A MULTIVARIATE ANALYSIS OF THE RELATIONSHIP OF ACADEMIC MOTIVATION APTITUDE, SOCIO-ECONOMIC STATUS, AND AGE TO PERSISTENCE IN AN ADULT EVENING SCHOOL

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ABSTRACT

A MULTIVARIATE ANALYSIS OF THE RELATIONSHIP OF ACADEMIC MOTIVATION, APTITUDE, SOCIO-ECONOMIC STATUS, AND AGE TO PERSISTENCE IN AN ADULT EVENING SCHOOL

by Walter A. Busby

The purpose of this investigation was to study the various factors related to the persistence of adults who enrolled in the academic curriculum of an adult evening school. Objective measures of academic motivation (Michigan State M-Scale), aptitude (Differential Aptitude Test-Verbal Reasoning), socio-economic status (Socio-Economic Scale), and age, were applied to a sample of male and female persisting and non-persisting adult students (those who enrolled and completed the work for their high school diploma and those who enrolled and subsequently dropped out).

The population consisted of all the adult students who enrolled in the academic curriculum of the Lansing Adult Evening Program from 1956-1963. The population was stratified into four different groups according to sex and persistence and a random sample of ten students was selected from each group.

The instruments used in the study were the Differential Aptitude Test, Verbal Reasoning, The Socio-Economic Scale, and The Michigan State M-Scale. The M-Scale is composed of the following sub-tests: the Generalized Situational Choice Inventory, the Word Rating List, the Human Trait Inventory and the Preferred Job Characteristics.

Simple correlation, analysis of variance, and multiple discriminant analysis were used to analyze the data.

The major proposition of the study, that there is a relationship between academic motivation and persistence, was supported by the male sample but not by the female sample. Male persisters and non-persisters differed significantly on Total M-Scale and three of the four sub-tests while female persisters and non-persisters showed no significant differences on either the Total M-Scale or its four sub-tests. Aptitude and age were not significantly related to persistence in either the male or female samples. On the other hand socio-economic status was found to be significantly related to persistence in both the male and female sample. No significant differences were found between persisting males and females or non-persisting males and females.

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CHAPTER I

NATURE OF THE PROBLEM

Statement of Purpose

The purpose of this investigation is to study various factors related to the persistence of adults who enroll in the academic curriculum of an adult evening school. Of primary interest is the relationship of academic motivation to persistence. Other variables to be considered in relationship to persistence are socio-economic status, aptitude, age and sex. Accordingly, objective measures of academic motivation (Michigan State M-Scales), aptitude (Differential Aptitude Test-Verbal Reasoning), socio-economic status, (socio-economic scale), and age will be applied to a sample of persisting and non-persisting adults classified according to sex.

Significance of the Problem

Democracy cannot long survive without an enlightened, informed citizenry. The education of each individual to his fullest potential is, therefore, a necessary goal for the welfare of a democratic society. Because of the constantly changing and complex nature of today's society, this ideal

can only be achieved through a well-organized program of continuing education for all levels of people in all segments of society.

Primary among the social and cultural changes that have increased the need and demand for adult education are:[1]

1. Our population is growing faster--by 1975 it will reach 225 million.

2. Our population is becoming more mobile, thanks to rapid developments in transportation and communication.

3. Our population is getting older. Medical science and better health services are extending our lives.

4. Our expanding economy demands a larger and more qualified work force.

5. Tremendous advances in the production of power is resulting in speed, complexity, and bigness. This change lies at the root of nearly all other changes and brings with it many social and economic problems such as increased leisure, and displaced workers due to automation.

Consequently, adult education is increasingly becoming a formidable part of our nation's educational program. Between June 1961 and June 1962 it was estimated that twenty-five million adult Americans were active in some category of adult education.[2] Of this number over 2,500,000 were full-time students.[3]

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[1]The major portion of this list was found in Ambrose Caliver's, "The National Concern for Adult Education," (reprint) School Life (May, 1957).

[2]John W. Johnstone, Volunteers for Learning, (Chicago: National Opinion Research Center, Report #89, February, 1963), p. 25.

[3]Ibid.

Clearly, more education is needed for adults to keep pace with our changing world. However, it is less clear how greater receptivity and motivation for education can be developed among those who need it most. As technology advances there remain fewer jobs for the unskilled and the uneducated, and more unfilled jobs demanding higher levels of skills and education. Yet, it has been estimated that up to forty percent of the students who enter the fifth grade will not graduate from high school.[4] The situation in adult education is not any brighter, with nearly one-third failing to complete the classes in which they enroll.[5]

The problem becomes even more serious if only statistics for adults enrolled in academic courses are considered. Between 1956 and 1963 approximately 2,000 adults enrolled in the academic curriculum of the adult evening school of Lansing, Michigan. The academic curriculum is designed for students who wish to complete the requirements for their high school diploma. Only 122 out of the almost 2,000 who enrolled were graduated.

The welfare of our democratic society demands that we reduce this waste of human resources. Consequently, the problem of academic motivation has become one of the most

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[4]Gordon Watson (ed.), No Room at the Bottom (Washington: National Education Association, 1963), p. 2.

[5]National Education Association, A Study of Urban Public School Adult Education Programs (Washington, D.C.: NEA, 1952), p. 28.

pressing concerns of our time. To eliminate the human waste caused by students and adults failing to develop their full potential, it will be necessary to first understand the many facets of the relationship of academic motivation to persistence.

