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ABSTRACT

The Wechsler Preschool and Primary Scale of Intelligence (WPPSI) has recently undergone a major revision and restandardization to update its 20-year-old norms, extend the age range down to age 3 and up to age 7 years, update and revise its test items, and increase its appeal to young children. This paper presents the results of a concurrent validation study comparing the performance of 33 preschool children, aged 48 to 60 months, on the revised WPPSI (WPPSI-R) and on the McCarthy Scales of Children's Abilities (MSCA) and the Peabody Picture Vocabulary Test--Revised (PPVT-R). A relatively high level of parental education and economic status made the sample not representative of the general population. Subjects were administered the WPPSI-R on one day and the MSCA and PPVT-R on another day, never more than 26 days later. Scores obtained on all measures were compared through Pearson product moment correlations and t-tests of the paired mean differences for the total sample. Analysis of variance techniques were used to evaluate the potential impact of order of administration or gender on test outcomes. Mean performance on each instrument was within the average range for the sample. Results suggest that the WPPSI-R samples cognitive function in a manner similar to the MSCA for this age range. The diminished intercorrelation with the PPVT-R may reflect the restricted range of the current sample or may reflect substantial differences in what the two tests measure. Five tables present study data. A 20-item list of references is included. (Author/SLD)

Concurrent Validation of the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI) with the McCarthy Scales of Children's Abilities, and the Peabody Picture Vocabulary Test - Revised

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ABSTRACT

The Wechsler Preschool and Primary Scale of Intelligence has recently undergone a major revision and restandardization to update its 20 year old norms, to extend the age range downward to age three and up to age seven, to update and revise test items and materials, and to increase its appeal to young children. The present study presents the results of a concurrent validation study comparing the performance of preschool children on the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R) to their performance on two other widely used measures of cognitive competence, the McCarthy Scales of Children's Abilities (MSCA; McCarthy, 1972) and the Peabody Picture Vocabulary Test - Revised (PPVT-R; Dunn, 1981).Thirty three neurologically and developmentally intact children between the ages of 48-60 months of age participated in the study. The order of administration was counterbalanced across the entire sample and within sessions. There were no significant differences in test scores observed on the principle measures as a function of test administration order or gender. Children participating in the study were characteristically from white middle to upper middle class families. Parental level of education was above average, with forty six percent reporting four or more years of college education. The relatively high overall economic status of the families and educational status of the parents makes the sample not representative of the general population. Both parents were occupied outside of the home on at least a part-time basis in sixty-one percent of the households.Subjects were administered the standardization version of the WPPSI-R in a single session and the MSCA and PPVT-R on another day. Intertest interval did not exceed 26 days, and most Ss were tested over a two week period. Scores obtained on all measures were compared through Pearson Product moment correlations and t-tests of the paired mean differences for the total sample. Analysis of variance techniques were used to evaluate the potential impact of order of administration or gender on test outcomes. Mean performance on each instrument was wholly within the average range for the sample; WPPSI-R FSIQ = 106 (SD=12.57). Results indicate a strong and significant correlation between the WPPSI-R Full Scale IQ and the MSCA-GCI (r=.697, corrected for restricted range). Similar high intercorrelations were noted in comparisons of the MSCA-GCI and VIQ and PIQ values from the WPPSI-R. Intercorrelation between the FSIQ and the PPVT-R was significantly lower, and were markedly lower than the values reported with the original version of the WPPSI. Results of this study suggests that the WPPSI-R samples cognitive function in a fashion similar to the McCarthy in this age range. The diminished intercorrelation with PPVT-R may be a factor of restricted range in the current sample, or may reflect substantial differences in what is measured by the two measures in this age range. The WPPSI-R is a major substantive revision of an important assessment instrument for preschool children. Further research with the instrument investigating its application with specialized populations, predictive validity, and concurrent validity will speak to its utility in the clinical setting.

Concurrent Validation of the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI) with the McCarthy Scales of Children's Abilities, and the Peabody Picture Vocabulary Test - Revised

The Wechsler Preschool and Primary Scale of Intelligence has recently undergone a major revision (1990) and restandardization to update its 20 year old norms, to extend the age range downward to age three and up to age seven, to update and revise test items and materials, and to increase its appeal to young children. The present study presents the results of a concurrent validation study comparing the performance of a group of 4 year old children on the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R) to their performance on two other widely used measures of cognitive competence, the McCarthy Scales of Children's Abilities (MSCA; McCarthy, 1972) and the Peabody Picture Vocabulary Test - Revised (PPVT-R; Dunn, 1981).

