The Weschsler Abbreviated Scale of Intelligence (WASI)

Published by The Psychological Corporation, 1999.

Reviewed by Thomas Garland
Jobcentre Plus, North East Region, 5th Floor, Broadacre House, Market Street East, Newcastle Upon Tyne, NE1 6HQ

TEST DESCRIPTION

The WASI is a battery of four subtests: Vocabulary, Block Design, Similarities and Matrix Reasoning. The format of the subtests is similar to their counterparts in the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III) (Wechsler, 1997) and the Wechsler Intelligence Scale for Children – Third Edition (WISC-III) although the actual content differs.

The four subtests comprise the full scale and yield the Full Scale IQ (FSIQ-4). The Vocabulary and Similarities subtests are combined to form the Verbal Scale and yield a Verbal IQ (VIQ) score, and the Block Design and Matrix Reasoning subtests form the Performance Scale and yield a Performance IQ (PIQ) score. In addition, a Full Scale IQ (FSIQ-2) can be calculated using only a two-subtest version of the WASI. This comprises the Vocabulary and Matrix Reasoning subtests. It should be noted that the two-subtest version can only yield a Full Scale IQ score (FSIQ-2) and not the Verbal and Performance IQ scores (VIQ and PIQ) because of this reduction in data.

Linking samples (N = 176 children and 248 adults, age range 6–89 years) were used to establish equivalency between the WASI and the WAIS-III. This enables users to determine predicted score ranges (at 90 per cent and 68 per cent confidence intervals) for the WAIS-III FSIQ and the WISC-III FSIQ using the WASI Full Scale IQ (FSIQ-4) score.

As mentioned previously the items of each subtest differ from, but are parallel to, the items of their counterpart subtests in the full WAIS-III. Therefore, this review will not provide an unnecessary overview of these familiar subtests; instead changes to the administration of the test in general and to the specific subtests will be highlighted.

The extended age range with which the WASI can be used, 6 to 89 years, means that a number of different start and stop points are provided for each subtest.

Vocabulary subtest (V) – this subtest now includes four low-end picture items, which require the respondent to name a picture (e.g. a fish). As with the WAIS-III the remaining items are delivered both orally and visually.

Block Design subtest (BD) – this mirrors the subtest in the WAIS-III, with a slight reduction in the number of nine-block designs (from 5 to 4).

Similarities subtest (S) – as with the Vocabulary subtest, this subtest now includes four low-end picture items that lower the floor of the scale. In these low-end items the examinee is shown a picture with three common objects along the top row and four pictorial response items along the bottom row. The respondent answers by pointing to the response option that is similar to the three target items.

Matrix Reasoning subtest (MR) – an extended number of items is presented in this subtest compared with the WAIS-III. Various start and stop points are provided for examinees aged between 6–8, 9–11, 12–44, 45–79 and 80–89 years.

FORMAT AND COSTS

In general, the administration of the WASI is straightforward, especially for those familiar with the format of the WAIS-III. There are,

however, some specific concerns that should be pointed out.

1 A couple of items in the vocabulary subtest are based on American English (flashlight and vacation). The test publishers provide alternative items that are more appropriate to the UK (torch and holiday). Patches are available to alter these items in the stimulus booklet but not in the test booklet. Administrators, especially those new to the test, would need to remember to amend these on the response form to avoid orally presenting the wrong item.
2 For each subtest a number of different start points are provided. These are based on the examinee's age and extend the usable age range of the WASI from 6 through to 89 years. As a result of this, numerous 'stop' points are provided which indicate the last item that should be administered to certain age groups if the discontinue criterion has not already been met. The stop points are included to reduce testing time, however, these, along with additional starting options, can provide a confusing distraction when administering the test, especially to those new to administering the WASI. This point may be particularly pertinent in the Matrix Reasoning subtest, where additional start and stop points are provided for examinees aged between 45 and 79.

The initial administration materials can be purchased for £210.38 (inc. VAT). This includes the test manual, a stimulus booklet, a set of 9 stimulus blocks and 25 record forms. Additional packs of record forms can be purchased at a cost of £36.43 (inc. VAT) per 25 forms or £134.54 (inc. VAT) per 100 forms.