While many studies and much progress has been made in the area of intellectual and social factors associated with achievement and persistence, equivalent progress has not been made in the area of motivational factors. The understanding of motivation and the variables affecting persistence will enable us to more adequately develop each individual to his full potential and therefore eliminate the waste of human resources that is so detrimental to our democracy.

CHAPTER II

BACKGROUND OF THEORY AND RESEARCH

As stated in Chapter I, the primary interest in this study is the relationship of academic motivation to adult persistence. Academic motivation is defined broadly as a combination of forces which initiate, direct, and sustain behavior towards a scholarly goal. Persistence is conceived as one of the three dimensions of academic motivation, the other dimensions being level of performance and direction of risk taking. Thus, the amount of academic motivation of a student will affect his level of performance, the difficulty of goal's selected, and his persistence or disposition to complete a goal once it is selected.

Academic Motivation

An objective measure of academic motivation has been developed by Farquhar and associates from a motivation task theory.[1] This theory is an extension and modification of

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[1]William W. Farquhar et al., Motivation Factors Related to Academic Achievement (East Lansing, Michigan: Office of Research and Publications, College of Education, Michigan State University, 1963).

McClelland's[2] theory and the research reported by Atkinson[3] on the achievement motive. McClelland has argued that the achievement motive can best be studied in a projective situation by allowing the subject to invent or make any associations which come to him. This is accomplished by flashing a picture on a screen for twenty seconds. The subject then writes a story describing what is going on. The stories are scored on the basis of the response in terms of (1) need for competition with a standard of excellence, (2) need for unique accomplishment, and (3) need for long-term involvement.

Farquhar and associates extended and bi-polarized this concept as shown in Table 1. On the basis of this theory the Farquhar team developed four instruments which comprise the Michigan State Motivational Scales. The four scales measure the following non-intellectual factors as seen in Table 2. Several studies have supported the validity of this instrument as a measure of academic motivation.

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[2]David McClelland et al., The Achievement Motive (New York: Appleton-Century-Crofts, 1953).

[3]John W. Atkinson (ed.), Motives in Fantasy, Action and Society (Princeton, N.J.: D. Van Nostrand Co., 1958).

Table 1. Polar theory of high and low academic achievement motivation[a]

High Academic Achievement Motivation	Low Academic Achievement Motivation
1. Need for long-term involvement	1. Need for short-term involvement
2. Need for unique accomplishment	2. Need for common accomplishment
3. Need to compete with a maximal standard of excellence	3. Need to compete with a minimal standard of excellence

[a]William W. Farquhar, Motivational Factors Related to Academic Achievement, p. 10.

Table 2. Non-intellectual factor measured by the M-Scale

Factors	Sub-test of M-Scale
1. Need for academic achievement	1. General situational choice inventory
2. Academic self-concept	2. Word Rating list
3. Academic personality factors	3. Human trait inventory
4. Occupational aspirations	4. Preferred job characteristics scale

Persistence

Historically, there have been three different approaches to the study of persistence.[4] The first approach comprises research which is concerned with persistence as a trait or uniformity of behavior. Typically, these studies show the relationship between persistence scores (usually in terms of time) for a variety of different tasks. The basic interest of this research is in consistency of behavior.

The second approach consists of studies which are concerned with the problem of resistance to extinction. In the trait studies, a common technique is to measure the time for which the subject typically performs a task without success. In the extinction studies the subject typically performs a task without reinforcement after being subjected to a particular type of reinforcement schedule during an acquisition series. Extinction studies generally ignore the possible effects of stable personality differences and focus on the influence of situational variables, especially differences in pattern and amount of reinforcement.

Finally, the third approach comprises the research which is concerned with persistence as a motivational phenomenon. This theory has taken two directions. One theory considers persistence mainly in terms of situational

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[4]For a complete and comprehensive discussion of persistence, see N.T. Feathers, "The Study of Persistence," Psychological Bulletin, Vol. 59, No. 2 (1962), pp. 94-115.

parameters, leaving personality variables relatively unspecified. An example of this approach is Lewin's field theory.[5] The other direction of persistence conceived as a motivational phenomenon is concerned with stable personality dispositions or motives. An example of this approach is Atkinson's theory of achievement motivation.[6] This latter theory of achievement motivation provided the theoretical framework for the development of the theory used in the present study.

Atkinson conceived of persistence as one of the three dimensions of academic motivation; the other two dimensions being level of performance and direction of risk taking. However, Atkinson and others who have conducted research on academic motivation were concerned with only the individuals on a single task or, at most, a group of tasks. The major proposition of this study is that this theory may have application in a broader academic setting. Farquhar and associates have already demonstrated that academic motivation, as measured by the Michigan State M-Scale, can predict achievement or level of performance. Using Atkinson's theory it thus becomes tenable that the M-Scale should also predict persistence.

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[5]Kurt Lewin, Dynamic Theory of Personality (New York: McGraw-Hill, 1935).

[6]J.W. Atkinson, "Personality Dynamics," Annual Review of Psychology, Vol. 2 (1960), pp. 255-290. J.W. Atkinson and G.H. Litwin, "Achievement Motives and Test Anxiety as Motives to Avoid Failure," Journal of Abnormal and Social Psychology, Vol. 60 (1960), pp. 52-63.

A review of the literature yielded four additional variables that had been shown to affect academic persistence. They are:

1. Aptitude
2. Socio-economic status
3. Sex
4. Age

In one sense, these additional variables are used as control variables. However, by using the multiple discriminate analysis with a factual design it will be possible to not only determine the relationship between academic motivation and persistence, but, in addition, it will be possible to observe the relationship of the different variables and the magnitude of their contributions to persistence.

