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PERFORMANCE BY HIGH AND LOW RISK COLLEGE FRESHMEN ON MEASURES OF CREATIVITY.

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To examine the use of creativity measures as supplementary, supportive data in college admissions procedures, and to examine the relationships between level of aspiration measures, actual college performance, and creativity measure performance, 18 high- and low-risk freshmen entering Tufts University completed three creativity measures and the Worell level of aspiration scale in September 1964, and repeated the Worell scale in February 1965. Scholastic Aptitude Test (SAT) scores, predicted grade point averages (GPA), and advisor creativity ratings were obtained for each subject. The Word Association Test, Uses Test, Make-up Problems Test, and Jackson's "Creativity and Intelligence" were used as creativity measures. The results of this study suggest that creativity measures would not provide useful admissions information at Tufts University, but do suggest that aspiration level measures may provide useful information in predicting college performance. The low-risk group exhibited higher levels of aspiration, more realistic estimates of aspiration level, and superior performance on the SAT and GPA's earned compared with the high-risk group. Advisor ratings were not found useful. (WR)

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PERFORMANCE BY HIGH AND LOW RISK COLLEGE FRESHMEN ON MEASURES OF CREATIVITY

Cooperative Research Project Number 5-8201-24

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CHAPTER I

RESEARCH PROBLEM AND OBJECTIVES

It has been predicted that, in the next decade, the number of students seeking admission to colleges and universities in the United States will double. As the emphasis on technical or advanced training as a prerequisite to admission to the world of work increases, the number of students who will seek a college education will increase. Some universities are in a position to expand their physical facilities as well as their instructional staff to accommodate more students. Other colleges, limited by physical space or administrative policies regarding the maximum size of the student body, have raised requirements for admission and have become more selective in their choice of students. A few colleges have instituted limited programs for the admission of "calculated risks" in an attempt to provide a college education for students whose past academic performance does not meet the usual standards for admission.

The flood of applications for admission to colleges and universities not only has brought increased pressure on admission committees who must make decisions on who shall be admitted, but has also called for sober reflection and re-assessment of existing admission policies. Bowles (1) summarized this particular problem when he stated, "The difficulty lies in the fact that the change in the numbers, the aspirations, and the needs of applicants which have produced the shift toward the

general use of selective admissions has not be paralleled by any significant change in the process itself." The use of Scholastic Aptitude Test scores as well as high school grades and/or rank in class remain the major source of information on which admission decisions are based. Palmer (9) reflects the rationale behind the use of these criteria as follows. "Here (Tufts University), as at most colleges, a statistically adjusted blend of secondary school records and college board scores is still the most efficient way to predict the marks our professors will assign."

Despite some limitations, college board scores and secondary school records provide valuable "objective" data on which to base decisions for admission to college. Although admission officers and their committees are willing, at time, to "fly in the face of all numerical evidence..." (9) in order to admit a particular candidate to college, the existence of alternative objective data on which to base decisions for selection of candidates for admission to college has not been demonstrated. Studies in the area of divergent thinking or creativity have suggested that these measures may provide additional important information in the identification of able students. While a more detailed discussion of these findings is presented in Chapter II, it should be indicated here that several studies have shown that performance on measures of creativity is relatively unrelated to the more traditional measures of IQ.

The present study is designed to examine the utility of employing measures of divergent thinking, creativity, as supplementary or supportive data for the identification of students whose talents and ability to do acceptable college work may not be reflected adequately by "formal paper records". It is important to emphasize the terms "supportive" and "supplementary" in the above statement. It is not within the scope of this study to evaluate the effectiveness of the Scholastic Aptitude Test scores or high school grades as criteria for admission to college. It is felt that the identification of any additional "objective" evidence that would serve to aid in the selection of students for admission to college would constitute a useful contribution. It is assumed that as the total number of applications to college increases, the number of students who, on the basis of aptitude test scores and high school performance, may be classified as "fully qualified" for admission will increase also. Anyone associated with high school guidance programs or college admissions offices will attest to the reasonableness of the above assumption. Even in state-supported institutions, whose admission policies are more flexible than those of private institutions, admission officers are forced to deny admission to qualified candidates because of lack of facilities.

Admissions officers have developed "hunches" or other sources of subjective evidence, developed through years of experience, which allow them to select candidates whose "formal

paper records" are not outstanding but who seem to have "something special" as a criteria for admission. It is hoped that the present study may aid in providing data which will support these hunches and allow admission committees to select students on the basis of more objective evidence.

