AN ABSTRACT OF THE THESIS OF

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This study investigated the relationships between the complete battery of the Wechsler Adult Intelligence Scale-Revised (WAIS-R) and Kaufman's Short Form 3 (SF3). Twenty-five men and 25 women, ages 18 to 25, were administered the complete WAIS-R from which scores were extracted for three subtests, Information, Picture Completion, and Digit Span, (i.e., SF3).

For the total sample the mean WAIS-R Verbal (V), Performance (P), and Full Scale (FS) IQs were 109.00, 109.42, and 110.18, respectively. For the women the V, P, and FS IQs were 109.00, 111.00, 111.00, respectively, and for the men 108.16, 108.20, and 109.40, respectively. The mean IQs for the SF3 estimates of the Full Scale IQ were 102.00 for the entire sample, 101.04 for the women, and 103.00 for the men.

The Pearson product-moment correlation coefficients between the Full Scale WAIS-R scores and the SF3 were .74 for the complete sample, .76 for the men , and .74 for the women. The correlations between the SF3 and the Verbal WAIS-R scores were .66 for the complete sample, .72 for the men, and .56 for the women. The correlations between the SF3 and the Performance WAIS-R scores were .66 for the complete sample,

.67 for the men, and .71 for the women. The results of this study indicated that the SF3 may be used to estimate WAIS-R IQ scores when used with 18 to 25 year olds.

A COMPARISON OF THE WECHSLER ADULT INTELLIGENCE SCALE-REVISED AND KAUFMAN'S SHORT FORM 3

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CHAPTER 1

INTRODUCTION

The assessment of intelligence, particularly of adolescents and adults, has been a concern within the areas of cognitive psychology, education, school psychology, clinical psychology, neuropsychology, and everyday life (Kaufman, 1990). Nowhere is intellectual assessment more important than in the psychological setting where administered tests are frequently used to classify clients in a variety of diagnostic categories.

Evaluating intelligence is achieved by abstracting general knowledge from the subject in a variety of critical areas (Terman & Merrill, 1937). According to Anastasi (1982), this is done by administering a variety of tasks to the subject in hopes of gaining an adequate sampling of important intellectual functions. The Wechsler Adult Intelligence Scale-Revised (WAIS-R) (Wechsler, 1981) represents the most up-to-date, well-standardized, and reliable assessment of intelligence for persons ages 16 to adult (Ryan, 1983). Clinicians who assess adult intelligence almost always use the WAIS-R (Kaufman, 1990).

Statement of Problem

The WAIS-R takes 60 to 90 minutes to complete the battery of tests depending on the age of the subject (Wechsler, 1981). An increasing number of clients and less time for proper assessment have created a need in the clinical setting for a valid, reliable shorter form of the

WAIS-R.

Statement of Purpose

In an attempt to decrease the amount of time required to obtain an accurate estimate of intellectual functioning, psychologists have attempted to shorten the WAIS-R either by using selected items or by subtests (Watkins, 1986). The purpose of this study is to assess whether the Short Form 3 (SF3), which includes the subtests Information, Digit Span, and Picture Completion from the WAIS-R, will yield a reasonably accurate estimate of overall intelligence level and pattern of intellectual abilities in comparison to the complete WAIS-R.

Statement of Significance

In today's society, the role of clinical psychologists is rapidly expanding in that the amount of psychological assessment done by a clinician is increasing (e.g., assessment of client's intellectual functioning, psychological screenings, and personal histories). Thoroughly assessing a client through a battery of psychological tests is a time consuming, tiring process. This fatigue is becoming particularly important in populations with which full scale WAIS-R procedures can be taxing (Ryan, Georgemiller, & McKiney 1984; Schwartz, 1982). However, clinicians are frequently asked to perform rapid intellectual evaluations on patients with medical and/or psychiatric disorders (Ryan & Rosenberg, 1984). Thus, reducing the amount of time required to administer a test

would aid psychologists in assessing their clients in a shorter amount of time without diminished validity. Obviously, an intelligence test that can be briefly administered and scored and yet still retain its reliability and validity would be a valuable tool.

