Preliminary Validation of the Thai Version of the Wechsler Abbreviated Scale of Intelligence

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Abstract : **The researchers aimed to study comparisons between the Thai version of the Wechsler Abbreviated Scale of Intelligence (WASI-T) and the original version (WASI). Samples were people from urban and rural areas, aged from 6-70 years. The structure and pattern of 4 subtests of WASI-T were the same as those of the WASI but some items in vocabulary were changed to make them suitable for Thai respondents. Reliability for both child and adult samples ranges from .82 to .97. Factor analysis found the factor pattern identical to the original WASI findings. The researcher suggests using the test for screening purposes when there is limited time available and no in-depth assessment of intellectual function is needed, or when mass screening of subjects is necessary and there are inadequate conditions for the using of full test.**

Key words : The abbreviated Wechsler intelligence scale –Thai version, Validation

เรื่องย่อ : การประเมินความเชื่อถือได้ของแบบทดสอบ The Wechsler Abbreviated Scale of Intelligence ฉบับภาษาไทย

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สารศิริราช 2545; 54: 345-353.

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Full supported by Siriraj Grant for Research Development. Faculty of Medicine Siriraj Hospital, Mahidol University.

การประเมินความเชื่อมั่นของแบบทดสอบ The Wechsler Abbreviated Scale of Intelligence ฉบับภาษาไทย มีวัตถุประสงค์เพื่อเปรียบเทียบความสามารถในการวัดเชาวน์ปัญญาของแบบทดสอบฉบับภาษาไทยกับฉบับเดิม ซึ่งสร้างตามวัฒนธรรมตะวันตก กลุ่มตัวอย่างเป็นตัวแทนจากจังหวัดอุบลราชธานีและกรุงเทพมหานคร อายุตั้งแต่ 6-70 ปี ลักษณะของแบบทดสอบชุดภาษาไทยประกอบด้วย 4 ด้านเหมือนชุดเดิม เพียงแต่ด้านที่วัดเกี่ยวกับภาษาได้มีการแปลและดัดแปลงให้เข้ากับวัฒนธรรมไทย ผลการวิจัยพบว่าความเชื่อถือได้จากกลุ่มตัวอย่างทั้งเด็กและผู้ใหญ่มีค่าอยู่ระหว่าง .82 - .97 และการวิเคราะห์ความตรงเชิงโครงสร้าง พบว่ามีความสอดคล้องกับฉบับเดิม ผู้วิจัยเสนอว่า น่าจะใช้แบบทดสอบชุดภาษาไทยนี้เมื่อต้องการคัดกรองด้านเชาวน์ปัญญาเมื่อมีเวลาในการทดสอบที่จำกัด หรือเมื่อผู้รับการทดสอบไม่อยู่ในสภาพการณ์ที่เหมาะสมที่จะทำชุดเต็มได้ หรือเมื่อต้องการคัดกรองด้านเชาวน์ปัญญากับคนจำนวนมาก โดยไม่ต้องการรายละเอียดเกี่ยวกับ cognitive function ทั้งหมด

INTRODUCTION

Contextual intelligence is intelligent behavior that involves adapting to the present environment as well as shaping it better to fit the individual's need, abilities, and values. This perspective views intelligent behaviors as varying from one culture to another, and from one period of life to another. The PASS theory clarifies these issues in four areas of cognitive functioning elaborated by Das and Naglieri[1] as follows.

Planning involves determining, selecting, and using efficient solutions to problems. Planning includes executive processes in problem solving, such as formulating alternatives, monitoring and evaluating processes.

Attention involves selectively attending to a particular stimulus and not attending to competing stimuli. High levels of intentional processing are involved when the target stimuli are more silent than the non-target stimuli.

Successive processing involves integrating stimuli into a serial order. Linguistic tasks that require processing stimulus order involve successive processing.

Simultaneous processing involves integrating stimuli into groups of non-verbal tasks, such as progressive matrices and block design, as well as logical verbal questions.

General mental ability involves processes such as calculating, reasoning, classifying, learning, the use of language and adjusting to new situations. The major reason for this is that IQ scores reflect the composite nature of intelligence and cognitive functioning[2]. Naturally, the more relevant the assessment, the more accurate the diagnosis and treatment plan. Clinicians and researchers have made numerous attempts to postdict, measure, or estimate the premorbid cognitive, intellectual, and neuropsychological functioning of their patients referred for psychiatric evaluation, and to estimate IQ scores for vocational or rehabilitation purposes, memory functioning[3], and research purposes[4,5]. Currently, the most wildly used intelligence tests are The Wechsler Scales which spends almost one hour in completing the test administration. Therefore, several investigators have proposed short forms of different versions of the Wechsler Scales to provide more cost-effective estimates of psychometric intelligence. The results suggest that in the healthy sample, the correlation between the short-forms and full-length IQs did not differ significantly[6-9].