Hypothesis to be Tested

Following directly from the previously outlined theory, the subsequent hypothesis was formulated:

It is possible to differentiate among groups of adult students classified by persistence and sex on the basis of objective measures of academic motivation, aptitude, socio-economic status, and age.

Thus, for the purpose of the statistical test, the null hypothesis becomes:

There are no differences in academic motivation, aptitude, socio-economic status, and age among adult students classified according to persistence and sex.

The null hypothesis tests the assumption that all the groups of adult students may be considered members of the same parent population and no significant difference exists among the groups in academic motivation, socio-economic status, aptitude, and age.

If the null hypothesis is rejected, the differences among groups will be examined. In addition, it will be possible to examine the relationship of the interaction among the groups.

Summary

Of primary interest in this study is the relationship of academic motivation to adult persistence. An objective measure of academic motivation has been developed by Farquhar and associates from the motivational task theory of McClelland, et al. This theory is based on the students concern with: (1) long-term involvement, (2) competition with a standard of excellence, and (3) unique accomplishment. On the basis of a modification and extention of this theory the Farquhar team developed four instruments which comprise the Michigan State Motivational Scales. Several studies have supported the validity of this instrument as a measure of academic motivation.

Atkinson conceived of persistence as one of the three dimensions of academic motivation; the other two dimensions being level of performance and direction of risk

taking. Although Atkinson was concerned with individuals on a single task, it is possible that his theory may have application in a broader academic setting. Thus, the major proposition of this thesis is that it is possible to use a measure of academic motivation to predict persistence in an academic situation.

After adding the appropriate control variables of sex, age, socio-economic status, and aptitude our research hypothesis becomes:

It is possible to differentiate among groups of adult students classified by persistence and sex on the basis of an objective measure of academic motivation, aptitude, socio-economic status, and age.

CHAPTER III

REVIEW OF THE LITERATURE

This chapter contains an examination of research in the broad area of academic motivation and persistence, as well as research specifically related to adult persistence. In the first section, theory and research pertaining to academic motivation is presented. Two studies dealing directly with the Michigan State Scale are presented and reviewed. Research on persistence conceived as a motivational phenomenon is dealt with in the second section and several pertinent research studies are examined. Because of its obvious importance to motivation and persistence, research on socio-economic status is reviewed in the third section. A study of particular importance concerned with academic motivation and socio-economic status is examined in detail. The last section of this chapter is a comprehensive review of research that has been conducted in the specific area of adult persistence.

Academic Motivation

In general, there have been two approaches to the measurement of motivational states. The first is the attempt

to measure a person's motivational conditions either by measuring his psychological condition or by simply asking him how he feels about the condition under study. Second is the approach that assumes that people are not always conscious of their motivations, and therefore we can only ascertain motivational patterns through indirect means. One technique used in measuring motivation indirectly is the projective test. This test is a series of ambiguous pictures in which a person must structure and project something of himself into the situation in the picture. The rationale here is that even though a person can consciously control and sublimate his real motivational states, he will often reveal them unwittingly through his structured situations.

During the past forty years, there has been a steady expansion in the use of indirect measures of motivation.[1] Many early scholars such as Jung, Freud, and Darwin conceived of man as being relatively helpless in the grip of blind forces which dominate his existence. This line of thought has led to a contempt for what Allport has called the psychic surface of life--the persons outward expression of his needs and desires are only a cover for what is going on inside and of which he is not usually aware.[2]

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[1]Harold L. Hodgkinson, Education in Social and Cultural Perspectives (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962), p. 157.

[2]Gordon Allport, "The Trend in Motivational Theory," American Journal of Orthopsychiatry, Vol. 23 (1953), pp. 107-119.

The Achievement Motive

Every human being has some sort of goals. By the achievement of goals, we establish our social status and find out in part who we are. The need for achievement is in some measure the need to find our identity, and thus a part of all people in all cultures, although not consistent in form. The strength of the need for achievement will of course vary widely between individuals and within a given person as he moves from situation to situation.

A large amount of research in this area has been stimulated by McClelland, who has argued that the achievement motive can best be studied in a projective situation by allowing the subject to invent or make any associations which come to him.[3] McClelland accomplished this by flashing a picture on a screen for twenty seconds from which the subject was to write a story about what was going on. Emphasis was placed on making stories creative and dramatic. Four questions were used:

1. What is happening? Who are the persons?
2. What has led to the situation? That is, what has happened in the past?
3. What is being thought? What is wanted? By whom?
4. What will happen? What will be done?

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[3]D. McClelland et al., The Achievement Motive (New York: Appleton-Century-Crofts, 1953).

The stories were then scored with emphasis on reference to competition with a standard of excellence, unique accomplishment, and long-term involvement with a task.

Using this index of achievement motivation, McClelland and his associates attempted to answer the question: What differentiates those who score high in achievement motivation from those who score low?

The conclusion briefly was: Those who score high on the project test also tend to do more problems in a timed test, improve faster in doing anagrams, get better grades, recall more incompleted tasks, use future grammatical constructions in talking about themselves, and recognize achievement-related words faster.[4]

Michigan State Motivation Scale

Using an extension of McClelland's theory (for details see Chapter II) Farquhar and associates have developed a scale for measuring academic motivation.[5] Subsequent research has attested to the utility of this instrument in predicting achievement of high school students. The Farquhar approach, although far different from the approach of McClelland, can still be a part of the indirect school.

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[4]D. McClelland, op. cit., p. 327.

[5]William Farquhar et al., Motivation Factors Related to Academic Achievement (East Lansing, Michigan: Office of Research and Publications, College of Education, Michigan State University, 1963).

