

ACT

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ACADEMIC AND

NON-ACADEMIC ACCOMPLISHMENT:

CORRELATED OR UNCORRELATED?

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Summary

In a sample of 7262 college freshmen attending 24 colleges and universities, the student scores for several academic achievement tests, the student scores for several scales of extracurricular achievement, and the student average school grades were intercorrelated. The correlations between these measures of academic and non-academic accomplishments are generally negligible (median $r = .04$). The results can be attributed neither to a narrow range of academic talent nor to non-linear relationships. The results strongly suggest that academic and non-academic accomplishment are relatively independent dimensions of talent. The implications of the findings for the selection of talented persons and the conservation of talent were discussed.

Academic and Non-Academic Accomplishment:

Correlated or Uncorrelated?

John L. Holland and James M. Richards, Jr.

In the last five years, the study of effective performance in schools and colleges, and in extracurricular activity and in vocation has produced many findings which suggest that academic success, and measures of academic potential, have little relationship to effective performance outside of the classroom (Astin, 1962; Getzels and Jackson, 1962; MacKinnon, 1960; Torrance, 1962; Price, Taylor, Richards, and Jacobsen, 1964; Holland and Nichols, 1964; Gough, Hall, and Harris, 1963; and Thorndike and Hagen, 1959). Such studies have generated considerable controversy both because their findings are contrary to popular belief and because many such studies are subject to several common criticisms. First, most earlier studies were based on a narrow range of talent. Second, some criteria of non-academic accomplishment were often of little social importance--test scores on originality measures, or scorings of projective devices. Most recently, McNemar (1964) has excoriated investigators for their failure to cope successfully with these and other problems.

The purpose of the present study is to reexamine the relationships between academic achievement and several kinds of effective non-academic performance in a population with a broad range of talent and

with diverse criteria of socially relevant performances.

The plan for the examination of the relationships among various criteria and measures of accomplishment was simple: Each kind of accomplishment was defined by a cluster of socially relevant criteria and test measures assumed to assess the construct in question. A large sample of college freshmen was obtained and were administered the various assessment devices. All variables representing the various kinds of accomplishment studied here were then intercorrelated (product-moment). Finally, regression analyses were performed to learn if our results could be due to curvilinear regressions or other abnormal distributions of test scores and criteria. The following sections describe the college freshman sample, the assessment of the different kinds of achievement, and the interrelationships among the variables used to represent various accomplishments.

Method

The present study grew out of the American College Survey (Abe, Holland, Lutz, and Richards, 1965), a project conducted by the American College Testing Program in an attempt to obtain a more complete account of the typical American college student and the variation among students from college to college. To accomplish this task, a comprehensive assessment was administered to 12,432 college freshmen in 31 institutions of higher education in the months of April or May in 1964. Students filled out the survey in English classes, chapel, and

convocations, or in dormitories and their homes. College officials were polled to learn if the administration of the survey produced any difficulties. Generally they reported that no special problems resulted from the administration of the survey. The sample of the present research is restricted to the group of these 12,432 freshmen who also took the American College Test battery in the academic year 1962-63 as part of their application for admission to college.

Sample

The sample for this study consisted of 7262 college freshmen, of whom 3770 were male and 3492 female, enrolled in 24 colleges. These colleges are: Arkansas Polytechnic College, Baylor University, Black Hills Teachers College (S.D.), Bloom Township Community College (Ill.), Burlington Community College (Iowa), California State College at Hayward, Carthage College (Wis.), Colorado State College, Fairmont State College (W. Va.), Indiana State College (Ind.), Jamestown Community College (N. Y.), Kansas State University, Lyons Township Junior College (Ill.), New Mexico State University, Plymouth State College (N.H.), Snow College (Utah), Southeastern State College (Okla.), Southern Illinois University, University of Alabama, University of Kentucky, University of North Dakota, University of Tennessee, William Carey College (Miss.), and William Jewell College (Mo.).