Before presenting the specific objective of this study, a brief discussion and description of the term "predicted grade-point average" must be introduced. The "predicted grade-point average" occupies a central position not only in the present study but also in admissions procedures in many colleges and universities. A "predicted grade-point average" is an estimate of the grade-point average an applicant is expected to achieve if admitted to college. Although the specific measures used in the development of the "predicted grade-point average" will vary from one institution to another, the scores from the aptitude portion of the Scholastic Aptitude Test, the scores on the various Achievement tests associated with the Scholastic Aptitude Test, rank in class in high school and overall grade-point average in secondary school are common sources of data. By assigning different weights to each measure used, a formula is developed which allows the particular college to predict how well an applicant may be expected to perform if admitted. The original development of the weight assigned is based on data collected from students who have already been admitted to college. Over a period of years these weights are adjusted until the prediction level of this formula becomes quite high. For

example, if a particular college placed great emphasis on the humanities, the formula for that college would have a higher weight assigned to the Verbal portion of the Scholastic Aptitude Test.

The specific objectives for the present study may be summarized as follows:

1. To determine if there is a significant relationship between performance on measures of divergent thinking (creativity) and predicted grade-point averages as well as actual grade-point averages for the Freshman class enrolled at Tufts University.

2. To determine if the addition of the scores from several measures of divergent thinking significantly improves the prediction of the actual grade-point average obtained during the freshman year.

3. To determine if the Worell level of aspiration scale is significantly related to performance on measures of divergent thinking, to predicted grade-point average and to actual grade-point average during the freshman year.

4. To determine if there are significant differences in performance on measures of divergent thinking and on the Worell level of aspiration scale by high risk and low risk admission groups.

5. To determine if ratings by freshman advisors on a scale of creativity are significantly related to performance on various measures of divergent thinking.

To summarize, the present study will examine the utility of using measures of divergent thinking to increase the accuracy of the predicted grade-point average formula. This study will also examine the relationship between level of aspiration measures and actual performance in college as well as performance on measures of divergent thinking.

CHAPTER II

RELATED LITERATURE

The research literature which is pertinent to this study is of rather recent origin and comes from research interests which are not related directly to the problem under investigation. The literature reviewed here will be considered under two major headings. The first deals with studies on divergent thinking or creativity, especially as they relate to aptitude and achievement. The second area to be considered is concerned with various factors which have been used to predict academic success. More specifically, the non-cognitive measures such as level of aspiration as they relate to academic achievement will be reviewed.

The work of Guilford and his associates on the "structure of intellect" (6) provided an important first step in the study of the multiple factors which are collectively referred to as intelligence. In the development of a general theory of intellectual functioning, Guilford describes three major areas or groups of factors. Guilford suggests that intellectual capacities vary in terms of the "content" of the information which a subject selects for data as a source of intellectual activity. A second area is described by Guildord as "products". This area refers to the specific behaviors engaged in by a subject in the manipulation of data. The third area, and the area that is of greatest relevance to the present study, is

termed "operations". This area deals with the processing behaviors used by a subject in problem solving.

Within the area of "operations" are two factors which relate specifically to the intellectual productions of the subjects. One operation, "convergent thinking," is defined by Guilford as follows. "In tests of convergent thinking there is always one conclusion or answer that is regarded as unique, and thinking is to be channeled or controlled in the direction of that answer..." (6). Current usage of the term "convergent thinking" has focused on what have been referred to as "traditional" measure of IQ such as standardized aptitude tests and measures of achievement. In both cases, there is one predetermined correct answer. The relevance of "convergent thinking" for this study is the defining of the Scholastic Aptitude Test as a measure of convergent thinking.

The other operation is labeled "divergent thinking". This operation is characterized by Guilford as "..being less goal bound. There is freedom to go off in different directions." (6) Many of the "creativity" measures is use are attempts to sample divergent thinking. In these measures, there is no one predetermined correct response. For the present study, it is useful to employ performance by a subject on measures of divergent thinking as an operational definition of "creativity".

Although divergent and convergent thought processes belong to the same class of intellectual factors, these two operations are relatively independent of each other and sample

two quite distinct methods of dealing with intellectual problems. The identification and demonstration of these two apparently independent operations provided the impetus for a series of studies which focused on the relationship between tests of aptitude and achievement and measures of creativity.

Torrance (11) performed a series of studies on elementary school children using some of Guilford's measures of divergent thinking and developing several additional measures which were appropriate for the age of his subjects. In general, Torrance appears to have done the most complete work in this area of any of the many researchers in the field. Torrance reports that, "The virtual lack of relationship between measures of creative thinking and IQ is also shown when the two are correlated. In most cases, the relationship is little more than can be expected by chance." (11 p. 59). Torrance differentiated between the "highly creative" and the "highly intelligent" child by using measures of creativity and the Stanford-Binet Intelligence Test. He stated, "The highly creative group ranked in the upper 20 percent on creative thinking but not on intelligence. The highly intelligent group ranked in the upper 20 percent on intelligence but not on creativity. Those who were in the upper 20 percent on both measures were eliminated, but the overlap was small. In fact, if we were to identify children as gifted on the basis of intelligence tests, we would eliminate from consideration approximately 70 percent of the most creative.