Early Childhood Assessment

Recent changes in the Education of the Handicapped Act (PL 99-457) extend all rights and privileges of PL 94-142 by the school year 1990-91 to handicapped children aged 3-5 years. Mandated services include: timely multidisciplinary assessments, placement in the least restrictive environment, preparation of an IEP that must be reviewed periodically, and due process provisions in cases of parental dissatisfaction. An excellent brief review of the new legislation is included in a recent article by Short, Simeonsson, & Huntington(1990).

Increasing demands will be placed upon professionals to locate psychometrically sound and clinically useful assessment tools for preschool applications. The Wechsler Preschool and Primary Scale of Intelligence (WPPSI) has historically been used: for

determining classification and placement of preschool children, for clinical evaluations and for planning individualized programs. Based upon its utilization in this context, careful evaluation of the psychometric properties of the revised instrument is mandated.

According to the Standards for Educational and Psychological Testing (1985), "validity is the most important consideration in test evaluation." Anastasi (1982) notes that validity studies enable the test developer to determine how well the test fulfills its intended function and whether inferences can be properly made based on test results. Validity testing falls into three general categories: content validity, construct validity, and criterion related validity. Concurrent validity is a specific example of criterion related validity, which speaks to the relationship between test scores and a current criterion, such as scores on other established tests measuring a similar construct.

The Wechsler Preschool and Primary Scale of Intelligence (WPPSI)

The Wechsler Preschool and Primary Scale of Intelligence has recently undergone a major revision and restandardization to update its 20 year old norms, to extend the age range downward to age three and up to age seven, to update and revise test items and materials, and to increase its appeal to young children. The original WPPSI was developed as a downward extension of the WISC, which was itself a downward extension of the Wechsler-Bellvue Scales. Factor analytic research with the WPPSI revealed two factors identical to the Verbal and Performance scales of the test (Elbert & Holden, 1985; Eichorn, 1972), and these have been maintained in the revised test.

Correlations of the WPPSI with other developmental measures were generally good. The manual reports correlations with the Stanford Binet (Form L-M) of .75, and between the WPPSI and the PPVT at .58. This data was based upon an initial validity study composed of only 98 children. A group of studies comparing WPPSI FSIQ's with

McCarthy GCI yielded an average correlation of .75 (Knack, 1978; Arinoldo, 1979; Schmits & Beckenbaugh, 1979; Philips, et al., 1978; McCarthy, 1972), however Kaufman (1982) notes that when these data are corrected for restriction of range by entering the standard deviations for each additional score into the formula, the average correlation coefficient increased to .85.

Problems with the WPPSI have included a limited base and ceiling, test length, over-reliance on intact language skills, and inclusions of basic concepts not readily understood by young children. Concerns with the open-ended character of the scoring on certain subtests (notably, Information, Vocabulary, Similarity, and Comprehension) have been noted. In these subtests, poor verbalization due to inadequate or poor developed communication skills was felt to yield inaccurate VIQs that underestimated true abilities. In contrast to the more motor-activity oriented MSCA, the Wechsler tests are regarded more language dependent.

The Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R)

The Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R; Wechsler, 1989) is the result of a four year development effort undertaken by the Psychological Corporation to update the norms and extend the age range of the scale both upward and downward.

The WPPSI-R maintains the basic structure of the WPPSI and efforts were made to make it more equivalent in content and form to the remainder of the Wechsler batteries. Approximately 50 percent of the original items were maintained. In its revised form, the WPPSI-R contains a total of 12 subtests, of which 10 are required and two (Animal Pegs and Sentences) are optional. Table 1 describes the content of the revised test.

Insert Table 1 about here

An Object Assembly subtest was added to increase the similarities in structure with the WISC-R, and the former Animal House subtest was renamed the Animal Pegs subtest. New items, including some in color, were added to all subtests (except Animal Pegs), and bonus points for speed were added to the Block Design and Object Assembly subtests to increase the range and discriminability of the overall test. The stratified sampling plan for the restandardization was derived from 1986 census data, and data was gathered on 1700 children aged 3 through 7 years, 3 months. A detailed description of the WPPSI-R and the changes from the original instrument are detailed in the test manual.

The McCarthy Scales of Children's Abilities (1972) were designed to assess intellectual functioning in children 2 1/2 to 8 1/2 years. Norms were developed for each 3 month interval, like the current WPPSI-R. The findings on the McCarthy are reported out on a general measure of cognitive functioning (called the General Cognitive Index or GCI) and a profile of five specific cognitive abilities. Clinically it is used extensively for clinical evaluation, identification of developmental delays, screening for learning disabilities in preschoolers (although there is no direct support for its validity for this use), and individualized program planning for preschool children.

