

RELATIONSHIPS BETWEEN SCORES ON THE AMERICAN COLLEGE
TEST AND THE WECHSLER ADULT INTELLIGENCE SCALE-REVISED

A Thesis
Presented to
the Division of Psychology and Special Education
Emporia State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
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May 1989

AN ABSTRACT OF THE THESIS OF

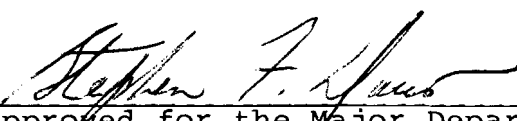
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in Psychology presented on May 1989

Title: RELATIONSHIPS BETWEEN SCORES ON THE AMERICAN COLLEGE
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Abstract approved: Cooper B. Holmes

This study examined the relationships between the Wechsler Adult Intelligence Test--Revised (WAIS-R) and the American College Test (ACT). A college sample of 30 introductory psychology students (15 males, 15 females) was administered the WAIS-R, and the results were compared with their ACT scores which were already on file at the university. The study yielded ten scores for each subject: five scores for the ACT, the composite and its four subtests; and five scores for the WAIS-R, Verbal, Performance, and Full Scale IQs and two of its subtests (Vocabulary and Information). Pearson product-moment coefficients were calculated to determine the relationships between the ACT scores and the WAIS-R scores. Correlations of up to .96 were reached. The t-test was used to determine if the differences between male and female means were significant. A significant difference was apparent

between the sexes on the ACT Natural Sciences Reading. This study indicates that the WAIS-R Full Scale IQ score may be a valid and reliable tool for predicting ACT scores. Future studies need to be conducted to determine if results are consistent.


Approved for the Major Department


Approved for the Graduate Council

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CHAPTER 1
INTRODUCTION

Nationally, many colleges and scholarship sponsors require potential students to take the American College Test (ACT). Second in popularity only to the Scholastic Aptitude Test (SAT), the ACT is generally taken during the high school years (Aiken, 1985). Scores provide the student and his/her guidance counselor, with pertinent information about future academic performance. Admission to college and/or scholarship awards can rest solely upon a particular score. Basically the ACT assesses general knowledge and skills obtained throughout the school years. ACT scores highlight areas in which the student may have weaknesses or strengths. The scores, then, also allow the student to make decisions about major areas of study once admitted to college.

The Wechsler Adult Intelligence Scale-Revised (WAIS-R) is an intelligence test which attempts to assess an individual's potential for purposeful and useful behavior (Wechsler, 1981). Published in 1981, it provides an examiner with a view of a client's intellectual abilities. It is also employed to appraise educational and vocational competences.

Guidance and counseling in an academic setting can be a complex process dependent upon information from a variety of sources. Prediction of future academic performance is also dependent upon this information. ACT scores and WAIS-R IQs are sources of such information. However, the ACT is given only certain times of the year, and the scores are not immediately available. In fact, there is a six week period between test administration and score report. In contrast, the WAIS-R is readily available in an educational setting and can be administered and scored without waiting.

For many students, guidance counseling for college admission should begin by the eleventh grade, particularly for those students wanting to attend a selective admittance school, which requires application by February 1 or February 15 of the senior year. Often these students are in a gifted program and have WAIS-R IQ scores on file.

The ability to use the WAIS-R as a predictor of ACT scores would be beneficial to the counselor and student in their joint decision making process. There would be two main advantages; the instrument is

readily available to most counselors, and results are objective and immediate. Furthermore, if the Vocabulary and Information subtests of the WAIS-R could predict ACT scores as well, this too, would have similar benefits. Again, results would be objective and immediate, expense would be at a minimum since only the manual and record form is needed, and quick prediction would be possible, as administration time for these two subtests is about 20 minutes.

Previous Research

The American College Testing Program was developed in 1959 under the direction of E. F. Lindquist. It is an intersection of more traditional aptitude and achievement tests (Anastasi, 1982) and spotlights basic intellectual skills necessary for satisfactory performance in college. The test is administered five times a year--October, December, February, April, and July --across the nation to college-bound students.

The ACT consists of four sections: English Usage, Mathematics Usage, Social Studies Reading, and Natural Sciences Reading. Included also are a Student Profile Section and the ACT Interest Inventory.

Stress is placed on problem-solving and reasoning abilities. The Academic Sections are described below.

The English Usage Test measures an individual's understanding of standard written English. Specifically, punctuation, grammar, sentence structure, diction and style, and logic and organization are examined in detail. The test is comprised of 75 items and requires 40 minutes testing time.

