THE INTERRELATIONSHIPS AMONG ANXIETY, INTELLIGENCE, AND ACADEMIC ACHIEVEMENT IN COLLEGE STUDENTS

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THE INTERRELATIONSHIPS AMONG ANXIETY, INTELLIGENCE, AND ACADEMIC ACHIEVEMENT IN COLLEGE STUDENTS

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MASTER OF ARTS

By

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CHAPTER I

INTRODUCTION

Due to the importance placed on education as a means of advancement, both intellectually and socially, increasing pressure in recent years has been placed on the student to receive a college degree. These pressures may cause many anxieties, worries, and frustrations which may interact with ability level in determining scholastic performance.

Hull (9, 11) demonstrated in his mathematical theory of learning that many factors, including habit strength, stimulus intensity, drive, motivation, and native ability level, affect learning, and that each of these factors must be present in order for learning to occur. This paper is concerned with the influence on learning of only two of these variables—anxiety and intelligence. Hull included intellectual ability and drive as factors of learning but failed to mention anxiety. The present study is based on the acceptance of the position of Taylor (35) and Robinson (24) that anxiety is a kind of drive. Thus, drive (as related to feelings of anxiety) works with ability level (intelligence) in producing learning (academic achievement).

Research suggests that the influence of anxiety on academic performance is not the same for all levels of
intelligence. It appears that the influence of other variables, although present, is relatively insignificant at low and high levels of intelligence. Previous research has indicated that intelligence is the most important variable in producing academic achievement and that a great amount of intellectual ability may cause superior academic performance while a great lack may cause low academic performance (7, 10, 23, 25, 31, 36). Thus, anxiety does not appear to greatly influence academic achievement at the extreme ends of the intellectual continuum since intelligence is a dominating factor in such cases.

However, anxiety may become a significant variable at the level of average intelligence. It is here that intellectual ability is felt to be neither high enough to produce high academic achievement nor low enough to cause low academic achievement. It is here that anxiety exerts its most noticeable effect on academic achievement.

In describing the influence of anxiety on academic performance for persons of average intelligence, it is hypothesized that the presence of anxiety facilitates performance while its absence hinders performance. This is deduced from Taylor (35) and Robinson (24), who theorized that underlying pressures and fears of failure cause anxiety feelings and drive states which motivate the person to high performance levels. Thus, it is possible that very successful
academic performance at the average level of intelligence will not result without sufficient drive.

Statement of the Problem

It was the purpose of this study to investigate the nature of the relationships among anxiety, achievement, and intelligence. It was deduced that anxiety and intelligence work together mainly at the level of average intelligence. At this level, the addition of drive in the form of anxiety increases performance level, while a lack of drive or anxiety decreases that level. The influence of anxiety on academic achievement is insignificant at other levels due to the overriding effects of intelligence.

A Review of the Literature

A review of the literature involving anxiety, intelligence, and academic performance revealed that many studies related anxiety to intelligence but did not include their effects on academic achievement (2, 3, 5, 6, 13, 14, 15, 16, 18, 19, 20, 21, 26, 27, 28, 29, 30, 31, 32). Several studies using College Entrance Examination Board scores as the measure of intelligence found insignificant results (3, 16, 21, 26, 30, 32). Several studies using the Wechsler scales as the measure of intelligence found insignificant results (2, 5, 13, 20, 21). Additional studies using other criteria as the measure of intelligence found negative relationships.
between anxiety and intelligence (6, 14, 15, 19, 27, 28, 29, 31).

Many studies were found in which anxiety was related to measures of academic performance but not to intelligence (3, 4, 12, 16, 19, 26, 28, 29, 31). Several found insignificant results (3, 12, 16). Others found negative results (4, 28, 29, 31). No studies were found which reported a positive relationship between anxiety and academic achievement.