Therefore, initial outlay is £8.42 per respondent. This drops to £1.46 per respondent after the first 25 forms (based on purchase of a pack of 25 record forms).

The only additional equipment required is a stopwatch and pen / pencil.

Timing

Only 1 of the 4 subtests is timed and therefore the timing of the test will vary between assessments. In general, each subtest takes approximately 5–10 minutes to administer and the time taken to administer the entire battery is approximately 30–35 minutes. The two-subtest version can be administered in approximately 15 minutes.

The scoring of the test takes approximately 10–15 minutes. Those administrators familiar with the scoring of the full Wechsler intelligence battery will find the principles for scoring the WASI very similar. As with the Vocabulary and Similarities subtests in the WAIS-III, scoring times can be rapidly reduced once the administrator becomes familiar with the items.

It should be noted that the WASI differs from other Wechsler scales in that raw scores are converted into T-scores instead of subtest scaled scores. These are then used to calculate the IQ scores as with the other Wechsler intelligence scale. The T-score scale is used because it has a wider range of score points. This can therefore provide a better differentiation of the levels of ability reflected by the subtest raw scores.

TEST RATIONALE

The Wechsler Abbreviated Scale of Intelligence (WASI) is aimed at clinicians, psychologists and researchers who require a brief and reliable estimate of a person's intelligence functioning. The WASI provides an effective screening tool for differentiating between individuals whose intellectual functioning is in the normal range and those outside this range (e.g. general learning difficulties).

Traditionally, psychologists and clinicians have used 'short forms' of the Wechsler Intelligence Scales to meet this need for a brief assessment tool, such as the seven-subtest version of the WAIS-III (Axelrod *et al.*, 2001). This short form has demonstrated good estimates and high reliability for the Full-Scale IQ (FSIQ) and Verbal

scale (VIQ) scores. However, the short form estimates were less stable and accurate for Performance scale (PIQ) scores.

In general, the 'short forms' of the Wechsler scales are subject to a number of limitations. First, too many versions of the shortened Wechsler scales are available and these have often been developed through different methods. This could lead to administrators reviewing large volumes of research in trying to decide which short form best suits their particular needs or using an inferior brief test of intelligence instead. Alternative tests, such as the Kaufman Brief Intelligence Test (K-BIT) (Kaufman and Kaufman, 1990), provide a smaller number of, and less diverse, subtests than the WASI and subsequently produce less differentiation in cognitive functioning and yield less clinically useful information (Hays *et al*., 2002).

Secondly, there are no independent norms for the short forms of the Wechsler intelligence scales. Instead the norms are usually derived from the standardised data of the full Wechsler scale. There is evidence to suggest that individuals' performance may differ between a two-subtest short form and the full Wechsler battery (Thompson, 1987).

Finally, the short forms are only derivatives of the full Wechsler intelligence battery and therefore when this changes so must the short forms. This means that new studies must be conducted to ensure that the short forms maintain their reliability and validity.

The WASI was developed to fill the niche created by the limitations of derivative short forms and the lack of acceptable brief tests of intelligence.

Relevant Application

This test is designed specifically for use in a clinical or educational setting. However, as with the WAIS-III, this test can be used effectively in an occupational environment to provide a reliable and accurate estimate of an individual's intelligence. An awareness of an individual's cognitive functioning provides key information in assessing the suitability of work goals, work preparation goals, and the appropriateness of training programmes.

TECHNICAL INFORMATION

Test development

The selection of the four subtests was based on literature reviews of research in intellectual assessment and included the following considerations; theoretical rationale, subtest loadings on general intelligence, clinical accuracy, coverage of cognitive functioning, testing format, testing time and ease of scoring.

The items were developed using a systematic method involving; content analysis of the WAIS-III and WISC-III, generation of parallel items, analysis of the difficulty of the parallel items and then expert review of the items. Two pilot studies (N = 242, N = 316) and a nationwide tryout (N = 978) study were conducted to evaluate the new subtests.