Measures of Academic Potential and Performance

In this study the construct, academic accomplishment, was

represented by a test of academic potential (the ACT test battery) and by average high school grade. Both measures were obtained in the regular ACT program for testing high school students planning to attend college. The ACT test battery yields the following subtest scores: English, Mathematics, Social Studies, and Natural Science. These scores are averaged to yield a composite score. Each score is converted to a common scale with a mean of approximately 20 and a standard deviation of approximately 5 for college bound high school seniors.

The high correlations between the ACT battery and similar measures demonstrate that the ACT battery is a typical measure of academic potential so that we would not expect markedly different results in the present study, if we had used some other measure of academic potential such as the SAT or the SCAT. For example, research by Eells (1962) in Illinois colleges and universities indicates a median correlation of .53 between SAT verbal and ACT English, of .70 between SAT verbal and ACT social studies, and of .78 between SAT quantitative and ACT mathematics. Similar correlations are reported between ACT scores and SCAT and College Qualification Test scores. The reliabilities of the ACT test scores are also comparable to other tests of college potential (ACT Technical Report, 1960), ranging from .83 to .88 with a median of .85.

As a regular part of the ACT procedure, persons taking the ACT test are asked to report the grades they have received in high school

courses in four areas: English, mathematics, social studies, and natural science. Research by Davidsen (1963) indicates that in a large sample such self-reported grades correspond closely to grades for the same courses recorded on high school transcripts. A reanalysis of Davidsen's data indicated a correlation of .92 between student reported and school reported grades. The measure used in the present study is the overall average of all grades reported. In another study by Hoyt (1963) the predictive efficiency of average self-reported grades equaled that of the student's high school rank obtained from his transcript.

Measures of Non-Academic Performance

The assessment device used to estimate various student characteristics was called the American College Survey (Abe, Holland, Lutz, and Richards, 1965). The American College Survey is a booklet which contains a letter explaining the purpose of the survey and a series of sections planned to elicit information about a student's achievements, aspirations, attitudes, interests, potentials, values, and background. Students recorded their 1004 responses on two special answer sheets. The present study is concerned only with student achievement.

For the present study, the American College Survey was scored to yield 18 scales to assess a student's non-academic achievement in high school, competencies, originality, and "acquiescence" (the tendency to say yes in response to questionnaire items). The following section describes our knowledge of the assessment devices used in this particular

study.

Extracurricular Achievement Record. A checklist of extracurricular accomplishment for the high school years was used (Holland and Nichols, 1964) to obtain scores in the following areas: art, music, literature, dramatic arts, leadership, and science. Items ranged from common and less important accomplishments to rare and more important accomplishments. For example, science items included accomplishments such as: did an independent, scientific experiment; won a prize or award of any kind for scientific work or study; had scientific paper published in a scientific journal; placed first, second, or third in a national science contest; invented a patentable device; etc. Leadership items included: appointed to a student office, organized own business or service, received a Junior Achievement award, elected president of class, etc. The items in the remaining scales consisted of similar item content planned to assess a great range of achievement. The score on each scale is simply the number of accomplishments checked. Students with high scores on one or more of these simple scales have attained a high level of accomplishment which requires complex skills, long term persistence or originality, and which generally received public recognition so that in principle such accomplishments can be verified.

The reliabilities (K-R 21) for individual scales of accomplishment range from .48 to .75 for men and from .58 to .86 for women for

National Merit Finalists. In the American College Survey sample, the reliabilities (K-R 20) ranged from .72 to .84 for men and from .65 to .81 for women.

Range of Competencies. Students checked those activities from a list of 143 which "you can do well or competently." The assumption underlying these scales is that a large number of competencies is conducive to achievement generally and that competencies in a particular field are conducive to achievement in the same field. Typical items from this list included: I have a working knowledge of Roberts' Rules of Order, I can dance, I am a good cook, I can make jewelry, I can read blueprints, I can read Greek, I can operate a tractor, I can use logarithm tables, etc. The number of activities checked equals a student's range of competencies or total number of competencies. In the present study, scores were also derived for each student in the following areas of competency: scientific, technical, governmental, business and clerical, social and educational, arts, leadership, and foreign language. Items were assigned to scales by pooling the independent decisions of three judges. The total competencies score includes both the scales listed earlier and some athletic and homemaking competencies, and a few unclassifiable competencies. Students were then scored for each kind of competency. The reliability (K-R 20) for the total number of self-reported competencies was .94 and .93 for male and female college freshmen. For the different kinds of competency, reliabilities ranged

from .35 to .87 for men with a median of .74, and from .11 to .85 for women with a median of .71. The low reliabilities for some scales appear to result from the small number of items in those scales.

