A Study of Anxiety Relative to Academic Achievement and to Sex

Gerald R. Shulenbarger

Central Washington University

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A STUDY OF ANXIETY RELATIVE TO ACADEMIC ACHIEVEMENT AND TO SEX

A Thesis
Presented to
the Graduate Faculty
Central Washington State College

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

by
Gerald R. Shulenbarger
August 1967
APPROVED FOR THE GRADUATE FACULTY

______________________________
Colin D. Condit, COMMITTEE CHAIRMAN

______________________________
Joe E. Rich

______________________________
Eldon E. Jacobsen
ACKNOWLEDGMENTS

An acknowledgment page is usually replete with the names of people who, in one way or another, have helped the author in his efforts. Usually absent are the names of many people who have loaned their talent, wisdom, materials, and patience. This page is no exception. Too numerous to mention are those who helped on purpose, or perhaps incidentally. Their help is appreciated.

Thanks must go to Mr. Darwin J. Goodey and Dr. Frank B. Nelson, whose help in allowing the use of their classes as subjects was invaluable. My thanks also to Paul Miller and Dick Giroux who were instrumental in statistical advice and moral support.

My thanks also to my committee who have tolerated many unexpected visits and long discussions. To Dr. Eldon E. Jacobsen, Dr. Joe E. Rich, and my chairman, Dr. Colin D. Condit, many thanks.

Lastly, thanks to my wife, Jeanie, who has tolerated this experience with understanding and patience.
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Problem

The purpose of this study was to examine the relationship between anxiety and achievement, and anxiety level and sex. The anxiety level was measured by the Institute for Personality and Ability Testing (IPAT) Anxiety Scale Questionnaire. Specifically, this study investigated how assessed anxiety relates to the achievement of students in Junior level Psychology courses. The courses were Human Growth and Development. Further, the difference in anxiety levels between sexes was studied. Before delving into the specific problem, however, a general overview of the basic concepts is necessary.

"Our era has been called the 'age of anxiety' and anxiety manifestations are certainly widespread . . ." (Cattell and Scheier, 1963). Although the concept of anxiety is a difficult one to define, most of us, including the above authors, are aware of its presence. Nearly every individual in our society realizes, on the basis of his observation of his fellowmen as well as his own experiences, that anxiety is a phenomenon that influences the lives of many people. There are numerous situations that we experience in our daily lives that are anxiety creating. Threats of war, uncontrolled nuclear weapons, economic and racial upheaval are just a few. There are also less obvious sources of anxiety. Uncertainty about our personal worth, inner
confusion, conflict over values and standards are just a few of the deeper, more personal anxiety creating factors.

It is not the task of the researcher to delineate the innumerable "causes" of anxiety, nor to prove its existence. As one author so aptly states, "... to endeavor to 'prove' the pervasiveness of anxiety in our day is as unnecessary as the proverbial carrying of coals to Newcastle" (May, 1950).

Traditionally, anxiety has been an area of concern to man. He may not have recognized it by name, but rather by a "feeling" or "sensation." It was not until almost fifty years ago that Freud (1920) singled out anxiety as the crucial problem of emotional and behavioral disorders. Further developments in psychology and psychoanalysis have, for the most part, substantiated his original position, until it is now generally recognized among applied psychologists and mental health practitioners that anxiety is the fundamental phenomenon of neurosis. It is also becoming apparent that anxiety, or at least manifestation of anxiety, is more widespread than several decades ago. This thought is exemplified by May (1950), "Whereas the period of two decades ago might have been termed the 'age of covert anxiety' ... the present phase of our century may well be called the 'age of overt anxiety'." He cites examples from the fields of literature, sociology, political and economic
thought, education, religion, and philosophy to demonstrate that what we contend with now are overt manifestations of anxiety, rather than symptoms of anxiety that were present in these fields twenty-five or thirty years ago. He feels the emergence of anxiety from an implicit to an explicit problem in our society is the significant phenomena with which we should concern ourselves.

Just what anxiety is, and how it affects a person, it difficult to interpret. Possibly one of the clearest and simplest definitions is that "Anxiety is the apprehension cued off by a threat to some value which the individual holds essential to his existence as a personality" (May, 1950). How anxiety affects individuals has become the problem for psychologists engaged in the prediction of future performance. Since this variable has been shown to affect the performance in laboratory situations (Lucas, 1952; Montague, 1953; Taylor, 1953; Sarasan, 1956), it is reasonable that there would also be interest in extending the knowledge of its effects to real life situations.

In an attempt to do this, Taylor (1953) developed a Manifest Anxiety Scale (MAS) to measure anxiety and determine how it affected performance of humans. Her philosophy, firmly entrenched in the Hullian framework, viewed anxiety as drive. She hypothesized that individuals scoring high on the MAS would condition faster than low scorers, but
would perform less well if the task was a complex one.

Since the appearance of the MAS, numerous studies have been conducted to determine the relationship of anxiety to human performance. A review of these studies suggests some contradictions.

One such contradiction is summarized in the comparable research of Taylor and Spence (1952) and Hughes, Sprague and Bendig (1954). Subjects in both studies were administered the MAS and then required to perform a serial learning task. The task involved competing responses. Taylor and Spence hypothesized that the performance of anxious subjects would be inferior to that of nonanxious subjects because of the complexity of the task. They found their hypothesis to be upheld. Hughes, et al. found no significant differences between anxiety groups.