Norms

The manual claims that the standardisation sample is highly representative of the English-speaking US population and consisted of 1,145 adults and 1,100 children, with a range of abilities and ages (from 6 to 89). The sample contains roughly equal numbers of males and females, and the race / ethnic proportions were based upon the proportions in the population, within each age range, according to the 1997 US census. Demographic characteristics of the sample according to educational attainment and geographical location are also provided but not socio-economic status. A UK specific normative sample is not available.

Reliability

Internal consistency

To assess internal consistency, the correlation between the total scores for split-half tests was calculated for each age range (once corrected by the Spearman-Brown formula for the full subtest).

At the subtest level, reliability coefficients ranged from 0.90 to 0.98 for Vocabulary, 0.84 to 0.96 for Similarities, 0.90 to 0.94 for Block Design and 0.88 to 0.96 for Matrix Reasoning. The reliability coefficients for the scale scores ranged from 0.92 to 0.98 for VIQ and 0.94 to 0.97 for PIQ. The reliability coefficients for Full Scale IQ scores ranged from 0.96 to 0.98 for the full FSIQ-4, and 0.93 to 0.98 for the abbreviated FSIQ-2.

Overall, these reliability coefficients represent a high level of internal consistency and suggest that the WASI is relatively free from measurement error.

Test–retest reliability

The stability of the WASI test scores was assessed using the test-retest method. Participants (N = 222) from a range of age groups were tested twice with an interval of between 2 and 12 weeks (mean interval = 31 days). The average stability coefficients for the adult sample ranged from 0.87 to 0.92 for the IQ scores, indicating that these scores pose adequate stability over time.

However, the scores for the second testing sessions are consistently higher, as would be expected as a result of practice effects, especially considering the short mean interval between testing sessions. These increases are higher in the PIQ scale than the VIQ.

Inter-rater reliability

The subjective element to the scoring of the Vocabulary and Similarities subtests meant that reliability coefficients were calculated accounting for differences in scorer leniency. This yielded highly impressive coefficients of 0.98 and 0.99 (for Similarities and Vocabulary respectively) between the raters (N = 4). However, reliability coefficients not accounting for differences in rater leniency are not provided and would have been more insightful. Coefficients for the Performance scale items are said to be in the high 0.90s but exact figures are not provided.

Validity

Content validity

The similarity between the items in the WASI and the parallel items in the WAIS-III ensured that the content validity of the full Wechsler battery was maintained.

Concurrent validity

A correlational study between the WASI and the WAIS-III (N = 248) revealed that most of the WASI subtests have good convergent validity with the counterparts in the WAIS-III (ranging from 0.76 to 0.88). Both the WASI 4-subtest and 2-subtest full-scale IQ scores correlated strongly with full-scale WAIS-III IQ scores (0.92 and 0.87 respectively).

However, the correlation between the Matrix Reasoning subtests was lower at 0.66. Scores on this subtest on the WAIS-III were slightly higher than scores on the WASI version. This is compared with a correlation of 0.81 between the Matrix Reasoning subtest on the WAIS-III and the Standard Progressive Matrices (SPM) (Raven, 1976). No explanation for this smaller correlation is provided.

Discriminant validity

Can the brief version of the Wechsler Scales still accurately discriminate between population groups?

1 Learning disability: Approximately 87 per cent of the sample of individuals diagnosed with a learning disability (N = 119) obtained FSIQ scores of 70 or lower on the WASI. A diagnosis of a learning disability requires the individual to have a FSIQ of 70 or less,

therefore the entire sample would be expected to score at, or below, this figure. This indicates that the WASI is sufficiently sensitive to act as a screening tool for learning disabilities. The percentage of participants who scored below 70 was too similar between individuals with mild or moderate learning disabilities and those with Down's syndrome for the WASI to be effectively used in distinguishing the degree of intellectual disability.

