Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV)

Harcourt Assessment/The Psychological Corporation (2003)
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Age range: 6 year 0 months through 16 years 11 months (6:0-16:11)
Cost: $775 Soft or Hard Case with complete kit; $725 Box with complete kit
$165 Scoring Assistant; $350 Report Writer

Many new or newly revised intelligence tests are now available, and school districts may be in the midst of holding workshops about them or deciding which of these tests will become part of their assessment repertoire. Since their development, the Wechsler scales have been a major force in intelligence testing. The WISC-IV, with its linkage to the Wechsler tradition and research base, will doubtless be given serious consideration. The following review of the WISC-IV will familiarize psychologists with the psychometric, theoretical and administrative nuances of the WISC-IV.

Description

Scales and indices. The WISC-IV, like its predecessor, the Wechsler Intelligence Scales for Children, 3rd Edition (WISC-III) (1991), provides a measure of general intellectual functioning (Full Scale IQ [FSIQ]). The WISC-IV four-index framework (Verbal Comprehension, Perceptual Reasoning, Working Memory and Processing Speed) is similar to that of the WISC-III. However, there have been changes to both the title and content of some of the index areas. For instance, the manual reports that the WISC-III Perceptual Organization Index was renamed Perceptual Reasoning Index (PRI) to reflect increased emphasis on fluid reasoning abilities. Similarly, the WISC-III Freedom from Distractibility Index was renamed Working Memory Index (WMI) to more appropriately reflect the theoretical structure of that index. The titles, Verbal Comprehension Index (VCI) and Processing Speed Index (PSI), have been retained by the WISC-IV, although some of the subtests that contribute to the VCI have been deleted — the WISC-IV VCI now includes only Similarities, Vocabulary and Comprehension.

The Verbal-Performance dichotomy used in the WISC-III has been eliminated, but limited discussion was provided in the manual regarding the reasons for this change. The Technical and Interpretive Manual claims that the WISC-IV Verbal Comprehension Index and the Perceptual Reasoning Index may be used in the same way that the WISC-III Verbal IQ and Performance IQ were used in clinical decision-making. One may wonder, however, what sort of clinical decision-making the tests authors are referring to in this case? Are they referring to the use of either of the scales for making learning disabilities eligibility decisions? The manual is unclear on this important issue.

Subtests. The WISC-IV has ten core subtests and five supplemental subtests, which are presented below according to the order of their administration. Supplemental subtests may be substituted for specific core subtests when one of the core subtests is spoiled.

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The WISC-IV has a different subtest composition from that of the WISC-III. Matrix Reasoning, Picture Concepts and Letter-Number Sequencing were added to the WISC-IV core battery, while the WISC-III subtests of Picture Completion, Information and Arithmetic were removed from the core battery and included as supplemental subtests. New supplemental subtests include Cancellation and Word Reasoning. The technical manual reports that the addition of Matrix Reasoning and Picture Concepts has improved the WISC-IV's ability to measure fluid reasoning abilities. Similarly, the addition of Letter-Number Sequencing has augmented the test's capacity to measure rote aspects of short-term memory. Overall, the WISC-IV requires fewer subtest administrations (10) compared to that required (12) by the WISC-III. This is a positive feature of the WISC-IV, reducing administration time.

Theoretical Overview

Like previous editions, the WISC-IV ascribes to a hierarchical conceptualization (e.g., Spearman's original "g" factor) of intelligence by incorporating a FS1Q score with four index areas that contribute to the overall FS1Q. On the one hand, the WISC-IV attempts to maintain its alignment with past Wechsler theoretical tradition through Wechsler-like labeling of factor index scores. On the other hand, it has linked its factorial structure with contemporary theories of intelligence and cognitive abilities. This tends to somewhat obscure the theoretical structure of the WISC-IV. While Wechsler-like labels are retained for the index areas, a description of those index areas is presented using more contemporary nomenclature (e.g., Carroll, 1993; Cattell & Horn, 1978).