Review of the Literature

The developments that have led to the present WAIS-R date back to 1939 when Wechsler published the Wechsler-Bellevue I. The first test was comprised of subtests developed primarily by Binet and World War I psychologists. Wechsler's Verbal Scale was essentially a Yerkes point-scale adaptation of Stanford-Binet tasks, and the Performance Scale was similar to other non-verbal batteries of the 1920s and 1930s (Cornell & Coxe, 1934; Pintner & Paterson, 1925). The concepts Wechsler used to develop his intelligence test were available to other psychologists, but Wechsler was a visionary who anticipated the needs of the practitioners (Kaufman, 1990).

In 1946, the Wechsler-Bellevue I scale was revised. The Wechsler Adult Intelligence Scale was completed in 1955, followed by a 1981 revision. In 1949, 1967, 1974, 1989, and 1991 Wechsler added a variety of intelligence tests and revisions designed for children. Like the adult tests, the revisions for these tests were done in order to improve standardization norms, to clarify and make more elaborate administration manuals, to simplify administration procedures, and to improve item quality.

The WAIS-R takes a sum of scaled scores that are derived from raw scores and converts them to Verbal, Performance, and Full Scale IQs. The raw scores are converted to scaled scores from a series of six subtests in the Verbal section and five subtests in the Performance section. The conversion tables for changing raw scores into scaled scores are based on the test performance of the full standardization sample, or so called "reference group" (Wechsler, 1981). The mean score and standard deviation of IQ tests are 100 and 15, respectively, and 10 and 3 for subtests (Wechsler, 1981).

Because administration time of the WAIS-R usually requires 1 to 1.5 hours, psychologists often find it necessary to rely on short forms (Cella, Jacobsen, & Hymowitz, 1985). In an effort to shorten administration time while maintaining high reliability and validity, a variety of short forms have been created. Fortunately, a number of recent investigations have examined these short forms in clinical trials in order to establish reliability and validity in the testing instruments (Haynes, 1983).

Historically, short form research with the Wechsler test has focused upon eliminating test items (Resnick, 1977; Yudin, 1966). For example, in an overall estimate of intellectual functioning, item-reduction techniques attempt to retain the original pattern of intersubtest scatter for the purpose of individual profile interpretation (Boone, 1991a).

Item-reduction procedures reduce the total number of

items administered on most subtests by one half to two thirds (Satz & Mogel, 1962). A partial score is derived from each abbreviated subtest and is multiplied by two or three, depending on the number of items deleted, to obtain a full raw score (Watkins, 1986).

In 1991 Boone conducted a study using the Satz-Mogel short form. The Satz-Mogel is a widely used short form of the WAIS-R that tends to estimate more reliably IQ range than other short forms that use other selected subtests (Cella et al., 1985). Boone's sample included 75 patients, 55 men and 20 women ranging in age from 18 to 64, who were referred for intellectual assessment. Fifty-five patients were diagnosed with a schizophrenic disorder while 20 patients received an affective disorder diagnosis.

The 75 patients completed the entire WAIS-R. Two short form IQs then were computed for each subject using the Adams, Smigeilski, and Jenkins (1984) procedure as the item-reduction approach. Every third item on the Information, Vocabulary, and Picture Completion subtests and every other item on the remaining ones except the Digit Span and Digit Symbol were used. The Digit Span and the Digit Symbol were given in their entirety.

Based on Silverstein's (1985) evaluation of the study, the correlation coefficient between the Satz-Mogel short form of the WAIS-R and the full subtest scale score from the WAIS-R were consistently large and significant ($r = .90$, $p < .01$). Since the Satz-Mogel does not shorten Digit Span or Digit

Symbol, mean score differences were not reported. Use of the Satz-Mogel short form results in a savings of approximately 37 minutes, from the time it takes to administer a WAIS-R (Ward, Selby, & Clark, 1987). According to Kaufman (1977), a big advantage in using this subtest-reduction technique is the relative ease in using the Satz-Mogel and the reduced amount of administration time. Obviously, the use of the Satz-Mogel short form would be beneficial where intelligence testing is a crucial element in assessing a client.

Ward et al.(1987) noted that prior studies done using short forms had only been concerned with the length of the short form in terms of the number of subtests. They also noticed that validities had been compared within dyads, triads, and tetrads without considering the administration times of the combinations. Thus, they tried to ascertain whether subtest administration times do differ and to demonstrate that the reliability and validity of Full Scale IQ can be achieved with an abbreviated form of an intelligence test.