Only three research articles studied the interaction effect of anxiety and intelligence on academic performance (12, 24, 34). Robinson (24) reported that people of average intelligence in an honors program had much higher anxiety levels than people of higher intelligence in the same program. The main point made was that people of average intelligence who made good grades experienced more anxiety in school than did those of superior intelligence who made good grades. It was theorized that this high anxiety level of the average students caused them to have higher drive levels, which enabled them to make the same grades as people of superior intelligence. It appeared that anxiety is a facilitating factor in academic achievement and that its influence is mainly felt at the level of average intelligence when intelligence is not enough in itself to facilitate learning yet is not so low that good grades are unattainable due to low mental capacity.
A study by Spielberger and Katzenmeyer (34) reported that college grades (academic performance) varied inversely with anxiety level for people of average intellect. Thus, high anxiety levels for people of average intelligence led to lower academic achievement. Anxiety was debilitating in this study. The interaction of anxiety and intelligence was not significant for persons of low or high intelligence. Although this study supported the view that anxiety does not affect academic performance for subjects of extremely low or high intelligence, showing that anxiety is most important at average intelligence levels, it did not uphold the contention that the effects of high anxiety on persons of average intelligence produce high academic achievement and that the effects of low anxiety on persons of average intelligence produce low academic achievement. A last study by Jones (12) of the interaction effect of anxiety and intelligence on academic achievement reported insignificant results.

No studies were found in which a lack of anxiety was related to poor academic achievement. Every study that mentioned anxiety reported that its presence either facilitated or debilitating academic achievement.

Although these were the only research articles which made studies of the interaction of anxiety and intelligence as related to academic performance, several studies involving anxiety, intelligence, and academic achievement controlled for anxiety, by holding it constant, and then observed the
correlation between intelligence and academic performance under different levels of anxiety (8, 17, 22). Two studies placed subjects into groups of low, middle, and high anxiety levels and correlated intelligence and academic performance scores (17, 22). They both found the highest significant positive correlation to exist between intelligence and academic performance in the low anxiety group. In contrast, a third study in this field, which also placed subjects under three levels of high, middle, and low anxiety, found the highest correlation of intelligence to academic performance to be the high-anxiety group (8).

Another set of studies dealt with the three variables of anxiety, intelligence, and academic performance by controlling for intelligence (holding it constant) and correlating the two remaining variables of anxiety and academic performance under varying levels of intelligence (1, 6, 22, 33). One study found that anxiety was negatively related to performance for students of average ability but was positively related to performance for students of high ability (33). This meant that anxiety was detrimental to the academic performance of subjects of average ability but facilitated the academic performance of subjects of high ability. A second study found similar results (6). It reported that a significant negative correlation existed between anxiety and academic performance for students of low and average intelligence but also that a positive one existed for students of
high ability. Two other studies found insignificant correlations between anxiety and academic performance when intelligence was held constant (1, 22).

In summing up, most research studies reported correlations which involved only two of the three variables of anxiety, intelligence, and academic achievement. Positive, negative, and insignificant results were found. Since all three variables are of importance, such a variety of findings may have occurred because of the failure to account for the third variable. Since these studies were of correlations, no specific conclusions as to cause-effect or interaction effects could be drawn.

Only three studies were found involving the interaction of all three variables. Contradictory and/or insignificant results were reported. In studies correlating anxiety and grade-point average while holding intelligence constant, negative and insignificant results were obtained. In studies correlating intelligence and grade-point average while holding anxiety constant, contradictory results were obtained.

As current research has failed to make clear the relationship between anxiety, intelligence, and academic achievement and as such research involving all three variables is scarce, it is felt that further study is warranted in order to clarify the nature of the relationship among them.
Hypotheses

It was hypothesized that

I. There would be a significant interaction effect, as measured by a 3 x 3 analysis of variance design, between anxiety and intelligence on academic performance.

A. People of average intelligence with high anxiety levels would show no significant difference in academic achievement from people of superior intelligence having any degree of anxiety.

B. People of average intelligence with low levels of anxiety would show no significant difference in academic achievement from people of low intelligence having any degree of anxiety.

C. A significant difference would be present between academic achievement scores of people of average intelligence having low anxiety and people of average intelligence having high anxiety. The average intelligence-low anxiety group would have lower academic achievement scores than the average intelligence-high anxiety group.

II. A significant curvilinear relationship would result between intelligence and academic achievement at the level of low anxiety.

III. A significantly positive correlation would occur between intelligence and academic achievement at the level of average anxiety.
IV. A significant curvilinear relationship would result between intelligence and academic achievement at the level of high anxiety.