Interpersonal Competency Scale. This twenty-item, a priori scale was modeled after the work of Foote and Cottrell (1955), who defined interpersonal competence as "acquired ability for effective interaction," and who outlined a program of research to study this concept. Scale items simply poll the subject for those factors which Foote and Cottrell believe to be conducive to, or typical of interpersonal competency--good health, social experience and competencies, positive self-regard. The reliability (K-R 20) of the Interpersonal Competency Scale for groups of 6289 male and 6143 female college freshmen was .69 and .67 respectively.

Preconscious Activity Scale (Originality). This scale is an a priori scale developed to measure Kubie's (1958) notion of preconscious activity as a process in creative performance (Nichols and Holland, 1963). The Preconscious Activity Scale is a 38-item true-false scale with reliabilities (K-R 20) of .72 and .68 for male and female college freshmen. The predictive validities of this scale and its concurrent relationships with originality and interest measures imply that the Preconscious Activity Scale should be interpreted as an originality measure, especially in the fields of art, literature, and music (Nichols and Holland, 1963).

Acquiescence. This score was based on an entirely separate

section of the American College Survey which consisted of the Vocational Preference Inventory, a personality and interest inventory which is composed only of occupational titles (Holland, 1958). To take the inventory, a student marks "Yes" on the answer sheet for those occupations he likes and "No" for those occupations he dislikes. There are 160 occupations included in this inventory, and the measure of acquiescence used in this study was the number of "Yes" answers on items 31-160. The reliability (K-R 20) of this score is .97 for both the males and the females in the American College Survey sample.

Results

As a first step, a comparison was made between the distributions of test scores in our sample with the corresponding distributions in a national norm group.¹ Of the national norms routinely computed for the ACT tests, the most pertinent to this study are those for college bound high school seniors. Accordingly, the percentile distributions for the total sample (both sexes) for this study on the four ACT subtests were computed and compared with the 1962-63 norm group percentile distributions. The results in Table 1 reveal that on each ACT subtest the sample includes fewer persons with low scores than does the national norm group. This difference probably occurred because the norm group

¹All computations for this project were carried out on computers. The authors wish to thank C. Michael Beetner of the staff of the Measurement Research Center, University of Iowa for his skillful assistance in the processing of the data.

Table 1

Comparison of ACT Score Percentile Distributions for Sample
and for National Norm Group of College Bound High School Seniors

ACT Score	English		Mathematics		Social Science		Natural Science	
	Sample %ile	Nat'l %ile	Sample %ile	Nat'l %ile	Sample %ile	Nat'l %ile	Sample %ile	Nat'l %ile
32			97	97	99	99	99	99
31			96	96	97	97	98	98
30			93	94	95	95	96	96
29	99	99	90	91	92	92	92	92
28	97	97	87	88	89	89	87	88
27	94	95	83	85	85	86	82	83
26	90	91	78	81	79	81	76	78
25	85	86	72	76	72	74	69	72
24	78	79	68	72	66	69	63	67
23	69	71	62	67	60	64	55	60
22	61	64	55	62	54	57	48	54
21	52	57	50	57	47	52	43	49
20	42	48	43	51	40	46	38	44
19	33	40	37	45	34	40	32	39
18	25	32	31	39	29	34	26	32
17	19	25	25	33	22	28	20	26
16	14	20	20	27	17	22	16	22
15	10	15	16	23	12	18	12	18
14	8	11	12	18	9	13	9	14
13	6	9	9	15	6	10	7	11
12	4	7	7	12	4	7	5	8
11	3	5	5	9	3	6	3	6
10	2	4	4	6	2	4	2	5
9	2	3	3	4	1	2	2	3
8	1	2	2	3		1	1	2
7		2	1	2				1
6		1		1				

