8-1-1998

Predicting Academic Success in College Using the Wechsler Adult Intelligence Scale-Revised

Katherine Bishop

Western Kentucky University

Follow this and additional works at: <http://digitalcommons.wku.edu/theses>

Part of the [Education Commons](#), and the [Psychology Commons](#)

Recommended Citation

Bishop, Katherine, "Predicting Academic Success in College Using the Wechsler Adult Intelligence Scale-Revised" (1998). *Masters Theses & Specialist Projects*. Paper 335.
<http://digitalcommons.wku.edu/theses/335>

This Thesis is brought to you for free and open access by TopSCHOLAR®. It has been accepted for inclusion in Masters Theses & Specialist Projects by an authorized administrator of TopSCHOLAR®. For more information, please contact topscholar@wku.edu.

PREDICTING ACADEMIC SUCCESS IN COLLEGE USING THE
WECHSLER ADULT INTELLIGENCE SCALE-REVISED

A Thesis
Presented to
the Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

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

by
Katherine L. Bishop
August 1998

PREDICTING ACADEMIC SUCCESS IN COLLEGE USING THE
WECHSLER ADULT INTELLIGENCE SCALE-REVISED

Date Recommended 6/29/98

Director of Thesis

Elizabeth L. Jones

Dean, Graduate Studies and Research

7/31/98
Date

Acknowledgments

I wish to thank the members of my committee, Drs. Sally Kuhlenschmidt (chairperson), John Bruni, and Elizabeth Jones, for their assistance and patience in the completion of this project. I am especially grateful for their help as I worked to finish this thesis from out-of-state.

I would also like to thank those individuals at Southern Illinois University at Carbondale who provided encouragement and suggestions. Having people available locally to remind me about my thesis helped me to keep from getting too distracted amidst my new challenges.

Additionally, I must express my gratitude to my wonderful support system of friends. They always seemed to know when I needed a push and when I needed to be left alone. They also provided many needed distractions.

Finally, I must thank my family for their constant attempts to keep me focused on the task at hand. Without their love, encouragement and faith in me, both now and throughout my entire life, this endeavor would not have been possible.

Table of Contents

List of Tables	v
Abstract	vi
Introduction.....	1
Review of the Literature.....	4
Method	15
Results	21
Discussion	26
Tables.....	34
References	42
Appendices.....	49

List of Tables

Table 1	Demographic Characteristics of the Study Sample	35
Table 2.	T-tests for Study Sample and Student Body or Standardization Sample	36
Table 3.	Intercorrelations Between GPAs, ACT Composite Scores, WAIS-R Scores, and Gender	37
Table 4.	Summary of Simple Regression Analyses for Variables Predicting College GPA after 30 Hours.....	38
Table 5.	Summary of Regression Analyses for Variables Predicting College GPA after 120 Hours.....	39
Table 6.	Summary of Multiple Regression Analysis for Variables Predicting College GPA at 30 and 120 Hours	40
Table 7.	Predicted college GPA after 30 hours for Selected WAIS-R Full Scale IQ Scores	41

PREDICTING ACADEMIC SUCCESS IN COLLEGE USING THE WECHSLER ADULT INTELLIGENCE SCALE-REVISED

Katherine L. Bishop

August 1998

52 Pages

Directed by: Sally Kuhlenschmidt, John Bruni, and Elizabeth Jones

Department of Psychology

Western Kentucky University

The prediction of success in college has received a substantial amount of research interest. A variety of predictor variables have been examined including personality and demographic variables as well as scores on standardized college entrance examinations. However, few studies have included the Wechsler Adult Intelligence Scale-Revised (WAIS-R). In the present study, this researcher examined the ability of the WAIS-R to predict college success as measured by grade point average (GPA). The participants were 49 undergraduates, from a public university, who volunteered for intellectual assessments. It was hypothesized that the WAIS-R would predict college GPA. The prediction was expected to be stronger with the Verbal Scale of the WAIS-R than with the Performance Scale. The magnitude of the predictions was expected to decrease across time spent in college. The results indicated that the WAIS-R does predict college GPA. The differences between predictions from the Verbal Scale and the Performance Scale were not significant. The predictions did not significantly decrease with time spent in college. Gender differences were also found for GPA after 120 hours. Gender accounted significantly for the most unique variance in the prediction of GPA after 120 hours followed by ACT/SAT score and then WAIS-R IQ scores.

Introduction

With over 50% of Americans today choosing to attend college and more than 3,500 American institutions educating these approximately 14.5 million college students (Gardner & Jewler, 1997), interest in how to succeed academically in college and how to predict academic success is wide-spread. Success in college may be defined in many different ways. Often college success is conceptualized as graduation or as the student's final cumulative grade point average. Much research has been conducted involving these and other measures of academic success in college.

Reviews (Mathiasen, 1984; Mouw & Khanna, 1993) of the literature on predicting academic college success have identified numerous variables used to measure college academic success. These variables included freshman grade point average (GPA), cumulative GPA over varying lengths of time, specific course grades, and educational standing after four years in college. These variables attempt to measure academic success in college; however, overall college success may be defined in many ways other than by these strictly academic outcomes. For example, college success may be indicated by such things as career development, level of responsibility, awards or special recognition, job or life satisfaction after college, participation or citizenship in the community, scores on later tests, or income (Astin, 1993).

Although these other measures of success are important especially at the individual level, this study will be focusing on an academic measure of success in college, namely GPA. Admittedly, GPA as a measure of academic college success has its limitations. For example, Young (1993) reports that grading

standards may vary by instructor, course, department, and institution introducing measurement error into the GPA, thus affecting its reliability as a measure. Also, many other outside variables or events may occur during an individual student's college career and may, thus, affect GPA.

Even though GPA as a measure of academic success has its limitations, it is commonly used to define academic success because it is understood by the public and is easily defined (Young, 1993). More importantly, GPA as a criterion of academic success is also used in many instances as a practical measure. For example, GPA is used while a student is still in college to make decisions regarding academic probation or expulsion, maintenance of scholarships, and entrance into certain programs. GPA is also used following graduation as a criterion for admission to graduate schools and job applicant selection (Young, 1993). GPA is also typically considered a measure of collegiate success by the public in general.

Although GPA has received considerable criticism as a measure of success, Astin (1993) concluded that even after controlling for numerous input, environmental, and involvement variables, GPA was found to be related to all of the cognitive and academic growth measures used in his study. He concluded that GPA "appears to reflect the student's actual learning and growth during the undergraduate years" (p. 242). Other studies have also suggested that GPA is a fairly reliable measure (Millman, Slovacek, Kulick, & Mitchell, 1983; Munday, 1970). These researchers report reliability coefficients for freshman GPA ranging from .80 to .82.

Studies predicting academic success in college have used different GPA measures as the dependent variable. In Mouw and Khanna's (1993) review of this research literature, 34 of the 39 studies reviewed predicted college GPA. Of these 34 studies, 18 used freshman GPA, and the other 16 used cumulative

GPA's measured at various points in time. The ability to predict GPA decreases over time. For example, Scannel (1960) found that correlations between achievement tests and GPA fell from .63 to .54 over four years of college. Also, Hoyt (1963; as cited in Rowen, 1978) found that correlations decreased from .58 to .42. Rowen reported this same pattern of shrinking predictability using correlations between GPA across four years and ACT scores. However, even with these decreases, Rowen found that the correlations between GPA and ACT remained significant through eight semesters.

This current literature review will concentrate on variables used in the prediction of academic success in college as measured by GPA at various points across the students' years in college. Specifically, it will examine the predictive nature of scores on standardized college entrance examinations and the Wechsler Adult Intelligence Test-Revised (Wechsler, 1981).

Review of the Literature

The use of measures of cognitive ability to predict future performance has a long history across many areas. Hunter (1986), for example, reviewed hundreds of studies conducted in professional, industrial, and military settings. He concluded that general cognitive ability does predict performance ratings and training success for all jobs. Additionally, if individuals are trained after being hired, no other predictor has validity as high as general cognitive ability. For civilian work, general cognitive ability predicted work sample performance with an average validity of .75. Hunter also found that training success was better predicted by general cognitive ability than by specific aptitude measures suggesting that job learning is based on a general cognitive ability rather than on specific cognitive aptitudes. This emphasis on the importance of a general ability has been supported by other researchers (e.g., McHenry, Hough, Toquarn, Hanson, & Ashworth, 1990; Ree & Earles, 1991; Ree, Earles, & Teachout, 1994).