V. An insignificant correlation would result between anxiety and academic achievement at the level of low intelligence.

VI. A significantly positive correlation would result between anxiety and academic achievement at the level of average intelligence.

VII. An insignificant correlation would result between anxiety and academic achievement at the level of high intelligence.


34. and W. C. Katzenmeyer, "Manifest Anxiety, Intelligence, and College Grades," Journal of Consulting Psychology, XXIII (June, 1959), 278.

CHAPTER II

METHODOLOGY

Subjects

Data were collected on 163 students enrolled at North Texas State University during the spring, 1969 semester. In order to fit the analysis of variance design employing equal N's, only 117 of these subjects, including seventy-six males and forty-one females, were used. The forty-six students not used in the study were randomly selected out. No distinction as to age, race, classification, or socioeconomic status was made. A division according to sex was not deemed necessary as no consistent sex bias had been reported (2, 3, 4, 5, 6, 7, 10, 11, 13, 14, 17, 19, 20). Also, the majority of studies had used both male and female subjects.

Definition of Terms

Anxiety was defined in terms of scores made on the Taylor Manifest Anxiety Scale (20). This test is considered a measure of general anxiety and not of specific anxiety (1). Several authors have stated that tests of general anxiety are not adequate in measuring the kind of anxiety experienced in taking an examination or experienced in academic achievement (1, 8). They developed tests which they had hoped would be better and more specific measures of academic anxiety.
However, further research demonstrated that, although tests of general anxiety were not nearly as well-correlated with measures of test performance as were tests of specific anxiety, general anxiety tests were as good or even better predictors of academic performance as were tests of specific anxiety (15, 18, 21). As the influence of anxiety on academic performance was desired in this study, it seemed permissible to use a test of general anxiety, such as the Taylor test. Furthermore, Sassenrath (16) showed that tests of general anxiety and tests of specific anxiety had many factors in common and were not as different as previously thought.

For a division of anxiety scores into categories of high, average, and low, the sample was ranked from high to low according to anxiety scores and then divided into thirds. Persons scoring nineteen or above on the anxiety scale were considered to have high anxiety. Those scoring eleven through eighteen were considered to have average anxiety. Those scoring ten or below were considered to have low anxiety.

Intelligence was defined in terms of scores made on college entrance examinations. All American College Testing (ACT) scores were converted into College Entrance Examination Board (SAT) scores according to an ACT conversion table (12). For a division of intelligence scores into categories of high, average, and low, the sample was ranked from high to low according to intelligence scores and then divided into
thirds. Persons scoring 979 and above were considered to have high intelligence. Those scoring 776 through 976 were considered to have average intelligence. Those scoring 769 and below were considered to have low intelligence.

The subjects were placed into one of nine cells according to their scores on both the anxiety and intelligence tests. The cells were labeled as such:

1. low anxiety-high intelligence
2. average anxiety-high intelligence
3. high anxiety-high intelligence
4. low anxiety-average intelligence
5. average anxiety-average intelligence
6. high anxiety-average intelligence
7. low anxiety-low intelligence
8. average anxiety-low intelligence
9. high anxiety-low intelligence.

Academic achievement was defined in terms of college grade-point average for the preceding semester of the study. Grade-point average scores were used as the dependent variable of this study.

Procedure

The subjects were administered the Taylor Manifest Anxiety Scale as part of a Biographical Inventory, a method used by Taylor (20) and Jones (9). This was done in order that the subjects would, hopefully, not be as aware of the
nature of the test and thus would give more accurate answers. The subjects were told that the questionnaires were to be used for university research purposes only and that their answers would be kept strictly confidential. They were also told not to fill out the forms if they could not answer the questions truthfully. A copy of the Biographical Inventory including the Taylor scale is found in the appendix.

After the anxiety tests were administered, the intelligence scores (College Entrance Examination Board scores) and academic achievement scores (grade-point averages) were obtained from student permanent record cards on file in the office of the registrar.

Statistical Treatment of Data

The data obtained were submitted to the computer center at North Texas State University for the statistical computations.