Note. --Sample N = 7262.

consisted of potentially college bound high school seniors while our
sample consisted of college freshmen who had already survived more

than one half of the freshman year. The differences in the distribution of test scores between the sample and the norm groups are statistically significant, particularly if tests of differences between means are used, but the sample is still a reasonable representation of the national college freshman population, since it does not depart markedly from the national score distributions. Equally important, a full range of talent is represented in the sample so that our results cannot be attributed to a narrow range of talent.

Correlations were computed separately for each sex between the measures of academic potential and performance (four ACT scores plus high school grades), the seventeen criteria (six scales measuring extra-curricular achievement, nine competencies scales, the Interpersonal Competency Scale, and the Preconscious Activity Scale), and a measure of acquiescence. These correlations together with the predictor inter-correlations, are shown in Table 2. The most notable finding in Table 2 is the low magnitude of the correlations between academic potential or performance, and artistic, scientific, and social accomplishment. The highest correlation is only .23, the median correlation is .04, and 26% of the correlations are negative. On the other hand, both the inter-correlations of the ACT tests and the correlations of the ACT tests with high school grades are quite consistent with the findings of other investigators (Eells, 1962) and with the normative data presented in the ACT Technical Report (1960). Therefore, it appears that the

Table 2

Intercorrelations and Correlations with Artistic, Scientific, and Social Accomplishment
of ACT Scores and High School Grades

Variables	Males (N = 3770)					Females (N = 3492)				
	ACT Eng.	ACT Math.	ACT Soc.St.	ACT N.Sci.	H.S. Average	ACT Eng.	ACT Math.	ACT Soc.St.	ACT N.Sci.	H.S. Average
ACT Mathematics	56					54				
ACT Social Studies	59	47				60	50			
ACT Natural Science	57	59	64			55	58	63		
High School Average	39	44	34	34		38	42	38	36	
Science Achievement	11	14	12	18	15	07	11	09	13	10
Leadership Achievement	10	06	07	03	21	09	09	08	06	20
Dramatic Arts Achievement	05	-03	03	00	08	05	00	07	04	10
Artistic Achievement	-01	-09	-02	-03	-05	-01	-03	-01	00	-05
Literary Achievement	14	02	13	07	10	18	09	16	11	16
Musical Achievement	08	00	03	03	02	05	04	00	03	06
Scientific Competency	07	11	05	17	13	08	19	11	20	13
Technical Competency	-10	04	-12	06	-06	-05	08	-05	04	01
Govt. & Social Studies Comp.	05	-05	15	04	04	09	03	20	09	11
Business & Clerical Comp.	00	-01	03	01	00	02	02	02	00	02
Social & Educ'l Comp.	-02	-10	-06	-10	-05	-02	-04	-03	-06	-01
Arts Competency	09	-06	03	01	00	08	-01	05	02	01
Leadership Competency	08	01	07	02	09	09	08	11	05	16
Foreign Language Comp.	17	06	11	05	04	23	13	17	10	07
Total Competencies	00	-05	-04	00	-03	02	04	02	03	02
Interpersonal Competency	-02	-07	-03	-07	-04	01	-02	-02	-02	-03
Preconscious Activity	14	01	14	13	-03	13	-01	16	13	-05
Acquiescence	-03	-04	-02	-03	-03	04	06	09	07	04

$r_{05} = .03$; $r_{01} = .04$

low correlations in Table 2 cannot be attributed to idiosyncrasies of the sample or to a narrow range of academic potential. The majority of the correlations between academic potential and artistic, scientific, and social accomplishment are statistically significant, but with N's as large as those used in this study a correlation accounting for less than one per cent of the variance is statistically significant. Therefore, in interpreting the results presented in Table 2 the absolute magnitude of a correlation is more pertinent than is its statistical significance.

