Wechsler Intelligence Scale for Children

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The Wechsler Intelligence Scale for Children (WISC), developed by Dr. David Wechsler, is an individually administered intelligence test for children between the ages of 6 and 16 inclusive that can be completed without reading or writing. The WISC takes 65-80 minutes to administer and generates an IQ score which represents a child's general cognitive ability.

History

The original WISC (Wechsler, 1949) was an adaption of several of the subtests which made up the Wechsler-Bellevue Intelligence Scale (Wechsler, 1939) but also featured several subtests designed specifically for it. The subtests were organized into Verbal and Performance scales, and provided scores for Verbal IQ (VIQ), Performance IQ (PIQ), and Full Scale IQ (FSIQ). A revised edition was published in 1974 as the WISC-R (Wechsler, 1974), featuring the same subtests however the age range was changed from 5-15 to 6-16. The third edition was published in 1991 (WISC-III; Wechsler, 1991) and brought with it a new subtest as a measure of processing speed. In addition to the traditional VIQ, PIQ, and FSIQ scores, four new index scores were introduced to represent more narrow domains of cognitive function: the Verbal Comprehension Index (VCI), the Perceptual Organization Index (POI), the Freedom from Distractibility Index (FDI), and the Processing Speed Index (PSI).

The current version, the WISC-IV, was produced in 2003 followed by the UK version in 2004. Each successive version has re-normed the test to compensate for the Flynn effect. Ensuring not only that the norms do not become outdated which is suggested to result in inflated scores on intelligence measures, but that they are representative of the current population (Flynn, 1984, 1987, 1999; Matarazzo, 1972). Additional updates and refinements include changes to the questions to make them less biased against minorities and females, and updated materials to make them more useful in the administration of the test.

Test format

The WISC is one of a family of Wechsler intelligence scales. Subjects 16 and over are tested with the Wechsler Adult Intelligence Scale (WAIS), and children ages three to seven years, three months are tested with the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). There is some overlap between tests, with children aged 7 being able to complete the WPPSI or the WISC-IV, and children aged 16 being able to complete the WISC-IV or the WAIS. Different floor and ceiling effects can be achieved using the different tests, allowing for a greater understanding of the child's abilities or deficits. This means that a 16 year old child who has mental retardation may be tested using the WISC-IV so that the clinician may see the floor of their knowledge (the lowest level).

The WISC-IV is divided into fifteen subtests, ten of which formed part of the previous WISC III. The

five new subtests include three core tests: Picture Concepts, Letter-Number Sequencing, Matrix Reasoning and two supplemental tests: Cancellation and Word Reasoning. The supplemental subtests are used to accommodate children in certain rare cases, or to make up for spoiled results which may occur from interruptions or other circumstances. Testers are allowed no more than two substitutions in any FSIQ test, or no more than one per index. A total of five composite scores can be derived with the WISC-IV. The WISC-IV generates a Full Scale IQ (FSIQ) which represents overall cognitive ability, the four other composite scores are Verbal Comprehension index (VCI), Perceptual Reasoning Index (PRI), Processing Speed Index (PSI) and Working Memory Index (WMI).

Each of the ten core subtests is given equal weighting towards full scale IQ. There are three subtests for both VCI and PRI, thus they are given 30% weighting each; in addition, PSI and WMI are given weighting for their two subtests each. The WISC-IV also produces seven process scores on three subtests: block design, cancellation and digit span. These scores are intended to provide more detailed information on cognitive abilities that contribute to performance on the subtest. These scores do not contribute to the composite scores.

The VCI's subtests are as follows:

Vocabulary - examinee is asked to define a provided word.
Similarities - asking how two words are alike/similar.
Comprehension - questions about social situations or common concepts.
Information (supplemental) - general knowledge questions.
Word reasoning (supplemental)- a task involving clues that lead to a specific word, each clue adds more information about the object/word/concept.

The Verbal Comprehension Index is an overall measure of verbal concept formation (the child's ability to verbally reason) and is influenced by knowledge learned from the environment.

The PRI's subtests are as follows:

Block Design - children put together red-and-white blocks in a pattern according to a displayed model. This is timed, and some of the more difficult puzzles award bonuses for speed.
Picture Concepts - children are provided with a series of pictures presented in rows (either two or three rows) and asked to determine which pictures go together, one from each row.
Matrix Reasoning - children are shown an array of pictures with one missing square, and select the picture that fits the array from five options.
Picture Completion (supplemental) - children are shown artwork of common objects with a missing part, and asked to identify the missing part by pointing and/or naming.

The WMI's (formerly known as Freedom from Distractibility Index) subtests are as follows:

Digit Span - children are orally given sequences of numbers and asked to repeat them, either as heard or in reverse order.
Letter-Number Sequencing - children are provided a series of numbers and letters and asked to provide them back to the examiner in a predetermined order.
Arithmetic (supplemental) - orally administered arithmetic questions. Timed.

The PSI's subtests are as follows:

Coding - children under 8 mark rows of shapes with different lines according to a code, children over 8 transcribe a digit-symbol code. The task is time-limited with bonuses for speed.
Symbol Search - children are given rows of symbols and target symbols, and asked to mark whether or not the target symbols appear in each row.
Cancellation (supplemental)- children scan random and structured arrangements of pictures and marks specific target pictures within a limited amount of time.