This percentage seems to hold fairly well, no matter what measure of intelligence we use and no matter what educational level we study, from kindergarten through graduate scho -." (11 p.5).

The studies of Torrance appear to confirm the findings of Guilford of two rather independent types of intellectual talent. Torrance further indicates that the existence of a high degree of intellectual talent (IQ) is usually not accompanied by an equally high degree of creative ability. Although the bulk of Torrance's work was with elementary school children, his studies suggest that the independence of these two types of intellectual ability holds through advanced graduate work.

Getzels and Jackson (5) have provided a study of the relationship between IQ and creativity for a group of secondary school subjects. In general, the findings of Getzel and Jackson support those of both Guilford and Torrance. Getzels and Jackson state, "... the items on the typical intelligence test seemed to us to represent a rather narrow band of intellectual tasks, relying chiefly on those in Guilford's terms convergent thinking and neglecting those requiring divergent thinking." (5, p.2). Despite the clear differences in performance on IQ and creativity measures, Getzels and Jackson reported no significant differences in level of scholastic achievement between the "high IQ" and the 'high creative" groups. Questions have been raised regarding the selectivity of the sample used by Getzels and Jackson. In spite of the fact that students in the

upper 20 percent in IQ were excluded from their study, the mean IQ for the high aptitude group was 150 while the mean IQ for the high creative group was 123.

Two additional findings by Getzels and Jackson are of interest to the present study. Although no significant differences in academic performance was found for the two groups, when teachers were asked to indicate which students were considered more "desirable," the high IQ students were selected more often than were the high creative students. There appears to be a vague inference in this finding that the high creative students were more difficult to deal with in the classroom or that their classroom behavior was not viewed by the teacher as being totally appropriate. Getzels and Jackson also investigated differences in performance on McClelland's need-achievement scale by the "high IQ" and the "high creative" groups. They reported no significant differences in performance.

Edwards and Tyler (3) questioned whether findings similar to those reported by Getzels and Jackson would be found with a "non-selective" group. Edwards and Tyler reported findings from a "non-selective" sample of Junior High School students where measures of achievement, aptitude and creativity were used. In contrast to the groups used by Getzels and Jackson, the Edwards and Tyler groups had a mean IQ of 123 for the "high aptitude" group and a mean score of 102 for the "creative" group. It should be noted that the mean IQ for the high aptitude group in the Edwards and Tyler study is the same mean IQ reported by

Getzels and Jackson for their high creative group. In comparing the achievement of the high aptitude group with that of the creative group, Edwards and Tyler reported significantly higher achievement test scores (STEP) for the high aptitude group. These findings do not support the results of Getzels and Jackson. In a discussion of these findings, Edwards and Tyler state, "Perhaps for subjects below average in general scholastic aptitude (as many of our high creativity subjects were) abilities measured by creativity tests cannot compensate for the lack of abilities measured by intelligence tests of the more traditional sort." (3). These authors also identified a "twice talented" group who showed superior performance on both the creativity as well as the aptitude measures. When compared to the high aptitude group, the "twice talented" group did not differ significantly on STEP scores (aptitude) but was significantly lower on grade-point average.

The research findings in the area of creativity appear to provide evidence that two quite distinct groups may be identified. These two groups are typically referred to as the "high IQ" group and the "high creative" group. Although Edwards and Tyler reported finding for a "twice talented" group, the research available suggests that the overlap in talent on both IQ measures and creativity measures is not large. Edwards and Tyler reported that their "high aptitude" group showed significantly higher levels of achievement although Getzels and Jackson reported no significant difference. Other studies

have been reported which focus on the relationship between academic achievement and a series of "non-cognitive" factors.

In a study using the California Psychological Inventory, Holland (8) reported that using this scale in conjunction with the Scholastic Aptitude Test adds significantly to the correlation between aptitude and grade prediction. In another study using a series of personality measures, Holland (7) reported that several scales such as "deferred gratification," "super-ego," and "persistence" were useful in predicting academic achievement. Holland stated, "The implications of the present investigation, which are consistent with our growing knowledge of creativity, argue against the uncritical use of high school and college grades as predictors of post-college achievement ans as unqualified criteria for selecting persons for admissions, scholarships, fellowships and jobs" (7).

