

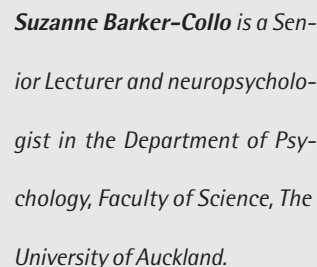
Valery L Feigin and Suzanne Barker-Collo

After administering a battery of neuropsychological tests, the neuropsychologist is faced with the task of making sense out of an abundance of numerical data. To best understand test data, the neuropsychologist must have a reference point as to what constitutes 'normal' performance. This numerical frame of reference is provided by normative data. As noted by Mitrushina et al.¹ *'Normative data provide this empirical context and represent the range of performance on a particular test of a group of medically/neurologically healthy individuals...these normative reference groups are considered the 'gold standard' against which an individual's test performance is compared and contrasted.'*

or the test wasn't administered in a standardised fashion. It was only with the publication of Spreen and Strauss' *A compendium of neuropsychological tests*^{2,3} that clinicians had a single source of previously published normative data sets for a large number of neuropsychological tests. This seminal text provides clinicians with access to a substantial number of normative data sets that are embedded in publications of clinical studies, making them otherwise difficult to locate. Mitrushina et al.¹ provide a similar resource, though they present a review of the characteristics of studies which provide normative data, and their data are for a more select group of tests. In examining these two seminal texts, it becomes apparent that the majority of normative data that is currently available continues to come in the form of data from normal control groups used for the purposes of comparison to clinical samples.

on North American samples. Scores on neuropsychological tests that are used to assess cognitive functioning are subject to variation due to random error and to systematic error due to factors such as cultural diversity.⁴ As a result, it is not clear whether these normative data sets can provide a true indication of level of deficit when compared to the ethnically diverse New Zealand population. Indeed, the literature indicates that level of impairment identified on some neuropsychological tests in New Zealanders may be the subject of cultural variations.⁴⁻¹⁰

Despite their critical importance, there are still relatively few large scale normative data sets available in the literature. Further, the data are limited to use with patients whose demographic characteristics are similar to those of the normative data. In most cases, normative data sets remain small and do not allow for stratification by ethnic group. The need to establish such normative data is suggested by the recent funding of several large scale normative



projects for African-American individuals conducted in response to the pressing need to generate normative data specifically for this group, including the Consortium to Establish a Registry for Alzheimer's Disease,¹¹ the Washington-Heights-Inwood-Columbia Aging project,¹² and the San Diego African American Norms Project.^{13,14} The need for normative data for individuals of non-American nationality has also resulted in the Macquarie University Neuropsychological Normative Study (MUNNS) in Australia.¹⁵

In the psychological test literature it has become a virtual truism that individuals of different cultural identities perform differently on tests of neuropsychological functioning.^{4,14,16} Anastasi and Urbina¹⁷ point out that neuropsychological tests tend to favour people from the same culture as the test developers. Cultural variation (also termed cultural bias) refers to whether a test yields comparable scores across cultural groups or whether use of the tests results in disparate treatment of members of different racial and ethnic groups.⁴ For example Manly et al.⁹ reported that neuropsychological test scores of normal ethnic minority subjects are significantly lower than those of their Anglo-American counterparts,

resulting in higher rates of misclassification for brain injury. Cultural variation has also been defined as the extent to which test content is more familiar to white middle-class (American) examinees than it is to individuals from other cultures.⁴ Despite the above, as noted by Ardila⁶ there has been a dearth of investigations that have been sensitive to the analysis of cultural variables within the field of neuropsychology which has limited our understanding of the impact of cultural factors on both assessment and treatment. Lezak¹¹ also notes that culture has

been largely ignored in the construction of neuropsychological tests. It is clear, however, that scores on neuropsychological tests that are used to assess cognitive functioning are subject to variation due to random error and to systematic error due to factors such as cultural diversity.⁴