The Mathematics Usage Test measures mathematical reasoning ability. It accents practical solutions to problems. The test consists of 40 items and requires 50 minutes testing time.

The Social Studies Reading Test examines students' comprehension, analytical and evaluative reasoning, and necessary problem-solving skills in the social sciences. Comprised of 52 items, this test has a time limit of 35 minutes.

The Natural Sciences Reading Test measures interpretation, evaluation and problem-solving skills necessary in the natural sciences. The test has 52 items and takes 35 minutes.

The entire ACT battery takes about 3-1/2 hours to complete. Total testing time for the Academic Section is 2 hours, 40 minutes. A composite score is also given by averaging the four scores. These scores are then compared to the scores of other potential college students who have taken the test. Reported scaled scores range from 1 (low) to 36 (high). The national norms are Composite (18.7), Social Studies Reading (17.5), Natural Science Reading (21.3), Mathematics Usage (17.2), and English Usage (18.3). The standard deviations for the ACT composite and its subtests are Composite (5.9), Social Studies Reading (7.3), Natural Science Reading (6.4), Mathematics Usage (8.0), and English Usage (5.3) (M. Ruger, personal communication, August 1988).

The Wechsler Adult Intelligence Scale-Revised (WAIS-R) was published in 1981 by the Psychological Corporation. This was a revision of the Wechsler Adult Intelligence Scale (WAIS), which was published in 1955. This in turn was a revision of the original edition of the Wechsler-Bellevue Intelligence Scale, which was published in 1939. It was revised in 1981 to "insure its continued effectiveness as a basic test

of intelligence and as a valid diagnostic tool and research instrument" (Wechsler, 1981, p.1).

Standardization of the WAIS-R followed a stratified sampling plan to insure representiveness from the total population. Equal numbers of men and women were chosen in each of nine age groups ranging from 16 to 74. Census reports furnished the basis for the stratification along seven variables. The variables were: Age, Sex, Race, Geographic Region, Occupation, Education, and Urban-Rural Residence. All testing was conducted between 1976 and 1980 (Wechsler, 1981).

The entire test was administered to each member of the standardization sample. The test can be given to individuals ranging in age from 16 years, 0 months to 74 years, 11 months.

The WAIS-R is comprised of eleven subtests, six verbal and five nonverbal. The subtests are arranged in increasing order of difficulty within each subtest. The verbal and nonverbal sections may be given independently or together. Verbal, Performance, and Full-Scale IQs are reported for each subject. The WAIS-R has a mean of 100 and a standard deviation of 15.

The use of both sections allow the individual to display his/her capabilities in a variety of ways, thus allowing the examiner a wide range of information from which to assess abilities. The eleven subtests are:

Verbal Scales

Information
Digit Span
Vocabulary
Arithmetic
Comprehension
Similarities

Performance Scales

Picture Completion
Picture Arrangement
Block Design
Object Assembly
Digit Symbol

For the purpose of this study, the Vocabulary and Information subtests are examined in detail. These subtests have a mean of 10 and a standard deviation of 3. The Information subtest consists of 29 questions of informal knowledge that adults have presumably had an opportunity to acquire as a result of living and interacting within the culture. Specialized or academic knowledge was not included. The WAIS-R test manual reports an correlation of .76 for this subtest with Full Scale IQ.

The Vocabulary subtest has 35 words of increasing difficulty presented orally and visually. It measures language background and the ability to define words. This has been shown to correlate highly with WAIS-R Full Scale IQs (Anastasi, 1982). The WAIS-R test manual reports an intercorrelation of .81 for this subtest with Full Scale IQ.

Wechsler (1958) stated that the subtests of the original Wechsler-Bellevue I and the WAIS could be useful in providing information concerning potential aptitude and vocational interests. It is assumed that the WAIS-R has the same potential.

Lewis and Johnson (1985) compared WAIS and WAIS-R IQs from comparable college populations who already had ACT scores. Their ACT scores were then correlated with Verbal, Performance, and Full Scale IQ scores. The authors concluded that the WAIS-R possibly provided a better measurement of academic ability than the WAIS, at least in relation to predictive value, which was congruent with ACT test results.

A study conducted by Martin and Rudolph (1972) correlated the WAIS, The Slossen Intelligence Test (SIT), ACT scores and grade point averages. It was concluded that the SIT correlated highly with ACT

scores and could be useful as a predictive device when dealing with acceptance and performance in college.