The prediction of academic success in college has received considerable research attention including two recent reviews of this literature (Mathiasen, 1984; Mouw and Khanna, 1993). According to Mathiasen, this research has primarily focused on the predictive value of four groups of variables--high school performance, college entrance examinations, personality traits, and study skills and attitudes. Each of these four broad variables have been measured in numerous ways with a variety of instruments and surveys. Mathiasen's overall conclusion based on his review of approximately 60 studies was that students who are successful in college "excelled in high school and

obtained high scores on college entrance examinations. There [sic] students possess good study habits and appear to be more introverted, more responsible, more academically motivated, and more achievement oriented than most college students” (p. 384). He also stated that among predictor variables, performance in high school and on standardized tests such as the American College Testing Program (ACT; American College Testing Program, 1959-1993) or the College Entrance Examination Board’s Scholastic Aptitude Test (SAT; Educational Testing Service, 1948-1993) seems to best predict academic success in college.

In the review by Mouw and Khanna (1993), the predictor variables were divided into two general categories--traditional predictors (college entrance examinations and high school performance) and nontraditional predictors (demographic, environmental and personality variables). These authors found that for the 39 studies included in their review, the combination of college entrance examination scores and high school performance provided the “consistently best predictor set” (p. 331). However, they concluded that even this predictor set included such a large standard error of prediction that the value of the predictions would be “disappointingly low” (p. 333) and would give only “very minor improvement over the use of no information in predicting academic success” (p. 332). Although Mouw and Khanna concluded that even the best predictors of college academic success are virtually worthless, other researchers have continued to explore possible predictor variables and would likely disagree with Mouw and Khanna’s disheartening conclusion.

Standardized College Entrance Examinations

The present investigation is primarily examining the predictive role of WAIS-R IQ scores which has received very little attention in the literature as a predictor variable. However, other variables have been frequently studied.

One of the variables that is commonly included in studies concerned with predicting college academic success is the score on a standardized college entrance examination--the American College Testing Assessment Program (ACT) or the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board.

Millions of college-bound students each year take one or both of these tests, and many universities use these scores in admission decisions. Therefore, much research has been conducted on the extent to which the ACT and SAT actually predict success in college. Reviews of the ACT Assessment Program (Aiken, 1985) indicate that the ACT Composite score correlates between .40 and .50 with freshman college grade point averages and improves the accuracy of predicting college grades from high school grades alone. Another reviewer (Kifer, 1985) concluded that this addition of the ACT Composite score leads to an increase of approximately 10% in the amount of variation accounted for in the prediction of college grades. Reviewers of the SAT state that over 3,500 studies conducted at 750 colleges have shown that SAT scores and college performance are "indeed correlated" (no values are reported; Cohn, 1985, p. 362) and that the combination of SAT scores and high school rank "predicts college grades as well as can be hoped" (Cronbach, 1985, p. 363).

Studies examining the relationship of college grades and ACT scores show correlations ranging from .27 to .59 (Aleamoni, & Oboler, 1978; Rowen, 1978; Wilingham, Rock, & Pollack, 1990). More recent research conducted by Pettijohn (1995) explored the relationship between ACT Composite score, college GPA based on two quarters of college enrollment, and high school GPA with a sample of 78 students. He found a significant correlation ($r = .63$, $p < .001$) between ACT Composite score and college GPA and a significant

correlation ($r = .62$, $p < .001$) between high school and college GPAs with the multiple correlation among the three variables at $R = .74$ ($p < .001$). Pettijohn concluded that the ACT and high school grades are each useful in the prediction of college success and that together the prediction is improved.

Additionally, a study by Hamilton (1990) investigated the accuracy of predicting cumulative college GPA at graduation from six predictor variables for a sample of 585 graduates from the University of Wyoming's Department of Vocational Education. These variables were high school rank, age at graduation, ACT Composite score, high school size, previous community college enrollment, and high school GPA. Using stepwise multiple regression, Hamilton found that high school rank, age at graduation, and ACT score were significant positive predictors of final college GPA. Even though they were statistically significant, the addition of the three remaining variables (high school size, previous community college enrollment, and high school GPA) had little to contribute to the practical prediction of GPA only increasing the multiple R^2 value from .725 to .727 ($p < .001$). Other researchers (Ramist, Lewis, & McCamley, 1990; Ramist & Weiss, 1990; Willingham, Rock, & Pollack, 1990) focusing on the SAT have concluded that the SAT is helpful in predicting college grades, finding correlational values ranging from .34 to .57.

Other researchers have concluded that the SAT provides little if any predictive value above the use of other information. For example, Halpin, Halpin, and Schaer (1981) compared the usefulness of the California Achievement Tests (CAT), the ACT, the SAT, and high school GPA in predicting college GPA in a sample of more than 2,000 freshmen. High school GPA was found to be the most useful single predictor. They also found that the CAT, ACT, and SAT provided an equal increase in the prediction when combined with high school GPA. This combination increased the efficiency of the prediction by

approximately 18% ultimately accounting for about 28% of the total variation in college freshman-year GPA. These results suggest that measures other than the ACT or SAT such as achievement tests may be as helpful in predicting college success as these traditional measures.

Also, Baron and Norman (1992) examined the usefulness of predicting cumulative GPA from SAT scores, the mean score of three achievement tests, and high school class rank. They found that for a sample of almost 4,000 students, SAT scores added nothing to the prediction of GPA when achievement test scores and class rank were known or when only achievement test scores were known. SAT scores did, however, appear to contribute something to the prediction when the only known information was high school class rank.

In another study, Brown (1994) investigated the ability of several measures to predict first-year GPA for 124 freshmen in a College of Engineering and Technology. The predictor variables included in this study were scores from the SAT-Verbal scale, the SAT-Mathematics scale, the Adjective Checklist (a personality measure), the Ship Destination Test (a test of arithmetical reasoning), the Logical Reasoning Test, and the Academic Achievement Interest Scales of the College Major Interest Indicator. Brown's results showed that the Adjective Checklist was the best single predictor of GPA ($R^2 = .60$, $p < .01$). The combined SAT-V and SAT-M scores accounted for only 10% of the variance.

Kanoy and Latta (1989) also compared the effectiveness of traditional variables such as SAT scores and high school GPAs with nontraditional cognitive and psychological measures to predict first-year GPA for a sample of 70 females at a two-year liberal arts college. This sample was divided into two groups based on expected performance. The high-performance group had

predicted GPAs of 2.90 to 3.66, and the low-performance group had predicted GPAs of 1.80 to 2.08. This study found that for the high-achieving group, the only variables that contributed significantly to the prediction were high school GPA, a traditional variable, and academic self-concept, a nontraditional psychological variable. This combination accounted for 56% of the variance in first-year GPAs. For the low-achieving group, the two variables best predicting GPA (46% of the variance) were academic effort and taking responsibility for achieving success both of which were nontraditional variables. Clearly, generalizing from such a sample warrants caution, but SAT scores did not appear to aid in the prediction of GPA especially for low-achieving students. However, it is also important to recognize that these researchers greatly restricted the range of GPA by dividing the sample into high- and low-achieving groups, thus, restricting the size of the possible correlations.

Finally, Crouse and Trusheim have conducted a series of studies (Crouse, 1985; Crouse & Trusheim, 1988; Trusheim & Crouse, 1984) comparing the outcomes of various college admissions strategies. For example, they compared the college admissions decisions that would have been made using high school GPA alone with the decisions that would have been made from high school GPA plus SAT scores (Trusheim & Crouse, 1984). In that study, as well as their other studies, they found that the addition of SAT scores provided virtually no information above high school grades. They concluded that SAT scores are no more useful in predicting college freshman GPA or college completion than are high school grades or high school rank and do not help colleges make better admissions decisions.