The 18 subtests of the McCarthy are clustered around the six clinical scales. Verbal, Perceptual-Performance, and Quantitative Scales (which are content oriented), the Memory and Motor Scales (which are process oriented) and the GCI. Scores on the Verbal, Perceptual Performance and Quantitative scales are combined to form the GCI, which McCarthy (1972) defines as " the child's ability to integrate his accumulated learning and adapt them to the tasks of the scales." The MSCA Index is similar to the

WPPSI in that it has a mean of 100 and a standard deviation of 16, whereas the WPPSI-R has a mean of 100 and a standard deviation of 15. The 1970 normative sample included 1032 children, with a minimum of 100 children in each 6 month age grouping. Equal numbers of males and females were included in the standardization sample, however bilingual children, handicapped children, and children with cognitive deficits were formally excluded from the sample. Race, geographic area and father's occupation reflected the 1970 census. Limited information on test validity is provided in the manual. Ammons & Ammons (1974) provides some evidence on a limited sample of 35 children, with others adding additional information since the publication of the test. As noted above, the average correlation between the GCI and the WPPSI FSIQ was .75. Taylor (1979) found a correlation of .47 between the PPVT-R and the MSCA GCI in normal children.

The Peabody Picture Vocabulary Test - Revised (PPVT-R; 1981) is an untimed, individually administered test which is available in two parallel forms. It is generally regarded as a measure of receptive vocabulary and is frequently used as a screening measure of the intelligence of both children and adults, with a normative age range from 2.5 - 40 years. Because it does not require reading ability, speech, physical movement, or an expressive vocabulary, it is useful in assessing many populations, such as verbally inhibited or physically challenged children. Umburger (1984) suggests that the PPVT-R can be used as an achievement test for vocabulary, a measure of general intelligence, and a good predictor of school success. Concurrent validity studies reveal a correlation coefficient of .47 with the MSCA GCI and .58 with the WPPSI FSIQ in normal populations.

Subjects

Participants in this study included thirty three neurologically and developmentally intact children (17 females and 16 males) enrolled in a private preschool program in the mid-Atlantic region. The children ranged in age from 48 to 60 months of age (Mean=53.9; SD=3.75) participated in the current study with the consent of their parents. Children participating in the study were characteristically from white middle to upper middle class families. Parental level of education was above average, with forty six percent reporting four or more years of college education. The relatively high overall economic status of the families and educational status of the parents makes the sample not representative of the general population. Both parents were occupied outside of the home on at least a part-time basis in sixty-one percent of the households.

Procedure

Subjects were administered the standardization version of the WPPSI-R in a single session and the MSCA and PPVT-R on another day. Testing was completed between January and March 1988. Intertest interval did not exceed 26 days, and most Ss were tested over a two week period. In order to minimize the potential contribution of practice effects, the order of administration was counterbalanced across the entire sample and within sessions for the MSCA and the PPVT-R.

Results

Scores obtained on all measures were compared through Pearson Product moment correlations and t-tests of the paired mean differences for the total sample. Analysis of variance techniques were used to evaluate the potential impact of order of administration or gender on test outcomes. There were no significant differences in test scores observed on the principle measures as a function of test administration order or gender. Means and standard deviations of the WPPSI-R global scores, the MSCA GCI and PPVT-R for the

sample are presented in Table 2. Examination of these scores reveals no significant differences between performance on the WPPSI-R FSIQ and either of the other two measures; scores obtained on the PPVT-R were significantly lower than those obtained on the MSCA GCI ($t = 2.69$; $p < .05$) in this sample. Within-test comparisons revealed that this sample of average functioning children performed about the same on the WPPSI-R Verbal and Performance Scales .

Insert Table 2 About here

WPPSI-R/PPVT-R intercorrelations revealed few significant relationships (Table 3). Positive but low correlations were noted between the PPVT-R standard score and the Information and Picture Completion subtests, accounting for less that 15% of the variance in those measures. Notably the lowest correlation was found in comparing the PPVT-R standard score (a measure of receptive vocabulary) and the Vocabulary subtest scale score from the WPPSI-R (a measure of expressive vocabulary).

Insert Table 3 about here

Intercorrelations between WPPSI-R global scores and the MSCA Indexes are considerably stronger than those observed with the PPVT-R (Table 4). Moderately strong intercorrelations are noted between the MSCA GCI and all three summative measures on the WPPSI-R; a strong correlation was noted between the Verbal Scale of the MSCA and the Verbal Scale of the WPPSI-R.

Insert Table 4 about here

Table 5 examines the intercorrelations between the principal measures, corrected for restricted range (Glass & Hopkins, 1984). Intercorrelations between the MSCA and the WPPSI-R are modestly strengthened by this procedure, with modest amounts of variance shared between the GCI and the Verbal Scale score of the WPPSI-R.