Relating more directly to the study proposed, Feingold (1983) investigated the predictive value of the Information and Vocabulary subtests of the WAIS in relation to grade point average as compared to four college aptitude tests. The aptitude tests chosen for the study were the ACT, the American Council on Education Psychological Examination for College Freshmen (ACE), the Scholastic Aptitude Test (SAT), and the Cooperative School and College Ability Test (SCAT). Feingold chose these Information and Vocabulary subtests since they require only a short time to administer and score. Furthermore, expense is not a consideration since only the manual and record form are necessary for administration. It was determined that the Information and Vocabulary subtests could be utilized by a guidance counselor in an academic setting to obtain a quick assessment of academic ability. Also, Feingold felt that these results could be extrapolated to the WAIS-R since few changes were made between the editions. However, that has not yet been determined.

CHAPTER 2

METHOD

Subjects

The sample for this study was comprised of 30 subjects (15 females, 15 males) enrolled in introductory psychology classes at Emporia State University. The sample included two black males and two Hispanic females.

There were two criteria by which the subjects were selected: 1) the subjects had to have ACT scores on file at the University, and 2) the subjects could not be above 20 years of age. Age range was from 18 years, 2 months to 20 years, 2 months. Participation in the study was completely voluntary. However, extra credit was given for participation.

The names of the subjects were not listed to insure confidentiality. These subjects were identified only by age, sex, and race.

Variables

This study contained 10 score data variables. From the ACT, each subject had an English Usage score, Mathematics Usage score, Social Studies Reading score,

Natural Sciences Reading score, and a Composite score. From the WAIS-R each subject had a Verbal, Performance, and Full Scale IQ score. The Vocabulary and Information subtests also contributed two scores for each subject.

Procedure

The WAIS-R was administered to each subject. Testing occurred between October and December, 1986. Each subject was given all eleven subtests from both the Verbal and Performance Sections. Complete directions were followed as specified by the test manual. The examiner was a second year graduate student trained in WAIS-R administration who was properly supervised by an instructor at Emporia State University.

Each participant signed release of information forms prior to testing, granting permission to use the WAIS-R scores and access to ACT scores already on file at the University. Additionally, test scores were reported to subjects if requested.

Statistical Design

The study yielded ten scores for each subject. There were five scores for the ACT on file and five scores for the WAIS-R.

Standard deviations and group means were computed for males, females, and male-female combinations for each score. The Pearson product-moment correlation coefficient (r) was used to assess the relationships between each of the ACT scores with each of the WAIS-R scores and the subtests. The .05 level of significance was used. In analyzing pairs of means between the two instruments, the .05 level of significance was again used. These data were further analyzed to determine if statistically significant differences occurred between males and females on any of the tests.

Significance of the Study

In academic settings it is the guidance counselor who facilitates a student's decision making process when it comes time to pick a college and major area of study. ACT scores provide the counselor with information to assist this process. However, the ACT is administered only five times a year, and test results are not immediately available. Therefore, it would be beneficial if the counselor had at his/her disposal another tool for predicting ACT scores without the expense and time delay.

In contrast, the WAIS-R is often available to counselors in this setting. It would be of great value if this measurement could be shown to predict ACT scores validly. In comparison to the ACT, the complete WAIS-R requires about an hour to administer and scoring may be immediate.

Of further importance would be if the Vocabulary and Information subtests of the WAIS-R were shown to predict ACT scores accurately since this would lower expense and time administration. These subtests require only the test manual and a record form, with only 20 minutes needed for administration. Scoring is objective and may be immediate. To do this would give the counselor an idea about a student's performance on the ACT, thereby getting a jump on the decision making process most likely to greatly affect a student's academic future.

CHAPTER 3

RESULTS

Five scores from the WAIS-R, and five scores from the ACT were obtained for each subject. The means, standard deviations, and ranges from the 30 subjects are presented in Table 1.

Table 1

Descriptive Statistics for the ACT and WAIS-R(Male/Female Combined).

<u>Test</u>	<u>M</u>	<u>SD</u>	<u>Range</u>
ACT			
Composite	17.17	5.56	7 - 27
English Usage	16.70	5.69	5 - 25
Mathematics Usage	15.63	7.02	1 - 26
Social Studies Reading	16.37	7.02	2 - 31
Natural Sciences Reading	19.20	6.75	7 - 31
WAIS-R			
Verbal	99.53	11.22	84 - 134
Performance	110.07	13.05	85 - 136
Full Scale	104.17	10.70	83 - 127
Information	8.10	2.50	5 - 15
Vocabulary	8.33	2.10	6 - 14

The obtained means for the ACT categories were below the 1988 national norms (reported on page 5). The two that fall farthest below are Natural Sciences Reading and English Usage.