Even with the debate in the literature concerning the effectiveness of predicting college academic success from scores on tests such as the ACT and

the SAT, most college and universities consider these scores in admissions decisions (Gardner & Jewler, 1987).

Intelligence Measures

Another, more traditional, variable that is not typically used in admissions decisions but that has been studied as a predictor of collegiate academic success is intelligence. The relationship of intelligence and academic achievement has been explored by studying the relationship of intelligence test scores with scores from achievement tests and with more direct measures of school performance such as grades. Sattler (1992), for example, reports correlations between WAIS-R Full Scale IQ scores and scores from the Wide Range Achievement Test-Revised (WRAT-R), a commonly used test of achievement, as ranging between .60 and .76. Others (Ryan & Rosenberg, 1983; Spruill & Beck, 1986) have also reported similar correlations between scores from the WAIS-R and scores from the WRAT and the WRAT-R. Sattler concluded that the WAIS-R has “satisfactory concurrent validity” (1992, p. 224) with measures of achievement.

The prediction of school performance from intelligence tests has been examined in “thousands of studies across the age range” (Kaufman, 1990, p.18) leading Matarazzo (1972) to conclude that the correlation between school performance and intelligence as measured by IQ is approximately .50. However according to Matarazzo, many of these studies were based on IQ scores derived from group-administered intelligence tests. Some of these studies did, however, use individually-administered tests, mainly the Wechsler Adult Intelligence Scale (Wechsler, 1955). Various individual and group intelligence tests in general show correlations in the range of .70-.90, but individually administered tests tend to have higher test-retest reliabilities than

group tests (Aiken, 1996). Also, the individual being tested may be more motivated to do well on an individually-administered test (Aiken, 1996).

As Matarazzo (1972) and Kaufman (1990) have indicated, the studies that have been conducted to examine the usefulness of the WAIS in predicting college academic success have found correlations of approximately .50 between WAIS scores and college grades. For example, a study by Plant and Lynd (1959) found correlations of .53, .58, and .53 between college freshman GPA and WAIS Full Scale, Verbal Scale, and Performance Scale IQ scores respectively for 161 freshmen. Another similar study (Wall, Marks, Ford, & Ziegler, 1962) found validity coefficients of approximately .30 between first semester college GPA and WAIS Verbal and Full Scale scores and a correlation of .22 between GPA and WAIS Performance Scale scores from a randomly selected sample of 106 first-semester freshmen. These correlations were similar to those found between GPA and three aptitude tests also administered.

Another study examining the correlations between the WAIS and academic success was conducted by Conry and Plant (1965). They examined correlations between freshman college GPA and the WAIS subtest scaled scores, the WAIS Verbal, Performance, and Full Scale summed scale scores, and their respective IQ scores. These correlations ranged from .04 to .48 for the various subtests and were .43 for the Full Scale IQ scores, .45 for the Verbal Scale, and .24 for the Performance Scale. The Verbal Scale subtests of Information (.48) and Vocabulary (.46) showed the highest correlation with GPA. Also, a later study using the WAIS as a predictor of college academic success (Dennis, 1978) found correlations between college GPA after four semesters and WAIS IQ scores of .47 for the Full Scale IQ scores, .51 for the Verbal Scale, and .29 for the Performance Scale. In many of the studies investigating the

ability of WAIS scores to predict college academic success (Conry & Plant, 1965; Dennis, 1978; Plant & Lynd, 1959; Wall et al., 1962), the prediction of college GPA was stronger using the Verbal Scale than the Performance Scale.

From four previous studies examining this WAIS-GPA relationship, Feingold (1983) investigated the usefulness of two WAIS Verbal subtests, Information and Vocabulary, to predict college GPA. It is unclear from this study at what point in time college GPA was collected. Feingold (1983) examined the correlations between college GPA and the WAIS IQ scores, the subtest scores, and the verbal and composite scores from the various college aptitude tests used in the published studies (ACT, SAT, American Council on Education Psychological Examination for College Freshmen, and Cooperative School and College Ability Test). The researcher concluded that the Information ($r = .37$, $p < .01$) and Vocabulary ($r = .36$, $p < .01$) subtests were slightly less helpful in predicting college GPA than was the WAIS Verbal Scale IQ ($r = .41$, $p < .01$), but the WAIS Verbal Scale IQ was more helpful than the WAIS Full Scale IQ (r not reported). Also, the Information and Vocabulary subtests were found to be as accurate at predicting college GPA as the composite scores from the aptitude tests and were better predictors than the verbal sections of the tests. Feingold (1983) concluded that of these variables, the WAIS Verbal Scale IQ score was the best predictor and was a better predictor than even the verbal sections of the aptitude tests. However, these findings were based on information derived from several studies using differing combinations of measures and, as such, are difficult to interpret.

With the vast amount of literature investigating the ability of the WAIS to predict college academic success, it would be expected that there would be a similarly large body of research conducted using the WAIS-R following its publication in 1981. However, this does not appear to be the case. The

previously mentioned prediction literature review by Mouw and Khanna (1993) did not include any studies involving the WAIS- R, nor did this researcher find many additional studies examining the prediction of college success from WAIS-R scores.

One such study involving the WAIS-R was conducted by Wong (1993). This study examined the ability of a modified WAIS-R to predict college GPA in comparison to the Shipley Institute of Living Scale. This scale has repeatedly been shown to correlate significantly with the WAIS-R. GPA was measured at the time of the assessments resulting in 70% of the participants' GPAs being based on only one semester of college enrollment. In this study, Wong found no significant correlations between either of the two instruments and GPA. Using multiple regression analysis, this study also failed to find any significant predictors of college GPA from either test or their subtests.

The findings indicating that the WAIS-R has no value as a predictor of college academic success seem to contradict the many studies showing significant correlations between college academic success and the earlier WAIS. Because many studies involving the WAIS and the WAIS-R have shown very high correlations with a median correlation of .94 (Sattler, 1992), it would be expected that the WAIS-R would show correlations with college GPA similar to those found using the WAIS. Wong's findings seem to directly contradict this expectation. When administering the WAIS-R in this study, however, the standardized instructions were not followed. Only certain subtests were given and several were administered in a group format that did not allow for participants to improve upon their responses by asking for clarification or responding to examiner queries. Wong provided no rationale for these modifications in the WAIS-R administrations. This disregard for the

standardized instructions seems likely to have invalidated the WAIS-R scores used in these analyses.

Hypotheses

With the vast literature on the prediction of college academic success using the ACT, SAT, and the WAIS, the lack of research conducted using the WAIS-R was unexpected and conspicuous. Thus, the current study was warranted. The purpose of this study was to examine the effectiveness of WAIS-R scores in predicting academic success in college as measured by GPA. It was hypothesized that WAIS-R scores would predict college GPA. Based on research using the WAIS, these predictions were hypothesized to be stronger with the Verbal Scale of the WAIS-R than with the Performance Scale. It was also hypothesized that the magnitude of these relationships of college GPA by WAIS-R scores would decrease across time spent in college as has been found in studies of GPA and ACT scores. Since ACT and SAT scores are commonly used as predictors of college academic success while WAIS-R scores are not, a further purpose of this study was to compare the predictions using the WAIS-R with predictions from ACT and SAT scores.

Method

Participants

The data were collected from existing Psychological Clinic files at a mid-size university. The participants were 13 undergraduate men and 36 undergraduate women who either volunteered for the intellectual assessments in order to receive extra credit in psychology courses or were self-referred due to a curiosity regarding their intellectual level or their intellectual strengths and weaknesses. The sample originally consisted of 209 students; however, university records could only be obtained for 141 of these students. This sample was further reduced to 49 participants due to missing data in the subject's university records. Only these 49 individuals had GPA data for all of the semesters included.

The examiners were 37 first-year students in a graduate program in clinical or school psychology. The assessments were conducted from 1987-1993 as a requirement for a practicum class in psychological assessment, a graduate-level course. This course was taken in the first semester of a Master's degree program in clinical psychology or a Specialist's degree program in school psychology. The course involves a lecture component in which testing theory and psychometric properties of the intellectual assessment instruments are discussed and a practicum component in which the procedures and techniques of the tests are learned and practiced.