If non-cognitive factors are in fact of importance in academic achievement, the specific factors which appear to contribute to increased achievement have been difficult to identify. There has been some speculation that a critical element in the "need for achievement" may be the level of aspiration of the subject. The history of the development of studies on level of aspiration is lengthy and the results have often been conflicting or lacking in a central concept or model. Studies by Festinger (4) and Sears (10) of the discrepancy scores between actual and predicted achievement employed a

"reality-irreality" continuum where a high discrepancy was seen as reflecting a high degree of irreality and a small discrepancy reflected a more "reality-oriented" individual. Although Worell (12) found the "reality-irreality" continuum of value in his investigation of the relationship between level of aspiration and academic achievement for college students, he modified the method by which the measure of "actual" achievement was obtained. Instead of using the traditional measure of actual achievement, actual grades or test performance, Worell asked the subject to provide an estimate of actual performance level. Specifically, Worell obtained an estimate of the subject's previous performance with the question, "How do you think your average grades compare with those of your classmates?" (12 p. 48). In relating academic achievement to level of aspiration measures, Worell stated, "Thus for example, two persons with identical scores of previous performance, the one with the more discrepant scores is expected to perform less well since achievement situations for him evoke more unrealistic behaviors." Worell reported statistically significant differences between academic achievement of students whose discrepancy scores were large, "unrealistic," and those students whose estimates were classified as being more "realistic". Superiority in academic achievement was associated with low discrepancy scores.

CHAPTER III

METHOD AND PROCEDURE

SETTING

The subjects for this study were members of the entering Freshman class in 1964 at Tufts University, which is a small, liberal arts university enrolling both men and women. Although the University is coeducational, the men are admitted to Tufts College while the women enroll in Jackson College. Each of these two colleges has an admissions office although there is considerable coordination between the two offices. The Trustees of Tufts have voted to keep the size of the undergraduate student body at its present level of about 550. As the number of applications for admission to Tufts increases, the admissions policies will clearly become more selective in order to maintain the same size student body.

Approximately 2400 males apply each year for admission. About 350 or 10.4 percent of the applicants are admitted. About 1450 females submitted applications to Jackson College and some 210, or 14.4 percent, were admitted. The mean Scholastic Aptitude test scores reflect the "selective" nature of the University. For the males, the mean SAT-verbal score was 615 and the mean SAT-mathematics was 642. For the females, the mean SAT-verbal was 632 and the mean SAT-mathematics was 622. These SAT scores place the students admitted in the upper 15 percent of those taking the Scholastic Aptitude test.

Despite the selective nature of the admissions procedure, Tufts has, each year, traditionally admitted a number of students who, on the basis of SAT scores and high school records, would be classified as "high risk" admissions. In one year, for example, about 25 percent of the men admitted were predicted to earn an academic average at Tufts of "less than C level" (9). Overall, about 7 to 8 percent of all students admitted have scores on the SAT of below 500.

SUBJECTS

In the Fall of 1964, 340 men and 210 women were admitted as Freshmen to Tufts University. On the basis of the predicted grade-point average computed on each applicant, 90 students were classified as "high risk" admittees and another 90 were classified as "low risk" admittees. The ratio of males-to-females at Tufts University is about 3:2. In order to conform to this ratio, for each group of 90, 55 males and 35 were females. The mean predicted grade-point average for the four groups is presented in Table 1. The grade-point average is computed on the basis of 4.00 for "A".

Table 1

Mean Predicted Grade-Point Averages for High and Low Risk Groups

	High Risk		Low Risk	
	Mean	S.D.	Mean	S.D.
Males	1.84	.317	3.01	.266
Females	2.13	.502	3.44	.198

The mean predicted grade-point average of 1.84 for the high risk males corresponds to a "high D". The mean for the high risk females corresponds to a "low C". The mean predicted grade-point averages for the low risk groups correspond to "B averages".

PROCEDURE

During the week prior to registration for the Fall semester, incoming Freshmen are required to attend a series of Orientation Meetings. It was in this time period that the initial testing of the entire Freshman class was done. Each subject completed three "creativity" measures and the Worell level of aspiration scale. Scholastic Aptitude Test scores as well as predicted grade-point averages for each subject were obtained from the Office of Admissions.

Early in February of 1965, the Worell level of aspiration scale was administered for a second time to the 180 subjects. This time period was selected because it was long enough after final examinations for the subject to have received their Fall semester grades and early enough in the Spring semester to allow students time to complete the scale.

Every Freshman at Tufts is assigned an advisor who works with the student on his academic program and serves as a source of information and guidance. At the end of the academic year (May), each advisor was sent a list of his advisees and asked to complete a short rating form for each advisee dealing with

the "creativeness" of the student. The list sent each advisor contained all of his advisees. This was done so that the advisor was unable to determine which of his advisees were subjects for the study.