However, although the IQ tests are useful, the original standardized sample came from Western cultures. To avoid complex problems of interpretation, which have a cultural bias, the test should be revised and consequently restandardized.

The standardization of any test of intelligence needs to be based on systematic stratification of the following variables: age, gender, education, geographic region and place of residence. This researched is aimed to determine whether the revised scale still maintained the same factors as the original one to justify cross-cultural comparisons.

Instrument

The Wechsler Abbreviated Scale of Intelligence (WASI) was developed to meet the demands for a short and reliable measure of intelligence in clinical, psychoeducational, and research settings. The WASI is administered individually and is designed for use with individuals aged from 6-89 years. The four subtests comprise :-

Vocabulary-measures of the individual's expressive vocabulary, verbal knowledge, and fund of information. Additionally, it is a good measure of crystallized intelligence and general intelligence (g).

Similarities – measures of verbal concept formation, abstract verbal reasoning ability, and general intellectual ability.

Matrix Reasoning – measures of nonverbal fluid reasoning and general intellectual ability. Additionally, it is relatively culture fair and language free and requires visual information processing and abstract reasoning skills, but no manual manipulation.

Block Design – measures abilities related to spatial visualization, visual-motor coordination, and abstract conceptualization. Therefore, perceptual organization and general intelligence are the properties of this subtest.

The Vocabulary and Similarities subtests measure verbal ability and together yield an estimated Verbal IQ. The Block Design and Matrix Reasoning subtests measure nonverbal ability and combine to yield an estimated Performance IQ. Moreover, the broad age range of the WASI, from ages 6-89 years, allows for its use with children and adults. This extension across a large age range makes it possible to compare scores of an individual retested over time in a more valid manner. The range of IQ scores estimated from the comprehensive battery increases its clinical utility and importance in psychoeducational screening. This information is used to predict at what academic level the child should succeed, whether there are any specific learning disabilities, and the specific pattern of strength and weakness which indicate how well the child is able to learn. Since the WASI normative data were collected on individuals who lived in the United States and spoke fluent English, those who are not fluent in English or for whom English is a second language, the author suggested using a translated version and administering it in the examinee's native language[10].This notion is confirmed by the comparative study of visual and verbal short –term memory in English and Spanish speakers that found cultural and educational issues also contribute to the observed differences between the two language speakers[11]. Moreover, Demsky et al. found the Spanish translations of the Wechsler Memory Scale-Revised in Spanish-speaking people revealed normal individuals getting scores an average of 1 SD below average[12]. Based on this result, the clinical practice of using translations of English language test should renorming and running new validity test.

Preliminary validation is based on the variables: age, gender, education and place of residence. Gender differences on the Wechsler tests have been reported in the literature[13-17]. With regard to age, it is proposed that qualitative changes in psychological features associated with the dynamic features of cognitive activity occur at the age of 7 years[18]. Moreover, scores relying on acquired knowledge are associated with age only in child with lower IQ, whereas Spatial Ability and Speed-related tasks are not related to age[19]. Educational level and place of residence are related to the opportunity to acquire a wide variety of knowledge and culture that plays an important role in intellectual development.

Objectives

Primary objective was to compare the Thai version of the Wechsler Abbreviated Scale of Intelligence to the English version.

Secondary objectives were

1. to assess the similarity of the rural and urban Thai samples.
2. to assess the age-equivalence in school age children, early adulthood, and adulthood.

Methods

Method of recruitment of population: The sample was designed to be representative of Thais by stratification according to age, sex, education, and urban versus rural residence.

Procedure

The WASI-T was developed according to a

systematic method involving multiple steps. The first step was a content analysis relating the original WASI and Thai culture. The structure and pattern of the 4 subtests of the WASI-T were the same as those of the WASI. Translation and back translation were used on the verbal subtest. The researcher translated the two verbal scales of the WASI to make them suitable for Thai respondents. The pool of words used in the vocabulary test was selected in consultation with Thai linguists and senior clinical psychologists. Then, the researcher and validators (specialists in clinical psychology and education) selected Thai words to use in the WASI-T version. A fluent bilingual Thai linguist did a back translation into English to compare the similarity of the content of the two versions. The Block Design, and Matrix Reasoning subtests were not altered.

