

A Comparison of WAIS-III Profiles of Australian and American Adolescents with Special Educational Needs: A Preliminary Report from an Ongoing Study

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ABSTRACT

Fifty-nine special needs adolescents [mild intellectual disability (n=16, 9 males and 7 females); moderate intellectual disability (n=33, 14 males and 19 females) and, learning disability (n=10, 7 males and 3 females) aged 16-19 years were administered the Wechsler Adult Intelligence Scale – Third edition (WAIS-III) to examine how comparable the profiles of Australian special needs adolescents were (a) to each other and (b) to those of their US counterparts. ANOVA and t-test analyses suggested differences among the profiles of the special needs groups. As the severity of the intellectual disability increased IQ scores were lowered progressively and the decreases were apparent across in a wider range of intelligence measures. Cross-cultural differences among the profiles were also evident with Australian developmentally disabled adolescents scoring higher and Australian learning disabled adolescents scoring lower than their US counterparts did respectively.

INTRODUCTION

The Wechsler scales are among the world's most widely individually administered measures of cognitive function (Wechsler, 1997) and have, together with other psychometric assessments, proved useful for the identification of students with specific learning needs and as bases for the design of suitable educational intervention programs for them (Holowenko, 1999). Recent American research has sought to identify specific cognitive profiles for special needs populations such as learning disabled, mild and moderately intellectually disabled people (Prifitera & Dersh, 1992; Wechsler, 1997). In New South Wales the Wechsler scales are frequently used to assess the eligibility of students for special needs assistance (Epstein-Frisch, 1992). Despite the frequency of their use in Australia, very little data are available to support the applicability of the American Wechsler norms to the local context. The aim of this study is to offer some preliminary data to examine how comparable the WAIS-III profiles of Australian special needs adolescents are to those of their US counterparts. The Wechsler Adult Intelligence Scale – Third edition Australian Adaptation (WAIS-III) (Wechsler, 1997) was chosen as the measurement tool for this study firstly because of the documented increase in the numbers of special needs adolescents who are accessing the senior secondary and tertiary education systems (Carlton, 2000; Hishinuma, 1998; Vogel, Leonard, Scales, Hayeslip, Hermansen & Donnell, 1998) and whose cognitive functions may not be adequately measured by the Wechsler Intelligence Scale for Children – Third edition Australian Adaptation (WISC-III) (Wechsler, 1991; 1992), and secondly because of the lack of any published local WAIS-III data.

Limited research is available examining the validity of any Wechsler scale for the Australian population and the results of these studies are mixed. Australian studies have been undertaken of the Wechsler Memory Scale (Wechsler, 1945) by Ivison (1977), the Wechsler Adult Intelligence Scale –

Revised (WAIS-R) (Wechsler, 1981), and the Wechsler Memory Scale – Revised (Wechsler, 1987). In studies of the WAIS-R and the WMS-R, differences have been found between US and the Australian norms (Shores & Carstairs, 2000) and in the factor structures of the tests (Bowden, Carstairs & Shores, 1999). While significant differences were found, there is evidence to suggest that the sample used was not representative of the Australian population as a whole (Carstairs & Shores, 2000) and consequently the extent to which the differences may be attributable to sampling error is not yet clear. Australian adaptations have been made to other Wechsler tests; language and item changes have been made to the WAIS-III (Wechsler, 1997), the WAIS-R (de Lemos, 1981) and the WIAT-II (The Psychological Corporation, 2002). Data have been published supporting the Australian adaptation of item content for the WIAT-II (The Psychological Corporation, 2002) as well as normative data for the WISC-III (Wechsler, 1992). The WISC-III data suggest the US norms are applicable to the Australian context. The means for the Verbal IQ are not significantly different to the published US norm, allowing for the standard error of estimates, whereas the Performance IQ's and consequently the Full Scale IQ's tend to be high for some of the younger groups. Overall these data are consistent with the findings of Rodriguez, Treacy, Sowerby & Murphy (1998); which indicated a non-representative sample of New Zealand children who were tested on the WISC-III Australian adaptation returned IQ scores that were consistent with the US norm. These mixed results suggest that the collection of local data to support the use of the Wechsler scales should be encouraged.

