

Performance of Rural and Urban Adult Participants in Neuropsychological Tests in Zambia

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Formulation of normative sample for Zambia

Neuropsychological examination is an important way of formally assessing brain function. While there is so much documentation about the influence that some factors such as age and education has on neuropsychological tests (NP), not so much has been done to assess the influence that residency (rural/urban) may have. The specific objectives of this study were to establish if there is a significant difference in mean test scores on NP tests between rural and urban participants, to assess which tests on the Zambia Neurobehavioural Test Battery (ZNTB) are more affected by the participants' residency (rural/urban) and to determine the extent to which education, gender and age predict test performance on NP tests for rural and urban participants.

To ensure that the study met the ethical requirements, the research proposal was submitted to the University of Zambia Biomedical Ethics Committee and the Ministry of Health in Zambia after which it was approved. This was to ensure that the participants' interests and ethical issues such as confidentiality and informed consent were put into consideration.

The participants (324) were drawn from both urban and rural areas of Zambia (Rural = 152 and Urban = 172). However, only 234 participants (Rural = 152 and Urban 82) were used for all the analyses in this particular study. The 234 participants were used as the actual proportion of the rural vs. urban population in Zambia was 65%: 35%, respectively (CSO, 2003). The rural-urban ratio for the participants that were captured during the data collection process was 152: 172, respectively. Thus, all the rural participants (152) were included and 90 of the 172 urban participants were randomly excluded so that the rural/urban ratio reached the desired 65%: 35 % which was the required ideal statistic for appropriate representation of the actual population in Zambia. Data on NP tests were analyzed from 234 participants, rural (N=152) reflecting 65% and urban (N=82) reflecting 35%. T-tests indicated that urban participants had superior performances in all the seven NP tests domains and all the mean differences in all these domains were found to be statistically significant. The NP tests domains were visual episodic memory, verbal episodic memory, attention/working memory, verbal fluency, speed of information processing, executive functioning and motor functioning. Residency had a large or moderate effect in five domains, while its effect size was small only in two of the domains. A standard multiple regression revealed that education, age and residency as predictor variables made a significant contribution to variance in performance on various domains of the ZNTB. However, gender of participants was not a major factor in determining one's performance on neuropsychological tests.

As can be seen from table below, residency (rural/urban) had a large effect size with regard to performance on the domains of verbal fluency and speed of information processing. The effect of residency was moderate/medium on the domains of verbal episodic memory, visual episodic memory and attention/working memory. The effect size of residency was however, small in the domains of motor/dexterity and executive functioning. The influence of residency on the performance of the seven domains of the ZNTB was therefore, either large or moderate in five and was small only in two.

Standard multiple regression was also used to assess the ability of four independent/predictor variables (education – years/level of and quality of, gender, age, and residency – rural/urban) to predict NP tests performance on the seven domains of the Zambia Neurobehavioural Test Battery (ZNTB). Residency had a statistically significant contribution to the model in five of the domains, namely, visual episodic memory, verbal episodic memory, verbal fluency, speed of information processing motor/dexterity. The results in this study

Table 1. Mean Effect sizes of Residency on the NP Tests Domains of the ZNTB.

| NP Tests Domains | Residency | N | Mean | Std. Deviation | P | Eta squared value |
|---------------------------------|-----------|-----|-------|----------------|--------|-------------------|
| Verbal fluency | Rural | 152 | 9.75 | 2.18 | <.005* | .238 |
| | Urban | 82 | 12.10 | 1.67 | | |
| Speed of information processing | Rural | 152 | 9.62 | 2.13 | <.005* | .175 |
| | Urban | 82 | 11.63 | 2.02 | | |
| Verbal episodic memory | Rural | 152 | 9.63 | 2.74 | <.005* | .118 |
| | Urban | 82 | 11.72 | 2.73 | | |
| Visual episodic memory | Rural | 152 | 9.64 | 2.88 | <.005* | .083 |
| | Urban | 82 | 11.47 | 3.00 | | |
| Attention/Working memory | Rural | 152 | 9.80 | 2.19 | <.005* | .079 |
| | Urban | 82 | 11.20 | 2.49 | | |
| Motor/dexterity | Rural | 152 | 9.72 | 2.56 | <.005* | .054 |
| | Urban | 82 | 11.04 | 2.82 | | |
| Executive functioning | Rural | 152 | 152 | 1.99 | <.005* | .053 |
| | Urban | 82 | 82 | 2.28 | | |

* Results significant at $p < .05$ with 95% confidence.

indicated to a larger extent that residency as a predictor variable is an “umbrella” that has within it a number of associated factors such as education and acculturation that makes it a better predictor of performance on NP tests in developing countries as compared to a single independent/predictor variable of education, age, gender, etc., assessed individually. This particular report is part of an ongoing larger cutting-edge study aimed at formulating the normative data for Zambia with regard to performance on neuropsychological tests. This is necessary for appropriate, effective and efficient assessment or diagnosis of various neurocognitive and neurobehavioural deficits that a number of people may currently be suffering from, (Strauss et al., 2006). It has been shown in this study that it is vital to make careful analyses of the variables that may be associated with one’s performance on neuropsychological tests.

References

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2. Strauss, D.T., Stethem, L.L., Hegenhoiltz, H., & Richard, M.T. (1989). Traumatic brain injury: A comparison of three clinical tests and analysis of recovery. *The Clinical Neuropsychologist* **3**, 145-156.