The correlations among the measures of artistic, scientific, and social accomplishment, together with the Acquiescence Scale, are shown in Table 3. In Table 3 all correlations between the special competency scales and Total Competencies are uncorrected part-whole correlations. Interpersonal Competency, of course, is a separate true-false measure which did not enter into the computation of Total Competencies.

The intercorrelations shown in Table 3 indicate that there is some generality to artistic, scientific, and social accomplishments. While there are moderate correlations with Acquiescence, little of the covariation among the different measures of socially relevant performance and little of the true score variance in the individual criteria can be accounted for solely by a tendency to say "Yes" on questionnaire items. In general, the pattern of intercorrelations presented in Table 3 supports the construct validity of the various scales.

Table 3
Intercorrelations of Artistic, Scientific, and Social Accomplishments

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Science Achievement	--	31	37	39	42	34	34	21	12	19	14	29	21	27	32	08	18	11
2. Leadership Achievement	26	--	50	23	38	27	25	19	22	28	41	37	52	17	45	33	05	20
3. Dramatic Arts Achievement	34	46	--	36	50	43	18	10	18	23	32	50	40	19	40	22	16	17
4. Artistic Achievement	32	18	30	--	43	35	14	09	15	13	17	40	19	21	30	10	23	13
5. Literary Achievement	31	40	45	27	--	33	19	04	22	20	25	42	36	27	33	16	26	14
6. Musical Achievement	29	28	36	22	22	--	07	08	06	15	19	51	18	17	09	16	31	11
7. Scientific Competency	29	20	14	18	19	10	--	42	35	32	36	39	36	23	63	26	14	17
8. Technical Competency	22	29	26	22	19	19	38	--	09	31	24	24	24	03	59	22	-03	17
9. Govt. & Social Studies Comp.	12	20	18	13	26	04	33	15	--	27	34	37	37	21	43	24	16	18
10. Business & Clerical Comp.	11	27	17	07	18	13	20	28	19	--	39	39	43	20	56	28	00	19
11. Social & Educational Comp.	10	40	31	12	23	16	26	22	25	27	--	58	68	24	76	54	12	28
12. Arts Competency	22	40	52	35	40	41	38	36	35	29	55	--	56	35	79	36	33	29
13. Leadership Competency	17	55	39	13	40	17	28	28	30	34	62	51	--	22	72	45	11	29
14. Foreign Language Comp.	12	17	13	10	21	03	20	10	21	11	18	28	18	--	35	16	16	14
15. Total Competencies	25	48	45	29	37	28	56	62	40	45	71	82	70	30	--	50	20	33
16. Interpersonal Competency	11	34	28	11	19	12	23	24	19	24	54	44	44	17	53	--	03	22
17. Preconscious Activity (Originality)	10	06	19	22	24	07	12	04	17	-03	19	32	06	16	18	08	--	11
18. Acquiescence	10	18	18	13	18	05	21	21	18	15	21	29	23	12	31	20	26	--

$r_{05} = .03$; $r_{01} = .04$

Note. --Correlations for males (N=3770) are presented above the diagonal and for women (N=3492) below the diagonal.

Some investigators of the relationship between academic potential and socially relevant performance have implied curvilinear regressions (MacKinnon, 1960). To examine this possibility, Eta coefficients for each sex were computed between the ACT English score and the six criteria of extracurricular achievement, with the results shown in Table 4. These results show that in a few cases there is a reliable difference between the curvilinear correlation and the corresponding linear correlation, but a comparison of Table 4 with Table 2 indicates that there is little difference in the absolute magnitude of the two correlations. These results suggest that the deviations from linearity are negligible and can be ignored in view of the advantages of a linear conceptualization and treatment. An inspection of the plots of all other regressions between the measures of academic performance and potential, and the measures of extracurricular achievement supported this conclusion.

Table 4
Curvilinear Correlations between the ACT English Test
and the Achievement Scales

Variable	Males (N = 3770)		
	Correlation	Test of Hypothesis that E=0	Test of Hypothesis that E-r=0
	E	F	F
Science Achievement	.12	5.19**	.93
Leadership Achievement	.11	4.27**	1.13
Dramatic Arts Achievement	.07	1.52	.76
Artistic Achievement	.04	.61	.64
Literary Achievement	.16	8.63**	2.15*
Musical Achievement	.11	3.78**	1.84*
		df=11/3758	df=10/3758

Table 4 (cont.)