Replication of factor structure. Despite the somewhat unclear discussion of the theoretical structure, factor analytic studies reported in the technical manual provide clear evidence for the factor structure of the WISC-IV. In addition, the reviewers undertook independent exploratory (e.g., principal components analysis with verimax rotation limited to two iterations) and confirmatory (e.g., LISREL 8.54 — Joreskog & Sorbom, 1993) factor analyses of the factor structure of the WISC-IV using the correlation matrices reported in the technical manual. Based on these analyses, the reviewers were able to replicate the four-factor solution reported in the technical manual. We also found that the verbal-nonverbal dichotomy, incorporated into the WISC-III, was not a viable factor solution for the WISC-IV. One additional finding from our analyses emerged, which was not reported in the technical manual. Although we found that the Similarities subtest loaded primarily on the Verbal Comprehension Index, we also found that it loaded, but to a lesser degree across most ages, on the Perceptual Reasoning Index. This finding is consistent with the perspective that the Similarities subtest has a strong reasoning component. Our independent analysis would therefore suggest that examinee performance on Similarities would be correlated with performance on the PRI.

Overall, the WISC-IV test authors have attempted to improve upon its theoretical framework, although this aspect could be bolstered by more clearly stating how the WISC-IV factor structure is linked to contemporary thinking regarding cognitive abilities. Despite the recommendation for a clearer elucidation of the WISC-IV factors, we were able to readily replicate the four-factor structure of the WISC-IV reported in the technical manual. The practical implications of this replication are that it provides support for examiner interpretation of the WISC-IV beyond the FS1Q and at the index area score level.

Interpretation. The Technical and Interpretive Manual provides a framework for interpreting the results of the WISC-IV, placing primary emphasis on interpretation of the FS1Q followed by interpretation at the Index Level. Practitioners seeking Index-level discrepancy comparisons, subtest strengths and weaknesses, subtest level discrepancy comparisons, and response patterns within individual subtests are provided details on how to conduct these analyses. When delving into analyses of the WISC-IV beyond the index level, practitioners ought to consider both the scientific appropriateness and functional utility of these practices. While detailed analyses may assist in helping to better understand a child's cognitive profile, detailed analyses at the subtest level may be less meaningful for identification and intervention decision-making (Dombrowski, 2003; Kamphaus, 2001). This issue becomes particularly salient in the case of learning disabilities classification and intervention design. Pending legislation may radically alter the way in which IQ tests are used for learning disabilities diagnostic practice (see Dombrowski, Kamphaus, & Reynolds, 2004).
Technical and Psychometric Properties

The technical and psychometric properties of the WISC-IV are sound and meet the high standard level established by the APA/NCME/AERA test standards (1999). The WISC-IV has a mean of 100 and a standard deviation of 15. Index area scores are scaled on this same matrix. The standard error of measurement of the FSIQ is 2.68. Subtests are scaled on a mean of 10 and have a standard deviation of 3. Additional floor and ceiling items were incorporated to facilitate evaluation of gifted and lower cognitive functioning children.

Reliability. The Technical and Interpretive Manual reports strong evidence for reliability with overall average reliabilities in the range of .88 (PSI) to .97 (FSIQ) at the full scale and index levels. Individual subtest reliabilities were slightly lower, ranging from .79 (Symbol Search) to .90 (Letter-Number Sequencing). Both test-retest and split-half methods of ascertaining reliability were used. Reliability figures reported in the technical manual are appropriately high.

Validity. The relationship between the WISC-IV and other measures of cognitive ability, achievement, memory, adaptive behavior, giftedness and emotional intelligence are reported in the Technical and Interpretive Manual. Concurrent validity evidence is strong, with identically reported correlations of .89 between the FSIQ score on the WISC-IV and the FSIQ on the WISC-III, WAIS-III, and WPPSI-III. The Technical and Interpretive Manual reports criterion related validity of .78 (Reading), .78 (Mathematics), .76 (Written Language), .75 (Oral Language), and .87 (Total Achievement) between the WISC-IV FSIQ and respective WIAT-II composites. The reader is referred to the technical manual for a review of validity studies as they relate to adaptive behavior, emotional intelligence, memory and giftedness.