Instruments

Wechsler Adult Intelligence Scale-Revised. The intellectual assessments were conducted using a variety of cognitive measures. However,

for the current research only the scores from the Wechsler Adult Intelligence Scale-Revised (WAIS-R) were used. The WAIS-R is a test of overall intellectual functioning (Wechsler, 1981). It includes 11 subtests divided into a Verbal Scale and a Performance Scale. Scores are given for the Verbal Scale, the Performance Scale, and the Full Scale which includes both the Verbal and Performance Scales. The IQ scores are reported as standard scores with a mean of 100 and a standard deviation of 15.

Reliability coefficients are provided for each of the nine age groups used in the standardization sample. The split-half reliability coefficients for the 17 to 25-year-olds in the standardization sample range from .95 to .97 for the Verbal Scale, from .88 to .94 for the Performance Scale, and from .96 to .98 for the Full Scale (Wechsler, 1981). The test-retest coefficients were reported as .94 for the Verbal, .89 for the Performance, and .95 for the Full Scale. The validity of the WAIS-R has been demonstrated in numerous correlational studies with other measures such as the WAIS, the Wechsler Intelligence Scale for Children-Third Edition, the Stanford-Binet: Fourth Edition, and various other intelligence and achievement measures (Sattler, 1992).

American College Testing Assessment Program. When available, the students' scores on the American College Testing Assessment Program academic tests (ACT) were collected from the students' university files. The university requires this test or the SAT and uses them in admission and scholarship decisions (F. Eggleton, personal communication, October 14, 1997).

The ACT Assessment Program includes four academic tests, the ACT Interest Inventory, and the Student Profile Section (Aiken, 1985). The four academic tests--the English Usage Test, the Mathematics Usage Test, the Social Studies Reading Test, and the Natural Sciences Reading Test--were

designed to assess the academic skills necessary to be successful in typical first-year college curricula (American College Testing Program, 1997). When the ACT was enhanced in 1989, these tests were renamed the English Test, Mathematics Test, Reading Test, and Science Reasoning Test (American College Testing Program, 1989). Each of the academic tests is timed, and the scores are reported using a standard score scale ranging from 1 to 36 (Aiken, 1985). The Composite score is the average of the standard scores of the four academic tests rounded up to the nearest whole number (American College Testing Program, 1988). It has a range from 1 to 36. Only the Composite scores were used in this study.

The ACT was enhanced beginning with the October 1989 test administration date. According to the American College Test Program (1989), the Enhanced ACT Assessment is similar to the earlier version, but the content coverage of the four academic tests has been expanded to better cover the curriculum in these areas. ACT asserts that the overall difficulty of the Enhanced test is the same. They provide a concordance table to convert scores from the two versions. According to ACT, each concordant value for the Enhanced version has the “same relative standing in the national sample” (American College Test Program, 1989, p.3) as the corresponding score from the earlier test. For this study, the scores of the participants who had taken the pre-Enhanced version were converted to Enhanced scores using this table in order to be more comparable (see Appendix A).

For entering college freshmen in 1987 and 1988, the national mean standard score for the Composite was 19.20 ($SD = 5.8$; American College Testing Program, 1988). For the national sample of college-bound high school seniors in 1988, the mean for the Composite score was 18.13 ($SD = 4.56$; American College Testing Program, 1997). In 1995, following the enhancement

of the ACT, the mean Composite score for the national sample of college-bound twelfth-graders was 18.30 ($SD = 4.87$; American College Testing Program, 1997). The mean Composite score for the study university for 1990-1993 was 20.61 (SD was not reported, F. Eggleton, personal communication, October 14, 1997). Of the years involved in the current study, ACT information was available for only these years. The Kuder Richardson internal consistency coefficient for the Composite score is .96 both from the 15 forms given from 1983 to 1986 (American College Testing Program, 1988) and the 1995 national sample (American College Testing Program, 1997).

In a review of the ACT Assessment Program, Kifer (1985) concludes that the ACT reliability values (internal consistency, test-retest, and coefficient alpha statistics) range between .80 to .85 for the Composite score and for the various subtests. The research services of ACT (1988) report that for the 1985-1986 freshman class of 139 at a reporting university, ACT Composite scores correlate .51 with first semester college GPA and that for a sample of over 119,000 students, the median multiple R for the four academic tests and first semester GPA was .48. Aiken (1985) also reports a correlation of .40 to .50 between college freshman GPA and the ACT Composite score.

College Entrance Examination Board's Scholastic Aptitude Test. When available, the students' scores on the Scholastic Aptitude Test (SAT) were collected from the students' university files. The SAT is divided into a Verbal and a Mathematics section which are combined to form a Total score (Cohn, 1985). The Test of Standard Written English is also administered at the time of the testing. For this study, the participants' SAT-Total scores were converted into equivalent ACT Composite scores using a conversion table.

Each section of the SAT consists of two 30-minute tests. The scores are reported as scaled scores ranging from 200 to 800 for each section. Cohn

(1985) reports that test-retest coefficients are approximately .87 for both the verbal and mathematics sections and that typical internal consistency reliability coefficients are greater than .90. Cronbach (1985) indicates that the variance due to repeated testing leads to a standard error of 34 for the verbal section and 37 for the mathematics section.

Grade Point Average. College grade point average (GPA) was calculated on a 4.0 scale. GPAs were obtained for each subject following completion of 30-40 hours, 60-70 hours, 90-100 hours, and more than 120 hours. In instances when a subject had GPAs from more than one semester following the completion of 120 hours, the final or cumulative GPA was used.

University Statistics. Information about the university student body was obtained from the Office of the Registrar for the years corresponding to the years the assessments were conducted. This information included mean GPAs for all students enrolled from 1987-1993 and mean ACT scores for freshmen entering in the years from 1990-1993. ACT scores were not available for 1987-1989.

Other Information. Other information obtained for each subject included gender, race, marital status, graduating major, number of declared majors, number of transfer hours, whether or not the subject graduated, length of time spent at the university, whether the subject had withdrawn from the university at any point, year of the assessment, and year in college at the time of the assessment. This information was obtained in order to further describe the sample.

Procedure

In the current study, the researcher compiled the participants' WAIS-R scores and demographic information from a review of the Psychological Clinic records.

At the time of the original assessment, after a subject signed a consent form for the assessment (see Appendix B), the examiner conducted a brief clinical interview to gather background information and to establish rapport with the subject. The examiner then administered the WAIS-R.

The examiners were supervised by a Ph.D. clinical psychologist and a peer in the class who used a procedures checklist to critique the assessment. The examiners then computed the WAIS-R scores. The protocol scoring accuracy was checked by a second year graduate student serving as the teaching assistant for the course and by the practicum supervisor, a licensed clinical psychologist. Any errors on the assessment protocols were then corrected by the examiners and rechecked by the practicum supervisor. The additional information regarding the participants was obtained from university records by this same faculty member several years subsequent to the testing. Approval of the university's Human Subjects Review Board was obtained for the use of this archival data (see Appendix C).

Results

Descriptive Statistics

The 49 participants in the present study ranged in age at the time of the intellectual assessments from 17 to 25 with a mean age of 19.04 ($SD = 1.89$). Demographic statistics are presented in Table 1. At the time of the assessments, 64% ($n = 31$) of the participants were freshmen, 10% ($n = 5$) sophomores, 12% ($n = 6$) juniors, and 14% ($n = 7$) seniors. The participants' mean GPA after completion of 120 hours was 3.06 ($SD = .54$) with 88% graduating. Psychology and public relations were the most common majors each comprising approximately 10% ($n = 5$) of the sample. The remaining participants were distributed across 21 additional majors. Most of the participants were Caucasian (78%, $n = 38$), right-handed (70%, $n = 34$), and unmarried (96%, $n = 47$).

Seventy-four percent ($n = 36$) of the participants were female, and 26 % ($n = 13$) were male. Because the female-to-male ratio in this sample was so large, independent samples t -tests were conducted to determine if there were significant differences by gender. These tests were done for WAIS-R Full, Verbal, and Performance Scale IQ scores, ACT/SAT scores, GPA after 30 hours, and GPA after 120 hours. Gender differences were significant only for the variable of GPA after 120 hours with females earning significantly higher GPAs [$t(47) = 2.53, p < .05$].