1. A 3 x 3 analysis of variance with anxiety and intelligence serving as the independent variables and grade-point average serving as the dependent variable was used to test Hypothesis I. Three levels—high, average, low—of anxiety were used, as were three levels—high, average, low—of intelligence. The interaction effect that anxiety and intelligence exerted on grade-point average was considered the most important aspect of the study.

2. To test Hypotheses II and IV, scattergrams were constructed
in order to determine if the relationships were curvi-
linear. If they were, Eta was to be calculated. If they
were not, two separate product-moment correlations were
calculated. These were for intelligence and grade-point
average with anxiety being held constant at levels of
high and low anxiety.

3. To test Hypothesis III, a product-moment correlation of
intelligence and grade-point average at the level of ave-
rage anxiety was calculated.

4. Results of three separate product-moment correlations
between anxiety and grade-point average with intelligence
being held constant at levels of high, average, and low
intelligence were calculated. These statistics provided
a test of Hypotheses V, VI, and VII.
CHAPTER BIBLIOGRAPHY


12. Lindquist, E. F., conversion table obtained from the office of the registrar, North Texas State University, Denton, Texas, March, 1969.


CHAPTER III

RESULTS AND DISCUSSION

Table I shows the results of the analysis of variance involving anxiety, intelligence, and academic achievement. As would be expected, a significant relationship was found between intelligence and grade-point average. The differences among the mean grade-point averages for the three levels of ability were significant at the .01 level.

TABLE I

ANALYSIS OF VARIANCE FOR INTELLIGENCE (SAT), ANXIETY (MAS), AND GRADE-POINT AVERAGE

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Squares</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rows (SAT)</td>
<td>11.7041</td>
<td>2</td>
<td>5.8520</td>
<td>16.1924</td>
<td>.01</td>
</tr>
<tr>
<td>Columns (MAS)</td>
<td>.6534</td>
<td>2</td>
<td>.3267</td>
<td>.9040</td>
<td>N/S</td>
</tr>
<tr>
<td>Interaction</td>
<td>.6560</td>
<td>4</td>
<td>.1640</td>
<td>.4537</td>
<td>N/S</td>
</tr>
<tr>
<td>Within Cells</td>
<td>39.0321</td>
<td>108</td>
<td>.3614</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>52.0456</td>
<td>116</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There was no significant relationship between anxiety and grade-point average. That is, the mean grade-point averages did not differ for the three anxiety groups.
Hypothesis I was concerned with the interaction effect between ability and anxiety on grade-point average. As can be seen in Table I, the F for interaction was not significant. This means that the differences in mean grade-point averages among SAT groups were consistent across the anxiety levels. Hypothesis I must be rejected.

Table II gives the mean grade-point average for each cell within the analysis of variance design. It also shows the total mean grade-point average for each level of anxiety, for each level of intelligence, and for the entire sample.

**TABLE II**

**MEAN GRADE-POINT AVERAGES FOR ALL GROUPS**

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>Anxiety</th>
<th>Total Intelligence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Average</td>
</tr>
<tr>
<td>High</td>
<td>1.73538</td>
<td>1.82769</td>
</tr>
<tr>
<td>Average</td>
<td>1.32615</td>
<td>1.36153</td>
</tr>
<tr>
<td>Low</td>
<td>0.93923</td>
<td>1.26846</td>
</tr>
<tr>
<td>Total (Anxiety)</td>
<td>1.33358</td>
<td>1.48589</td>
</tr>
</tbody>
</table>

*Overall mean total.

An inspection of the means shows that, with one exception, the higher the level of anxiety, the higher the grade-point average. This consistency is reflected in the column means, which follow the same trend as the cell means.
increasing from the low to the high anxiety group. However, as was indicated earlier, this main effect was not significant. Also, for all anxiety levels, the higher the intelligence, the higher the grade-point average. Since the interaction was not significant, Hypotheses A, B, and C must also be rejected. If an interaction is not significant, no comparisons among cell means is justified.

An inspection of a scattergram, as shown in Figure 1, shows that the relationship of intelligence to grade-point average at the level of low anxiety appears to be linear, instead of curvilinear. Thus, Hypothesis II was rejected.