INSTRUMENTS

The three measures of "creativity" were taken from Getzels and Jackson's Creativity and Intelligence (5). Standard instructions and scoring procedures were used. The three tests used were: Word Association Test, The Uses Test, and The Make-Up Problems Test.

The Word Association Test was selected as it appears to have a strong verbal loading and measures the ability to change frames of reference. The Make-Up Problems Test was selected as it appears to have a strong quantitative loading. The Uses Test was included as it appears to be the least affected by either verbal or quantitative abilities.

Level of aspiration was measured by the Worell Scale. This scale asks the subject to respond on a 10-point rating scale to five questions. The Worell Scale is designed to allow the subject to predict not only his future performance but also to predict how well he is performing relative to others. This scale has been found to be valuable in differentiating between high and low achievers in a college situation.

CHAPTER IV

RESULTS

The "high risk" and the "low risk" groups used in this study were selected according to their predicted grade-point averages. Prior to the presentation of the data, it should be demonstrated that two independent groups are being compared. Table 2 presents the t-tests for significance of differences (2) for the two groups. The means and standard deviations for the two groups have already been presented in Table 1.

Table 2

Significant Differences of Mean Predicted Grade-Point Averages for High and Low Risk Groups

Group	Comparison	Difference in means	t	p
Total Male and Female	High vs. low risk	1.24	22.55	.01
Males	High vs. low risk	1.17	21.27	.01
Females	High vs. low risk	1.31	14.72	.01
High Risk	Males vs. Females	0.29	3.05	.01
Low Risk	Males vs. Females	0.43	9.56	.01

Examination of Table 2 indicates that the two groups, high and low risk, may be considered as independent groups. It was hoped that no significant differences due to sex would

be found but such was not the case. Not only is the mean for the low risk group significantly higher than that for the high risk group, but the mean predicted grade-point average of the females for both the high and the low risk groups is significantly higher than that of the males for each group. Since Tufts has had a history of being somewhat more selective, as reflected by SAT scores, for the females, this finding is considered to be in line with the admission experience at Tufts. Because of the finding of sex differences, the data to be presented in this Chapter will be divided by sex as well as by risk group assignment.

It has been demonstrated that the high and the low risk groups do differ significantly for predicted grade-point average. Table 3 summarizes the analysis of significance of differences in actual grade-point averages earned at Tufts during the freshman year. Examination of Table 3 indicates that the low risk

Table 3

Significant Differences of Mead Actual Grade-Point Averages for High and Low Risk Groups

Grade-Point Average	Sex	Risk Group	Mean	t	p
Fall	Male	Low	2.77		
		High	2.03	7.12	.01
	Female	Low	2.98		
		High	2.32	4.55	.01
Spring	Male	Low	2.70		
		High	2.09	5.55	.01

Table 3
(Con't.)

Grade-Point Average	Sex	Risk Group	Mean	t	p
Cumulative	Female	Low	3.02	4.69	.01
		High	2.34		
	Male	Low	2.74	6.80	.01
		High	2.06		
	Female	Low	2.99	4.93	.01
		High	2.31		

groups for both the males and females earned a significantly higher grade-point average when compared with the high risk group. When the numerical grade-poing average is converted to a letter grade (4.00 being equivalent to "A"), it is clear that while the subjects in the two groups did satisfactory work, about "C" level, with the exception of the Spring grade-point average for the low risk females, the grades are not outstanding. It was pointed out in Table 2 that the females, in general, performed somewhat better than the males at Tufts. The data presented in Table 3 supports this finding. A comparison of the mean cumulative grade-point averages for the high and low risk groups indicates that the low risk males obtained an average of about "C to C-plus" while the high risk males earned a "low C" average. The low risk females earned a mean cumulative grade-point average of 2.99 which is almost a "low B" while the high risk females obtained a "C" average. Not only do the high and low risk groups differ significantly on pre-

dicted grade-point averages but they were significantly different in actual grades earned during the freshman year.

The predicted grade-point average at Tufts is adjusted and revised periodically as additional data on actual performance by freshmen becomes available. It should be noted that while the Office of Admissions at Tufts is concerned with predicting the level of performance of the students during their four academic years, they are specifically concerned with predicting level of performance during the first year and even during the first semester. If a student is unable to complete the first or second semester of the first year successfully, prediction for the next three years is irrelevant. Table 4 presents correlation coefficients for the predicted grade-point average and the actual grades received during the freshman year. While many of the coefficients presented in Table 4 are statistically significant, none of them are extremely high. Although the correlation coefficients for the relationship between Fall-Spring, Fall-Cumulative, etc. are not included in Table 4, they are all .70 or higher.