The extent to which the WAIS-III profiles of Australian and American special needs adolescents are comparable is also confounded by differences in definition. Unlike the US where the definition of what constitutes a student with special educational needs and the use of intelligence tests is mandated via legislation (National Information Center for Children and Youth with Disabilities, 2000), no such facility exists in Australia. Consequently, the definition of what constitutes a learning disability or other special educational need can vary from State to State and among the various government departments (Reid-Lyon & Flynn, 1991; Vaughn & Reid-Lyon, 1994). The NSW Department of Education and Training (DET) (1998) has, for example, established its own criteria for the identification of eligible students for special service provisions. The lack of a consistent definition makes it extremely difficult to identify special needs groups, let alone examine the applicability of American data to them. In a pilot study (McCarthy 2001) comparing the WAIS-III profiles of American and Australian adolescents with special educational needs, differences were found. However the extent to which the differences were real or due to the differences in the classification procedures is not clear.

Based on the available research, it is hypothesised that differences will exist among the WAIS-III profiles of (a) Australian special needs groups and (b) comparable groups of American and Australian special needs adolescents. It is anticipated that Australian adolescents will score higher than their US counterparts, primarily due to the differences in the procedures used to classify special educational needs.

METHOD

Participants

Fifty-nine adolescents (30 male and 29 female) aged between 16 and 19 years participated in this study. Each participant had been diagnosed during childhood using NSW DET criteria (1998) and as belonging to one of the following special needs groups: Mild Intellectual Disability (n=16, 9 males and 7 females); Moderate Intellectual Disability (n=33, 14 males and 19 females) and, Learning Disability (n=10, 7 males and 3 females). The participants had not been previously assessed using the WAIS-III. Students with mild and moderate intellectual disabilities participated in the ongoing special needs program offered by their respective schools while the learning disabled students were integrated with the mainstream class groups. All students spoke English as a first language and none of them had

uncorrected visual or auditory deficits. All participants were treated in accordance with the “Ethical Principles of Psychologists and Code of Conduct” (American Psychological Association, 1992).

Materials

The examiners, the second author and another honours level psychology student, were trained to administer the WAIS-III by the first author. Competency in administering and scoring the WAIS-III was established using an observational checklist (Sattler & Ryan, 1999) that was administered to the trainee examiners by the first author.

The WAIS-III Australian adaptation was administered individually to each participant by one of the examiners following standard procedure as outlined in the test manual (Wechsler, 1997). Each participant was administered all fourteen subtests. The order of subtest administration was not counterbalanced because it has been suggested (Ryan, Lopez & Werth, 1998) that this practice has minimal, if any, impact upon performance on the Wechsler scales.

Testing allowances for special needs students are usually recommended (Kaufman & Lichtenberger, 1999) however in this instance they were not made because it is not necessary to modify the test when the special need or impairment itself is the construct under consideration (Hishinuma, 1998). The WAIS-III Writer (The Psychological Corporation, 1999) was used to computer score the test results.

Procedure

Ethics approval was sought from and given by the university and the faculty ethics committees as well as by the NSW DET Strategic Research Directorate before any secondary school was approached. Only high schools that offered special education programs were invited to participate in this study. Interviews were conducted with the school principal and/or a designate and written permission was obtained from them before information letters and consent forms were distributed to the parents/caregivers of potential participants. The participants were students whose parents had returned on their behalf the signed and completed informed consent documentation. Any student who chose not to participate on the day of testing was thanked for their time and escorted back to their classroom. Assessments took place during normal school hours in a quiet room away from the participant’s normal classroom environment. In each instance the examiners offered the participants suitable breaks on an “as needs” basis. Participants required between 90 and 120 minutes to complete the assessment. A double blind testing procedure was used to minimize the possibility of demand characteristics (Vaughn & Reid-Lyon, 1994) contaminating the data. At the time of testing the test administrators were unaware of the special needs status of the participants because the first author had gathered that information separately from the school counsellor assigned to each school. The first author had no contact with participants or their parents.