Fig. 1--Scattergram of the relationship of intelligence (SAT) to grade-point average (GPA) at the level of low anxiety.
When the correlation was calculated between intelligence and grade-point average at the level of low anxiety, as shown in Table III, it did not quite reach significance.

### Table III

**The Relationship of Intelligence (SAT) and Grade-Point Average (GPA) at the Level of Low Anxiety**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>S.D.</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT</td>
<td>886.0512</td>
<td>198.8950</td>
<td>.3040</td>
<td>N/S</td>
</tr>
<tr>
<td>GPA</td>
<td>1.3335</td>
<td>.6525</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table IV, the correlation of intelligence to grade-point average at the level of average anxiety was significant at the .05 level of confidence. Thus, Hypothesis III was supported.

### Table IV

**The Relationship of Intelligence (SAT) and Grade-Point Average (GPA) at the Level of Average Anxiety**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>S.D.</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT</td>
<td>868.8205</td>
<td>194.9738</td>
<td>.3457</td>
<td>.05</td>
</tr>
<tr>
<td>GPA</td>
<td>1.4858</td>
<td>.6156</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In speaking of Hypothesis IV, support for noncurvilinearity can be seen in Figure 2, which is a scattergram of
the relationship of intelligence to grade-point average at the level of high anxiety. The relationship appears to be linear. Thus, Hypothesis IV was rejected.

Fig. 2--Scattergram of the relationship of intelligence (SAT) to grade-point average (GPA) at the level of high anxiety.

When the correlation between intelligence and grade-point average at the level of high anxiety was calculated, it was significant at the .01 level of confidence. The result of this computation is reported in Table V.
TABLE V

THE RELATIONSHIP OF INTELLIGENCE (SAT) AND GRADE-POINT AVERAGE (GPA) AT THE LEVEL OF HIGH ANXIETY

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>S.D.</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT</td>
<td>862.6153</td>
<td>191.6678</td>
<td>.5563</td>
<td>.01</td>
</tr>
<tr>
<td>GPA</td>
<td>1.4905</td>
<td>.7169</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As seen in Table VI, the correlation of anxiety and grade-point average was insignificant at the level of low intelligence. Thus, Hypothesis V was upheld.

TABLE VI

THE RELATIONSHIP OF ANXIETY (MAS) TO GRADE-POINT AVERAGE (GPA) AT THE LEVEL OF LOW INTELLIGENCE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>S.D.</th>
<th>r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAS</td>
<td>15.4358</td>
<td>7.2599</td>
<td>.0819</td>
<td>N/S</td>
</tr>
<tr>
<td>GPA</td>
<td>1.0812</td>
<td>.5264</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The correlation of anxiety to grade-point average, as shown in Table VII, was insignificant at the level of average intelligence. Thus, Hypothesis VI was rejected.

The correlation of anxiety to grade-point average, as shown in Table VIII, was insignificant at the level of high intelligence. Thus, Hypothesis VII was supported.
TABLE VII
THE RELATIONSHIP OF ANXIETY (MAS) TO GRADE-POINT AVERAGE (GPA) AT THE LEVEL OF AVERAGE INTELLIGENCE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>S.D.</th>
<th>( r )</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAS</td>
<td>14.6153</td>
<td>7.2628</td>
<td>.0987</td>
<td>N/S</td>
</tr>
<tr>
<td>GPA</td>
<td>1.3779</td>
<td>.6707</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE VIII
THE RELATIONSHIP OF ANXIETY (MAS) TO GRADE-POINT AVERAGE (GPA) AT THE LEVEL OF HIGH INTELLIGENCE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means</th>
<th>S.D.</th>
<th>( r )</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAS</td>
<td>16.6666</td>
<td>8.3601</td>
<td>.2536</td>
<td>N/S</td>
</tr>
<tr>
<td>GPA</td>
<td>1.8502</td>
<td>.5554</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

In the analysis of variance design, the only significant variable related to grade-point average was intelligence. This was expected, as previous research demonstrated that intelligence is an extremely important factor in producing academic achievement with higher intelligence levels being associated with higher grades (2, 4, 6, 7, 10, 12).