Table 4 presents a variety of findings. When the correlations for high and low risk groups, including both male and female are examined, a significant correlation exists between the predicted grade-point average and the three sets of actual grade-point averages. In both cases, the correlation for the Fall average is higher than that for the Spring average.

Table 4

Correlation Coefficients for
Predicted vs. Actual Grade-Point
Averages for High and Low Risk Groups

Risk Group	Sex	Fall	Spring	Cumulative
Low	Male and Female	.371**	.253*	.320**
High	Male and Female	.376**	.217*	.325**
Low	Male	.379**	.088	.244
High	Male	.138	- .034	.059
Low	Female	.231	.192	.211
High	Female	.570**	.301	.489**

*Significant at .05 level; **Significant at .01 level

When the correlations for high and low risk groups are examined for each sex separately, the number of significant correlations between predicted grade-point average and the actual grade averages decreases. There is a significant correlation between predicted grade-point average and Fall grade-point average for the low risk males and the high risk females. The rather modest size of the correlation coefficients presented in Table 4 suggests that the present predicted grade-point average formula should be re-examined and revised to develop more acceptable correlations.

The next area to be considered is the performance by the high and low risk groups on the three measures of divergent thinking, creativity. It was indicated in Chapter III that

the three measures of divergent thinking were selected to sample three somewhat different talents. Table 5 summarizes the correlation coefficients for these three measures for the high and low risk groups. Our expectation that the three measures would sample somewhat different talents, and not be highly intercorrelated, is supported in large part. The correlation between the Word Association Test and the Uses Test for both the high and low risk groups is significant at the .05 level.

Table 5

Correlation Coefficients for Divergent Thought Measures for High and Low Risk Groups

Risk Group	Sex		Divergent Thought Measures: Uses	Divergent Thought Measures: Problems
Low	Male and Female	Word Assoc.	.202*	.133
		Uses		.051
High	Male and Female	Word Assoc.	.260*	.035
		Uses		- .024
Low	Males	Word Assoc.	.160	.208
		Uses		.012
High	Males	Word Assoc.	.118	.020
		Uses		- .081
Low	Females	Word Assoc.	.284*	.053
		Uses		.129
High	Females	Word Assoc.	.561**	- .054
				.112

*Significant at .05 level; **Significant at .01 level

When the correlations between the three measures are divided by sex, no significant correlations were found between the three measures for the males for either the high or low risk group. Both the high and low risk females had significant correlations between the Word Association Test and the Uses Test. The original premise that the Uses Test was not significantly affected by verbal fluency does not appear to be supported at least for the females in the present study.

Table 6 presents the mean scores for both the high and low risk groups for the three measures of divergent thinking. When a "t-test" of the significance of differences in performance between the high and low risk groups on each of the measures was performed, only one mean difference was found to be significant. The low risk males performed significantly better on the Word Association Test than did the high risk males. In general, the low risk males performed slightly better on the Uses Test and the Make-Up Problems Test. No such trend is apparent for the females.

The data presented in Table 6 indicate that performance on measures of divergent thinking, creativity, is not significantly different for the high risk and the low risk groups. That is, these two groups perform about equally well on these measures. It was decided to separate the high and low risk groups into two samples which were designated "high creative" and "low creative". It was found that subjects who performed

Table 6

Mean Scores on Measure of Divergent Thought by High and Low Risk Groups

Creativity Measure	Sex	Risk Group	Mean	Std. Dev.
Word Association	Male	Low	61.0**	10.12
		High	53.3	12.44
	Female	Low	62.4	10.89
		High	61.8	8.44
Uses Test	Male	Low	27.3	10.99
		High	24.6	12.44
	Female	Low	26.7	7.19
		High	27.6	9.85
Make-Up Problems	Male	Low	16.0	9.26
		High	12.5	10.52
	Female	Low	12.1	8.10
		High	13.3	7.37

** Significant at the .01 level

well on one measure of creativity did not necessarily perform as well on the other two measures. The data to be discussed was collected from three somewhat independent groups. For each of the three measures, those subjects having the top and bottom 10 percent of the scores on that measure were designated as "high" and "low" creative. There was little overlap of subjects from one measure to the other. Table 7 presents the data for the Uses Test. Examination of Table 7 indicates that the "high creative" group earned a significantly higher cumulative grade-point average than did the "low creative" group. No significant

differences in grade-point average for the "high creative" and the "low creative" groups were found for either the Word Association Test or the Make-Up Problems Test.

