NART, WTAR and VCI From The WAIS-III: Do They Measure the Same Thing?

M. Bunnage[1,2,3] and H Dawson[4,2]

1 Department of Neuropsychology, Frenchay Hospital, North Bristol NHS Trust, Bristol, UK
2 Department of Experimental Psychology, University of Bristol, UK
3 Institute of Clinical Neuroscience, Bristol, UK
4 Department of Pharmacy and Pharmacology, University of Bath, Bath, UK.

Abstract

Objective : The National Adult Reading Test (NART) and Wechsler Test of Adult Reading (WTAR) are often used as measures of premorbid intellectual ability. The Verbal Comprehension Index from the Wechsler Adult Intelligence Scale–III (VCI) is generally considered a measure of contemporaneous verbal intelligence. Recent factor analytic research suggests they may all measure the same latent trait, crystallised intelligence. This study aimed to determine whether, in a clinical sample, it is reasonable to interpret the NART, WTAR and VCI as measuring different things.

Participants and Methods: Psychometric data from a heterogeneous clinical sample of 93 adult patients were analysed.

Results : Scores on the NART, WTAR and VCI were all highly correlated with one another (NART:WTAR r=.77; NART:VCI r=.66; WTAR:VCI r=.76). All three measures were contrasted with the number of years of formal education completed by participants. The mean differences between NART, WTAR and VCI scores and the number of years of education completed were not significant across measures (p=0.96). All three measures were contrasted with current performance on the Processing Speed Index from the Wechsler Adult
Intelligence Scale-III (PSI). On average NART, WTAR and VCI scores were higher than PSI scores. The mean differences between the NART, WTAR and VCI scores and performance on PSI were not significant across measures (p=0.98).

Conclusions : These results suggest performance on the NART, WTAR and VCI may all be a reflection of the same underlying trait; presumably crystallised intelligence. There were no systematic differences between performance on these measures and number of years of education (a proxy reflection of likely premorbid intelligence) or PSI (current measure sensitive to the effects of brain injury). These results suggest the NART, WTAR and VCI may all be equally good indicators of likely premorbid intelligence and/or all equally affected by brain injury.

Introduction

Frequently performance on tests of word knowledge or reading is used to infer likely premorbid intellectual ability. Measures such as the National Adult Reading Test (NART) and by extension the Wechsler Test of Adult Reading (WTAR) are often considered, when used contemporaneously, to be an index of premorbid ability (in elderly patients, Sharpe and Carroll, 1991, McGurn et al, 2004; in patients with head injury, Watt and Carroll, 1999; in patients with Alzheimer's or Korsakoff's syndrome, Bright et al, 2002). Their validity has, however, been questioned as performance on these tests has been shown to be sensitive to current brain damage (for example Mathias et al, 2007; McFarlane et al, 2006).

Performance on a concurrent measure of verbal intelligence, such as the Verbal Comprehension Index (VCI) from the Wechsler Adult Intelligence Scale – III is generally not considered in this same way and is often reported as a measure of current intellectual ability. Factor analytic data from healthy adults suggests that measures such as the NART, WTAR and the tests that comprise the VCI may all be drawn from the same latent trait of ability, namely verbal crystallised intelligence (Flanagan and Harrison, 2005).

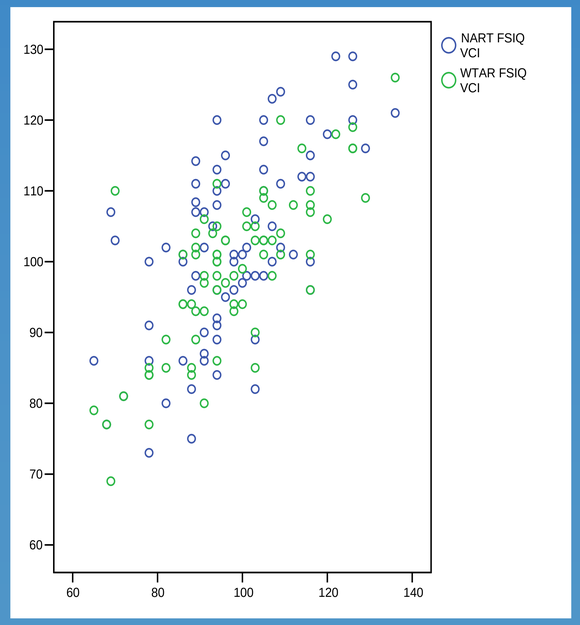
It is somewhat uncertain, therefore, whether it makes scientific or clinical sense to interpret the NART and WTAR as measuring premorbid ability and the VCI as measuring current ability, when it is perhaps the case that all three actually measure the same thing, namely crystallised ability.

In the current study data from 93 clinical adult cases were analysed to examine this question.

Method & Results

The NART, WTAR, VCI and Processing Speed Index (PSI) from the Wechsler Adult Intelligence Scale – III were measured, as part of a more comprehensive cognitive test battery, in 93 clinical adult cases referred for neuropsychological assessment.