RESULTS

Preliminary Analyses

Tests were scored according to the standard instructions using the WAIS-III Writer (The Psychological Corporation, 1999) a computerized scoring program. The group mean scores for Full Scale IQ (FSIQ), Verbal IQ (VIQ) and Performance IQ (PIQ) in addition to the four factor-based index scores: Verbal Comprehension (VCI), Perceptual Organization (POI), Working Memory (WMI) and Processing Speed (PSI) are presented in Table 1.

Table 1: Means and Standard Deviations of the WAIS-III IQ and Index Scores for each Special Needs Group and Z-Score Comparisons with the Published American Norm Data

WAIS-III Measure	Special Needs Group								
	Moderate Intellectual Disability			Mild Intellectual Disability (n=16)			Learning Disability (n=10)		
	<i>M</i>	<i>SD</i>	<i>Z</i>	<i>M</i>	<i>SD</i>	<i>Z</i>	<i>M</i>	<i>SD</i>	<i>Z</i>
FSIQ	55.12	6.17	-17.19**	72.25	7.29	-7.40**	85.40	6.67	-3.08**
VIQ	60.03	5.88	-15.31**	71.56	7.75	-7.58**	84.00	7.27	-3.37**
PIQ	57.70	6.24	-16.20**	77.94	8.67	-5.88**	89.60	9.51	-2.19*
VCI	61.64	7.31	-14.69**	73.38	10.01	-7.10**	84.10	8.27	-3.35**
POI	62.06	7.33	-14.53**	81.44	11.36	-4.95**	93.80	13.39	-1.31
WMI	54.61	5.41	-17.38**	70.56	7.60	-7.85**	83.00	7.69	-3.58**
PSI	59.39	4.75	-15.55**	75.50	5.29	-6.53**	88.10	12.88	-2.51*

Note. ** $p < .01$, * $p < .05$.

Table 1 indicates the differences among the score profiles of each group. The moderately and mildly intellectually disabled groups scored approximately 3 and 2 standard deviations below the published American mean FSIQ of 100 and SD of 15 (Wechsler, 1997) respectively while the Learning Disabled group scored approximately one standard deviation below the American mean FSIQ. When the seven intelligence score means of the Australian special needs groups were compared to the published American normative data (Wechsler, 1997) using one sample z-tests, in all instances excepting one the Australian groups scored significantly lower. No significant difference was found when the Perceptual Organization Index scores of the US published norm sample and the Australian Learning Disabled group was compared.

Comparisons among the Australian Special Needs Profiles

A 3 (special needs group) x 7 (WAIS-III measure) mixed Analysis of Variance (ANOVA) was used to examine for possible differences among the score profiles of the special needs groups. Results are presented in Table 2.

Table 2: Mixed Analysis of Variance for Australian Special Needs Groups

Source	<i>df</i>	<i>MS</i>	<i>F</i>
Between subjects			
Groups	2	25018.165	110.83**
Error	56	225.727	
Within subjects			
WAIS-III Measures	2.35	1209.33	16.74**
Groups x Measures	4.70	230.31	3.18*
Error (Measures)	131.58	72.26	

Note. ** $p < .01$, * $p < .05$.

A significant main effect for groups confirmed that differences exist among the profiles of the special needs groups [$F(2,56) = 110.83$; $p < .01$]. A significant main effect for WAIS-III measure [$F(2.3, 131.6) = 16.74$; $p < .01$] and an interactive effect of special needs group x WAIS-III measure [$F(4.7,$

131.6) = 3.18; $p < .05$] was also indicated. A significant result on Mauchly's test of sphericity, indicating heterogeneity of covariance was found, therefore a conservative Greenhouse-Geisser estimate was used to calculate these values.

A series of one-way ANOVA were then calculated to further explore the simple effects of the IQ and factor-based index scores and the results are presented in Table 3. The differences among the means (see Table 1) of the seven intelligence measures among the special needs groups were found to be significant. Post hoc comparisons via Tukey test confirmed that significant differences ($p < .01$) existed among all of the special needs groups in relation to each of the seven intelligence measures.