Their research was based on a private practice sample of 15 males and 15 females with a mean age of 40.23 years. Subtest times to the nearest minute on the WAIS-R were obtained by two experienced examiners, one a doctoral clinical psychologist and the other a trained technician at a Veterans Administration hospital. The examiners were not aware of the purpose for recording all the subtest times and promptly scored each subtest at the completion of each

testing session.

Of major interest were the differences among subtests in administration times. The two fastest Verbal subtest mean completion times for both examiners were Digit Span at 3.53 minutes and Similarities at 5.07 minutes. The longest to administer were Vocabulary (6.63 minutes) and Comprehension (8.4 minutes). Picture Completion at 5.87 minutes and Digit Symbol at 3.50 required the least amount of time on the Performance subtests. The rest of the Performance subtests' times were above 10 minutes (Ward et al., 1987).

Selecting a WAIS-R short form requires more than examining the validities (Ward et al., 1987). For instance, the four-test short form of Digit Span, Similarities, Picture Completion, and Digit Symbol can be administered in approximately the same time as required for Vocabulary and Block Design, the most valid dyad. The latter combination of validity according to McNemar's (1950) formula has a validity of .91, and the former .90. Using Silverstein's (1970) correction for unreliability, the dyad has a validity of .93 and the short form was .90. Fortunately, with no loss of time or validity the tetrad alternative could be used. Subtest administration times should be considered when the validity of selecting short forms is high.

The WAIS-R has two and four subtest forms that maintain reasonable reliability and validity in a brief amount of testing time (Silverstein, 1982). The two-subtest short form consists of Vocabulary and Block Design, while the four-

subtest short form includes Arithmetic, Vocabulary, Picture Arrangement, and Block Design. The average amount of time that it takes to administer the two and four subtest short forms is 19 and 35 minutes, respectively (Thompson, Howard, & Anderson, 1986).

Sattler (1988) suggested that when saving time is essential for intellectual assessment, a two-subtest form may be useful. Ryan (1983) investigated the validity of two-subtest short form as an estimate of the WAIS-R Full Scale IQ in a sample of 30 psychiatric patients. Ryan discovered that the correlation between the short form IQ and the WAIS-R Full Scale IQ was highly significant at .87. Also, the short form was a useful screening device that discriminated between patients with normal and subnormal intelligence with a correct classification rate of 87% (Ryan, 1983).

Kaufman (1990) and Kaufman and Ishikuma (1989) also have been interested in providing a reliable and valid Full Scale IQ estimate in the briefest amount of time. Thus, they developed three WAIS-R subtest-reduction short forms of two (SF2), three (SF3), and four (SF4) subtests, all of which can be administered and scored in less than 20 minutes. The SF2 is made up of Information and Digit Span and takes approximately 12 minutes to administer and score. The SF3 includes Information, Digit Span, and Picture Completion, takes approximately 16 minutes to administer and score, and is able to assess the factors of Comprehension, Freedom of Distractibility, and Perceptual Organization. The SF4

consists of the Arithmetic, Similarities, Picture Completion, and Digit Symbol subtests and has an administration and scoring time of approximately 19 minutes.

Boone (1992) conducted a study using 100 male and female psychiatric patients, ranging from 18 to 64 years of age, in which he administered the complete WAIS-R and obtained short form scores from the full test. Full Scale IQ estimates for each short form were obtained for the subjects by using tables provided by Kaufman. Among Kaufman's short forms, it was recommended that the Kaufman (Kaufman, 1990; Kaufman and Ishikuma, 1989) triad be used when a quick, global estimate of intellectual functioning is needed for psychiatric inpatients (Boone, 1992). No differences in the statistical and clinical accuracy using Kaufman's triad and tetrad to predict the actual Full Scale IQ were obtained. It appears that the short forms may be used to predict successfully a WAIS-R Full Scale IQ (Boone, 1992). Therefore, the triad is used due to the short amount of time needed to administer and score.