Other contradictory results involve the work of Farber and Spence (1953), and its replication by Axelrod, Cowen, and Heilizer (1956). Farber, et al. studied complex learning and conditioning as a function of anxiety. They predicted that the anxious subjects' performance would be significantly poorer than that of the nonanxious subjects. They also hypothesized that the largest difference would be at the more difficult choice points, and that the anxious subjects would be superior in the initial conditioning. In each case their prediction was upheld.
Axelrod, et al. in replication, could find no significant differences among anxiety groups with respect either to total errors or trials to criterion. Also, no significant relationships were found between choice point difficulty and performance of the groups.

Deese, Lazarus, and Keenan (1953) performed two identical verbal serial learning experiments. In the first of these they found anxious subjects generally superior to nonanxious ones. In the second sample they found the reverse was true.

There are numerous other studies that report contradictory results (Heilizer, Axelrod, and Cowen, 1956; Silverman and Blitz, 1956; Kamin and Clark, 1957; Saltz and Hoen, 1957; Nicholson, 1958). Several of these studies were specifically designed to test predictions from Hullian theory and were found not to be consistent with a drive interpretation of anxiety.

The MAS has also been used in an effort to relate anxiety to academic achievement. Malnig (1964), using college freshmen, could find significant differences between the high and low anxiety groups when their achievement was compared. He also found that the middle anxiety group did not differ significantly from either extreme in relation to achievement.
Essman (1957) also used the MAS in relation to the achievement of introductory psychology students. On the basis of their scores they were placed in a low or a high anxiety group. The mean score of all multiple choice course examinations was calculated and it was determined that the low anxiety group did significantly better than the high anxiety group.

Matarazzo, Ulett, Guze and Saslow (1954) attempted to determine the relationship between anxiety and several measures of intelligence, grade point average being one of these. They used 101 college sophomores divided into seven groups according to their score on the MAS. When each subject's grade point average was plotted as a function of anxiety level, no differences were found, i.e., grades had no significant relationship to anxiety.

Klugh and Bendig (1955) endeavored to find the relation of achievement and anxiety using 184 students enrolled in an introductory psychology course. They used the MAS and related these scores to Quality Point Average. The correlation was not significant.

Suinn (1965) also used the MAS in an experiment designed to replicate the finding by Sarason (1957) that test anxiety had an interfering effect on academic achievement, while general anxiety had a facilitating effect. In one of two samples he found the MAS score correlated .26
with the course grade. This correlation was significant at the .05 level of confidence. In the second sample the correlation was .10; not significant at the .05 level of confidence.

Alpert and Haber (1960) used the MAS and other measures of anxiety to determine anxiety's effect on the achievement of college freshmen. The MAS was correlated with grade point average, course grade, final exam grade, and mid-term grade. All correlations were not significant.

It can be easily seen that inconsistent results are not confined to the laboratory. When a personality variable such as manifest anxiety, as measured by the MAS, is viewed in relation to human performance such as academic achievement, there are often contradictions.

After reviewing several such studies Sarason (1957) states, "With respect to the Taylor scale, the results thus far have been disappointing. The most reliable studies in the literature indicate that level of anxiety has no demonstrable effect on academic achievement."

Bendig and Vaughn (1957) report, "The general impression one receives from reviewing the results . . . is that the relationship between a manifest anxiety scale and learning is like extrasensory perception, a delicate flower that blooms only in certain environments."
Jackson and Bloomberg (1958) and Grooms and Endler (1960) raise questions concerning the generality of manifest measures of anxiety. They believe the uncritical use of the MAS as an indicant of anxiety may lead to misleading results and erroneous conclusions.

Experimental evidence has been presented by Hilgard, Jones and Kaplan (1951) and Montague (1953) that suggests only the highest scores on an MAS type measure discriminates a group different from the rest.

Others (McKeachie, Pollie and Speisman, 1955; Sarason and Mandler, 1952; Sassenrath, Kight and Kaiser, 1965) all find experimental evidence indicating that a general or manifest measure is an incomplete measure. They all conclude that there are more aspects to anxiety than previously suspected.

There are others (Phillips, Hindsman and McGuire, 1960) who question the uncritical use of an anxiety scale that reports scores in a general or manifest manner. In an experiment designed to test the hypothesis that there was more than one kind of anxiety, they found that they could identify several factors. They isolated and described factors associated with anxiety, as measured by the children's version of the MAS. They then related these factor scores to achievement and discovered that some of the factor scores predicted achievement much better than the total, or manifest score.
There are others who take the multidimensional approach to the study of anxiety. Perhaps the leaders in this approach to the study and measurement of anxiety are Cattell and Scheier (1961, 1963). They contend that when clinical research does use test measurement there is a tendency to define the concept operationally; that is, anxiety is what a particular test measures. Thus, in what is termed univariate research we are commonly faced with contradictory and inconsistent results about what anxiety is and how it relates to various personality characteristics and behaviors.

Instead of a univariate approach, they offer a multivariate concept in the study of personality factors. They maintain that through factor analysis several factors may be isolated that are associated with the clinical concept of anxiety. Using factor analysis, Cattell and Scheier (1963) isolated some sixteen major dimensions of personality. Five or six of these dimensions contain content suggesting psychiatric symptoms of anxiety; that is, they involve questions which characterize anxiety. These five or six dimensions also can be independently shown to go together, or correlate significantly, as distinct from the other dimensions. Five of the factors that correlate highest with the anxiety factor (U.I. 24) have been used in the construction of a scale for the measurement of anxiety. Using the scale
nine scores are obtainable. These are the five first order factors: total score (U.I. 24); an overt, or conscious score; a covert, or hidden score; and an overt-covert index.