Table 3: One-Way ANOVA Results of the WAIS-III IQ and Index Scores for each Australian Special Needs Group

WAIS-III		Sum of Squares	Df	Mean Square	F
FSIQ	Between	8222.48	2	4111.24	95.33**
	Within	2414.92	56	43.12	
	Total	10637.39	58		
VIQ	Between	4823.23	2	2411.61	54.39**
	Within	2482.91	56	44.34	
	Total	7306.14	58		
PIQ	Between	9727.93	2	4863.97	85.45**
	Within	3186.31	56	56.90	
	Total	12914.24	58		
VCI	Between	4367.51	2	2183.76	31.98**
	Within	3824.29	56	68.29	
	Total	8191.80	58		
POI	Between	9409.09	2	4704.55	50.00**
	Within	5269.42	56	94.10	
	Total	14678.51	58		
WMI	Between	7207.37	2	3603.69	86.40**
	Within	2335.82	56	41.71	
	Total	9543.19	58		
PSI	Between	7361.02	2	3680.51	78.23**
	Within	2634.78	56	47.05	
	Total	9995.80	58		

Note. ** $p < .01$.

Profile Analysis of the Australian Special Needs Groups

In order to offer psychologists maximum diagnostic utility from the results of this study it is necessary to further investigate the nature of the profile differences within each of the Australian special needs groups.

Figure 1 indicates that mean scores on the Perceptual Organization Index were higher than Working Memory Index mean scores for each of the special needs groups. In each instance the differences were found to be significant using paired t-test comparisons (Moderate Intellectual Disability $t = -6.82$, $p < .01$; Mild Intellectual Disability $t = 4.27$, $p < .01$; Learning Disability $t = 2.75$, $p < .05$). The Moderate and Mildly Intellectually Disabled group were further characterized by significantly lower scores on Verbal Comprehension ($t = -7.44$, $p < .01$; $t = 2.25$, $p < .05$) than on Perceptual Organization Index respectively. The Moderately Intellectually Disabled group also returned a significantly lower Processing Speed ($t = -4.73$, $p < .01$) than Perceptual Organization Index.

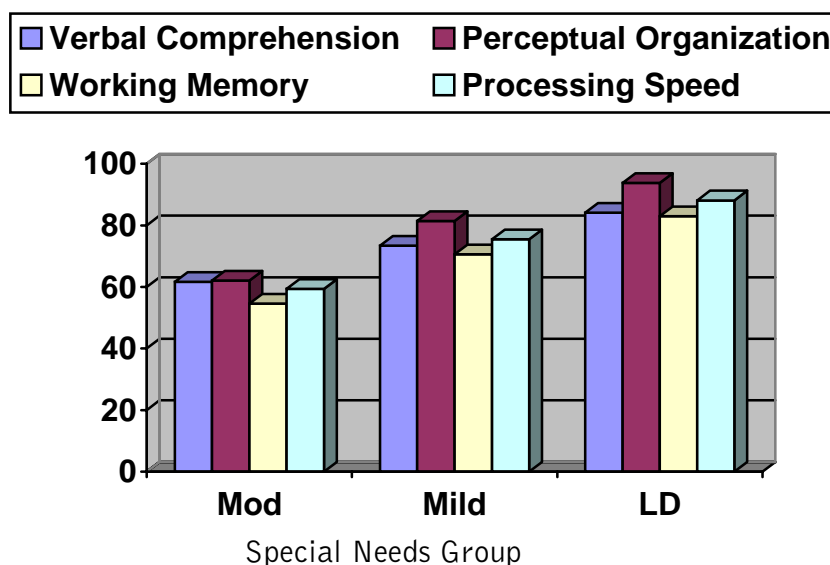


Figure 1. Mean WAIS-III Factor-Based Index Scores for Australian Moderate Intellectual Disability, Mild Intellectual Disability and Learning Disability Groups.

Comparisons of the American and Australian Special Needs Groups

The Full-Scale, Verbal and Performance IQ of each the Australian special needs groups was compared with its the American special needs group counterpart using data published in the WAIS-III Technical Manual (Wechsler, 1997). In each instance the 95% confidence limit was used to examine the likelihood that American special needs group mean score fell within the confidence interval of the Australian group mean score. Table 4 presents the mean IQ scores for each of the American and Australian special needs groups.