Table 7

Mean Cumulative Grade-Point Averages for High and Low Creative Subjects for the Uses Test

Sex	Creativity Group	Mean Cumulative Grade-Point Av.	t	p
Male and Female	High Low	2.69 2.04	2.41	.05
Male	High Low	2.61 2.03	2.37	.05
Female	High Low	2.81 2.06	2.45	.05

The "high creative" groups earned a cumulative grade-point average of about a high C, while the low creative had a grade-point average of low C. Again, the females performed somewhat better than the males regardless of creativity group.

If there are no significant differences in performance on tests of creativity for the high and low risk groups, the question of what factors do differentiate between these groups continues to be of importance. Worell's work with "level of aspiration" suggested that the high risk students would have significantly different aspiration levels than those in the low risk group. The Worell test was administered both in September and again in February to both the high and the low risk students.

In scoring the test, rank scores from one to ten were used with a score of ten representing the "positive" or "high" end of the scale (terms used were "very much more" and "very much harder") while a low score represented the other end of the continuum.

Table 8 summarizes the results of the two administrations of the level of aspiration test to the high and low risk groups. A copy of the Worell scale is included in the appendix.

Table 8

Mean Level of Aspiration Scores for High and Low Risk Students

Test Time	Sex	Risk Group	Item: 1	2	3	4	5
Sept.	Male	Low	6.8	6.8	7.2	7.8	8.2
		High	6.7	5.9	6.9	7.6	7.9
	Female	Low	7.1	6.8	6.9	7.0	8.1
		High	6.7	6.2	6.8	7.3	7.9
	Total	Low	6.9	6.8	7.1	7.6	8.2
		High	6.7	6.1	6.8	7.5	7.9
Feb.	Male	Low	6.2	6.6	7.4	8.3	8.1
		High	6.3	5.3	6.9	7.5	7.8
	Female	Low	6.3	6.8	6.7	7.9	8.1
		High	6.0	5.6	6.7	7.6	8.2
	Total	Low	6.3	6.7	7.1	8.2	8.1
			6.2	5.4	6.8	7.5	8.0

1 - Effort
2 - Past
3 - Future
4 - Capacity
5 - Satisfaction

It is of interest that for item No. 5 (How well would you like to do to be reasonably satisfied?) that there were no significant differences between the high and low risk groups considered together, or when considered separately. In all cases, on a 10-point scale, these subjects indicated that they would want to do "very well" in order to be reasonably satisfied. Their minimal standards are, therefore, high. Because this is a rather selected sample, in terms of SAT scores, this suggests that these subjects are used to doing well and are not satisfied with poor performance.

There were no significant differences between mean scores for No. 1 (How hard do you work?) for the high and low risk subjects on the September measure. The mean scores (about six or seven) suggest that these subjects feel that they put in slightly more than average effort compared to other students. It is interesting to note that there is a general drop in score from September to February for the high and low risk groups. While not all these differences in score are statistically significant, the general result is a feeling by these subjects, after one semester of school, that their effort in studying tends to be viewed as"average". It may be that, in comparing their study efforts with others, these subjects feel that they are studying about as hard as most other students. In response to item No. 2 (Compare your grades with others), the low risk group mean score was significantly higher than that of the high

risk group. This reflects a realistic appraisal of relative standing with their classmates. There was no significant change in this perception by the low risk group from September to February, but, for the high risk group, there was a decrease in mean scores from September to February that was statistically significant. While there was a decrease for the high risk group, their estimates in February suggest that they perceive their grades as about "average" in relation to the rest of the student body.

In response to item No. 3 (Howe well will you do in the future?), there were no significant differences from September to February for either the high or low risk groups. For the males, on the February measure, the low risk group had a significantly higher mean score when compared to the high risk group. That is, for the male subjects, the estimate of future performance was significantly higher for the low risk group. For item No. 4 (How well could you do at capacity?), all groups indicated that their grades could be "much higher". Except for the male group, differences between high and low risk or from September to February, there were no significant differences. Again, the male, low risk group predicted significantly higher "capacity" when compared to the male, high risk group.

Worell indicates that the high risk student is more likely to be less realistic, show higher discrepancy scores, in his level of aspiration estimates than are the low risk

students. Table 9 presents the mean discrepancy scores for the four scales developed by Worell. In general, the high risk subjects have significantly higher discrepancy scores. It is of note that it is also the high risk subjects that show an increase in discrepancy scores from September to February.