Standardization. A total of 2,200 children stratified by age (e.g., 200 per year for ages 6 through 16:11 [11 age periods]) were included in the normative process. Using the March 2000 census, the children were matched according to age, race/ethnicity, sex, parental education level and geographic region. Experts in cross-cultural research and intelligence testing reviewed item content for potential bias. Moreover, traditional Mantel-Haenszel bias analyses (Holland & Thayer, 1988) and Item Response Theory (IRT) bias analyses (Hambleton, 1993) were employed to determine which items were potentially biased. To assist with these analyses, data on an additional sample of 252 African-Americans and 186 Hispanic children were collected to allow for a statistical examination of item bias using IRT methods of analysis.

In addition, the WISC-IV manual includes data for special group studies, which the manual claims will enhance the clinical utility and relevance of the WISC-IV. Thus, WISC-IV average score data on children for whom English is a second language, as well as children with learning disabilities, emotional disturbance, autism, mental retardation, orthopedic impairment, ADHD and language delays, were included. The Technical and Interpretive Manual reports mean scores for the FSIQ, Index areas and subtests for each of the groups and compares these data with a matched control group.

Commentary on Administration and Scoring

Those familiar with the Wechsler scales for children will not be disappointed with the fourth edition of the WISC. The transition to it is seamless. In fact, it is our opinion that the WISC-IV is even easier to administer than its predecessor. The instructions for each subtest have been simplified, shortened, and organized more clearly, making them both more developmentally appropriate and easier for the examinee to administer. The more cumbersome subtests of Picture Arrangement and Object Assembly have been eliminated. In addition, the number of subtest administrations required to derive the index areas has been shortened by two subtests. Ten subtests, compared with 12 for the WISC-III, are now required to calculate the index areas.

Nonetheless, the approximate 60 to 90-minute administration time required of the WISC-IV is still long and psychometrically unnecessary. Recent intelligence tests (e.g., the Differential Ability Scales, Elliot, 1990 and the Stanford-Binet Fifth Edition, Roid, 2003) use adaptive testing procedures to significantly reduce test administration time. The WISC-IV would be better served in future editions if administration length is shortened.

The technical manual indicates that the artwork has been updated to increase the appeal to children. However, this does not seem to involve a major revision, except where more modern pictures were incorporated or outdated items were removed. There were some minor changes made to many of the individual subtests. For instance, the standardized directions for Coding, Symbol Search and Block Design were truncated and written more concisely. New words were added to some of the Vocabulary and Similarities items, while test items that appeared in prior editions were retained.
There does not appear to be an inherent difference in hand scoring between the current and prior editions. In fact, the appearance of the protocol as well as the approach to its scoring is remarkably similar to that of the WISC-III. New users will continue to experience a learning curve, requiring diligence and attention to detail when scoring the subtests of Comprehension, Similarities and Vocabulary. All examiners must be cautious to scrutinize scoring criteria for Letter-Number Sequencing. While the standardized instructions request that the examinee repeat numbers first followed by letters in alphabetical order, the scoring criteria allows either alphabetized letters followed by numbers or numbers followed by alphabetized letters. Scoring software and report writing programs are currently available.

Summary

The WISC-IV is an easy instrument to administer and score, continuing in the Wechsler tradition of user friendliness and clinical utility. In addition, the research base supporting the Wechsler scales is abundant, and the term “WISC” has quite nearly become a term of vernacular. While decades of research are available that support the factor structure of the Wechsler scales, the WISC-IV would be well served by a clearer articulation of its theoretical structure. The WISC-IV attempts to remain linked to the Wechsler tradition while simultaneously aligning itself with contemporary theories of intelligence. This tends to obscure the theoretical structure of the WISC-IV. Despite this criticism, the underlying factor structure of the WISC-IV seems to be sound based upon evidence provided in the Technical and Interpretive Manual and our independent replication of the four-factor solution using both exploratory and confirmatory factor analytic procedures. The WISC-IV is an overall superior instrument that is designed in the style and tradition of prior Wechsler scales.

References


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