsychological tests report the NIT for their particular battery, for clinicians using that battery to be able to compare different MCI definitions. Taking into account the normal variability in cognitive functioning might be more useful to identify individuals at the greatest risk of progressing from MCI to dementia, and the NIT criteria seem to be very useful when the diagnosis of objective cognitive impairment is the main purpose.

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Table 1. Positive and negative predictive values for each mild cognitive impairment definition

Definition		Dementia	No dementia		Sen	Spec	PPV	NPV
Petersen/Winblad	MCI	26 (a)	437 (b)	463	0.77	0.58	5.62%	98.7%
	No MCI	8 (c)	602 (d)	610				
		34	1039	1073				
Jak/Bondi	MCI	25	361	386	0.74	0.66	6.48%	98.7%
	No MCI	9	678	687				
		34	1039	1073				
NIT	MCI	18	151	169	0.54	0.86	10.65%	98.2%
	No MCI	16	888	904				
		34	1039	1073				
Global CR	MCI	29	487	516	0.85	0.53	5.62%	99.1%
	No MCI	5	552	557				
		34	1039	1073				

Notes: NIT: number of impaired tests, Global CR: global clinical rating, MCI: mild cognitive impairment, Sen: sensitivity = $a / (a + c)$, Spec: specificity = $d / (b + d)$, PPV: positive predictive value = $a / (a + b)$, NPV: negative predictive value = $d / (c + d)$, See Glaros and Kline (1988) for a detailed explanation of diagnostic statistics

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References

- Brooks, B. L., Iverson, G., Holdnack, J., & Feldman, H. (2008). Potential for misclassification of mild cognitive impairment: A study of memory scores on the Wechsler Memory Scale-III in healthy older adults. *Journal of the International Neuropsychological Society*, 14(3), 463–478. <https://doi.org/10.1017/S1355617708080521>
- Chang, K. H., Wang, C., Qin, J., Katz, M. J., Byrd, D. A., Lipton, R. B., & Rabin, L. A. (2024). Comparing the predictive validity of four MCI definitions for incident dementia in demographically diverse community-dwelling individuals: Results from the Einstein Aging Study (EAS). *Journal of the International Neuropsychological Society*, 1–10. <https://doi.org/10.1017/S1355617724000729>
- Glaros, A. G., & Kline, R. B. (1988). Understanding the accuracy of tests with cutting scores: The sensitivity, specificity, and predictive value model. *Journal of Clinical Psychology*, 44(6), 1013–1023. [https://doi.org/10.1002/1097-4679\(198811\)44:6<1013::aid-jclp2270440627>3.0.co;2-z](https://doi.org/10.1002/1097-4679(198811)44:6<1013::aid-jclp2270440627>3.0.co;2-z)
- Oltra-Cucarella, J., Sánchez-SanSegundo, M., Lipnicki, D. M., Sachdev, P. S., Crawford, J. D., Pérez-Vicente, J. A., Cabello, L., & Ferrer-Cascales, R. (2018). Using the base rate of low scores helps to identify progression from amnesic MCI to AD. *Journal of the American Geriatrics Society*, 66(7), 1360–1366. <https://doi.org/10.1111/jgs.15412>
- Palmer, B. (1998). Base rates of “Impaired” neuropsychological test performance among healthy older adults. *Archives of Clinical Neuropsychology*, 13(6), 503–511. [https://doi.org/10.1016/S0887-6177\(97\)00037-1](https://doi.org/10.1016/S0887-6177(97)00037-1)