The first order factor scores are "... not meant to stand by themselves. They are too brief and unreliable for this" (Cattell, et al., 1963). For this reason the part scores will not be considered in the present investigation.

The total score reflects an individual's manifest or total anxiety. The overt score is the score for symptomatic, conscious anxiety and is derived from the last half of the test. The covert score is an unrealized "cryptic question" anxiety score and is obtained from the first half of the test. The overt-covert ratio is a score acquired when the overt score is divided by the covert score.

Although the scale has not been used in relation to achievement, earlier studies (Brogden, 1940; Cattell and Gruen, 1955; Scheier and Cattell, 1958) relating the various factors to achievement have found significant positive correlations averaging about .25 in children and slightly lower in adults.

In the fact of this evidence, Cattell and Scheier state elsewhere (1963) that there seems to be a slight negative relation between anxiety and academic achievement. These authors account for the reversal by stating,

Two of the earlier studies (Brogden, 1940; Cattel et al., 1955) had not yet achieved good measurement
of U.I. 24, and dealt with younger children. About seventy-five per cent of the subjects in the third study (Scheier, et al., 1958) were freshmen, and therefore more likely to be "eager beavers."

In the same source (1963) they go on to confound the issue by reporting that the slightly negative relationship between anxiety and academic achievement may be misleading. They suggest that the relationship may be curvilinear rather than linear. Culbertson (1960), investigating the relationship between tension (based on Mower and Dollard's discomfort-relief quotient applied to the Thematic Apperception Test stories) and grade point average, did find it to be curvilinear. Cattell, et al. (1963) indicate that the supposed negative correlation derives primarily from very high anxiety levels. At this level the debilitating effect of anxiety interferes with the learning. They also believe that very low anxiety can interfere with learning and achievement because the subject is too placid and is not concerned enough about his performance. This type of relationship would lead to a curvilinear association. Regarding high anxiety level, from research done with the scale, they also conclude that there is a tendency for the anxiety level in women to be higher than that of men.

As previously reported, the IPAT scale itself has not been used in relation to academic achievement. It has been used in other areas and proven very sensitive.
In one study, Levitt and Persky (1962) found that the scale successfully differentiated subjects in hypnotically induced anxiety from those in a normal state while other anxiety scales did not.

Using another scale, the overt-covert index, Levitt et al. (1962) discovered that student nurses who were dropped from school had significantly lower overt-covert ratios than those who remained in school.

The present study was concerned with four of the nine scores obtainable on the IPAT Anxiety Scale Questionnaire. These scores were U.I. 24, overt, covert, and overt-covert ratio scores. The achievement measure used was the difference score when a preachievement test score is subtracted from a postachievement test score, using the identical test for both administrations. Each of the anxiety scores were related to the achievement score to determine if any significant relationship exists. Each anxiety score for the group of females was also compared to the same score for the group of males to determine if any significant differences exist.

Therefore, the purpose of this investigation is two-fold. First, is there a difference between the IPAT scores of males and females used in this study, with the females obtaining the higher scores; and second, is there a curvilinear relationship between academic achievement of subjects used in this study, and each of the four anxiety factors?
Method

Experimental Design

The experimental design required the comparison of anxiety level, as measured by the IPAT scale, to achievement of college students. The experiment was designed to test the hypothesis that the relationship between these two variables was curvilinear, i.e., individuals scoring at high and low anxiety levels achieve at a lesser degree than those scoring at moderate anxiety levels. The experiment was also designed to test the hypothesis that the anxiety level in women is significantly higher than that of men.

Subjects

The subjects (Ss) used in this study were 101 students enrolled in Human Growth and Development classes at Central Washington State College, Spring Quarter, 1967. This is a class required for majors in psychology and for sophomores (some juniors) in the teacher education program. There were 37 males and 64 females.

Materials

The materials used were the IPAT Anxiety Scale Questionnaire Self Analysis Form (Cattell, et al., 1963) and an achievement test taken from the instructor's manual appropos to the textbook used for the course, Human Development in
Western Culture (Bernard, 1966). The achievement test was designed to assess concepts taught during the quarter (Appendix A).

Procedure

At the beginning of the quarter the IPAT was administered to the Ss during their regular class hour. They were told that the test was part of a research project, to be as honest as possible in answering the items, and that their results would be kept strictly confidential (Appendix B).

At the beginning of the quarter the achievement test was also administered. The Ss were told that the test was a general examination of previous background in human development concepts; that it was a part of a research project; to do their best on every item; and that the results would not affect their grade in any way (Appendix C).

At the end of the quarter the achievement test was readministered. The Ss were again told that this was a part of a research project and to do their very best (Appendix D).

The following were calculated for each S. A "d" or difference score was obtained by subtracting the preachievement test score from the postachievement score. Covert, overt, overt-covert ration, and total scores were obtained from the IPAT. Each of the scores was converted into a standard score for ease of comparison.
To determine if the difference between anxiety scores of male and female Ss was significant, t tests were used. Linear and eta correlations were calculated for each of the anxiety factors in relation to the achievement. Appropriate tests of significance of linear and curvilinear correlations were run on the correlations to ascertain if they were significant.