It was found that neither the effect of anxiety on grade-point average nor the interaction effect of anxiety
and intelligence on grade-point average was significant. From these results, it would appear that anxiety is not a determining variable in the production of academic achievement and that the presence or absence of anxiety at any intelligence level does not influence academic performance. The results of this study indicate that anxiety is not related to academic achievement as is intelligence.

The results of the correlational studies partly supported and partly disagreed with the deduction that anxiety is related to academic achievement. The significant correlation between intelligence and academic achievement at the level of average anxiety upheld the hypothesis that an average amount of anxiety would not confound the effect of intelligence on grade-point average and would result in an adequate picture of the relationship at this level.

Additionally, it was hypothesized that correlations of intelligence and grade-point average at levels of high and low anxiety would interfere with the effect of intelligence on academic performance and would result in curvilinear relationships between these two variables. The correlation of intelligence and academic performance at the level of low anxiety was insignificant but did not support the hypothesis as it appeared to be linear, instead of curvilinear. As the correlation was insignificant, no conclusions could be drawn. The correlation at the level of high anxiety was significant and did not support the hypothesis as it also appeared to
be linear, instead of curvilinear. Due to the high level of significance of this correlation, it would appear that high anxiety does not interfere with the relationship between ability and grade-point average.

As these three hypotheses were based on the same logic and yielded inconsistent results, it is probable that little faith can be placed in them. It would seem from these results that the higher the anxiety level, the more related intelligence is to grade-point average. If anxiety is a drive, then among high drive individuals, intelligence is most highly related to achievement.

With regard to the correlations involving anxiety and grade-point average while holding intelligence constant, all three correlations were insignificant. Although the hypotheses were upheld that the correlations of anxiety to grade-point average should be insignificant at low and high levels of intelligence due to the overriding effects of intellect at these levels, the hypothesis was not upheld that anxiety correlates positively and significantly with grade-point average at the level of average intelligence. No support was found showing that anxiety affects academic achievement to a greater extent when intellectual ability is not extreme. As all three hypotheses were based on the same logic and as varying results were found, doubt is cast on the validity of the hypotheses.
Although this study—particularly the results of the analysis of variance design—agreed with the results obtained by Jones (5), it is believed that inadequate measuring instruments may have caused the insignificant results of this study. Methods of measuring anxiety, intelligence, and grade-point average were, perhaps, at fault.

An ideal measure of intelligence would have been the administration of an actual intelligence test at the same time as the administration of the anxiety test. College entrance examination scores, usually indicative of performance several years previous to this study, may be unrepresentative of current intellectual functioning. Also, these scores may not be uniform nor accurate measures of intelligence, as they were administered at many different times and places. The scores obtained may have been affected by numerous factors besides intelligence. An accurate control of these variables was not exercised in this study.

With regard to the instrument used to measure anxiety, it is felt that this instrument, although considered a successful measure of academic drive and anxiety may not have related specifically to academic performance (8, 9, 11, 13). People who have high anxiety scores may feel such anxiety only in social situations and not in academic situations. Likewise, people scoring low in anxiety may be reflecting social attitudes which have no bearing on academic anxiety. Thus, no guarantee exists that a person's drive or anxiety
level is caused by feelings of academic pressure. It may be caused by numerous factors. It is suggested that a test specifically measuring academic drive be used in this type of study (2, 3).

A further criticism concerns the measure of grade-point average. This study used the grade-point average of the preceding semester. Perhaps an overall grade-point average should have been used. It was noticed that several subjects had experienced a poor semester, academically speaking, prior to this study and that the grade-point average used may not have been indicative of true college performance.

It is felt that the method of dividing intelligence and anxiety scores into categories of low, average, and high may have contributed to the insignificant results of this study. The total number of anxiety scores were ranked from high to low and divided into thirds. The same was done for intelligence scores. Thus, the high and low categories were determined by the actual scores obtained and were not based on previous norms for the general population. It is possible that the scores obtained may not have been extreme enough, and a larger sample than the one used might have resulted in a better representation of high and low scores. Perhaps, standardized norms instead of sample norms should have been used as cut-off scores.