Table 9

Mean Discrepancy Scores for
High and Low Risk Students

Test Time	Sex	Risk Group	SCALE A	B	C	D
Sept.	Male	Low	10.9	10.5	11.1	11.5
		High	10.9	10.8	11.5	11.8
	Female	Low	10.4	10.1	10.7	11.3
		High	10.6	10.5	11.1	12.1
	Total	Low	10.7	10.3	10.9	11.4
		High	10.7	10.7	11.3	11.9
Feb.	Male	Low	12.1	10.7	11.7	11.4
		High	11.3	11.6	12.2	12.6
	Female	Low	11.6	10.2	11.0	11.2
		High	11.5	11.0	12.0	12.3
	Total	Low	11.9	10.5	11.4	11.3
		High	11.4	11.4	12.2	12.5

A - Capacity vs. Effort
B - Future vs. Past
C - Capacity vs. Past
D - Satisfaction vs. Past

For Scale A, there is a significant increase in discrepancy score from September to February for both the high and low risk groups. No significant differences in discrepancy scores were

found between the high and low risk groups either in September or February. For the male group, there was a significant difference in discrepancy scores for the low risk group when compared to the high risk group. For this scale, both the high and low risk groups showed a significant increase in discrepancy scores in February. Since this discrepancy reflects differences in item 1 and item 4 (see Table 7), the significant drop in estimation of Effort (No. 1) from September to February appears to be contributing to this difference.

Scale B reflects discrepancies between items 3 (Future) and 2 (Past). The high risk group showed a significantly greater discrepancy score both in September and February when compared to the low risk group. Not only does the high risk group reflect this higher discrepancy over time, but, when comparing the discrepancy scores from September to February, there is a significant increase for the high risk group. The significant decrease in estimation of "average" grades from September to February for the high risk group appears to be the significant factor.

Scale C (Capacity vs. Past) reflects significantly higher discrepancy scores for both test times for the high risk group. For both risk groups, there is a significant increase in the discrepancy score from September to February. In this instance, an increase in rank score for the low risk group over time in estimation of Capacity and a decrease in estimation of "average"

performance by the high risk group combines to produce these significant differences in discrepancy score.

The discrepancy between Past performance and estimate of Capacity is reflected in Scale D. Again, it is the high risk group which showed significantly higher discrepancy scores. As in the case of Scale B, the high risk group also showed an increase in discrepancy score from September to February. It appears that the decrease in estimation of "average" grades for the high risk group results in this finding.

One last piece of data was collected on the subjects in this study. The faculty adviser for each student was asked to make some global judgments about the degree of "creativity" or uniqueness of the advisees. This data was requested in May which, hopefully, allowed sufficient time for the faculty advisor to get to know the student. In general, two types of responses were received. The first type was of the order; "I know too little about this student to make a judgment." The other type of response was of the order, "I have talked with this student on several occasions but have little impression about his creativity." As a result, this data was not used in the present study. It does reflect an overall lack of information about students by their advisors which suggests that the present system of faculty advisor assignments should be examined or dropped.

CHAPTER V

CONCLUSIONS

The major aim of the present study was to determine if the use of measures of divergent thinking (creativity) would serve as useful supplementary data in the selection of "high risk" students for admission to college. The results of this s udy indicate that significant differences in performance on measures of divergent thinking by high and low risk groups are found only in one case, and the superior performance was by thc low risk group. There is little doubt that the present findings do not support the findings of either Torrance or Getzels and Jackson. It should be noted that the present results do not support the findings of Edwards and Tyler who reported that the "high aptitude" students had significantly higher grade-point averages when compared to the "twice-talented" (High aptitude and high creativity) group. In fact, in the present study, the results suggest just the opposite. Within the limits of this research, there seems to be no evidence which suggests that measures of divergent thinking (creativity) would serve as a useful source of information in the selection of students for admission to Tufts University.

The data collected on "level of aspiratinn" as it relates to the high and low risk groups is more encouraging. The findings of the present study indicate that the low risk group exhibited higher levels of aspiration when compared to the high

risk group. The high risk group was significantly less realistic in their estimates of aspiration level when compared with the low risk group. Finally, it was the low risk group that reflected superior performance on both the SAT and in gradepoint averages earned at Tufts University. These findings are in accord with those reported by Worell and suggest that level of aspiration may serve as a useful source of information in predicting performance at college. This finding is of particular interest in that the Worell scale is designed to sample both present as well as predicted future level of aspiration and does not depend on actual performance in classes after having been admitted to college.

In summary, the evidence from the present study does not support the use of measure of divergent thinking (creativity) as useful additional data to be used in the selection of students for admission to college, at least for Tufts University. The results of the level of aspiration measures offers encouragement that this may be a useful bit of information for selection of students. Additional research in this area is called for. Although the SAT scores and high school grades have some deficiencies, the data presented here suggests that these measures continue to serve a useful function in the selection of students for admission.

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