In the second step, a pilot study was conducted to examine and evaluate test administration, scoring criteria, item statistics, subtest score reliability and validity.

The reliability of each WASI-T subtest estimated by the split-half method and internal consistency techniques referred to consistency and stability of the test score. The subtest items were divided (by an odd-even split) to form two half-tests. The variances of the two half tests were also compared to ensure that there was no significant statistical difference between them. The reliability coefficient of the subtest was the correlation between the total scores of the two half- tests using the Spearman-Brown formula for the full subtest and Cronbach's alpha for each subtest.

Pilot Study

The WASI-T pilot test was performed on a non-clinical sample of 35 children and adolescents aged 6-16 years and 84 adults aged 17-70 years at Siriraj Hospital. The mean and standard deviation of all groups of subjects are shown in Table 1.

Table 1. Mean and standard deviation of WASI-T subtest/scale in the subjects (pilot).

Subtest/Scale	Age (years)					
	6-16 (N = 35)		17-70 (N = 84)		6-70 (N = 119)	
	Mean	SD	Mean	SD	Mean	SD
Vocabulary	54.74	12.36	62.42	10.57	60.16	11.62
Similarities	51.91	7.28	53.16	8.29	52.79	8.00
Block Design	49.89	8.39	50.96	7.63	50.65	7.84
Matrix Reasoning	50.00	11.10	53.52	8.75	52.49	9.59
Verbal IQ	106.66	14.58	115.57	16.73	112.95	16.58
Performance IQ	99.89	14.92	104.49	14.36	103.13	14.62
Full Scale-4	206.54	20.62	220.06	22.56	216.08	22.78
Full Scale-2	104.74	15.71	115.94	13.35	112.65	14.92

The Spearman's internal consistency reliability coefficients for the WASI-T subtests and IQ scales by age group found that the average reliability coefficients of the WASI-T subtests ranged from .69 -.92 for the total children sample and the reliability coefficients for the IQ scales were .95 for VIQ, .92 for PIQ, .94 for FSIQ-4, and .93 for FSIQ-2. For the adult sample, the average reliability coefficients of the subtests ranged from .74 -.94 and VIQ =.92, PIQ=.94, FSIQ-4=.94, FSIQ-2=.92. For all samples (children and adult), the average reliability coefficients of the subtests ranged from .79 -.95 and VIQ =.96, PIQ =.94, FSIQ-4=.96, FSIQ-2=.95.

These results were within the expected ranges, which suggested that the subtests and IQ of the WASI-T measured constructs of intelligence similar to those measured by the original WASI.

Data Collection

Allocation of study: According to the census report concerning population distribution, Bangkok is the best representative for an urban areas while Nakhon Ratchasima and Ubon Ratchathani are ranked first and second for a rural area. In this study, Ubon Ratchathani was selected to represent a rural area because Nakhon Ratchasima is too close to Bangkok in many ways, such as the distance from Bangkok and the average income per head.

The target populations of Bangkok and Ubon Ratchathani provinces aged 6-70 years from the Statistics Thai Census Report in 1998 were 4,662, 779, and 1,577,580 respectively. The sample size should be 384 people from each area. Based on the objective of this study which is to study preliminary validation, this research extended the sample to 1,000 for each location, so the total sample included 2,000 subjects.

Exclusion criteria: Insufficient Thai-language proficiency for valid test results, seeing a doctor for memory problems or problems with thinking, medical or psychiatric condition that could potentially affect cognitive functioning, currently taking antidepressant, antianxiety, or antipsychotic medication, and color-blindness.

The total of 2,000 individuals were selected by multi-stage random sampling on residency (inner-outer communities) into 18 age groups varying from 1-10 years. (6,7,8,9,10,11,12,13,14,15,16,17-19,20-24,25-34,35-44,45-54,55-64, and 65-70). Then, a quota-sampling method was used to divide the samples in each age group so that each age group was composed of approximately 50-60 subjects and divided equally to give equal numbers of males and females. The test was then given to the urban and rural area samples that comprised students, office staff, sales clerks, and elderly people.

The WASI-Thai version was administered in full to all samples by experienced and well-trained examiners to meet the test requirement that "only individuals who have received professional training in psychological assessment should interpret WASI results". The scoring followed the test procedure.