Representativeness of Sample

The sample of 49 individuals used in this study was not identical to the university student body for the years included. Student body statistics were

obtained from the Office of the Registrar (F. Eggleton, personal communication, Oct. 14, 1997). t -tests for independent samples demonstrated that the participants in this study and the student body at large were significantly different on the variables of ACT/SAT scores and GPA. Additionally, the WAIS-R scores of this sample were significantly different from the WAIS-R standardization sample. Means, standard deviations, and significance levels are presented in Table 2. Also, according to the Office of the Registrar, approximately 38% of students typically graduate. Among these participants, however, the graduation rate was 88% ($n = 43$).

Correlations

Table 3 presents the correlations among the GPA measures, ACT/SAT scores, IQ scores on the WAIS-R, and gender. As expected, college GPAs measured after 30 hours and after 120 hours were highly correlated ($r = .79$, $p < .001$). Both GPA measures (30 and 120 hours) were also correlated with ACT/SAT scores and with the scales on the WAIS-R. The WAIS-R scales were correlated with the scores on the entrance examinations at .81 ($p < .001$) for the Full Scale score, .86 ($p < .001$) for the Verbal Scale, and .42 ($p < .001$) for the Performance Scale. The WAIS-R scores, ACT/SAT scores, and GPA measures were not significantly correlated with gender.

Hypothesis 1

The first hypothesis was that WAIS-R scores would be predictive of college GPA. WAIS-R scores and GPA were significantly and positively correlated. Fisher's r to z transformations (Hinkle, Wiersma, & Jurs, 1994) were conducted to calculate the mean correlations between the various GPA variables (measured at 30, 60, 90, and 120 hours) and the WAIS-R scores. The mean correlation between GPA and WAIS-R Full Scale scores was .54. The

mean correlation between GPA and WAIS-R Verbal Scale scores was .54. The mean correlation between GPA and WAIS-R Performance Scale scores was .34.

Regression analyses were conducted to determine the ability of WAIS-R scores to predict college GPA. These results are presented in Tables 4 and 5. In the simple regression of Full Scale WAIS-R score on GPA after 30 hours, the Full Scale IQ score accounted for 31% ($p < .001$) of the variance in GPA (see Table 4).

Because of the significant gender difference in GPA when measured after 120 hours, gender was simultaneously entered into the regression analysis. In the multiple regression analysis of WAIS-R Full Scale IQ score and gender on GPA after 120 hours, WAIS-R Full Scale IQ score and gender together accounted for 40% of the variance in predicting GPA (see Table 5). After partialling the unique variances due to IQ and gender (Pedhazur, 1982), WAIS-R Full Scale IQ accounted for 28% of the unique variance in college GPA [$F(1,46) = 13.08$, $p < .01$], and gender accounted for 15% [$F(1,46) = 21.54$, $p < .01$; see table 5]. Both of these increments in the unique variance in predicting GPA were significant.

Hypothesis 2

The second hypothesis was that the correlations between WAIS-R scores and GPA and the predictions of GPA from IQ scores would be stronger for the Verbal Scale than for the Performance Scale. This hypothesis was not supported. At 30 hours, the correlations between GPA and WAIS-R IQ scores were .56 ($p < .001$) for the Verbal Scale and .34 ($p < .001$) for the Performance Scale. Simple regression analyses (see Table 4) demonstrated that at 30 hours, Verbal Scale scores accounted for 31% ($p < .01$), and Performance Scale scores accounted for 12% ($p < .05$) of the variance in GPA. T-tests for

correlated groups indicated that these differences were not significant [$t(46) = 1.684, p > .05$].

After 120 hours, the correlations between GPA and WAIS-R Verbal Scale IQ scores and GPA and WAIS-R Performance Scale IQ scores were .46 ($p < .001$) and .35 ($p < .01$), respectively. Using t -tests for correlated groups, these correlations were found to be not significantly different [$t(46) = .689, p > .05$]. Gender was included in each of the regression equations involving GPA after 120 hours. The variance accounted for in GPA predictions from the Verbal Scale was 28% [$F(1,46) = 15.38, p < .01$], and the variance accounted for by gender was 18% [$F(1,46) = 21.54, p < .01$, see Table 5] with both of these increments being significant. The variance accounted for in GPA predictions from the Performance Scale was 13% [$F(1,46) = 6.47, p < .05$], and the variance accounted for by gender in this equation was 13% [$F(1,46) = 6.47, p < .05$]. Again, both of these increments in unique variance were significant.

Hypothesis 3

Additionally, a third hypothesis proposed that the magnitude of the correlations and predictions involving college GPA and WAIS-R IQ scores would decrease across time spent in college. This hypothesis was not supported. The correlations between GPA and Full Scale IQ scores, for example, were .56 ($p < .001$) at 30 hours and .48 ($p < .001$) at 120 hours. A similar pattern was also found for the Verbal and Performance Scales. WAIS-R Full Scale IQ scores accounted for 31% ($p < .001$) of the variance in college GPA at 30 hours and 28% ($p < .001$) after 120 hours with gender included in the equation. Correlated groups t -tests indicated that these differences were not statistically significant.

Hypothesis 4

A final purpose of this study was to compare the prediction of GPA using WAIS-R IQ scores to the prediction of GPA using scores from the ACT/SAT. Overall, ACT/SAT scores appeared to be a better predictor of GPA than did WAIS-R scores. Testing this comparison required multiple regression analyses (see Table 6) and the partialing of unique variance. At 30 hours, Full Scale IQ score and ACT/SAT score were entered into the regression equation resulting in a multiple R of .638 together accounting for 41% ($F = 15.75, p < .001$) of the variance in GPA. Full Scale IQ was found to account for 0.5% of unique variance in GPA. ACT/SAT score accounted for 8% of the variance. Using t -tests for correlated groups, this difference was found to be not significant [$t(46) = .998, p > .05$].

At 120 hours, Full Scale IQ score, ACT/SAT score, and gender were simultaneously entered into the regression equation resulting in a multiple R of .693 together accounting for 48% of the variance in GPA [$F(3,45) = 13.88, p < .001$]. After partialling the unique variances, Full Scale IQ was found to account for 0.7% of the variance in GPA, ACT/SAT score accounted for 14%, and gender accounted for 18%. F tests of significance indicated that the difference between the unique variance accounted for by WAIS-R Full Scale IQ score and the unique variance accounted for by ACT/SAT scores was significant [$F(1,45) = 14.92, p < .01$]. The difference in unique variance accounted for by WAIS-R Full Scale IQ score and gender was also significant [$F(1,45) = 6.67, p < .05$]. The difference in unique variance accounted for by ACT/SAT score and gender was not significant.

Discussion

Academic success in college is a topic that is currently receiving considerable interest. Being able to predict the level of this success may have vast implications for college-bound students and guidance counselors alike. The purpose of this study was to examine a small portion of those variables that may predict collegiate academic success. There have been very few previous studies that have included IQ scores from the WAIS-R as one of these predictor variables. In the present study, this researcher examined the effectiveness of WAIS-R scores as predictors and also served as a validity study for the WAIS-R. Academic success was measured by college GPA. It was predicted that the WAIS-R would predict college GPA and that these predictions would be stronger for the Verbal Scale scores than for the Performance Scale score. Furthermore, it was hypothesized that the magnitude of these predictions would decrease across time spent in college. Finally, these predictions were compared to predictions of college GPA made from ACT/SAT scores.

The first of these hypotheses was supported by the results of this study. WAIS-R scores were, in fact, positively related to college GPA and were helpful in predicting GPA. When intelligence scores were the only information available, these scores accounted for approximately 1/4 to 1/3 of the variability in GPA. These results are not surprising. The construct of intelligence that the WAIS-R was designed to measure should also be crucial to success in college. Although many other variables could play a role in an individual's success in college, some type of inherent intelligence is assumed to be fundamentally involved in academic success as well. Following from intelligence as a

fundamental aspect of academic success, these results provide further evidence of the validity of the WAIS-R as a measure of this construct of intelligence.