Psychometric properties

The WISC-IV US standardization sample consisted of 2,200 children between the ages of 6 and 16 years 11 months and the UK sample consisted of 780 children. Both standardizations included special group samples including the following: children identified as gifted, children with mild or moderate mental retardation, children with learning disorders (reading, reading/writing, math, reading/writing/math), children with ADHD, children with expressive and mixed receptive-expressive language disorders children with autistic disorder, children with Asperger's syndrome, children with open or closed head injury, and children with motor impairment.

WISC-IV is also validated with measures of achievement, memory, adaptive behaviour, emotional intelligence, and giftedness. Equivalency studies were also conducted within the Wechsler family of tests enabling comparisons between various Wechsler scores over the lifespan. A number of concurrent studies were conducted to examine the scale's reliability and validity. Evidence of the convergent and discriminant validity of the WISC-IV is provided by correlational studies with the following instruments: WISC-III, WPPSI-III, WAIS-III, WASI, WIAT-II, CMS, GRS, BarOn EQ, and the ABAS-II. Evidence of construct validity was provided through a series of exploratory and confirmatory factor-analytic studies and mean comparisons using matched samples of clinical and non-clinical children.

Uses

The WISC is used not only as an intelligence test, but as a clinical tool. Many practitioners use it to diagnose attention-deficit hyperactivity disorder (ADHD) and learning disabilities, for example. This is usually done through a process called pattern analysis, in which the various subtests' scores are compared to one another (ipsative scoring) and clusters of unusually low scores in relation to the

others are searched for. David Wechsler himself suggested this in 1958.

However, the research does not show this to be a very effective way to diagnose ADHD or learning disabilities. The vast majority of ADHD children do not display certain subscores substantially below others, and many children who display such patterns do not have ADHD. Other patterns for children with learning disabilities show a similar lack of usefulness of the WISC as a diagnostic tool.

When diagnosing children, best practice suggests that a multi-test battery (i.e., multi-factored evaluation) should be used as learning problems, attention, and emotional difficulties can have similar symptoms, co-occur, or reciprocally influence each other. For example, children with learning difficulties can become emotionally distraught and thus have concentration difficulties, begin to exhibit behavior problems, or both. Children with ADD or ADHD may show learning difficulties because of their attentional problems or also have learning disorder or mental retardation (or have nothing else). In short, while diagnosis of any childhood or adult difficulty should never be made based on IQ alone (or interview, physician examination, parent report, other test etc. for that matter) the cognitive ability test can help rule out, in conjunction with other tests and sources of information, other explanations for problems, uncover co-morbid problems, and be a rich source of information when properly analyzed and care is taken to avoid relying simply on the single summary IQ score (Sattler, 2008).

The empirical consensus is that the WISC is best used as a tool to evaluate intelligence and not to diagnose ADHD or learning disabled children. It can be used to show discrepancies between a child's intelligence and his/her performance at school (and it is this discrepancy that School Psychologists look for when using this test). In a clinical setting, learning disabilities are generally diagnosed through a comparison of intelligence scores and scores on an achievement test, such as the Woodcock Johnson III or Wechsler Individual Achievement Test II. If a child's achievement is below what would be expected given their level of intellectual functioning (as derived from an IQ test such as the WISC-IV), then a learning disability may be present.

Subsequently, the WISC can be used as part of an assessment battery to identify intellectual giftedness, learning difficulties, and cognitive strengths and weaknesses. When combined with other measures such as the Adaptive Behaviour Assessment System-II (ABAS-II; Harrison & Oakland, 2003) and the Children's Memory Scale (CMS; Cohen, 1997) it's clinical utility can be enhanced. Combinations such as these provide information on cognitive and adaptive functioning, both of which are required for the proper diagnosis of learning difficulties and learning and memory functioning resulting in a richer picture of a child's cognitive functioning.

The WISC-IV has also been co normed with the Wechsler Individual Achievement Test-II UK (WIAT-II UK; The Psychological Corporation, 2005), a measure of academic achievement. This linkage provides information on both cognitive ability and academic achievement in children. Tests

of intellectual functioning are used extensively in school settings to evaluate specific cognitive deficits that may contribute to low academic achievement, and to predict future academic achievement. Using the WISC-IV in such a manner provides information for educational intervention purposes, such as interventions that address learning difficulties and cognitive deficits.

The WISC-IV can also be used to assess a child's cognitive development, with respect to the child's chronological age. Using such comparisons with other sources of data, the WISC can contribute information concerning a child's developmental and psychological well-being. Very high or very low scores may suggest contributing factors for adjustment difficulties in social contexts that present problems in accepting such developmental diversity (or that cannot accommodate more than a certain level of high cognitive functioning.)

Translations

WISC has been translated or adapted to many languages, and norms have been established for a number of countries, including Spanish, Portuguese (Brazil), Norwegian, Swedish, Finnish, Croatian, French (France and Canada), German (Germany, Austria and Switzerland), English (United States, Canada, United Kingdom), Welsh, Dutch, Japanese, Chinese (Hong Kong), Korean (South Korea), Greek, Romanian, Slovenian and Italian. Separate norms are established with each translation. (Norway uses the Swedish norms). India uses the Malin's Intelligence Scale for Children (MISIC), an adaptation of WISC.