Short forms of the WAIS-R continue to be an important tool for clinicians and remain the preferred method of obtaining a brief measure of a psychiatric inpatient's global intellectual functioning (Boone, 1990, 1991a, 1991b). However, there is no validated short form of intellectual functioning available for college-aged students. Given Kaufman's (1990) high positive correlation using the SF3, the present study replicated Kaufman using college-aged students

to determine whether an equally high correlation would be obtained. Establishing the usefulness of the SF3 for college-aged students could decrease the amount of time required to obtain an accurate estimate of a client's intellectual functioning in a clinical setting.

CHAPTER 2

METHOD

Sample

The sample was drawn by asking for volunteers from Introductory English, Art History, Music, and Public Speaking courses at a regional Midwestern university. The students were told by their instructors that 25 male and 25 female volunteers would be selected to participate in the study to assess the value of abbreviated forms of the Wechsler Adult Intelligence Scale-Revised (WAIS-R), and by taking part in this study they would earn additional credit toward their grades. The first 25 female and 25 male volunteers, 18 to 25 years of age, were selected for the study. Before the collection of the data began, an application for permission to use human subjects was approved by Emporia State University's Institutional Review Board for Treatment of Human Subjects.

Procedure

Each student included his/her name, year in college, race, age, time requested for testing, and phone number on the sign-up sheet. Students were notified by phone by one of two examiners the week following their volunteering. If 25 students of both sexes were not on the sheet, the sign-up sheet was brought to different sections of the courses noted above until the requirements for the sample size were met.

The WAIS-R was administered to each participant in the study following the directions specified in the administration manual for the WAIS-R. The SF3 contains the

following subtests: Information, Digit Span, and Picture Completion and takes approximately 16 minutes to administer and score. The tester extracted the SF3 score from the complete WAIS-R.

The procedure for the testing was as follows. During the initial phone call, subjects were reminded of their sign-up times. All testing was conducted in Visser Hall on Emporia State University's campus in a room specifically designed for testing. Tests were administered in the fall, 1994 semester. Each subject was presented with a letter explaining the reasons for the study and the testing. Subjects were only identified by age, race, and gender on their testing data in order to maintain confidentiality. Then each subject completed a form giving consent to participate in the study. The WAIS-R was given to each participant according to standardized procedures described in the WAIS-R manual by one of two second year graduate clinical psychology students who had successfully completed PY 841 Clinical Mental Tests II (the Wechsler Scales).

Statistical Design

Full Scale estimates for the SF3 were obtained for each subject by using tables provided by Kaufman (Kaufman, 1990). The sum of the person's age-corrected scaled scores for the SF3 subtests, Information, Picture Completion, and Digit Span were computed in order to achieve an estimated WAIS-R Full Scale IQ (Kaufman, 1990).

The means and standard deviations of the four variables, SF3 scores, and the Verbal, Performance, and Full Scale IQs,

were calculated. The Pearson product-moment correlation was used to estimate the relationships of the scores between the SF3 estimated IQ and the WAIS-R Verbal, Performance, and Full Scale IQs for men, women, and the entire sample.

CHAPTER 3

RESULTS

In this study, Pearson product-moment correlation coefficients were computed to determine the relationships between the SF3 estimated scores and the Verbal, Performance, and Full Scale scores on the Wechsler Adult Intelligence Scale-Revised (WAIS-R) for the complete sample, for men, and for women (see Tables 1, 2, and 3). All correlations achieved statistical significance ($p < .01$). The means and standard deviations for the WAIS-R Verbal, Performance, and Full Scale scores, for men, women, and for the combined sample are summarized in Table 4. The means and standard deviations for the SF3 estimated Full Scale scores for men, women, and the combined sample are summarized in Table 5.