Variable	Females (N = 3492)		
	Correlation	Test of Hypothesis that E=0	Test of Hypothesis that E-r=0
	E	F	F
Science Achievement	.09	2.50**	.94
Leadership Achievement	.10	3.07**	.58
Dramatic Arts Achievement	.06	1.08	.24
Artistic Achievement	.05	.70	.73
Literary Achievement	.19	11.67**	1.53
Musical Achievement	.08	1.87*	1.04
		df=11/3480	df=10/3480

* $p < .05$

** $p < .01$

Note. --In computing these correlations, the ACT English distributions were divided into twelve categories.

As a final step, the 77 individual items in the extracurricular achievement scales were correlated (biserials) with the four ACT scores and the average high school grade. This analysis was important to perform for several reasons: since the scales of non-academic accomplishment contain many low level accomplishments, they may assess quantity rather than quality of accomplishment. Despite several item analyses in the past, the non-academic scales may also not be internally consistent so they will not correlate highly with any measure.

The distributions of correlations in Table 5 show that item-ACT score and item-average grade correlations are as negligible as are the correlations of the total accomplishment scales with measures of academic potential.

Table 5

Frequency Distribution of Biserial Correlations between
77 Non-Academic Achievements and Measures of Academic Potential

Biserial r's	Men		Women	
	4 ACT Scores	Mean HS Grade	4 ACT Scores	Mean HS Grade
36		1		
34				
32				1
30		1		
28		1		1
26		1		
24		1		2
22	3	3	1	1
20	2		2	5
18	9	3	12	2
16	9	3	9	1
14	13	4	9	2
12	15	1	12	4
10	19	5	26	5
08	22	3	24	8
06	21	5	31	8
04	28	6	39	5
02	36	3	28	5
00	29	4	23	5
-01	20	4	21	6
-03	32	8	19	7
-05	22	7	22	3
-07	8	4	17	2
-09	8	4	10	2
-11	8	3	1	2
-13	3	2	1	
-15	1		1	
Median r	(.03)	(.03)	(.05)	(.06)
N	308	77	308	77

The median correlation between the achievement scales and academic potential in Table 4 is about .04, and in Table 5 the median correlation

between the achievement items and academic potential is also about .04. Further, 89.6 per cent of the correlations in Table 5 fall between $\pm .15$. These results make clear that the low correlations cannot be attributed to scales which are not internally consistent or to an emphasis on quantity rather than quality.

Discussion

In contrast with most earlier studies of the relationships of academic potential and performance to socially relevant performance, the present study has several important strengths: a large sample, a wide range of talent, multiple predictors, and multiple socially-relevant criteria of accomplishment. Both the predictors and the criteria have moderate to high reliability. The evidence also does not indicate that the absence of relationship between measures of academic and non-academic achievement is due to strong curvilinear relationships which have gone unnoticed.

Along with its strengths, the present study has several plausible weaknesses. First, the criteria of socially relevant accomplishment rest on self-reports by the students. In the case of the Extracurricular Achievement Record, the criteria involve a student's retrospective report of what he did in high school. It is possible then that some students gave distorted reports of their achievements or simply forgot some achievements. On the other hand, since students were polled by an agency outside of their college there was no rational goal to be achieved

by distortion. Similarly, since students were second semester freshmen, admission to college, or the award of scholarship were no longer considerations which might lead to distortion. In this connection, the data for Davidsen's (1963) study of a comparable population indicate a correlation of .92 between self-reported and school reported grades, even when admission to college is a consideration.