RESULTS

The construct validity of WASI-T was supported by the intercorrelations of the WASI-T subtests and IQ scales as evidence of convergent and discriminant validity. Exploratory factor analysis was performed to evaluate whether the WASI-T subtests measured the constructs of verbal and non-verbal cognitive abilities. The psychometric qualities of the WASI-T determined the statistical method in a standardized group. Each age group provided the subject, which was based on the original age-norm tables. The results are as follows :-

Reliability

The simplest internal-consistency procedure, for both child and adult samples, the reliability coefficients of the WASI-T subtest/scale ranged from .82 to .97. They reflected high inter-item consistency, or homogeneity of the items both for content and the behavioral domains sampled. These results were relatively free from measurement error as in the original WASI study.

Validity

Intra and inter-test validity were used to examine the WASI-T construct validity. An intra-test; factor analysis procedure was used to provide construct-related evidence of the intellectual factors in each study age group. For the inter-test, a correlation study between the WASI-T score and WASI original in each subtest was made.

Factor Analysis

The WASI-T subtests were analyzed by factor analysis. A subsequent principle components analysis was performed by promax rotation with the total (6-70 yrs), child (6-16 yrs), adult (17-70 yrs), and another five samples (6 -9,10 -13,14 -16,17-34, and 35 -70 yrs).

Data analysis in this study converted the raw score into a standard T-score for the WASI-T and other tests which measured verbal performance and new variables created from the WASI-T due to (1) the

interpretation of the WASI-T based on an age-equivalent score and (2) range of the age-group which was 6 -70 years. This conversion method made the data in each group meet the same standard with regard to factor analysis.

The 2- factor solution was found to be quite stable, after promax rotation of factors with eigenvalues greater than 1.0, the first factor accounted for at least 57% of the variance. The positive manifold and simple structure of factor pattern was identical to the original WASI findings. The vocabulary and similarities subtests loaded onto factor I. Block Design and Matrix Reasoning subtests loaded onto factor II. Each test had a load greater than .78 on their scale's factor. The variance accounted for by two factors was 78 – 88%.The variance accounted for by the one factor solution was 73 – 80%.

The 2-factor solution was more stable than the one factor solution in present study, however, it accounted for a greater variance. For practical purposes in using the WASI-T, the 2- factor solution was preferred.

Correlation Study

For the correlation studies, the data from the WASI-T standardization sample was used. Similar to the factor analyses, taking the child sample, verbal ability was constructed from the sum of the vocabulary and similarity subtest scores, and non-verbal ability from the sum of the remaining subtests, and the four subtests and two subtest forms were used as new variables. For the adult sample, the information and picture completion subtest of the WAIS III were added. The scores were converted to a standard T score for the unit analysis. The correlation analyses were performed for each age group on both the urban and rural samples. The direction and magnitude of correlation was used to examine the convergent and discriminant validity of the WASI-T.

The data used in this analysis were the WASI-T subtest correlation matrices for the urban and rural standardization samples. For each sample, nine matrices were used ; the overall correlation matrix and the matrices for the 18 age groups. The number of factors for the 18 correlation matrices was determined using the eigenvalues 1 method. The two overall correlation matrices (1 urban and 1 rural) were then subjected to principal – factor analysis (squared multiple correlations of the diagonals as the final estimates of commonalities) followed by varimax and oblique rotations (obimax) for two and three factors. Finally, the general factor (g) and the three components of variance; common variance, specific variance, and error variance, were estimated for the two overall correlation matrices. (Tables 2, 3)

Table 2. Factor loading matrix PC analysis and promax rotation for children.

	Urban		Rural		Total	
Subscale	**I**	**II**	**I**	**II**	**I**	**II**
Vocabulary	.931	.515	.911	.408	.922	.420
Similarities	.820	.484	.792	.430	.801	.454
Block Design	.465	.920	.429	.900	.426	.907
Matrix Reasoning	.576	.784	.453	.843	.483	.822
Verbal IQ	.990	.556	.989	.467	.990	.483
Performance IQ	.569	.992	.495	.990	.504	.990
Full Scale-4	.923	.714	.903	.712	.914	.692
Full Scale-2	.865	.913	.851	.885	.852	.893
% of variance	70.558	15.358	66.710	18.559	67.465	18.093
Sample size	768		757		1525	

Table 3. Factor loading matrix PC analysis and promax rotation for adults.