The ranges for the ACT and its subtests varied from 20 to 29. The Natural Sciences Reading subtest had the highest range, while both Composite and English Usage had the lowest.

For the WAIS-R, only two of the obtained means were higher than the standardized mean of 100. Those were the Performance and Full Scale IQs, which were 110 and 104, respectively.

The ranges for the WAIS-R IQs were: Full Scale 44, Verbal 50, and Performance 51. WAIS-R Full Scale had the smallest range and Performance had the largest.

The obtained means for WAIS-R Information and Vocabulary subtests were both below the standardized mean of 10. Information was 8.10, and Vocabulary 8.33. The range for Information was 10, and Vocabulary 8.

Table 2 lists descriptive statistics for males and females separately. The t values were also presented.

Table 2

Descriptive Statistics and t-Test Comparisons for
Males and Females on the ACT and the WAIS-R.

Tests	Males		Females		<u>t</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	
ACT					
Composite	18.13	5.26	16.20	5.87	.95
English Usage	15.13	5.22	18.27	5.87	1.54
Mathematics Usage	17.13	6.41	14.13	7.50	1.18
Social Studies Reading	17.53	7.00	15.20	7.09	.91
Natural Sciences Reading	21.80	5.43	16.60	7.11	2.25*
WAIS-R					
Verbal	101.93	13.14	97.13	8.70	.49
Performance	109.67	12.06	110.47	14.38	.16
Full Scale	105.13	10.51	103.20	11.16	1.18
Information	9.00	2.30	7.20	2.45	2.07*
Vocabulary	8.5	2.03	8.13	2.23	.51

*p <.05

The highest score obtained for both males and females was the WAIS-R Performance IQ. Females scored higher than males on ACT English Usage and WAIS-R Performance IQ. Two significant differences were apparent between the male and female obtained means. They were ACT Natural Sciences Reading and WAIS-R Information subtest.

Pearson product-moment coefficients were computed to determine the relationships of the WAIS-R IQs with the ACT Scores. Table 3 provides this information for the combined 30 subjects.

Table 3

Correlations for WAIS-R and ACT Scores (Male/Female Combined).

<hr/>					
Test					
<hr/>					
WAIS-R	Verbal	Performance	Full Scale	Voc.	Info.
ACT	<u>r</u>				
Composite	.76*	.62*	.87*	.68*	.74*
English Usage	.55*	.55*	.70*	.62*	.33
Mathematics Usage	.65*	.64*	.80*	.46*	.64*
Social Studies	.64*	.47*	.71*	.68*	.74*
Natural Sciences	.65*	.42*	.67*	.55*	.70*

*p<.05

All correlations were statistically significant except for the ACT English Usage with the WAIS-R Information subtest. The highest correlation of .87 was with the ACT composite and the WAIS-R Full Scale. Six other correlations exceeded .70, and one other exactly .70. WAIS-R Vocabulary and Information subtests correlations ranged from .33 to .74.

Pearson product-moment coefficients were also calculated for males and females separately. Table 4 and Table 5 provide this information.

Table 4

Correlations for WAIS-R and ACT Scores (Males).

Test					
WAIS-R	Verbal	Performance	Full Scale	Voc.	Info.
ACT			<u>r</u>		
Composite	.75*	.65*	.96*	.62*	.72*
English Usage	.61*	.65*	.86*	.65*	.51
Mathematics Usage	.61*	.56*	.78*	.41	.68*
Social Studies	.68*	.56*	.88*	.59*	.69*
Natural Sciences	.69*	.47	.80*	.55*	.51

*p<.05

Table 5

Correlations for WAIS-R and ACT Scores (Females).

Test					
WAIS-R	Verbal	Performance	Full Scale	Voc.	Info.
ACT	<u>r</u>				
Composite	.80*	.63*	.79*	.72*	.76*
English Usage	.78*	.49	.68*	.70*	.47
Mathematics Usage	.73*	.74*	.83*	.48	.56*
Social Studies	.58*	.42	.54*	.77*	.77*
Natural Sciences	.65*	.46	.62*	.57*	.75*

*p<.05

Correlations for males show four from .80 to .96, and two significant correlations from .75 to .78. All but four of the 25 correlations were significant. The four correlations not significant were WAIS-R Performance with the ACT Natural Sciences Reading, WAIS-R Information subtest with both ACT English Usage and Natural Sciences. The WAIS-R Information and Vocabulary subtests had correlations that ranged from .41 to .69.