Table 4 indicates lower means on FSIQ, VIQ and PIQ for the American than the Australian Moderate Intellectually Disabled group as follows: $CI.95 = 53.72 < \mu < 56.52$, $CI.95 = 58.43 < \mu < 61.63$ and, $CI.95 = 56.20 < \mu < 59.20$ respectively. A similar pattern of results was indicated for the Mild Intellectually Disabled groups, where all American FSIQ, VIQ and PIQ scores were lower than those for the Australian sample $CI.95 = 69.90 < \mu < 74.60$, $CI.95 = 69.11 < \mu < 74.01$, and $CI.95 = 75.10 < \mu < 80.78$ respectively. In the case of the Learning Disabled groups, Australian adolescents scored up to one standard deviation lower than their American counterparts as follows: FSIQ $CI.95 = 79.48 < \mu < 91.32$, VIQ $CI.95 = 77.37 < \mu < 90.63$, and PIQ $CI.95 = 83.68 < \mu < 95.52$.

Table 4. American and Australian Mean WAIS-III IQ Scores for each Special Needs Group

WAIS-III IQ	Special Needs Group					
	Moderate Intellectual Disability		Mild Intellectual Disability		Learning Disability	
	Australian <i>M</i>	American <i>M</i>	Australian <i>M</i>	American <i>M</i>	Australian <i>M</i>	American <i>M</i>
Full Scale	55.1	50.9	72.3	58.3	85.4	99.0
Verbal	60.0	54.7	71.6	60.1	84.0	97.0
Performance	57.7	55.3	77.9	64.0	89.6	100.0

DISCUSSION

The results of this preliminary study suggest the WAIS-III is a useful tool for distinguishing the profiles of Australian special needs adolescents from their US counterparts and for differentiating among the profiles of some Australian special needs groups.

The Australian mild and moderate intellectually disabled participants returned mean FSIQ and VIQ scores that were approximately two and three standard deviations below the US norm respectively (Wechsler, 1997), consistent with the range of scores expected for each of their special need groups (DET, 1998). FSIQ and VIQ measures taken for the learning disabled group were approximately one standard deviation below and significantly different ($p < .05$) from the published norm data, a finding which contrasts with the research literature and the operational definition of the disorder (APA, 1994; Wechsler, 1997) that learning disabled individuals have normal intellectual functioning. While the reasons for the lower than expected scores from the learning disabled group are not entirely clear, it is possible that because learning disabled students are educated as apart of the mainstream class group and not, as mild and moderate intellectually disabled students are in a support class, they may be having difficulties learning alongside students who function at average and above average cognitive levels.

An examination of the factor based index scores returned some striking results about how the severity of the intellectual disability simultaneously decreased the IQ score and increased the number of aspects of intelligence it affected. The Perceptual Organization Index was consistently higher than the Working Memory Index in the profiles of each of the Australian learning disabled, mild and moderate intellectually disabled groups. The Perceptual Organisation Index was significantly higher than the Verbal Comprehension Index for only mild and moderate intellectually disabled participants. The Perceptual Organisation Index was relatively significantly higher than the Processing Speed Index for the moderate intellectually disabled participants alone. These results are consistent with literature cited in Groth-Marnat (1999), suggesting that intellectually disabled adults obtained relatively higher scores on general ability measures whose subtests measured perceptual-organizational skills. More importantly however the results of this study indicate, contrary to Wechsler's (1997, p.141) finding, that the WAIS-III profiles of the intellectually disabled were essentially "flat", that as the severity of the intellectual disability increases not only are IQ scores lowered but also the decreases are apparent across a wider range of intelligence measures.