Students are not asked directly about their state of motivation, but rather are asked a series of force answer questions concerning their perception of how others view them. These answers, along with other questions dealing with some of their preferences, are used to determine their level of academic motivation.

In the initial study using the M-Scales on a sample of high school over- and under-achievers, Farquhar, et al. stated the following conclusions:

1. High and low motivated eleventh grade students, when operationally defined as over- and under-achievers, do respond with significant differences to a number of items designed to measure reflected self-concept, personality traits, and preference for certain types of occupational characteristics. Furthermore, the motivational extremes report a number of significant differences in demographic information.

2. Scores based on the valid items (labeled the M-Scales) estimate grade point average better than chance. Furthermore, the total and sub-scales have Hoyt's analysis of variance reliability estimates within an acceptable range.

3. When the scores of either the sub- or total test are added to the Differential Aptitude Test-Verbal Reasoning the precision of estimating the grade point criterion is significantly increased.

4. Comparable evidence of validity is found for both validation and cross-validation samples.

5. Interpretable factors are identifiable from the items of each of the four sub-tests which show some evidence of validity.

6. Little relationship was found between an index of educational-occupational status and motivation, aptitude, or grade point average except for the over-achieving sample. This finding was undoubtedly heavily influenced by the high drop out rate of the under-achieving sample between tenth and eleventh grade.

7. The M-Scales were more valid for males than for females for the population studied. About 75 per cent of the valid items were common for both sexes. The finding of 25 per cent unique items would support the original decision to do all analyses separate for the sexes.

Hayden[6] later attempted to validate the Michigan State M-Scales on a population of college students. The sample, 330 males and 367 females, was selected from the total population of first-quarter freshmen at Michigan State University in 1962. The objective of the study was to determine the predictive efficiency of an objective measure of academic motivation when applied to a general college population. The predictive variables were academic aptitude (College Qualification Test) and academic achievement (Grade Point Average).

The analyses were carried out independently for the male and female samples and involved the following: (1) reliability estimates were calculated using Hoyt's analysis of variance technique, (2) Pearsonian correlations were computed to assess the relationship of the M-Scale to academic achievement, (3) multiple correlations were computed to assess the improvement in the predicting of Grade Point Average attained by the addition of the M-Scale to the College Qualification Test.

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[6]Mary Lou Hayden, "The Validation of the Michigan State M-Scale with College Freshmen" (unpublished Ed.d. dissertation, College of Education, Michigan State University, 1962).

On the basis of the findings, it was concluded that for the obtained sample:

1. There is a low-positive relationship between the M-Scale and academic achievement for a male college population.

2. There is no significant relationship between the M-Scale and academic achievement for a female population.

3. There is no significant relationship between the M-Scale and academic aptitude for a male population.

4. There is no significant relationship between the M-Scale and academic aptitude for a female population.

5. The correlation between Grade Point Average (academic achievement) and College Qualification Test (academic aptitude) scores for males (.49) and for females (.59) is not significantly increased by adding either the sub- or total M-Scale scores to the estimates.

On the basis of the findings of this study, the utility of the M-Scale for decision making at the college level is extremely limited. In the Farquhar[7] study, with eleventh grade students, the M-Scales did correctly classify those students who did not identify with the educational environment. However, with a college population a different emphasis in the theoretical foundation might be indicated with a resultant difference in item content. Particularly would this latter point be an important consideration for the females where it appears that the procedures employed with the Farquhar sample did not generalize to the college population.

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[7]William Farquhar, Motivation Factors Related to Academic Achievement, op. cit.

While the study pointed out some definite limitations of the M-Scales, it also raised some very interesting questions. For example, could the M-Scale be used on a non-college population? The simplest explanation for the failure of the Michigan State M-Scales to discriminate between college under- and over-achievers is that in spite of differences in achievement, this group is obviously quite homogenous in regard to academic motivation. Hence, this study served the purpose of putting some definite limits on the use of the M-Scales and raised questions for future investigation.

Persistence as a Motivational Phenomenon

The studies in this section are concerned with persistence in relation to a theory of motivation. Two theories are particularly relevant to this review: The Lewinian field theory with its assumption of behavior determined by the psychological life space and all that it evolves, and the theory of achievement motivation with its interactive assumption of motives, expectations, and incentive values.

Lewinian Field Theory:

Lewinian Field theory conceives of behavior in terms of interacting personality and situational factors. The typical situation employed in the investigation of persistence using this theory involves a situation in which a person in a state of tension is separated at some

psychological distance from a goal by a barrier. This barrier is the source of restraining forces acting upon the goal. The barrier may be objectively insurmountable, as when the subject is given an insolvable puzzle and asked to solve it, or the barrier may represent a very difficult task in which case the opposing restraining forces would be very strong but possibly surmounted.

Fajons,[8] in a study of success, persistence, and activity in infants and young children, investigated the effects of separating children from a goal object at different distances. Fajons found that previous failure at a task decreased persistence when subjects were again confronted with the same type of difficulty and when persistence was measured by duration of approach. Previous success, however, led to an increase in persistence.

Similar effects of success and failure were found by Wolf.[9] He found that persistence also increased with the decreasing distance from the goal.

Theory of Achievement Motivation:

In contrast to the Lewinian field theory, the theory of achievement motivation involves not only a conceptualization

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[8]Kurt Lewin, "Behavior and Development as a Function of the Total Situation," in L. Carmichael (ed.), Manual of Child Psychology (New York: Wiley, 1946), pp. 791-844.