Results

The purpose of the present study was to examine the relationships between anxiety and academic achievement, and anxiety and sex. Anxiety was measured by the IPAT Anxiety Scale Questionnaire (Cattell & Scheier, 1963).

The differences between the means of anxiety scores of male and female Ss was determined by use of t tests of significance. Table 1 summarizes the results of these comparisons.

There were no significant differences in either total, overt, or covert scores. The ratio score was significant, with the male Ss scoring significantly higher than the female Ss. This difference in a direction opposite of the hypothesis can be explained by one score. One male scored six times as high as the mean of the male group, therefore inflating the mean of the male group to a point where it was significantly higher in comparison to the female Ss scores.
Table 1

Comparison of IPAT Anxiety Scores for Male and Female Subjects

<table>
<thead>
<tr>
<th>Test</th>
<th>Male Mean</th>
<th>Female Mean</th>
<th>df</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>25.81</td>
<td>28.15</td>
<td>99</td>
<td>1.13</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Overt</td>
<td>12.02</td>
<td>13.50</td>
<td>99</td>
<td>1.20</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Covert</td>
<td>14.17</td>
<td>14.65</td>
<td>99</td>
<td>.47</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Ratio</td>
<td>1.07</td>
<td>.93</td>
<td>99</td>
<td>2.17</td>
<td>&lt;.05</td>
</tr>
</tbody>
</table>

When this score is eliminated, the mean of the male group is lower than that of the females. The hypothesis that the female Ss would score significantly higher than the male Ss was not supported by the data.

To discover the relationship, if any, between the anxiety scores and academic achievement, linear correlations were calculated. A coefficient of correlation calculated as the mean of the products of paired standard scores was utilized (Edwards, 1946). Table 2 summarizes the results of these calculations.

The linear correlations yielded no significant relationships with respect to any of the anxiety scores and the academic achievement score.
When an assumption of rectilinearity is not warranted, the correlation ratio or eta is used to determine the degree of curvilinear relationship between the two variables (Edwards, 1946). Table 3 summarizes the results of eta coefficients between the anxiety measures and the academic achievement measure. The correlations in Table 3 were all significant in that their standard errors show each of them to be a significant departure from zero (Guilford, 1965).

A further test of significance utilizing analysis of variance was used to determine if predictions could be made from the data. Guilford (1965) suggests "When the eta is near the lower margin of significance and a more rigorous test of significance is required . . . then the F test has its advantages." The analysis of variance procedure is
Table 3

Eta Coefficients Between IPAT Anxiety Scores and Academic Achievement Scores

<table>
<thead>
<tr>
<th>Test</th>
<th>eta</th>
<th>Standard Error</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>.633</td>
<td>.59</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Overt</td>
<td>.529</td>
<td>.072</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Covert</td>
<td>.616</td>
<td>.062</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Ratio</td>
<td>.458</td>
<td>.079</td>
<td>&lt;.01</td>
</tr>
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</table>

based upon data derived from the solution of the eta. Table 4 summarizes these analyses. It can be seen from Table 4 that only the total anxiety score was significant when analysis of variance techniques were applied. The other scores, while demonstrating the relationship was not a chance one, were not significant when the more rigorous F test was applied. The F test allows determination of whether whatever relationship that exists is a significant departure from linearity. Thus despite finding significant etas using standard error tests, we cannot count on the discovered curvilinear relationships to form consistently a single curved line departure from linearity.

The eta coefficient assumes no particular type of functional relationship between two variables. The type of
Table 4

An Analysis of Variance Based Upon Statistics Derived
in the Solution of the Correlation Ratio:

IPAT Anxiety Scores with
Achievement Scores

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between sets</td>
<td>23</td>
<td>1065</td>
<td>46.30</td>
<td>2.25</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Within sets</td>
<td>77</td>
<td>1588</td>
<td>20.62</td>
<td>2.25</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>2653</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overt</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between sets</td>
<td>24</td>
<td>772.13</td>
<td>32.17</td>
<td>1.28</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Within sets</td>
<td>76</td>
<td>1902.87</td>
<td>25.03</td>
<td>1.28</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>2675.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Covert</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between sets</td>
<td>26</td>
<td>989.52</td>
<td>38.05</td>
<td>1.75</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Within sets</td>
<td>74</td>
<td>1601.61</td>
<td>21.64</td>
<td>1.75</td>
<td>&gt;.05</td>
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<tr>
<td>Total</td>
<td>100</td>
<td>2591.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ratio</strong></td>
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<tr>
<td>Between sets</td>
<td>51</td>
<td>568.04</td>
<td>11.13</td>
<td>11.13</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Within sets</td>
<td>49</td>
<td>2096.80</td>
<td>42.79</td>
<td>1.26</td>
<td>&gt;.05</td>
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<tr>
<td>Total</td>
<td>100</td>
<td>2674.84</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
relationship is defined by the actual, unsmoothed trend of the means of the columns (Guilford, 1965). Figures 1, 2, 3, and 4 depict these relationships.

It may be seen from figures 1, 2, 3, and 4 that the means of the columns do not follow a smooth trend, but rather follow an irregular pattern. Guilford (1965) indicates that,

Because the eta coefficient does allow the regression curve to follow the means of the columns, a certain amount of error or purely sampling variance undoubtedly gets into the deviations of column means from the general mean of the columns; hence the eta is a somewhat inflated figure . . . . We should therefore discount any eta a little, particularly if the means of sets do not follow a smooth trend rather well.