Table 1

Pearson (r) correlations between Full Scale WAIS-R and the SF3

TESTS	r
Full Scale WAIS-R with SF3 (Complete Sample)	.74*
Full Scale WAIS-R with SF3 (Men)	.76*
Full Scale WAIS-R with SF3 (Women)	.74*

*$p < .01$

Table 2

Pearson (r) correlations between the Verbal WAIS-R scores and the SF3

TESTS	r
Verbal (WAIS-R) with SF3 (Complete Sample)	.66*
Verbal (WAIS-R) with SF3 (Men)	.72*
Verbal (WAIS-R) with SF3 (Women)	.56*

*$p < .01$

Table 3

Pearson (r) correlations between the Performance WAIS-R scores and the SF3

TESTS	r
Performance (WAIS-R) with SF3 (Complete Sample)	.66*
Performance (WAIS-R) with SF3 (Men)	.67*
Performance (WAIS-R) with SF3 (Women)	.71*

*$p < .01$

Table 4

Means and Standard Deviations for the Complete WAIS-R

	Men		Women		Combined	
	M	SD	M	SD	M	SD
V IQ	108.16	12.0	109.00	8.2	109.00	10.3
P IQ	108.20	12.9	111.00	16.9	109.42	15.1
FS IQ	109.40	12.4	111.00	12.4	110.18	12.4

V= Verbal

P= Performance

FS= Full Scale

Table 5

Means and Standard Deviations for the SF3 Estimates

	Men		Women		Combined	
	M	SD	M	SD	M	SD
FS IQ	103.00	10.5	101.04	8.5	102.00	9.6

FS= Full Scale

CHAPTER 4

DISCUSSION

The mean Wechsler Adult Intelligence Scale-Revised (WAIS-R) Verbal (V), Performance (P), and Full Scale (FS) IQs were higher than the norms for the American population fulfilling the expectation that college and university students would score higher than the general population (z scores, respectively, of 5.66, 5.89, and 5.76, $p < .01$). In a previous study at Emporia State University, 32 introductory psychology students had a mean WAIS-R FS IQ of 100.9 that was higher ($t(80) = 3.00$, $p < .05$) than the mean of the current study group (Carvajal, Gerber, Hewes, & Weaver, 1987). Although the standard deviation of the P IQ for the complete sample was virtually identical to that of the norm group, those of the V ($F(49,\infty) = 2.12$, $p < .05$) and FS IQ ($F(49,\infty) = 1.46$, $p < .05$) would indicate a much more homogeneous group when compared to the national norms. This is similar to the results found by (Carvajal et al., 1987).

Results of this study indicate that the Short Form 3 (SF3) may be used to estimate the Wechsler Adult Intelligence Scale-Revised (WAIS-R) IQs when used with 18 to 25 year olds. A correlation of .74 was found between the Full Scale WAIS-R and the SF3 for the complete sample. This correlation achieved statistical significance ($p < .01$) as did all of the correlations between the SF3 estimated scores for men, women, and the complete sample and the Verbal, Performance, and Full Scale scores on the WAIS-R.

The correlation of .74 compares favorably to values

reported in the WAIS-R manual for correlation of subtests with the V, P, and FS IQs. For example, for ages 18 and 19, Information intercorrelates with the Verbal IQ .80 and with Full Scale IQ .74. For 20 to 24 year olds, Information intercorrelations were .74 with Verbal IQ and .70 with Full Scale IQ respectively, and for 25 to 34 year olds, the intercorrelations for Information with Verbal IQ was.81 and with Full Scale, .79 (Wechsler, 1981).

In addition to the SF3 providing an acceptable estimate for the WAIS-R, it takes approximately 16 minutes for the SF3 to be administered and scored in comparison to 60 to 90 minutes for the complete administration and scoring of the WAIS-R. Undoubtedly, the time saved using the SF3 would be valuable to the practicing psychologist. However, a number of questions must be answered before using the SF3. What information is sought? What is the purpose of the evaluation? Does the saving of time allow for the collection of clinical data such as personal histories and personality screenings that might have not been obtained by the administration of a complete battery? Could the time saved be utilized in other meaningful activities with the same client? Could the time saved be used more efficiently with other clients? These are but a few of the concerns that must be addressed by clinicians.

It must be emphasized that an individual's SF3 score is converted into an <u>estimated</u> intelligence quotient. Thus, the estimated full scale score obtained from the SF3 should be interpreted with caution when it comes to determining a

person's full cognitive abilities. The means notably differ when comparing the Full Scale IQ and SF3 estimate collected in this study. However, for a good estimate of a client's ability, SF3 scores are sufficient. Studies should be conducted with a variety of populations in order to establish that the SF3 is indeed a recommended substitute when used by psychologists to assess cognitive abilities.

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