[9]Thomas H. Wolfe, The Effect of Praise and Competition on the Persistent Behavior of Kindergarten Children, Monogr. No. 15, Institute of Child Welfare, University of Minnesota, 1938.

of the effects of a momentary situation, but also provides for the influence of relatively stable dispositions on behavior. This theory is more restricted than the Lewinian field theory since it is specifically directed to the analysis of behavior in achievement contexts where performance may be related to standards of excellence.

Winterbottom,[10] as part of an investigation of the relationship of achievement motivation to early childhood training experiences, observed a sample of eight year old boys in a puzzle solving situation. During the test each child was given the opportunity to ask for help whenever he wanted it, and was offered help and rest at intervals. Using the projective thematic apperception method developed by McClelland[11] and associates, Winterbottom found that boys who were high in need achievement less frequently requested help and more often refused an invitation to stop work than boys who scored low in need achievement.

French and Thomas,[12] in a study involving a sample of servicemen, found a positive relationship between time

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[10]Marian R. Winterbottom, "The Relation of Need for Achievement to Learning Experiences in Independence and Mastery," in J.W. Atkinson (ed.), Motives in Fantasy, Action and Society (Princeton: VanNostrand, 1958), pp. 453-78.

[11]David McClelland, et al., op. cit.

[12]Elizabeth French and F. H. Thomas, "The Relationship of Achievement Motivation to Problem Solving Effectiveness," Journal of Abnormal Social Psychology, Vol. 56 (1958), pp. 46-48.

spent on a complicated mechanical problem and need achievement as assessed by the French Test of Insight, an apperceptive content device scored in the same way as the McClelland test. The majority of the high motive group used most or all of the time available for the puzzle, while only a few of the low motive group continued the puzzle to the end.

Thomas[13] had previously found that strength of achievement motive was related to the length of time a subject would work at a problem without objective knowledge of progress.

In the Nebraska Symposium on Motivation[14] Atkinson analyzed the role of the situations in relation to behavior in achievement content in terms of the expectation of a subject. This concept was further elaborated into a theory of achievement motivation.[15] In general the theory of achievement motivation considers motivation expressed in the direction, magnitude, and persistence of behavior as a positive function of the strength of the motive within the person.

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[13]Francis H. Thomas, "Visualization, Experience, and Motivation as Related to Feedback in Problem Solving," American Psychologist, Vol. 11 (1956), p. 444.

[14]M.R. Jones (Ed.), Nebraska Symposium on Motivation: 1955 (Lincoln: University of Nebraska Press, 1955), pp. 149-188.

[15]J.W. Atkinson, "Motivational Determinants of Risk-Taking Behavior," Psychological Review, Vol. 63 (1951), pp. 359-72.

Atkinson and Litwin,[16] using a sample of undergraduate students enrolled in a psychology course at University of Michigan, carried out a study of achievement motivation in relation to test anxiety. Risk-taking was measured by observing the students behavior on a simple ring tossing game. The grades they received on their final exam in the course was used as an indication of performance level, and the amount of time spent studying for the final exam was used as a measure of persistence. Using the scores for Test of Insight and the Test Anxiety Questionnaire they found that achievement motivation was positively related and test anxiety was negatively related to preference for the intermediate risk, performance level, and persistence.

Socio-Economic Status

The variable of socio-economic status has long been considered important in research concerned with predicting student behavior. This is especially true in the area of research concerned with academic motivation and persistence.

Hollingshead, in his classic study of Elmstown's Youth,[17] found that many socio-economic factors affect the

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[16] J.W. Atkinson and G.H. Litwin, "Achievement Motive and Test Anxiety as Motives to Approach Success and Avoid Failure," Journal of Abnormal Social Psychology, Vol. 60 (1960), pp. 52-63.

[17] August Hollingshead, Elmstown's Youth (New York: John Wiley & Sons, 1949).

persistence of high school students. His major findings were:

1. Class position is associated with whether an adolescent is in or out of school.
2. Boys are more likely to leave school than girls, especially those from a lower socio-economic group.
3. The withdrawal process is complex and begins well down in the elementary grades.
4. A family's formal education experience was the most significant factor in an adolescent's continuation or withdrawal from school.

Hollingshead states that for the members of the lower classes growing up means quitting school, getting a job, escaping control, doing as one pleases. Upper to middle class homes, on the other hand, are reported as stressing the things that formal education has to offer--book learning, manners, associates, preparation for a career, etc. In other words, while upper and middle class backgrounds reinforce or stress the ideals and practices that lead to a college career, at the lower level the situation is the opposite.

Many of the studies in this area have been concerned with the relationship between socio-economic status and academic achievement.

One early study by Coleman[18] dealt with the relationship of socio-economic status to the performance level of

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[18]Herbert A. Coleman, "The Relationship of Socio-economic Status to the Performance of Junior High School Students," Journal of Experimental Education, Vol. 9, No. 1 (1940), pp. 61-63.

junior high school students. Coleman compared two extreme socio-economic status groups with a control or "normative" group. He concluded that there seemed to be a definite relationship between socio-economic status and achievement in school subjects. However, no comparative statistics or significant level was given as the basis for drawing the conclusions. Coleman also suggested that there seems to be a close relationship between intelligence and achievement.

There have also been some studies that have found contradicting evidence between achievement and social class. Curry,[19] in a study of the characteristics of high school over- and under-achievers found the achievement levels not peculiar to any one socio-economic status level. Washburn,[20] in a study of the relationship between socio-economic status and the performance level of college students, found socio-economic status had no effect on achievement in college.