Cultural variations in neuropsychological tests in New Zealand

Within the New Zealand context, Ogden¹⁴ notes that *'A young Maori man who sustains a head injury and is assessed on a battery of neuropsychological tests developed and normed in the United Kingdom or the USA may demonstrate a pattern of 'impairments' that has more to do with the cultural bias of the tests than the consequences of brain damage.'* Preliminary efforts to examine the impact of culture on specific tests used to assess cognitive functioning have found that New Zealand samples perform worse than the normative data would anticipate, potentially leading to over-identification of deficits.^{1,6,8,10} For example, Barker-Collo et al.⁷ found that while performance

on a test of verbal memory (California Verbal Learning Test; CVLT) was not significantly impacted by sex or cultural identity (European/Pakeha;

Maori or Pacific Islander), overall performance of the sample placed the average New Zealander below the 16th percentile. They conclude that use of published American normative data to score this test is likely to result in a much larger proportion of New Zealand individuals being identified as having a deficit.

While New Zealanders in general are disadvantaged on neuropsychological tests, additional research points to particular disadvantage for New Zealand Maori. Ogden and McFarlane-Nathan¹⁴ examined the neuropsychological performance of

Maori men of low socioeconomic status aged 16 to 24 yrs residing in rural (n=14) and urban (n=10) environments. Participants completed a brief battery of neuropsychological tests and were found to perform well below what would be expected using American normative data on tests of verbal knowledge and visual memory. They further commented that *'future studies should attempt to include a more valid measure of acculturation in order to assess the influence of this variable on performance on tests developed and normed on white, western populations.'* Barfield and Leatham¹⁶ examined neuropsychological performance of 50 self-selected inmates of Wanganui prisons. On the whole the sample performed at lower levels on neuropsychological tests compared to norms, with performances on verbal tests significantly lower than normative group means. No significant differences in results were identified between high and low substance use groups. Maori participants performed significantly worse than European participants on all aspects of verbal memory. Ogden et al.¹⁴ compared Maori (n=20) and Pakeha/European (n=20) from low socio-economic backgrounds on a range of neuropsychological assessments and a Maori identity measure. Their results generally supported the hypotheses that Maori score poorly on tests that rely strongly on formal Western education and concepts, and perform as well or better than Pakeha on Maori versions of tests. Though data from New Zealand samples is lacking, the wider literature indicates that culture impacts on neuropsychological test performance for Asian and Pacific Island populations.¹⁸ Given these findings, while any population-based study of neuropsychological outcomes will allow examination of relationships between performances on various tests, examination of the absolute level of performance will be subject to cultural bias unless data from matched controls is made available.

Neuropsychological tests tend to favour people from the same culture as the test developers

Conclusions

To summarise, despite their critical importance, there are still relatively few large scale normative data sets available in the literature. Further, the data are limited to use with patients whose demographic characteristics are similar to those of the normative data. In most cases, normative data sets remain small, and do not allow for stratification by ethnic group. The need to establish such normative data

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data for individuals of non-American nationality has also resulted in the Macquarie University Neuropsychological Normative Study (MUNNS) in Australia.²² The data presented in this literature review provide a strong justification for the urgent need of accurate neuropsychological normative data for New Zealand.

Competing interests

None declared.

References

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The need for reconstruction and renewal

'Do the threats to primary care matter? Would it make a difference if the field were to fail? Of course, no one knows whether these challenges will mortally wound primary care. If primary care were to fail, some would argue that it was the market's way of benefiting consumers by replacing outdated approaches with those of competitors who responded better to changing consumer needs. History shows, however, that many excellent, even superior, products are lost through accidents of timing and the crude and often distorting forces of the market. We believe that primary care may well be in the latter category, and we therefore challenge primary care medicine to reconstruct itself during this complicated and unsettling, and yet exciting, time of transition in U.S. medical care.'

Moore G, Showstack J. Primary care medicine in crisis: Toward reconstruction and renewal. *Ann Int Med* 2003;138(3):244-248.