While the WAIS-III is one of the most widely administered measures of general intellectual function in Australia, the use of such tests continues to raise controversy both within the profession of psychology and in the community as a whole. One of the most pressing local issues in psychometric testing, indeed one that features prominently in this paper is the applicability of American or European norms to the Australian population. The results of this preliminary study indicate the existence of cross-cultural differences between the WAIS-III profiles of American and Australian special needs adolescents, particularly in relation to the developmentally disabled, where Australian adolescents scored higher than their US counterparts. The reasons for the higher Australian scores are yet to be fully determined, they may reflect differences in the classification procedures or perhaps more weighting was given to adaptive functioning than intelligence measures in the identification and diagnosis process. While the precise reasons for the cross-cultural differences are yet to be determined, these data should help psychologists to more fully understand how to assist Australian special needs adolescents and support their educational requirements.

In terms of future research, clearly the development of a complete set of Australian norms based on a representative sample and stratified in the manner of the original version of the test norm population is ideal. However it is difficult for a commercial entity such as a test publisher to justify such a large research project on a commercial basis given the size of the Australian market relative to the US. Similarly practicing psychologists working in the field are rarely called on to administer tests to individuals who meet the rigorous criteria required for inclusion in a "clean" normative sample,

instead clinicians are likely to serve individuals who have one or more special needs. Given that there is minimal financial incentive for test publishers to produce a complete set of local norms and that access to a “clean” sample is difficult if not impossible for clinicians, there are obvious practical difficulties associated with the development of local norms for small populations such as Australia. The problem is exacerbated by the relatively large number of tests that are now available for distribution in Australia. While local distribution offers Australian psychologists access to a wide choice of psychometric tests, it also dilutes the number of units sold across a diverse range of instruments and in turn further reduces the likelihood of any publisher undertaking a local norming or adaptation project. It is therefore essential that researchers continue to expand the knowledge base about local test norms and particularly in relation to special needs groups. In terms of the current research program we hope in the next two years to be able to publish data from a larger sample of adolescents with learning disabilities, mild and moderate intellectual disabilities and to also include a sample of attention deficit disordered participants.

While this study has demonstrated that differences exist between the profiles of some Australian and American special needs groups, the question of the applicability of the Wechsler scales to the assessment needs of persons who are from a non-english speaking background or to Australia’s indigenous peoples, Aboriginals or Torres Strait Islanders, is complex and one for which there are no clear answers to date. Aboriginals and Torres Strait Islanders comprise approximately 2% of Australia’s population and reside in a range of diverse urban and rural environments. Consequently the experiences of Aboriginals living in the metropolitan areas may be significantly different to those who live in the deserts of central Australia. There are also language differences across communities and strict rules based on familial lines about who may speak to whom and in what circumstances. Historically, Aboriginal culture and customs were passed down via the spoken word and while a rich oral history has always existed, there is no tradition of written language. This combination of factors, that is, being a culturally diverse and geographically far-flung group who speak a variety of different languages and dialects, means that only a limited number of attempts have been made to develop psychometric tests suitable for use with our indigenous population. The most recent attempt, the Nonverbal Abilities Test (Rowe, 1986) is no longer available and reportedly met with limited acceptance among clinicians. To date no other attempts to develop or adapt any measures of general ability for use in an Aboriginal population have been made. Therefore there is no evidence to suggest the results of this study are applicable to Aboriginal persons aged 16 to 89 years. While no data are available which relate specifically to the applicability of the WAIS-III Australian adaptation to either the indigenous population or to individuals from a non English speaking background, considerable debate (Davidson, 1988 ; see also Bates & Stough, 2000; Butler, 1998 ; Davidson, 1998 ; Davidson, Sanson & Gridley, 2000 ; Gridley, Davidson, Dudgeon, Pickett & Sanson, 2000 ; Stankov, 1998) has centred upon the extent to which Australian psychologists have been unwitting parties to the use of general ability tests that may serve to unfairly disadvantage minority groups both in educational and vocational settings. This debate has in part contributed to the Australian Psychological Society publishing a position paper (Sanson, Augustinos, Gridley, Kyrios, Reser & Turner, 1998) on racism and prejudice which deals with, among other issues, the development and use of psychometric tests. Now that the wider issues of racism and prejudice are being openly discussed among the Australian psychology community, it is anticipated that more research interest in the applicability of general ability tests to special needs groups within the indigenous population and to individuals from a non English speaking background will be generated.

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