Some of the difference in findings in studies concerned with socio-economic status are no doubt due to difference in defining and measuring socio-economic status and achievement. For example, Coleman used the Sims Socio-economic Score Card to measure socio-economic status, while

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[19]Robert L. Curry, "Certain Characteristics of Under-achievers and Over-achievers," Peabody Journal of Education, Vol. 39, No. 1 (1961), pp. 41-45.

[20]Normal F. Washburne, "Socio-economic Status, Urbanism, and Academic Performance in College," Journal of Educational Research, Vol. 53, No. 4 (1959), pp. 130-137.

Washburne used parents' educational level and fathers' occupation to measure the same variable.

Only one study was found that was concerned with the relationship of socio-economic status and academic motivation. In 1962, McDonald,[21] using the Michigan State M-Scale, studied the relationship between socio-economic status, aptitude and academic motivation of a sample of 11th grade high school students.

Socio-economic status was measured with the use of three weighted variables--fathers' education, mothers' education, and fathers' occupation. Fathers' occupation was weighted based upon the North-Hatch Scale with interpolations by Ohio State and A.O. Haller. The Differential Aptitude Test-Verbal Reasoning was used to measure academic aptitude and students' grade point average was used as a measure of their academic achievement.

The findings indicated that over-achievers came from high socio-economic status levels, while under-achievers are found in no peculiar socio-economic status level. In the use of socio-economic status scores for predicting academic achievement, no significant relationship was found after testing both beta weights and correlations. Perhaps the most important finding for the present study was that the

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[21]Keith McDonald, "An Investigation into the Relationship of Socio-economic Status to an Objective Measure of Motivation--The Michigan M-Scales" (unpublished Ed.d dissertation, College of Education, Michigan State University, 1962).

addition of the M-Scale to the Differential Aptitude Test-Verbal Reasoning Score increased significantly the precision of predicting academic achievement.

General Studies on Adult Persistence

There has been an abundance of research in the area of persistence in adult education. Verner and Davis[22] have conveniently located and reviewed thirty studies dealing with some aspect of adult persistence. They reviewed each study in terms of source of data, kinds of data, sampling procedures, instruments used, and statistical procedures. The following analysis draws heavily on this review.

Personal Factors

Intelligence. The influence of intelligence or I.Q. scores has not been adequately tested to determine its relationship to adult persistence. Greenburger[23] found no relationship between intelligence and the drop out rate among evening high school participants. Zahn and Philips[24] on the other hand found that students with lower ability

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[22]Coolie Verner and George Davis, Jr., "Completions and Drop Outs: A Review of Research," Adult Education, Vol. 14, No. 3 (Spring, 1964), pp. 157-176.

[23]Lawrence Greenburger, "Adult Education Through Evening High Schools" (unpublished Ph.D. dissertation, University of Pittsburgh, 1936).

[24]Jane Zahn and Laura Phillips, "A Study of Drop Outs in University Adult Education," Adult Education, Vol. 11 (Summer, 1961).

tend to drop out of university extension classes at a significantly higher rate than those with more ability.

Motivation: Various studies have attempted to relate motivation to drop out rate. Motivation in these studies is generally defined as the participants stated reason for enrolling. Studies in this area have also been undecisive. Greenburger found that students who enroll in a job related subject or specify job advancement as a reason for enrolling, drop out less than average. However this is contradicted by other studies[25,26] which suggests that those who enroll in order to get ahead on their jobs were found to drop out to a greater extent than average.

Social Participation: General social participation in the organized life of the community has been found to be related to persistence in attendence in adult education.[27] Students active in community affairs were found to have a significantly lower drop out rate than those less active,[28] and public evening high school students were found to

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[25]Henry B. Kirks, "Drop Out in the Evening Adult School" (unpublished Ed.d. dissertation, University of Southern California, 1955).

[26]James Preston, "The Study of Continuing and Non-Continuing Adult Students" (unpublished Ed.D. dissertation, University of California, 1958).

[27]Coolie Verner and John S. Newberry, Jr., "The Nature of Adult Participation," Adult Education, Vol. 13 (Spring, 1963), pp. 153-158.

[28]James Davis, Great Books and Small Groups (New York: The Free Press of Glencoe, 1961).

persist significantly longer if they attended meetings of community organizations.[29]

Socio-economic Factors

Research indicates that there are differences between those adults who persist and those who drop out of adult education courses in various socio-economic criteria.

Age: Research on age and persistence is inconclusive. Coolie and Verner in their summary of drop out research found as many studies that found no differences between age and persistence as there were studies which found young adults drop out more frequently.

Sex: Research on sex is as inconclusive as that on age. There is about as much evidence to support the hypothesis that there is no difference between those who persist and those who discontinue attendance in regard to sex as there is evidence to support the thesis that women have a higher drop out rate.[30]

Education: The evidence for the relationship between educational attainment and persistence seems to be a bit more conclusive. Preston[31] reports that participants

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[29]James Preston, The Study of Continuing and Non-Continuing Adult Students, op. cit.

[30]Coolie Verner and George Davis, Jr., op. cit., p. 164.

[31]James Preston, The Study of Continuing and Non-Continuing Adult Students, op., cit.

who have had some graduate study and those with less than an eighth grade education persist significantly longer than the average. Davis[32] indicates that while in general those with more education persist better, those with an extremely high education drop out at a higher rate.

Occupation and Income: Research supports the hypothesis that there is no relationship between occupation and drop outs.[33,34,35] On the other hand, research does support the closely related variable of income and persistence. Ewigleben,[36] found that drop outs tended to come from lower economic groups, and in a similar study, Preston[37] found that those earning less than $3,000 per year drop out more frequently than those earning above this amount.