These results are generally consistent with previous literature in the area. For example, the ACT-GPA relationships found in this study were very similar to those found by Pettijohn's (1995) research as well as to those reported by ACT (1988) and Aiken (1985). Also, the relationships among the various GPA and WAIS-R measures hovered around the r of approximately .50 reported by Matarazzo (1972) and Kaufman (1990) from "thousands of studies" (p. 18) of intelligence and school performance.

The second hypothesis was not supported by this study. The differences between the correlations of GPA with the Verbal Scale and with the Performance Scale were not statistically significant. These results are not consistent with those of previous literature. For example, studies by Conry and Plant (1965), Dennis (1978), and Wall et al. (1962) did find significant differences between correlations of GPA with the Verbal and Performance Scales of the WAIS. It is unclear why these previous results were not replicated in the current study. Perhaps the lack of differences in the current study were caused by the small differences between Verbal ($M = 107.27$, $SD = 10.96$) and Performance Scale scores ($M = 105.31$, $SD = 11.74$) or by the tightness of the study sample. In addition to having higher WAIS-R scores than the standardization sample, these participants also had lower standard deviations indicating a more homogenous group. The studies which found significant differences in the correlations for the Verbal and Performance Scales reported standard deviations that were not different from the standardization sample.

The third hypothesis was also not supported by the results of the current study. The relationships between WAIS-R scores and GPA did not significantly

decrease with time spent in college. This finding is inconsistent with literature in the area, which has shown that the ability to predict GPA from ACT and achievement test scores decreases across time spent in college (Hoyt, 1963 as cited in Rowen, 1978; Rowen, 1978; Scannel, 1960). Perhaps this inconsistency arises from differences that exist between WAIS-R scores and other test scores. ACT scores, for example, are expected to decrease across time in college because the ACT was specifically designed to predict first-year college GPA (American College Testing Program, 1997). In contrast, the WAIS-R was developed to measure the construct of intelligence, which is assumed to be a fairly stable characteristic of an individual (Wechsler, 1981). To the extent that intelligence is relatively stable and is fundamentally related to academic success in college, it would follow that the relationships between intelligence and academic success would remain relatively stable.

For the fourth purpose of this study--the comparisons between WAIS-R predictions and ACT/SAT predictions--the results showed that the standardized college entrance examination scores were responsible for significantly more unique variance in predicting college GPA than the WAIS-R IQ scores. The indication would be that ACT/SAT scores were more predictive of college GPA than were intelligence scores. However, gender was responsible for significantly more of the unique variance than either the WAIS-R IQ scores or the ACT/SAT scores.

Gender was not initially a variable of interest in this investigation. However, the significant differences between the GPAs of males and females after the completion of 120 hours and the high proportion of females in the study sample made it necessary to include gender in the analyses. The finding that gender accounted for significantly more unique variance in the prediction of GPA after 120 hours than did ACT/SAT scores or WAIS-R scores warrants

additional investigation. These differences were especially noteworthy because no gender differences were found after completion of just 30 hours.

Previous studies predicting college GPA have rarely included gender as a predictor variable in the analyses. However, a study by Morgan (1990) did include analyses based on gender. In a study that included freshman classes across 198 universities for the years of 1978, 1981, and 1985, Morgan correlated freshman GPA with high school GPA and SAT scores. He found that all of the correlation estimates were higher for females than for males. Other studies, however, have suggested that gender does not have a moderating effect on GPA predictions (e.g., Best & Stanford, 1983; Kirchner, 1993). Clearly, the effects of gender on GPA as well as on the predictions of GPA require further study.

This study differed from previous studies conducted to predict academic success by using WAIS-R scores as the predictor variable of interest. Previous studies have explored various other types of predictors such as demographic and personality characteristics, measures of high school academic performance, and standardized college entrance examination scores. Other studies have also examined the predictability of WAIS scores, but few have used scores from the more recent WAIS-R. It is in this aspect that the current study is an addition to existing knowledge in the area.

This addition is an important one for several reasons. First, this study is an addition to the validity research on the WAIS-R. Also, this investigation has implications for students considering college enrollment and for those advising them. Students who are contemplating whether or not they will be able to succeed in college might find it useful to be tested with the WAIS-R. From WAIS-R scores, likely college GPAs could be predicted. Table 6, for example, uses the regression equation derived in this study to predict GPA after 30 hours

for various WAIS-R Full Scale Scores. Being able to predicting a student's possible GPA would provide ambivalent students and their advisors with an additional piece of information.

The current researcher is not suggesting that colleges and universities change their strategies to use WAIS-R scores as criteria in admissions decisions. This approach would not be practical due to the costly and time-consuming nature of administering an individual intelligence test like the WAIS-R. However, when WAIS-R scores are available, admissions committees could consider these scores in lieu of ACT/SAT scores. Additionally, on a more individual level, WAIS-R scores could be useful in making decisions regarding college plans and choices.

There are, however, several possible limitations of the current study that must be addressed. The results can be only as reliable and valid as the variables themselves are. Some may question the validity of the WAIS-R scores because the tests were administered by graduate students rather than by licensed practitioners. However, research has indicated that graduate students are more accurate than practitioners (Slate, & Jones, 1990; Slate, Jones, Murray, & Coulter, 1993). These studies indicate that practitioners may actually make almost twice as many errors as do graduate students.

The use of GPA as a measure of success in college has also been questioned. Young (1993), for example, suggests that GPA is not a reliable measure due to variations in grading standards. Other researchers, however, have concluded that GPA is, in fact, a reliable measure of student learning during the college years. Astin (1993), for example, concluded that even after controlling for numerous input, environmental, and involvement variables, GPA was found to be related to all of the cognitive and academic growth measures used in his study. Other studies have also suggested that GPA is a fairly

reliable measure (Millman et al., 1983; Munday, 1970). These studies have reported reliability coefficients for freshman GPA ranging from .80 to .82. The current study does not claim that college GPA is the only or the ideal method of measuring an individual's success in college. Admittedly, there are numerous other variables and events that will affect a student's success in college. However, GPA is an informative and commonly-used measure which is also readably understood by the public as the culmination of an individual's collegiate career. Therefore, GPA is an appropriate outcome measure when discussing academic success in college.

Another potential limitation of this study is that the sample was not representative of either the university's student body or of the WAIS-R standardization sample. Overall, this sample demonstrated higher ACT/SAT scores and GPAs than the rest of the student body, and had a much higher graduation rate. This sample also had higher WAIS-R scores than did the respective standardization sample for this test. In addition to having higher scores, this sample also had a tighter distribution of scores than did the standardization samples of the WAIS-R and the ACT/SAT or the university student body as a whole. The meaning is that a restriction of range exists in the current sample. When the range of possible scores is restricted, the correlations among the variables are reduced making it more difficult to find significant results. The fact that this study did find significant results even with a restricted range suggests that these results are fairly robust.

The variability of the sample may also have been restricted by the nature of the final sample. In the process of narrowing the original sample from 209 students to the final group of 49, the sample size was greatly restricted. It is possible that by narrowing the sample, the "bottom half" of the sample may have been lost. Unfortunately, these remaining 160 individuals had to be discarded

due to missing information in their university records. Therefore, it was not possible to determine whether they did, in fact, comprise a lost "bottom half" of the sample. This problem poses a direct challenge to future generalizations from this study as this particular sample was not representative.

Future studies should continue to explore other possible predictor variables. The current study included only a few possible variables to enter into the regression equation. Previous studies have explored other possible predictor variables but have not included WAIS-R scores. In future work, it would be important to include variables such as WAIS-R scores in addition to more diverse types of variables (such as personality or event characteristics) in order to gain a breadth of information. Including these various types of information will also add to the possible relevance of the research. By omitting appropriate variables from the regression model, specification errors occur (Pedhazur, 1982). These errors may influence the results by biasing the regression coefficients in the equation. Thus, it is important to include several, possible predictor variables in future research, not only to learn more about these additional variables but also to improve the regression model itself.