Correlations for females show two from .80 to .83, and ten significant correlations from .70 to .79. All but five of the 25 correlations were statistically significant. The five correlations not significant were WAIS-R Performance with ACT English Usage, Social Studies Reading, and Natural Sciences Reading, WAIS-R Vocabulary subtest with ACT Mathematic Usage, and WAIS-R Information subtest with ACT English Usage. WAIS-R Vocabulary and Information subtests with ACT show correlations that range from .47 to .77.

CHAPTER 4

DISCUSSION

Major findings of this study are presented here. The WAIS-R Full Scale IQ had the highest correlations with the ACT Composite and its subtests throughout the study.

For the purpose of prediction, for the combined 30 subjects, WAIS-R Full Scale IQs had three of the five highest correlations with the ACT Composite and its four subtests. The other two of the five were with WAIS-R Verbal and ACT Composite, and WAIS-R Information with both ACT Composite and Social Studies Reading. All but one of the correlation coefficients are statistically significant. The one correlation not significant was with the WAIS-R Information subtest and ACT English Usage. For males, WAIS-R Full Scale IQs had the highest correlations with the ACT Composite and its subtests.

However, for females there were only two correlations between WAIS-R Full Scale IQs and ACT Composite that were high enough to have predictive value (.79 and .83). For this study a correlation must be above .70 for it to have predictive value and of use for individual predictions. This is an arbitrary decision made by the researcher.

The ACT Composite correlates highly with the WAIS-R Full Scale IQ on two of the categories; males (.96), females (.79), and combined (.87). This consistency for the three groups was true only in the Full Scale to Composite comparisons. For predicting ACT scores from WAIS-R IQs, these data suggest that using only the WAIS-R Full Scale IQ with the ACT Composite is suitable for that purpose. Many of the subtest correlations reach above .80, but their consistency at obtaining that correlation does not allow individual prediction to occur.

The gender of the subject should be addressed when evaluating WAIS-R Full Scale to ACT Composite. By far, the males had a higher correlation than females; .96 to .79 respectively although no significant difference between the means occurred on male and female scores. However, a significant difference was apparent between the sexes on the ACT Natural Sciences Reading. A significant difference was also apparent between the sexes on the WAIS-R Information subtest.

This study suggests that the WAIS-R Full Scale IQ score has a strong relationship with the ACT. For prediction, the WAIS-R Full Scale IQ score appears to be the most reliable for estimating an ACT Composite

score. The WAIS-R Vocabulary and Information subtest correlations were not high enough to warrant reliable individual prediction. Reliable prediction of an ACT therefore, would require a complete WAIS-R battery to obtain a Full Scale IQ score.

This study indicates, then, that in a counseling situation, the WAIS-R Full Scale IQ score would be a valid and reliable tool for predicting ACT Composite scores on an individual basis. Therefore, the WAIS-R Full Scale IQ can be utilized by counselors as a relatively quick assessment of a student's performance on the ACT without the expense and time delay involved with obtaining ACT scores.

However, this evidence is not conclusive. Replication of this study is necessary for further evidence. A larger sample size would be desirable. If further research produces consistent results with this study, then the WAIS-R Full Scale IQ can be utilized by high school counselors as a valid, and easily obtainable, tool for guiding college-bound students who have not yet taken the ACT. This will provide the counselor and student with the necessary information to get a jump on the decision making process most likely to affect a student's academic future.

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Appendix A

Original ACT Scores (Males).

Subject Number	English	Math	Social Studies	Natural Science	Composite
1	18	20	27	23	22
2	21	16	21	27	21
3	21	21	21	27	23
4	22	15	20	24	20
5	15	22	21	25	21
6	13	23	10	16	16
7	18	25	20	23	22
8	23	22	31	31	27
9	10	16	15	17	15
10	14	21	18	25	20
11	5	3	2	19	7
12	13	4	13	10	10
13	11	14	13	16	14
14	10	16	13	20	15
15	13	19	18	24	19

Appendix B

Original ACT Scores (Females).

Subject Number	English	Math	Social Studies	Natural Science	Composite
1	6	5	8	7	7
2	21	22	12	15	18
3	18	9	14	26	17
4	15	1	5	11	8
5	19	8	16	9	13
6	10	9	21	13	13
7	25	15	21	18	20
8	22	17	15	18	18
9	23	23	26	28	25
10	25	21	28	26	25
11	17	20	8	21	17
12	14	9	10	12	11
13	22	18	9	11	15
14	25	26	23	25	25
15	12	9	12	9	11