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[32]George Davis, Jr., "A Study of Classroom Factors Related to Drop Outs in Adult Education" (unpublished Ed.D. dissertation, Florida State University, 1963).

[33]Walter Greenwood, op. cit.

[34]Benjamin Novak and Gwendolyn E. Weiant, "Why Do Evening School Students Drop Out?," Adult Education, Vol. 13 (Autumn, 1960).

[35]Harold Sauides, "An Identification of Some Characteristics of Students Who Complete and Students Who Drop Out of an Evening Technical Curriculum" (unpublished Ed.d. dissertation, University of Wisconsin, 1960).

[36]Robert Ewigleben, "The Identification and Analysis of the Factors Contributing to the Drop Out Rate Among Participants in Classes of the Lansing Adult School Program" (unpublished Ed.d. dissertation, College of Education, Michigan State University, 1959).

[37]James Preston, A Study of Continuing and Non-Continuing Adult Students, op. cit.

Institution Factors

Various institutional and administrative factors have been studied in relation to adult persistence. Because the factors have no direct relationship to the present study, it should be sufficient to simply list a few of these factors. The following is a sample of situational factors studied:[38]

1. Time of day courses were offered.
2. Season of the year.
3. Day of the week.
4. Frequency of meetings.
5. Length of classes.
6. Size of class.
7. Type of program.

Summary

In this chapter research in the broad area of academic motivation and persistence, as well as more specific research related to adult persistence, was reviewed. In addition to presenting specific research findings, an effort was made to give the underlying theories on which the research was based.

Of particular interest to the present study was the research by Farquhar and associates dealing with the

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[38]Coolie Verner and George S. Davis, Jr., Adult Education, Vol. 14, No. 3 (Spring, 1964), pp. 167-169.

development of the Michigan State M-Scales and the subsequent validation of the scale on a high school population. This research supported the utility of the M-Scales as a measure of academic motivation. Also of interest were two studies which utilized the Michigan State M-Scales in their design. The first study tried to validate the M-Scale on a college population. The conclusions were that because of the homogeneity of this group, the M-Scale was not sensitive enough to be of utility. The second study found that the addition of the M-Scale scores to a measure of aptitude increased the precision of predicting academic achievement.

The review of research on adult persistence proved to be inconclusive. For example, as many studies support the hypothesis that there is no relationship between age and persistence as there are studies that support the hypothesis that young adults drop out more frequently. However, much of the contradictory findings in this area of research are due to the lack of uniformity in research design, inadequate sample control, lack of adequate statistical procedures, faulty instruments, and lack of operationally defined variables.

CHAPTER IV

METHODOLOGY

Definition of the Population

The population consisted of all the adult evening students enrolled in the academic curriculum of the Lansing Public School District from 1956 to 1963. The academic curriculum is designed for students who work to complete their high school education.

This population of adults studying to finish their high school education was chosen because it was necessary to insure that the subjects under investigation had an adequate academic goal towards which they could persist.

Table 3 shows the breakdown of the total population.

Table 3. Distribution of total population

Non-persisting males	366
Persisting males	60
Non-persisting females	342
Persisting females	62
Total	1,970

Selection of the Sample

Before the sample was drawn, the population was separated into four groups according to persistence and sex. This stratification was necessary because the statistical analysis to be used required that each group or cell have an equal number of adults. After careful consideration, it was decided that ten adults in each cell would be sufficient for the study.

Originally, a random sample of twenty persons was drawn from the total population of each of the four groups. Subjects were interviewed in order of selection until ten interviews were completed for each group. Of the original sample of eighty, eighteen could not be located or had moved. In addition, there were five persons who refused to participate in the study. Table 4 shows the distribution by groups of the persons who either refused to participate or could not be located.

Table 4. Distribution of non-participants

	Unable to Locate	Refusals
Non-persisting males	3	3
Persisting females	4	1
Non-persisting females	7	1
Persisting males	4	0
Total	18	5

With the exception of the three refusals in the non-persisting males (one of which came from the mother of the subject) there seems to be an equal distribution of "refusals" and "unable to locate" among the four groups.

Instrumentation

Objective measures of aptitude, academic motivation, and socio-economic status were obtained from individuals in the sample. The following instruments were selected to measure the above variable:

Aptitude - Differential Aptitude Test - Verbal Reasoning

Academic Motivation - Michigan State M-Scale

Socio-economic Status - Socio-economic Scale

Differential Aptitude Test - Verbal Reasoning

The Differential Aptitude Test was developed for use in the educational and vocational counseling of high school students. Although the test was originally designed for grades 8 through 12, it has proven to be suitable for unselected adults.[1] The Verbal Reasoning Test used in this study has shown high correlation with performance in all areas of academic work.[2] Farquhar and Payne used the verbal

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[1] Anne Anastasi, Psychological Testing (New York: The Macmillan Company, 1961), p. 350.

[2] Ibid., p. 350.

reasoning test effectively in a study of under- and over-achievers.[3] In addition, many authorities on adult psychology agree that if one is compelled to choose a single test as a measure of intellectual aptitude, the most satisfactory is that of a vocabulary type such as the Differential Aptitude Test - Verbal Reasoning.[4] Accordingly, the fact that this test is untimed is consistent with the current belief that the most valid results can be obtained from tests of adult aptitude when tests are untimed.[5]

Socio-economic Scale

The Socio-economic Scale was developed at the University of Chicago with the aid of a research grant from the United States Public Health Services. The scale is based on census statistics on income and education and uses the N.O.R.C. Occupational Prestige Rating Scale as a criterion in deriving weights for census characteristics.[6] A significant addition to the scale was made by adjusting for age

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[3]William W. Farquhar and David A. Payne, "A Comparison of Techniques Used in Selecting Under- and Over-Achievers" (Unpublished manuscript, Guidances and Personnel Services, Michigan State University, 1961).