2 Attention deficit / hyperactivity disorder (ADHD) and specific learning difficulties (SLDs): Individuals with ADHD and SLDs tend to have relatively lower scores on subtests related to working memory and processing speed (The Psychological Corporation, 2002). A relative weaknesses on the Arithmetic, Coding, Information and Digit Span subtests (ACID) has also been linked with individuals with specific learning difficulties. The WASI does not include subtests related to the Working Memory and Processing Speed factors, nor does it include any of these subtests, and therefore is not suitable for identifying individuals with either ADHD or SLD.

3 Traumatic brain injury: It is suggested that the severity of the injury may be related to the specific cognitive impairments that the individual will experience. Individuals with traumatic brain injury often have cognitive impairments related to memory and processing speed (The Psychological Corporation, 2002), which the WASI will be unable to identify. Individuals with moderately severe head injuries are reported to have some overall cognitive impairment (The Psychological Corporation, 2002). The group's (N = 14) overall depressed score on the WASI supported this association.

Restrictions on usage

As the WASI is easy to administer, individuals with bachelor's degrees in psychology, education, counselling, speech therapy and occupational therapy may administer the test. All examiners should receive appropriate training. However, only individuals who have received professional training in psychological assessment should interpret WASI results.

Use in the employment assessment

The application of the WASI to the occupational environment provides a reliable and accurate estimate of an individual's intelligence, suitable for screening individuals with suspected 'general' learning difficulties or moderate head injuries. However, its applicability to screening individuals with specific learning difficulties or ADHD is severely limited and so comprehensive assessment tools (e.g. WAIS-III) should be used from the start.

SUMMARY

The WASI appears to meet the general validity and reliability requirements for a brief test of intelligence functioning. The use of nationally, independent normative data overcomes one of the major concerns with previous short forms of the full Wechsler battery. Whilst the extension of the applicable age range may be useful for examiners working with children or the elderly, the introduction of numerous start and stop points may make the test unnecessarily complicated for novice administrators. The reduction in administrative timing when using the two-subtest version does not seem commensurable with the loss of the scale scores (PIQ and VIQ), although this could be a useful addition for examiners very short on time.

Further statistics regarding the inter-rater reliability, in particular for the Verbal scale subtests would have been informative given the subjective nature of the scoring system for these tests. An explanation for the relatively low correlation between the Matrix Reasoning subtest in the WASI and in the WAIS-III would

have been constructive and may warrant further investigation.

In conclusion, the need for a brief and reliable estimate of a person's intelligence functioning seems well founded. The fact that the WASI is quick and easy to administer, and scoring can take less than ten minutes for an experienced administrator, means that the WASI fulfils this role successfully. The WASI appears to provide a valid and reliable estimate of an individual's general intellectual functioning, but the lack of Working Memory and Processing Speed subtests limits its applicability to screening for other clinical populations.

REFERENCES

Axelrod, B.N., Ryan, J.J., and Ward, L.C. (2001). Evaluation of seven-subtest short forms of the Wechsler Adult Intelligence Scale-III in a referred sample. *Archives of Clinical Neuropsychology*, 16 (1), 1-8.

Hays, J.R., Reas, D.L., and Shaw, J.B. (2002). Concurrent validity of the Wechsler Abbreviated Scale of Intelligence and the Kaufman Brief Intelligence Test among psychiatric inpatients. *Psychological Reports*, 90 (2), 355-59.

Kaufman, A.S. and Kaufman, N.L. (1990). *Kaufman Brief Intelligence Test (K-BIT)*. Circle Pines, MN: AGS Publishing.

Raven, J.C. (1976). *Standard Progressive Matrices*. Oxford: Oxford Psychologists Press.

The Psychological Corporation (1999). *Wechsler Abbreviated Scale of Intelligence (WASI) Manual.* San Antonio, TX: The Psychological Corporation.

The Psychological Corporation (2002). *WAIS-III and WMS-III: Technical Manual*. San Antonio, TX: The Psychological Corporation.

Thompson, A.P. (1987). Methodological issues in the clinical evaluation of two- and four-subtest short forms of the WAIS-R. *Journal of Clinical Psychology*, 43(1), 142-44.

Wechsler, D. (1997). *Wechsler Adult Intelligence Scale – Third Edition*. San Antonio, TX: The Psychological Corporation.