The means of the columns of the data do not follow a smooth trend, therefore the best prediction that can be made from the Total anxiety score is the average achievement score of the column in which the anxiety score falls. These data do not support the second hypothesis; that the relationship between the anxiety measures and academic achievement is curvilinear.
FIGURE 1

RELATIONSHIP OF ACADEMIC ACHIEVEMENT TO IPAT TOTAL ANXIETY SCORES PLOTTED AS STANDARD SCORES

TOTAL ANXIETY SCORES

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ACHIEVEMENT SCORES

0 0 3 3 7 4 9 9 7 4 1 2 9 9 4 5 2 9 0 2 1 0 1 0 0 0 0 0
FIGURE 2

RELATIONSHIP OF ACADEMIC ACHIEVEMENT TO IPAT OVERT ANXIETY SCORES PLOTTED AS STANDARD SCORES

OVERT ANXIETY SCORES

ACHIEVEMENT SCORES

f 0 1 4 1 6 5 3 1 1 1 3 8 9 7 3 6 3 3 6 0 0 2 1 0 0 1 1 0 0 0
FIGURE 3

RELATIONSHIP OF ACADEMIC ACHIEVEMENT TO 1PAT
COVERT ANXIETY SCORES PLOTTED AS STANDARD SCORES

COVERT ANXIETY SCORES

ACHIEVEMENT SCORES
FIGURE 4

RELATIONSHIP OF ACADEMIC ACHIEVEMENT TO IPAT RATIO ANXIETY SCORES PLOTTED AS STANDARD SCORES
Discussion

This section includes a discussion of the following topics: (a) limitations of the study, (b) correspondence and difference from previous experiments, (c) implications of the results, and (d) suggestions for further research.

Limitations of the Study

The major limitation of the present experiment is its design. The field experiment undoubtedly has many advantages, but its most serious weakness is its lack of tight experimental control. Due to this weakness, statements of casual relationships are much less dependable than they are in laboratory experimental research. Kerlinger (1964) in writing of the field experiment, states,

One weakness inherent in field experimental situations is lack of precision. In the laboratory it is possible to achieve a high degree of precision or accuracy . . . . But in realistic situations, such as in schools and community groups, extraneous independent variables abound . . . . In other words, the dependent variables measures are often so crude that they cannot pick up all the variance that has been engendered by the independent variable.

This is probably the most crucial limitation of the present experiment; that of lack of control of many of the variables that may have influenced the outcome.

The use of more than one class for purposes of gathering data presented a problem of control. The classes used the same textbook, but they met at different hours, in
different rooms, had different instructors, in short, each class had dissimilar experiences. It is highly unlikely that each was exposed to the same events during the quarter. Data gathering was also done during the regular class hours and each class undoubtedly had a unique, rather than completely common testing experience.

Ethical considerations may have also had an influence on the results. In an effort not to deceive the students, they were informed that the tests would in no way affect their grades for the course. This type of instruction, for example, might have encouraged the more placid student to expend minimal effort. This same type of instruction, however, may have allowed the more anxious student to perform at a higher level, because of reduced tension.

The fact that anxiety level, as measured by the IPAT, is sensitive to change over time and from condition to condition (Cattell, et al., 1963) is another restriction of the present experiment. The anxiety measures were taken during the first of the quarter. There is no evidence available to say that the anxiety level of the students was consistent during the quarter. If the anxiety level did in fact change in some, or all, of the students, then the measure taken at the first of the quarter would not hold for the remainder of the term. The change in anxiety, if there was one, was not measured by the present experiment.
There is a possible difference that could exist between the sample of the present experiment and the standardization sample. The classes that were used are primarily for psychology majors and persons who are planning to become teachers. This class is usually taken near the end of the sophomore or first of the junior year. The standardization sample presumably took in all years of college and possibly a great many persons representing other walks of life. Cattell's sample was not made clear.

The most significant finding of the present experiment was the discovery of significant eta relationships between the anxiety measures and the academic achievement score. This relationship, because of the above stated limitations, cannot be regarded as a strong association. The other variables that may have filtered into the experiment certainly could have had an unmeasurable influence upon the results. This type of problem is to be expected in a field experiment where realism is desired.

Correspondence and Difference from Earlier Findings

Most previous studies have been conducted with the idea that the relationship between anxiety and academic achievement is linear. The widely accepted point of view suggests that the higher the anxiety the lower the achievement. This assumption was made because it was believed that the higher the anxiety the more interference the student
encounters when he is attempting to learn. In most of the experiments of this type, however, zero or near zero linear correlations were discovered. The linear correlations calculated on the data of the present experiment correspond favorably to the bulk of experiments reviewed in the introduction. Most of these studies used the MAS.

The results of this study do not follow those obtained by Brogden (1940), Cattell and Gruen (1955), or Scheier and Cattell (1958). In these studies significant positive linear correlations were found.

The results of this study also do not conform to the assumption of Cattell and Scheier (1963) that the relationship between these variables is curvilinear. The data, while demonstrating some relationship when eta was applied, do not achieve the characteristics required for prediction for curvilinear associations.

The sample of the present study differed from the standardization sample with respect to sex and anxiety level. In the original sample females scored higher than males. In the present experiment there were no significant differences with the exception of one comparison where male Ss scored significantly higher. It is assumed that the difference could possibly be due to sampling variance or the error term.
Implications of the Results

The results of the present experiment are valuable in that they demonstrated a case where linear correlations were near zero, but non-linear relationships were significant. In many experiments the linear correlation has been the only statistic applied and no relationship reported.