Insert Table 5 about here

Discussion

Kaufman (1982) criticized the WPPSI on the grounds that it was not child oriented, and notes that the test required knowledge of numerous basic concepts not readily understood by young children. Concepts such as "row" and "beginning" were not understood by 1/3 of middle class beginning kindergartners. The WPPSI assumed that the child understood 14 such concepts; the McCarthy assumes understanding of only seven (Kaufman, 1978). Assumptions regarding the model for the development of "intelligence" in young children incorporated into the WPPSI have been repeatedly questioned.

The test itself is substantially longer than its predecessor, reflecting both the addition of the Object Assembly subtest and the addition of items intended to sample the abilities of both younger and older children. Psychometrically , the test has a fairly reliable floor at the 3 1/2 year old age level , with a consistent floor present at the 4 year old level. All subtests have a sufficient ceiling through the 6 1/4 year age level and most through the 6 1/2 year age level. Taken together, this would suggest that the revised test has an adequate floor and ceiling to permit an accurate assessment of the abilities for most children.

In its final form, the WPPSI-R remains a lengthy, verbally oriented instrument. Particularly in the younger age ranges, discontinuation rules (e.g., 5 errors) seem lengthy. It continues to have only a limited base with little discriminative capacity in the newly named "Intellectually Deficient" range. Intra-subtest content revisions does allow sampling of additional cognitive skills not tapped on the earlier version of the test.

Conclusions

Results of the concurrent validity research presented here indicates a strong and significant correlation between the WPPSI-R Full Scale IQ and the MSCA- GCI; similar high intercorrelations were noted in comparisons of the MSCA-GCI and VIQ and PIQ values from the WPPSI-R. These values compare favorably with the results of the larger pooled sample reported in the manual, of which this data is a part and are stronger than the values reported on the original WPPSI. These high correlations, together with the low mean differences in score between the two measures (Mean=1.97; SD=9.8) suggests that the WPPSI-R samples cognitive function in a fashion similar to the McCarthy in this age range. Intercorrelation between the FSIQ and the PPVT-R was significantly lower, and was markedly lower than the values reported with the original version of the WPPSI. This diminished correlation may be a factor of restricted range in the current sample, or may reflect substantial differences in what is measured by the two measures in this age range.

The WPPSI-R is a major substantive revision of an important assessment instrument for preschool children. Further research with the instrument investigating its application with specialized populations, predictive validity, and concurrent validity will speak to its utility in the clinical setting.

Conclusions

The WPPSI-R is a major substantive revision of an important assessment instrument for preschool children. Further research with the instrument investigating its application with specialized populations, predictive validity, and concurrent validity will speak to its utility in the clinical setting.

Table 1

Wechsler Preschool and Primary Scale of Intelligence - Revised

Performance Scales	Verbal Scales
Object Assembly	Information
Geometric Design	Comprehension
Block Design	Arithmetic
Mazes	Vocabulary
Picture Completion	Similarities
Animal Pegs*	Sentences*

*Optional Subtests

Table 2

SAMPLE PERFORMANCE

	Measure	Result	Standard Dev	Range
WPPSI-R	FSIQ	106.12	12.57	81 - 133
MSCA	GCI	108.09	11.21	81 - 132
PPVT-R	IQ	101.49	11.07	82 - 119

Table 3

Coefficients of Correlation
PPVT-R and WPPSI-R

WPPSI-R Verbal Subtests						
	INFO	COMP	ARITH	VOCAB	SIM	SENT
PPVT-R IQ	.374*	.188	.263	-.018	.234	.135
WPPSI-R Performance Subtests						
	OBJECT ASSEMB	GEODES	BLOCK DESIGN	MAZES	PIC COMP	ANIMAL PEGS
PPVT-R IQ	.252	.103	.036	.267	.381*	.196

* p< .05

Table 4

COEFFICIENTS OF CORRELATION BETWEEN WPPSI-R AND MSCA INDEXES

	McCarthy Scales					
WPPSI-R	Verbal	Perceptual Performance	Quantitative	GCI	Memory	Motor
PIQ	.242	.489**	.491**	.495**	.317	.244
VIQ	.646***	.265	.363*	.633***	.524**	.164
FSIQ	.524**	.447**	.498**	.665***	.503**	.227
MSCA Mean	54.0	56.7	56.1	108.8	52.6	53.4
SD	9.9	6.2	7.1	11.2	9.4	7.1

* p< .05
** p< .01
*** p< .001

Table 5

Test Intercorrelations:	Corrected for Restricted Range	
WPPSI-R	PPVT-R	GCI
FSIQ	.394*	.697***
VIQ	.360*	.700***
PIQ	.361*	.573**

* p< .05
** p< .001
*** p< .0001

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