Since the measures used do rely heavily on self-report questionnaires, one might assume that the negligible relationship between academic and non-academic achievement occurred because students responded at random or by marking their answer sheet almost entirely "Yes" or mainly "No." The use of an independent acquiescence scale consisting of 130 occupational titles indicates, however, that very little of the relationship among the variables is due to simple acquiescence. The relationships among variables shown in Tables 2 and 3 are also internally meaningful, and have both convergent and discriminant validity. For example, in the male sample Interpersonal Competency correlates .54 with Social and Educational Competency and .33 with Leadership Achievement, but only .08 with Science Achievement. If the reader traces each variable through Tables 2 and 3 in this fashion, he can see that the students for the most part must have been making rational discriminations among items and appropriate responses in order to produce these meaningful patterns of correlations.

Finally, the results of this study pertain mainly to what students

do in high school, and are not directly concerned with predicting performance in college. Recently, Holland and Nichols (1964) using the same records of non-academic performance used in the present study, found in a sample of extremely bright students that such records are the best predictors of non-academic performance in the freshman year of college. Equally important, the predictive validities for such records averaged .38, while the Scholastic Aptitude Test, for example, did not contribute significantly to any multiple correlation in that study.

The present study lends strong support to earlier studies which obtained similar results but generally used a narrow range of talent. For example, the studies by Thorndike and Hagen (1959), Getzels and Jackson (1962), MacKinnon (1960), Richards, Taylor, and Price (1962), Torrance (1962), Gough, Hall, and Harris (1963), Holland and Nichols (1964), and Astin (1962), all suggest that the relationships between measures of aptitude or academic potential and various measures of real life achievement or originality are typically small. Our study strongly implies that these earlier findings hold for broad ranges of talent, and that attempts by critics to attribute all these earlier findings to methodological and statistical defects--restriction of range and unreliability of predictors or criteria--are no longer plausible. Taken together, these studies of academic and non-academic potential and achievement make it clear that academic potential and achievement have little relationship to other kinds of non-academic potential and socially important performance. Therefore,

the burden of proof would seem to rest on those who feel that the findings of all of these studies are due to errors of various sorts and that really there is a substantial relationship between academic and non-academic accomplishments.

The implications of the present study and its forerunners are pervasive and important for the selection and training of students and employees, and for the process of education. Since academic potential appears to be only one of several relatively independent dimensions of talent, it should be used with discrimination rather than as a panacea. We should continue to develop other independent measures of achievement and originality. Further, we should consider such measures as important in their own right and not as weak supplementary measures to remedy the slight defects of conventional aptitude and achievement tests. At the same time, we should not make the same mistake that the purveyors of aptitude and intelligence have made in the past; that is, to rely on only one kind of measure and to exclude others.

Measures of academic potential are the chief methods used to determine admission of students to college. Thus, a most significant implication of the present findings is that the emphasis in colleges and universities on academic potential, since such potential is a relatively independent dimension of talent, has led to neglect of other equally important talents. If academic talent had a substantial relation with vocational and other non-classroom achievement, then this intense,

pervasive concern with academic potential would be less disturbing. Unfortunately, college grades are generally poor predictors of real life success (Price et al., 1964; Taylor, Smith, and Ghiselin, 1963; Richards, Taylor, and Price, 1962) and are at best only inefficient predictors (Taylor, 1963). Put another way, these findings imply a need to examine grading practices, since a college education should be largely a preparation for life, both in the community and in a vocation. Under current grading practices a college education is mainly preparation for more education in graduate school.

Some of the practical applications of our findings seem clear. If a sponsor is interested only in finding students who will do well in the classroom in college, then high school grades and tests of academic potential are the best techniques available. On the other hand, if a sponsor wishes to find college students who will do outstanding things outside the classroom and in later life, then he should continue to make an effort to secure a better record of the student's competencies and achievements in high school. Our results support some of the items used for this purpose in typical application blanks for admission to college, scholarships, and fellowships, but they also suggest the potential usefulness of a more active effort to secure a more reliable and valid record of each student's past achievement and involvement.

Finally, national surveys concerned with the conservation of talent, since they use tests of academic potential almost exclusively, probably

present a grossly inaccurate picture of the loss of talent for "real life"--that is, non-classroom--accomplishment. Such surveys should incorporate measures of other important dimensions of potential to remedy the distortions in past assessments of talent loss.

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