Guilford (1965) suggests

This should stress the importance of plotting scatter diagrams more frequently than is ordinarily done; otherwise important non-linear regressions may be overlooked. It is possible that many zero Pearson r reported in the literature conceals a significant non-linear relationship.

Suggestions for Further Research

There are important limitations inherent in the field experiment. The aspect of control is the most crucial of these restrictions. In order to insure more control, a replication of the present experiment should endeavor to perform the evaluations on one large group of people, rather than several small groups. This would insure proper control over time, instructor, material covered— in short, each S would have essentially the same experience.

It is suggested that in further work with the IPAT Anxiety Scale Questionnaire all scores available on the test are utilized. This would apply not only in studies of this type, but in any other experiment using the IPAT scale. The scores on the IPAT, when reinforced with the appropriate
items from the IPAT Sixteen Personality Factor Questionnaire (Cattell, Saunders & Stice, 1957), gain the reliability needed to be used with confidence. This should also increase the reliability of the entire test by virtue of increasing the test to approximately three times the present length. Cattell and Scheier (1963) suggest this technique for increasing the reliability of the part scores and the entire test.

Summary

An attempt was made to determine the relationship of anxiety level to academic achievement and to sex. At the first of the quarter the college Ss took an achievement test designed to assess concepts taught during the quarter. They also took the IPAT Anxiety Scale Questionnaire. The same achievement test was administered at the end of the quarter. A difference score, or the difference between the post-achievement and preachievement tests, was defined as the amount of growth, or achievement. Linear correlations yielded no significant relationships between these two variables. Eta correlations suggest the two variables are related in an irregular manner. The comparison of anxiety level to sex revealed the male Ss scored significantly higher than the female Ss on the ratio anxiety score.
REFERENCES
References


Spence, K. W., & Taylor, Janet A. Anxiety and strength of the UCS as determiners of the amount of eyelid conditioning. *Journal of Experimental Psychology, 1951, 42*, 183-188.


APPENDICES
1. Contemporary theories of human development
   1. typically contradict older views
   2. have swung back and confirm the details of previous theories
   3. often supplement and reinterpret older beliefs
   4. reveal that ancient beliefs have consistently been sound
   5. are completely novel

2. Psychoanalytic studies emphasized most heavily
   1. sexual interests
   2. parental anxiety
   3. physiological data
   4. heredity factors
   5. unconscious motivation.

3. Wide differences in patterns of human behavior have been pointed out especially by
   1. medical doctors
   2. psychologists
   3. sociologists
   4. biologists
   5. anthropologists

4. A recent advance in the study of heredity consists of data concerning
   1. DNA structure
   2. Rh compatibility
   3. G factor in IQ
   4. effects of vitamin B
   5. hormonal activity

5. The most important item in the human's inheritance at the time of birth is his
   1. intelligence
   2. already developed abilities
   3. low metabolism
   4. potential
   5. biological evolution
6. The time of most rapid human growth is the
   1. neo-natal period
   2. period of the ovum
   3. fetal period
   4. period of infancy
   5. embryonic period

7. The Liley technique is used to counteract the effects of
   1. Rh incompatability
   2. German measles
   3. neurotic tendencies
   4. anoxemia
   5. birth trauma

8. Having babies without the aid of drugs or instruments
   except in unusual cases is endorsed by
   1. Otto Rank
   2. M. F. Ashley Montagu
   3. Arthur T. Jersild
   4. Grantly Dick-Read
   5. Ira S. Wile

9. An exception to the principle that growth takes place
   most rapidly in the early years is apparent in the
   development of
   1. personality
   2. head size
   3. intelligence
   4. leg growth
   5. sex organs

10. The recommendation that children not be exposed to
    formal reading instruction until they reach a mental
    age of 6½ years is an illustration of the principle that
    1. growth is most rapid in the early years
    2. each individual has his own rate of growth
    3. the effect of training depends on maturation
    4. growth is sequential
    5. growth rates tend to remain constant

11. Children are most likely to experience change in rate
    of intellectual development when
    1. their health status is changed
    2. there is a marked change in their environment
    3. one parent dies
    4. there is a change in foster homes
    5. the type of test used is changed.
12. The principle of heterostasis refers to
1. variability of behavioral patterns
2. the tendency of the organism to maintain equilibrium
3. self repair of the body
4. the urge to move away from the status quo
5. the tendency for traits to be correlated

13. Which of the following human characteristics is most responsive to environmental influences?
1. personality
2. intellectual ability
3. facial features
4. height
5. ratio of width of hips to shoulders.