A last criticism concerns the collegiate classification of the subjects used in this study. No distinction was made
according to classification. This failure to control for such differences may have confounded the study. The grades of freshmen subjects may have been influenced by many factors, such as unfamiliarity with college study habits and grading procedures by which the grades of upperclassmen may not have been affected. Also, anxiety feelings for different college classifications may be extremely different. College seniors may be accustomed to college pressures and may have overcome such feelings. Their grades may not be affected by anxiety nearly as much as those of first- or second-year students, who may be worried about college success and failure.
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CHAPTER IV

SUMMARY, RECOMMENDATIONS, AND CONCLUSIONS

This study investigated the hypothesis that anxiety interacts with intelligence level in producing academic achievement. It was proposed by Hull that many factors, including drive and individual ability level influence learning. Taylor and Robinson reasoned that anxiety is a kind of drive which facilitates grade-point average. From this, it was deduced that anxiety and intelligence both influence academic achievement and that the presence of anxiety facilitates academic performance while its absence lowers such.

As research indicated that intelligence is the most important factor in producing academic achievement, it was reasoned that anxiety is an important variable only when not overridden by the effects of intelligence. Thus, it was hypothesized that the effects of anxiety on academic performance are mainly felt at the level of average intelligence. There should be no significant difference in academic achievement scores between persons of average intelligence with high anxiety and persons of high intelligence with any degree of anxiety. Likewise, persons of average intelligence having low anxiety should show no significant difference in academic
achievement from people of low intelligence with any degree of anxiety. At the level of average intelligence, there should be a significant difference in academic achievement scores between people of low anxiety and people of high anxiety. This should follow if the higher the anxiety, the higher the academic performance at the level of average intelligence. Research concerning the above hypotheses was scarce and contradictory. Further study was indicated.

It was also hypothesized that correlations of intelligence and grade-point average at levels of low and high anxiety should be curvilinear, as anxiety would be exerting a noticeable influence at these levels. The correlation of intelligence and grade-point average at the level of average anxiety should be significantly positive as anxiety would be least influential at this level. Previous research concerning the above hypotheses indicated a need for further study.

It was further hypothesized that correlations of anxiety and grade-point average at levels of high and low intelligence should be insignificant due to the overriding effects of intelligence which would confound the effects of anxiety at these levels. It was hypothesized that the correlation of anxiety to grade-point average at the level of average intelligence should be positively significant, showing anxiety to be most beneficial at this level. Contradictory research concerning the above hypotheses indicated a need for further research.
Undergraduate students, numbering 117 and including seventy-six males and forty-one females, enrolled at North Texas State University during the spring semester of 1969 were used. They were administered the Taylor Manifest Anxiety Scale as a measure of anxiety. College entrance examination scores served as the measure of intelligence. The grade-point average for the preceding semester of the study was used as a measure of academic achievement. A 3 x 3 analysis of variance design served as one statistical tool in testing some hypotheses. High, average, and low levels of anxiety and intelligence served as the independent variables. Grade-point average was the dependent variable. The correlations appropriate to the remaining hypotheses were also run.

Results of the analysis of variance revealed that only intelligence was related to grade-point average. The effects of anxiety on grade-point average and the interaction effect of anxiety and intelligence on grade-point average were both insignificant. Thus, the first hypothesis was rejected.

Correlations involving intelligence and academic achievement while holding anxiety constant gave insignificant results at the low level of anxiety but gave significantly positive results at average and high values of anxiety. Since all three correlations were based on similar logic and since inconsistent results were obtained, it was concluded that the results were of doubtful validity.
Correlations involving anxiety and academic achievement while holding intelligence constant gave insignificant results at the low level of anxiety but gave significantly positive results at average and high values of anxiety. Since all three correlations were based on similar logic and since inconsistent results were obtained, it was concluded that the results were of doubtful validity.

Correlations involving anxiety and academic achievement while holding intelligence constant gave insignificant results at all three levels of intelligence. Since all three correlations were derived from the same theory and inconsistent results were obtained, it was felt that the results were of doubtful validity.

Recommendations

Several inadequacies in design were noted as possible causes of the insignificant results. The instruments used to measure anxiety, intelligence, and grade-point average were criticized, as was the method of choosing subjects. Doubt was cast on the method of dividing intelligence and anxiety scores into the appropriate levels. It was urged that further study avoiding the inadequacies of this design be undertaken.