It would also be important to examine potential differences in predictions for different populations of people. These studies are necessary especially given the gender differences found in this study. Other possible groups of people that would be valuable to study may include ethnic or racial groups, socioeconomic groups, urban versus rural populations, or various majors or colleges within a university. With the recent publication of the Wechsler Adult Intelligence Scale-3rd Ed. (Wechsler, 1997), it will be important to examine the predictive ability of this new assessment instrument. To the extent that the two instruments are similar, studies with the WAIS-III should be similar to the current study with the WAIS-R.

Studies examining variables that are predictive of success in college have direct implications for students considering college; guidance counselors, parents, and others advising these students; and college and university selection and admission committees. The author of the current study does not intend to conclude that WAIS-R scores should be used as the determining factor in deciding whether a student should apply to college or whether a college should accept a particular student. No single test score should be the deciding factor in such a multifaceted decision. Rather, WAIS-R scores are simply one of many possible pieces of information to consider.

Tables

Table 1

Demographic Characteristics of the Study Sample (n = 49)

Characteristic	<u>N</u>
Gender	
Male	13
Female	36
Race	
Caucasian	38
African-American	1
Asian-American	1
Not reported	9
Marital Status	
Married	2
Unmarried	47
Major	
Psychology	5
Public Relations	5
Other	39
Class Standing	
Freshman	31
Sophomore	5
Junior	6
Senior	7
Handedness	
Right	34
Left	15

Table 2

T-tests for Study Sample (n = 49) and Student Body or Standardization

Sample

<u>Score</u>	Study Sample		Student Body or Standardization Sample		
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>t</u>
ACT Composite	23.37	4.77	20.61	--	4.04***
GPA	3.06	0.54	2.27	--	10.17***
WAIS-R Full Scale	107.30	10.47	100.00	15	4.88***
WAIS-R Verbal Scale	107.27	10.96	100.00	15	4.64***
WAIS-R Performance Scale	105.31	11.74	100.00	15	3.16**

Note. The Standard Deviation values for the student body are unknown.

** p < .01

*** p < .001

Table 3

Intercorrelations Between GPAs, ACT Composite Scores, WAIS-R Scores,
and Gender (n = 49)

	1	2	3	4	5	6	7
1. GPA at 30 hrs.	--	.79***	.63***	.56***	.56***	.34**	-.05
2. GPA at 120 hrs.		--	.56***	.48***	.45***	.35**	-.35
3. ACT/SAT score			--	.81***	.86***	.42***	.13
4. WAIS-R Full Scale				--	.88***	.75***	.14
5. WAIS-R Verbal Scale					--	.36**	.21
6. WAIS-R Performance Scale						--	-.03
7. Gender							--

Note. Gender coded as 1 = female, 2 = male.

** p < .01

*** p < .001

Table 4

Summary of Simple Regression Analyses for Variables Predicting College GPA
after 30 Hours (n = 49)

Variable	<u>Multiple R</u>	<u>R²</u>	<u>df</u>	<u>F</u>
ACT Composite Score	.63	.40	1,47	31.44***
WAIS-R Full Scale	.56	.31	1,47	21.25***
WAIS-R Verbal Scale	.56	.31	1,47	21.50***
WAIS-R Performance Scale	.34	.12	1,47	6.26*

* $p < .05$

*** $p < .001$

Table 5

Summary of Regression Analyses for Variables Predicting College GPA after 120 Hours (n = 49)

Variable	<u>Multiple R</u>	<u>R²</u>	<u>df</u>	<u>F</u>	<u>Unique Variance Accounted For</u>	<u>F</u>
Regression 1 full model	.69	.47	2,46	20.73***		
ACT Composite Score					.34	14.17**
Gender					.14	29.17**
Regression 2 full model	.63	.40	2,46	15.30***		
WAIS-R Full Scale Score					.28	13.08**
Gender					.15	21.54**
Regression 3 full model	.63	.40	2,46	15.37**		
WAIS-R Verbal Scale					.28	15.38**
Gender					.18	21.54**
Regression 4 full model	.48	.23	2,46	6.99**		
WAIS-R Performance Scale					.13	6.47*
Gender					.13	6.47*

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

Table 6

Summary of Multiple Regression Analysis for Variables Predicting College GPA
at 30 and 120 Hours (n = 49)

	<u>multiple R</u>	<u>R²</u>	<u>df</u>	<u>F</u>	<u>Unique Variance</u> <u>Accounted For</u>
GPA 30 full model	.64	.41	3,45	15.75***	
WAIS-R Full Scale Score					0.5
ACT/SAT Score					8.0
GPA 120 full model	.69	.48	3,45	13.88***	
WAIS-R Full Scale Score					0.7
ACT/SAT Score					14.0
Gender					18.0

*** p < .001

Table 7

Predicted college GPA after 30 hours for Selected WAIS-R

Full Scale IQ Scores

WAIS-R Full Scale IQ Score	Predicted GPA
140+	4.00
130	3.76
120	3.45
110	3.13
100	2.82
90	2.50
80	2.18
70	1.87
60	1.55

References

Aiken, L. R. (1985). Review of ACT Assessment Program. Ninth Mental Measurements Yearbook, 1, 29-31.

Aiken, L. R. (1996). Assessment of intellectual functioning. New York: Plenum Press.

Aleamoni, L. M., & Oboler, L. (1978). ACT vs. SAT in predicting first semester GPA. Educational and Psychological Measurement, 38, 393-399.

American College Testing Program. (1959-1993). ACT Assessment. Iowa City, IA: Author.

American College Testing Program. (1988). ACT Assessment Program technical manual. Iowa City, IA: Author.

American College Testing Program. (1989). The Enhanced ACT Assessment: Using concordance tables. Iowa City, IA: Author.

American College Testing Program. (1997). ACT Assessment: Technical manual. Iowa City, IA: Author.

Astin, A. W. (1993). What matters in college? Four critical years revisited. San Francisco: Jossey-Bass.

Baron, J., & Norman, M. F. (1992). SATs, achievement tests, and high school class rank as predictors of college performance. Educational and Psychological Measurement, 52, 1047-1055.

Best, J. B., & Stanford, C. A. (1983). Gender, grade point average, and test anxiety. Psychological Reports, 52, 892-894.

Brown, N. (1994). Cognitive, interest, and personality variables predicting first-semester GPA. Psychological Reports, 74, 605-606.

Cohn, S. J. (1985). Review of College Board Scholastic Aptitude Test and Test of Standard Written English. Ninth Mental Measurements Yearbook, 1, 360-362.

Conry, R., & Plant, W. T. (1965). WAIS and group test predictions of an academic success criterion: High school and college. Educational and Psychological Measurement, 25, 493-500.

Cronbach, L. J. (1985). Review of College Board Scholastic Aptitude Test and Test of Standard Written English. Ninth Mental Measurements Yearbook, 1, 362-364.

Crouse, J. (1985). Does the SAT help college make better selection decisions? Harvard Educational Review, 55, 195-219.

Crouse, J., & Trusheim, D. (1988). The case against SAT. Chicago: The University of Chicago Press.

Dennis, O. C. (1978). The relative efficiency of the Wechsler Adult Intelligence Scale (WAIS) as a predictor of college academic achievement. Unpublished master's thesis, Western Kentucky University, Bowling Green.

Educational Testing Service. (1948-1993). College Board Scholastic Aptitude Test. Princeton, NJ: Author.

Feingold, A. (1983). The validity of the Information and Vocabulary subtests of the WAIS for predicting college achievement. Educational and Psychological Measurement, 43, 1127-1131.

Gardner, J. N., & Jewler, A. J. (1997). Your college experience: Strategies for success. Belmont, CA: Wadsworth Publishing.

Halpin, G., Halpin, G., & Schaer, B. B. (1981). Relative effectiveness of the California Achievement Tests in comparison with the ACT Assessment, College Board Scholastic Aptitude Test, and high school grade point average in predicting college grade point average. Educational and Psychological Measurement, 41, 821-827.

Hamilton, D. J. (1990). Multiple regression analysis and prediction of GPA upon degree completion. College Student Journal, 24, 91-96.

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (1994). Applied Statistics for the Behavioral Sciences-3rd Ed. Boston: Houghton Mifflin.