14. Most people in North America would be found in the combination of
1. upper-upper and upper-middle classes
2. upper-middle and lower-middle classes
3. upper-lower and lower-middle classes
4. upper-lower and lower-lower classes
5. lower-middle and lower-lower classes

15. Which of the following is most unlikely to be a factor in upward mobility?
1. Obtaining a higher status occupation
2. Earning substantially more money
3. Extensive education
4. Possessing high native intelligence
5. Associating with people of a higher class

16. Group intelligence tests seem to
1. favor children from the lower classes
2. reward verbal facility
3. detect special ability
4. have no relationship, in results, to socioeconomic status
5. have no social class bias in questions asked

17. Studies show that school grades are often awarded
1. on the basis of intelligence rather than achievement
2. in such a way as to favor lower-class pupils
3. inversely to the prestige of parents
4. entirely on the basis of achievement in relation to ability
5. along class lines
18. The major import of urban and rural in differences of development is in
1. sex morality
2. extent of education received by children and youth
3. size of family income
4. intellectual development at the cost of emotional stability
5. demonstrating cultural influences

19. A person who played a major role in the development of the Stanford-Binet individual tests of intelligence was
1. E. L. Thorndike
2. L. M. Terman
3. O. K. Buros
4. L. L. Thurstone
5. C. E. Spearman

20. The function of intelligence tests is to
1. measure innate capacity
2. measure developed capacity
3. indicate the level of academic achievement
4. estimate the existence of capacity by evaluating present status
5. predict the future development of the test subject

21. Which of the following is most likely to have a negative effect on intellectual development?
1. Sensory handicap
2. Being one of a set of twins
3. Being the first-born in a family
4. Having older parents
5. Heavy body build

22. Of the following, the most favorable to development of intellectual potential is
1. good health
2. starting to school early
3. being above average in height and weight
4. having a mother who does not work outside the home
5. associating with an interested and able adult

23. Ability groups in school should be based on
1. mental age
2. intelligence quotient
3. many factors
4. past school records
5. achievement test results
24. The infant learns mostly through  
1. imitation  
2. conditioning  
3. trial and error  
4. informal instruction  
5. direct tutelage

25. The correlation between intelligence scores of infants and later intelligence test scores are typically  
1. high  
2. negative  
3. low  
4. an individual matter  
5. of no consequence

26. In helping the baby learn to walk, the best procedure seems to be to  
1. hold the baby by the hands and walk along with him at about fourteen months  
2. let him learn by himself by providing freedom and opportunity  
3. discourage him until his legs straighten  
4. provide him with a jumper to exercise his legs  
5. provide a walker that will roll easily

27. Study of the social development of infants makes it appear that he is  
1. object directed  
2. egotistical  
3. parent centered  
4. primarily concerned with physical features  
5. self-centered

28. In early childhood probably the most important factor in the development of physical skills is  
1. level of intelligence  
2. maturation  
3. exercise and practice  
4. skilled instruction  
5. abundant toys with which to play

29. During the years two to six the child's play can best be described as  
1. independent  
2. cooperative  
3. solitary  
4. onlooker  
5. competitive
30. Independence in self-care is best encouraged by
   1. regular schedules
   2. letting maturation play the main role
   3. comparisons with siblings
   4. an overall salutary parent-child relationship
   5. solicititude and immediate help

31. The most difficult part of learning right and wrong is
   1. discovering what society wants
   2. finding good examples
   3. internalizing the concepts
   4. making distinctions between the accepted and non-accepted
   5. finding the right punishment for transgression

32. The middle childhood years are most noteworthy because of
   1. marked changes in the pattern of physical development
   2. school and peer influences
   3. emancipation from the family
   4. the speeded tempo of mental development
   5. disturbances of emotional balance

33. Conflicting demands created by cross currents in culture contribute to a child's feeling of
   1. uprootedness
   2. curiosity
   3. identity
   4. inquisitiveness
   5. aggression

34. The greatest danger to health and life during the middle childhood years is
   1. poliomyelitis
   2. tuberculosis
   3. benign tumors
   4. accidents
   5. the so-called childhood diseases

35. A widely used individual test for children in the middle years is the
   1. Pintner-Cunningham
   2. Otis Quick Scoring
   3. MAT
   4. WAIS
   5. WISC
36. Research indicates that one characteristic of intellectual development in preadolescence is
1. a temporary deceleration
2. an increase in general but not specific functions
3. a spurt in I.Q. level for individuals
4. a surge in creative production
5. an increased emergence of specific subabilities

37. Ego concepts are probably most greatly enhanced during preadolescence by
1. affectionate parents
2. teachers who display affection
3. physical skill in games
4. academic superiority
5. winning the approbation of members of the other sex

38. Hymes believes that discipline should be administered
1. if the child understands what is right
2. when a child does not understand what is right
3. consistently for every misdeed
4. only by one parent
5. by certain designated persons—in or out of school

39. Much of present day psychotherapy is devoted to
1. getting the individual to see the futility of his actions
2. improving the environment
3. reconstruction of parental attitudes
4. building a stronger self-image
5. discovering who is responsible for the maladjustment

40. Adolescence, as distinguished from puberty, is a phenomenon which is mainly
1. physical
2. personal
3. psychological
4. emotional
5. cultural

41. The existence and the imminence of obligatory military service
1. is resented by adolescent boys
2. tends to delay marriages
3. makes it easier for adolescents to plan their lives
4. creates more serious students
5. gives some young men a welcome purpose
42. It is most accurate to speak of adolescence as a time of emotional
1. lability
2. stability
3. stress and strain
4. chronic upheaval
5. consistency

43. The group in society which receives the least help from other parts of society is
1. children
2. those who have retired
3. adolescents
4. middle-aged persons
5. youth

44. Margaret Mead considers that man's increased participation in the family is
1. a great advantage to children
2. an inevitable trend in view of woman suffrage
3. a concomitant of urbanization
4. a hazard to national welfare
5. a means of stabilizing man's ego concept

45. Of the following, studies show that the most important factor in marital success is
1. same religion
2. personality maturity
3. age above twenty years
4. similarity of interests
5. same educational level