Conclusions

Although it appears that anxiety does not interact with intelligence in producing academic achievement in this
sample, it is felt that several possible weaknesses in design may have caused such results. Further study is needed in this area using better measuring instruments and different values of the independent measures.
APPENDIX

BIOGRAPHICAL INVENTORY

NAME_________________________ SOCIAL SECURITY NUMBER______
CLASSIFICATION_______ AGE_____ SEX____ HOMETOWN__________
MAJOR___________ MINOR_________ GRADUATION DATE____________
STATE OF HEALTH:  GOOD_____ AVERAGE____ FAIR____
T  F  1. I do not tire quickly.
T  F  2. I am troubled by attacks of nausea.
T  F  3. I believe I am no more nervous than most others.
T  F  4. I have very few headaches.
T  F  5. I work under a great deal of tension.
T  F  6. I cannot keep my mind on one thing.
T  F  7. I worry over money and business.
T  F  8. I frequently notice my hand shakes when I try to do something.
T  F  9. I blush no more often than others.
T  F  10. I have diarrhea once a month or more.
T  F  11. I worry quite a bit over possible misfortunes.
T  F  12. I practically never blush.
T  F  13. I am often afraid that I am going to blush.
T  F  14. I have nightmares every few nights.
T  F  15. My hands and feet are usually warm enough.
T  F  16. I sweat very easily even on cool days.
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<td>T</td>
<td>F</td>
<td>17. Sometimes when embarrassed, I break out in a sweat which annoys me greatly.</td>
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<td>T</td>
<td>F</td>
<td>18. I hardly ever notice my heart pounding and I am seldom short of breath.</td>
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<td>T</td>
<td>F</td>
<td>19. I feel hungry almost all of the time.</td>
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<td>T</td>
<td>F</td>
<td>20. I am very seldom troubled by constipation.</td>
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<td>T</td>
<td>F</td>
<td>21. I have a great deal of stomach trouble.</td>
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<td>T</td>
<td>F</td>
<td>22. I have had periods in which I lost sleep over worry.</td>
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<td>T</td>
<td>F</td>
<td>23. My sleep is fitful and disturbed.</td>
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<td>T</td>
<td>F</td>
<td>24. I dream frequently about things that are best kept to myself.</td>
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<td>T</td>
<td>F</td>
<td>25. I am easily embarrassed.</td>
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<td>T</td>
<td>F</td>
<td>26. I am more sensitive than most other people.</td>
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<td>T</td>
<td>F</td>
<td>27. I frequently find myself worrying about something.</td>
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<td>T</td>
<td>F</td>
<td>28. I wish I could be as happy as others seem to be.</td>
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<tr>
<td>T</td>
<td>F</td>
<td>29. I am usually calm and not easily upset.</td>
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<td>T</td>
<td>F</td>
<td>30. I cry easily.</td>
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<tr>
<td>T</td>
<td>F</td>
<td>31. I feel anxiety about something or someone almost all the time.</td>
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<tr>
<td>T</td>
<td>F</td>
<td>32. I am happy most of the time.</td>
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<td>T</td>
<td>F</td>
<td>33. It makes me nervous to have to wait.</td>
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<tr>
<td>T</td>
<td>F</td>
<td>34. I have periods of such great restlessness that I cannot sit long in a chair.</td>
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<td>T</td>
<td>F</td>
<td>35. Sometimes I become so excited that I find it hard to get to sleep.</td>
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<td>T</td>
<td>F</td>
<td>36. I have sometimes felt that difficulties were piling up so high that I could not overcome them.</td>
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</table>
37. I must admit that I have at times been worried beyond reason over something that did not really matter.

38. I have very few fears compared to my friends.

39. I have been afraid of things or people that I knew could not hurt me.

40. I certainly feel useless at times.

41. I find it hard to keep my mind on a task or job.

42. I am unusually self-conscious.

43. I am inclined to take things hard.

44. I am a high-strung person.

45. Life is a strain for me much of the time.

46. I think I am no good at all at times.

47. I am certainly lacking in self-confidence.

48. I sometimes feel that I am about to go to pieces.

49. I shrink from facing a crisis or difficulty.

50. I am entirely self-confident.
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