	Urban		Rural	Total
Subscale	**I**	**II**	**I**	**I**
Vocabulary	.936	.559	.855	.861
Similarities	.889	.601	.833	.843
Block Design	.558	.920	.809	.812
Matrix Reasoning	.578	.848	.809	.797
Information	.535	.693	.739	.729
Picture Completion	.809	.594	.754	.774
Verbal IQ	.988	.620	.912	.914
Performance IQ	.622	.982	.884	.881
Full Scale-4	.924	.781	.936	.942
Full Scale-2	.876	.918	.984	.984
% of variance	70.161	11.909	73.061	73.419
Sample size	400		392	792

DISCUSSION

The findings of the study indicated that for all samples, the reliability coefficients of the WASI-T showed in high inter-item consistency, or homogeneity of the items both for content and the behavior domains sampled. In the factor analysis, the correlation study for each of the 18 age groups showed a consistent pattern of relationship between the WASI-T scales and others. The results also met another objective of the project in assessing the similarity of the rural and urban Thai samples by age group. For each analysis, evidence of convergent validity and discriminant validity was demonstrated (Tables 4, 5). The scale was moderately related in the expected direction to similar constructs and poorly related to different constructs. The results confirmed the hypothesis that the structure and function of the factors in the WASI-T were similar to those of the WASI, suggesting that the WASI-T measured essentially the same constructs as did the WASI. According to the study of Zhu, Tulsky, and Leyva[20] which suggested that using the WASI and WAIS-III in conjunction was an effective method for clinicians to conveniently evaluate, assess, and re-evaluate individuals. Thus, the decision to administer in full, both the WASI and WAIS-III, or to use the substation method is highly dependent upon the needs of the clinician. Moreover, it was reasonable to make cross-cultural comparisons using these scales. However, generally to produce a national norm, all populations should be included in the selection procedure. This study could not follow that process because of the limitations of staffing and budget. However, based on the systematic procedure in this study, the results could represent values found in urban and rural Thai people.

SUMMARY

The results from this study show the similarity of the WASI-T with the original standardized intelligence test, both have the advantage of decreasing test administration time while providing an accurate estimate of the overall level of general intellectual functioning. Therefore, the WASI-T could be of benefit in many tasks in which an intelligence test plays an important role such as

Medical/Psychological - as an instrument to aid diagnosis and treatment.

Educationally - enable decision to be made about appropriate schooling for normal, disabled, and retarded children.

Table 4. Correlation matrix of WASI-T (6-16 age group, total sample).

	VO	SI	BD	MR	Verb	Perf	F4	F2
Vocabulary (VO)	-	.5364	.3324	.3110	.9113	.3655	.8829	.7160
Similarities (SI)		-	.3473	.3865	.8218	.4025	.5743	.6966
Block Design (BD)			-	.5252	.3720	.9293	.4824	.7948
Matrix Reasoning (MR)				-	.3805	.7636	.6810	.6864
Verbal IQ (Verb)					-	.4213	.8547	.8045
Performance IQ (Perf)						-	.6298	.8633
Full Scale - 4 (F4)							-	.8567
Full Scale - 2 (F2)								-

Table 5. Correlation matrix of WASI-T (17-70 age group, total sample).

	VO	SI	BD	MR	IN	PC	Verb	Perf	F4	F2
Vocabulary (VO)	-	.7244	.5410	.5312	.5264	.6486	.9562	.5903	.9327	.8412
Similarities (SI)		-	.5752	.5654	.5523	.6916	.8872	.6236	.7447	.8170
Block Design (BD)			-	.6470	.5822	.5439	.5921	.9546	.6524	.8578
Matrix Reasoning (MR)				-	.5969	.5248	.5826	.8264	.7779	.7730
Information (IN)					-	.5673	.5686	.6442	.6149	.6587
Picture Completion (PC)						-	.7103	.5881	.6720	.7050
Verbal IQ (Verb)							-	.6452	.9226	.8927
Performance IQ (Perf)								-	.7604	.9074
Full Scale - 4 (F4)									-	.9254
Full Scale - 2 (F2)										-

Research - this abbreviated intelligence test can be used for screening cognitive function.

ACKNOWLEDGEMENT

The researcher would like to thank the Siriraj Grant for Research Development and Medical Education, Faculty of Medicine Siriraj Hospital, Mahidol University for full supporting funds, and the Psychological Corporation Harcourt Assessment Company for permission to translate and adapt the test used in this study.

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