Hunter, J. E. (1986). Cognitive ability, cognitive aptitudes, job knowledge, and job performance. Journal of Vocational Behavior, 29, 340-362.

Kanoy, K. W., & Latta, M. (1989). Predicting college success of freshmen using traditional, cognitive, and psychological measures. Journal of Research and Development in Education, 22, 65-70.

Kaufman, A. S. (1990). Assessing adolescent and adult intelligence. Boston: Allyn and Bacon.

Kifer, E. (1985). Review of ACT Assessment Program. Ninth Mental Measurements Yearbook, 1, 31-36.

Kirchner, G. L. (1993). Gender as a moderator variable in predicting success in a master of arts in teaching program. Educational and Psychological Measurement, 53, 155-157.

Matarazzo, J. D. (1972). Wechsler's measurement and appraisal of adult intelligence. Baltimore: Williams and Wilkins.

Mathiasen, R. E. (1984). Predicting college academic achievement: A research review. College Student Journal, 18, 380-386.

McHenry, J. J., Hough, L. M., Hanson, M. A., & Ashworth, S. (1990). Project A validity results: The relationship between predictor and criterion domains. Personnel Psychology, 43, 335-354.

Millman, J., Slovacek, S. P., Kulick, E., & Mitchell, K. J. (1983). Does grade inflation affect the reliability of grades? Research in Higher Education, 19, 423-429.

Morgan, R. (1990). Analyses of predictive validity within student categorizations. In W. W. Wilingham, C. Lewis, R. Morgan, & L. Ramist (Eds.), Predicting college grades: An analysis of institutional trends over two decades. (pp. 103-116). New York and Princeton: The College Board and Educational Testing Service.

Mouw, J. T., & Khanna, R. K. (1993). Prediction of academic success: A review of the literature and some recommendations. College Student Journal, 27, 328-336.

Munday, L. (1970). Factors influencing the predictability of college grades. American Educational Research Journal, 7, 99-107.

Pedhazur, E. J. (1982). Multiple regression in behavioral research. New York: CBS College Publishing.

Pettijohn, T. F., II. (1995). Correlations among college students' grade point averages and American College Test scores. Psychological Reports, 76, 336-338.

Plant, W. T., & Lynd, C. (1959). A validity study and a college freshman norm group for the WAIS. Personnel and Guidance Journal, 37, 578-580.

Ramist, L., Lewis, C., & McCamley, L. (1990). Implications of using freshman GPA as the criterion for the predictive validity of the SAT. In W. W. Wilingham, C. Lewis, R. Morgan, & L. Ramist (Eds.), Predicting college grades: An analysis of institutional trends over two decades. (pp. 253-288). New York and Princeton: The College Board and Educational Testing Service.

Ramist, L., & Weiss, G. (1990). The predictive validity of the SAT, 1964-1988. In W. W. Wilingham, C. Lewis, R. Morgan, & L. Ramist (Eds.), Predicting college grades: An analysis of institutional trends over two decades. (pp. 117-140). New York and Princeton: The College Board and Educational Testing Service.

Ree, M. J., & Earles, J. A. (1991). Predicting training success: Not much more than g. Personnel Psychology, 44, 321-332.

Ree, M. J., Earles, J. A., & Teachout, M. S. (1994). Predicting job performance: Not much more than g. Journal of Applied Psychology, 79, 518-524.

Rowen, R. W. (1978). The predictive value of the ACT at Murray State Education University over a four-year college program. Measurement and Evaluation in Guidance, 11, 143-149.

Ryan, J. J., & Rosenberg, S. J. (1983). Relationship of WAIS-R and Wide Range Achievement Test in a sample of mixed patients. Perceptual and Motor Skills, 56, 623-626.

Sattler, J. M. (1992). Assessment of children: Revised and updated third edition. San Diego: Jerome M. Sattler.

Scannel, D. P. (1960). Prediction of college success from elementary and secondary performance. Journal of Educational Psychology, 51, 130-135.

Slate, J., & Jones, C. (1990). Identifying students' errors in administering the WAIS-R. Psychology in the Schools, 27, 83-87.

Slate, J. R., Jones, C. H., Murray, R. A., & Coulter, C. (1993). Evidence that practitioners err in administering and scoring the WAIS-R. Measurement and Evaluation in Counseling and Development, 25, 156-161.

Spruill, J., & Beck, B. (1986). Relationship between WAIS-R and Wide Range Achievement Test-Revised. Educational and Psychological Measurement, 46, 1037-1040.

Trusheim, D. W., & Crouse, J. H. (1984). The SAT and traditional predictive validity: A critical assessment. Journal of College Admissions, 104, 9-12.

Wall, H., Marks, L., Ford, D. H., & Ziegler, M. L. (1962). Estimates of the concurrent validity of the WAIS and normative distributions for college freshmen. Personnel and Guidance Journal, 40, 717-722.

Wechsler, D. (1955). Manual for the Wechsler Adult Intelligence Scale. San Antonio, TX: Psychological Corporation.

Wechsler, D. (1981). Manual for the Wechsler Adult Intelligence Scale-Revised. New York: Psychological Corporation.

Wechsler, D. (1997). Manual for the Wechsler Adult Intelligence Scale-Third Edition. New York: Psychological Corporation.

Willingham, W. W., Rock, D. A., & Pollack, J. (1990). Prediction of college grades: Three tests and three samples. In W. W. Willingham, C. Lewis, R. Morgan, & L. Ramist (Eds.), Predicting college grades: An analysis of institutional trends over two decades. (pp. 239-252). New York and Princeton: The College Board and Educational Testing Service.

Wong, J. L. (1993). Comparison of the Shipley versus WAIS-R subtests and summary scores in predicting college grade point average. Perceptual and Motor Skills, 76, 1075-1078.

Young, J. W. (1993). Grade adjustment methods. Review of Educational Research, 63, 151-165.

Appendices

Appendix A

Concordance Table for ACT Composite Score

Composite Score on Pre-enhanced ACT	Concordant Value on Enhanced ACT
35	36
34	35
33	34
32	33
31	32
30	31
29	30
28	29
27	28
26	27
25	26
24	25
23	24
22	23
21	22
20	21
19	21
18	20
17	19
16	19
15	18
14	17
13	17
12	16
11	15
10	14
9	14
8	13
7	12
6	11
5	11
4	9
3	7
2	5
1	3

(American College Testing Program, 1989)

Appendix B

PSYCHOLOGY DEPARTMENT
WESTERN KENTUCKY UNIVERSITY

INFORMED CONSENT

You are about to take an intelligence battery which is widely used by clinical and school psychologists. The purpose of this testing session is, to provide practice in administering this test for _____, a graduate student being supervised in clinical or school psychology. We will be happy to discuss the general results with you but will not reveal specific scores. Since the examiner is learning administration, such scores are not likely to reflect your true ability. Other graduate students in the course may see the results for instructional purposes but your name will not be released. Your signature below indicates your consent to this procedure.

Signature

Date

WESTERN KENTUCKY UNIVERSITY

Appendix C

Office of Sponsored Programs
104 Foundation Building
502-745-4652; Fax 502-745-4211
E-mail: Phillip.Myers@Wku.Edu

In future correspondence please refer to: HS9731 May 6, 1997

Katherine L. Bishop
c/o Dr. Sally Kuhlenschmidt
Department of Psychology
Western Kentucky University

Dear Ms. Bishop:

Your research topic "Using the WAIS-R to Predict Success in College," has undergone review by the Western Kentucky University IRB for human subjects of research and it has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects' welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

In addition, the IRB found that: (1) informed consent will be sought and documented from each prospective subject; (2) provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data; and (3) that appropriate safeguards are included to protect the rights and welfare of the subjects. Please store all data securely at an on campus location for a minimum of three years.

Your research therefore meets the criteria of Expedited review under the institutional human subjects protocol and is approved. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office Sponsored Programs at the above address.

Kindest regards.

Sincerely,

Phillip E. Myers, Ph.D.
Director, Office of Sponsored Programs and
Human Subjects Coordinator

c: Human Subjects File

HSApprovalLeBishop