Number of years of formal education was recorded from clinical interview and coded according to the criteria specified in Heaton et al (2004).



The sample comprised patients referred from either a neurology or neuropsychiatry clinic. The sample was comprised of virtually equal numbers of men and women (49% male). The average age for the sample was 50 years (range 22 – 85) and the modal years of education was 12 years (range 6 – 20 years).

NART predicted *(premorbid)* FSIQ, WTAR predicted *(premorbid)* FSIQ and current VCI were all highly and significantly correlated with one another (p=0.01). The correlations was larger between the WTAR and VCI than between the NART and WTAR or VCI. Both measures of so-called premorbid ability, namely the NART and WTAR, were strongly correlated with so-called current ability, namely VCI, see the graph and the table that follows.

	NART-FSIQ	WTAR-FSIQ	VCI
NART-FSIQ		r = .77	r = .66
WTAR-FSIQ	r = .77		r = .76
VCI	r = .66	r = .76	

The association between each measure, namely WTAR, NART and VCI, and the number of years of formal education completed by each patient in the sample was examined to establish whether any measure was any more or less associated with the number of years of completed education (a correlate of premorbid intellectual ability) than any other. Years of education within the sample were converted to z-scores as were scores on each of three other measures. The z-score number of years of education was subtracted from each of the three z-scores for the other measures. The average differences were then compared.

Analysis of variance demonstrated no significant group difference (F = 0.04, p = 0.96). The difference between NART-FSIQ and years of education, WTAR-FSIQ and number of years of education and VCI and number of years of education was statistically the same. There was not therefore evidence to indicate that the NART and WTAR were any better a reflection of likely premorbid ability (as reflected by extent of education) than was the VCI, all were equally associated with years of education.

The association between each measure, namely WTAR, NART and VCI, and current performance on the PSI was examined to establish whether any measure was any more or less associated with performance on this measure (a measure frequently affected by current pathology and therefore less likely to reflect premorbid ability in a clinical sample). PSI scores within the sample were converted to z-scores and subtracted from each of the three z-scores for the other measures. The average differences were then compared.

Analysis of variance demonstrated no significant group difference (F = 0.02, p = 0.98). The difference between NART-FSIQ and PSI , WTAR-FSIQ and PSI and VCI and PSI was statistically the same. There was not therefore evidence to indicate that the NART and WTAR were any less associated with current performance on a measure sensitive to pathology than was the VCI, all were equally associated with PSI.

Conclusion

The results of this analysis indicate in a clinical sample of 93 adult cases that contemporaneous performance on the NART, WTAR and VCI are highly correlated with one another.

There was no statistically significant difference between NART, WTAR and VCI performance and either years of education or current processing speed.

These data suggest that NART, WTAR and VCI are all equally good, or bad, at indexing premorbid ability (as reflected by years of completed education) and are all equally affected, or not affected, by current pathology (as reflected by performance on tests of processing speed). These similarities may be because all three measures, namely NART, WTAR and VCI, reflect the same underlying trait of cognitive ability, verbal crystallised intelligence.

References

Sharpe, K., O'Carroll, R. (1991) Estimating premorbid intellectual level in dementia using the National Adult Reading Test: A Canadian study. *British Journal of Clinical Psychology*, **30**(4), 381-4.

McGurn, B., Starr, J.M., Topfer, J.A., Pattie, A., Whiteman, M.C., Lemmon, H.A., Whalley, L.J., Deary, I.J. (2004). Pronounciation of irregular words is preserved in dementia, validating, premorbid IQ estimation. *Neurology*, **62**(7), 1184-6.

Watt, K.J. and Carroll, R.E (1999). Evaluating methods of estimating premorbid ability in closed head injury. *Journal of Neurology, Neurosurgery and Psychiatry*, **66**(4), 474-9.

Bright, P., Jaldow, E., Kopleman, M.D. (2002). The National Adult Reading Test as a measure of premorbid intelligence: a comparison with estimates derived from demographic variables. Journal of the *International Neuropsychological Society*, **8**(6), 847-54.

Mathias, J.L., Bowden, S.C., Bigler, E.D., Rosenfeld, J.V. (2007). Is performance on the Wechsler test of adult reading afected by traumatic brain injury? *British Journal of Clinical Psychology*, **46**(4), 457-66.

McFarlane, J., Welch, J., Rodgers, J. (2006). Severity of Alzheimer's disease and effect on premorbid measures of intelligence. *British Journal of Clinical Psychology*, **45**(4), 453-63.

Flanagan, D.P.and Harrison, P.L. (Eds). Contemporary Intellectual Assessment: Theories, tests and Issues (2nd ed.) (2005). *Guilford Press.*

Heaton, R.K., Miller, S.W., Taylor, M.J. and Grant, I. (2004). Revised Comprehensive Norms for an Expanded Halstead-Reitan Battery: Demographically Adjusted Neuropsychological Norms for African American and Caucasiona Adults. *Psychological Assessment Resources, Inc.*

www.clinicalneuropsychologytraining.co.uk