46. Divorce and separation rates are lowest among
1. the lower socioeconomic class
2. those families in which the woman works outside the home
3. families with two children
4. interfaith marriages
5. those couples with relatively more education

47. The role which religion plays in marriage is
1. unimportant
2. powerful since religion conditions one's outlook on life
3. significant only to devout members of a particular sect.
4. more important than age factors
5. important only when there are children
48. A family life problem which has arisen in recent years is
1. parent-adolescent conflict
2. women's lack of purpose after mid-life
3. the climacteric
4. the role of religion in the home and school
5. obtaining a personally owned home

49. Recognition of individual differences in school is
1. more a hope than it is a fact
2. widely practiced
3. contrary to democratic orientation
4. psychologically unsound
5. impractical in elementary schools

50. There are many factors which contribute to creativity but one of the most important is
1. high intelligence
2. language facility
3. teachers who insist that knowledge be acquired
4. separate schools for the gifted
5. freedom and encouragement of independence

51. Life-adjustment education is
1. the responsibility of the family
2. the responsibility of clinicians
3. unnecessary if subject matter is emphasized
4. more necessary for girls than for boys
5. sometimes a step which must precede subject-matter mastery

52. The most widely used single criterion of giftedness is
1. consistently high academic marks
2. the display of unusual talent
3. I.Q. above 130
4. I.Q. about 120
5. teacher's nominations

53. Which of the following is NOT listed specifically as one of the four educational objectives formulated by the Educational Policies Commission?
1. Self-realization
2. Human Relationships
3. Economic efficiency
4. Civic responsibility
5. Ethical character

54. In the process of growing up, boys and girls find it hardest to face disapproval of
1. fathers
2. parents
3. peers
4. mothers
5. teachers
55. European families are more likely than American families to be
1. nuclear
2. matriarchial
3. extended
4. broken
5. linear

56. Competition within groups
1. reduces cohesiveness among boys
2. increases cohesiveness among both boys and girls
3. increases friendliness
4. threatens morale
5. does not necessarily reduce solidarity of friendships

57. Two persons who have made significant contributions to knowledge of peer groups are
1. Smith and Hudgins
2. Berelson and Steiner
3. Barry and Wolf
4. Redl and Wattenberg
5. Sherif and Sherif

58. The really major task of adolescence is to
1. find a job
2. establish an identity
3. get weaned away from home
4. find a marriage partner
5. complete one's education

59. The greatest threat to the health and viability of children up to age four is
1. tuberculosis
2. poliomyelitis
3. accidents
4. cancer
5. diphtheria

60. The greatest threat to the life of individuals in the first two decades of life is
1. poliomyelitis
2. accidents
3. cancer
4. radioactivity
5. influenza
61. Accident proneness appears to be concomitant of
   1. low intelligence
   2. life style
   3. organic predisposition
   4. parental inadequacy
   5. mechanization

62. Sibling jealousy is
   1. greatest during the primary school years
   2. outgrown by the time of adolescence
   3. a quite normal reaction
   4. rarely accompanies any lasting personality damage
   5. more likely to occur in the last born child

63. Of those who start school in the United States about what per cent of them will drop out before finishing high school?
   1. 75%  3. 35%  5. 10%
   2. 50%  4. 25%

64. Self-realization is
   1. freedom from lop-sided development
   2. a state of emotional satisfaction
   3. a way of productive living
   4. the achievement of adjustment
   5. the ability to accept present reality without question.

65. At present, institutional treatment for mental illness is
   1. a custodial function
   2. designed to protect those who are normal
   3. effective in twenty-five per cent of cases
   4. effective in about eight per cent of the cases
   5. declining in effectiveness

66. Of the following, the most important in self-realization is
   1. physical health
   2. appropriate school curriculum
   3. a healthy ego concept
   4. high intelligence
   5. emotional indifference
67. The most important factor in child rearing which bears on optimal development is
1. toilet training practices
2. weaning practices
3. the total family milieu
4. disciplinary methods
5. sanitary health regimes

68. Self-realization is most likely to be achieved during
1. the years of infancy
2. middle childhood
3. adolescence
4. the middle adult years
5. old age
APPENDIX B

INSTRUCTIONS FOR IPAT ANXIETY SCALE QUESTIONNAIRE

The form I will pass out is part of a research project. Your answers on this form do not in any way affect your grade in this or any other class. Please make each answer your own, and be as frank as possible. The results will be strictly confidential.

When you get your paper, please put your name, sex, and age in the appropriate spaces. In the space marked "other facts," please put your year in school.
APPENDIX C

INSTRUCTIONS FOR PREACtIIEVEMENT TEST

This is a test of previous background in human development concepts. We are interested in how much background or knowledge you have before taking this course. It is part of a research study. Since it is not a measure of what you have learned in this course, we cannot, and will not, let it affect your grade. However, to help us understand you and later groups, please try your best on every question. Do not leave any blanks. If you do not know the answer, just make your very best attempt, or best guess.
APPENDIX D

INSTRUCTIONS FOR POSTACCEIVEMENT TEST

This is a general test of human development concepts. We are interested in how much knowledge you have gained since the beginning of the quarter. It is part of a research study. The results of this examination will in no way affect your grade; however, it is the same type of test as your final, so this will be a good time to try yourself. To help us understand you and later groups taking Psychology 309, please try your best on every item. Do not leave any blanks. If you do not know the answer, just make your very best attempt.