[4]J. R. Kidd, How Adults Learn (New York: Association Press, 1959), p. 87.

[5]Irving Lorge, Review of Educational Research, Vol. 11 (December, 1941), pp. 171-181.

[6]Albert Reiss, Jr., Occupations and Social Status (New York: The Free Press at Glencoe, Inc., 1961), p. 109.

difference in the income and education variables using the method of expected cases.[7]

The socio-economic scale was selected because it would seem to give a valid estimate of socio-economic status for a heterogeneous group of adults. Previous research studies have used the N.O.R.C. Occupational Prestige Rating Scale weighted with estimates of education and income. However, the fact that N.O.R.C. scores are available for only half of the labor force constitutes a major weakness.[8]

Michigan State M-Scale

The M-Scales were developed by Farquhar and associates as part of a comprehensive research project on the motivational factors related to academic achievement. The M-Scales were designed to discriminate between high and low motivated students who were assumed to be discrepant in academic achievement.[9] The M-Scale consists of the following four sub-tests.

Generalized Situational Choice Inventory (GSCI): This subtest was developed using an adaptation of McClelland's hypotheses that N-achievement is composed of (a) long-term

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[7] Ibid., p. 109.

[8] Ibid., p. 110.

[9] William Farquhar et al., Motivational Factors Related to Academic Achievement (East Lansing, Michigan: Office of Research and Publications, College of Education, Michigan State University, 1963).

involvement, (b) unique accomplishment, (c) competition with a standard of excellence. The constructs were polarized by postulating a continuum of achievement motivation with the low motivation of N-achievement being opposite in composition from that advocated by McClelland and associates. Furthermore, the constructs were viewed as being related specifically to the academic setting.

A two hundred item forced-choice inventory describing situations logically related to the extremes of the polar dimensions theory was developed. One alternate of each dichotomized forced-choice pair of items was related to the high academic motivation pole and the other to the low academic motivation pole. Responses were scored either D or I with the high score in the direction of high motivation.

Forty-five male and thirty female items remained after cross-validation. Reliability estimates were obtained by Hoyt's analysis of variance technique. Reliability estimates for males ranged from .80 to .84 and for females from .77 to .90. The correlation was .50 for males and .32 (significant at .01 level).

Word Rating List (WRL): The Word Rating List was developed by extracting descriptive words and phrases from the self-concept literature and from a review of personality, motivational, and intellectual characteristics of students representing academic extremes. Students were asked to rate each item on a four-point scale (never, sometimes, usually,

always) as it applied to themselves. Forty-eight male and forty-eight female items remained after cross-validation.

Reliability estimates were obtained using Hoyt's analysis of variance technique. Reliability estimates ranged from .91 to .93 for males and from .88 to .93 for females. The correlation with grade point criterion was .51 for males and .42 for females (significant at the .01 level).

Human Trait Inventory (HTI): This sub-test was constructed from items which previous research (Altus,[10] Gough,[11] McQuary and Truax[12]) had found to differentiate between discrepant achievers. The items were edited and adapted to the same four-point scale (never, sometimes, usually, and always) used with the Word Rating List. Students were asked to rate each item as it applied to themselves. The direction of scoring was designated by the theory of personality traits of discrepant achievers outlined in Chapter I. A high score indicated a response similar to over-achievers.

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[10]William D. Altus, "A College Achiever and Non-Achiever Scale for the MMPI," Journal of Applied Psychology, Vol. 32 (1948), pp. 385-397.

[11]H. G. Gough, "What Determines the Academic Achievement of High School Students," Journal of Educational Research, Vol. 46 (January, 1953), pp. 321-331.

[12]John J. McQuary and William E. Truax, "An Under-Achievement Scale," Journal of Educational Research, Vol. 48 (January, 1955), pp. 393-409.

Twenty-six items remained after cross-validation for males and twenty-five items for the females. Hoyt's analysis of variance reliability estimates were .68 to .80 for males and .71 to .76 for females. The correlation with the grade-point criterion was .42 for males and .36 for females (significant at .01 level).

Preferred Job Characteristics Scale (PJCS): A scale of sixteen items was developed, some of which were adapted from the Vocational Values Inventory[13,14] and some of which were especially constructed to represent extremes in occupational motivation as logically typified by the polar theory of academic motivation. Eight of the items were related to high and eight to low occupational motivation. The independent judges were asked to classify the items on the basis of face validity into the two extremes of the polar theory. There was unanimous agreement by the three judges which agree with the original categorizations. Sixty-four item pairs were formed by combining the eight high with the eight low motivational alternatives. The item-pairs were randomly ordered and administered to the students with directions to choose the one alternative he most preferred in a future job. After cross-validation, twenty items remained

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[13]L. Johnson et al., Vocational Values Inventory, privately printed, Michigan State University, 1958.

[14]Buford Stefflre, "Concurrent Validity of the Vocational Values Inventory," Journal of Educational Research, Vol. 52 (May, 1959), pp. 339-341.

for males and thirty-three items remained for females.

The reliability estimates were .76 for males and .60 for females. This was the lowest of all the scales; however, the estimates were within the acceptable range for discrepant achiever samples.

The four measures (GSCI, WRL, HTI, and PJCS) were combined into one instrument and labeled the Michigan State M-Scales. The total scale contained 139 male and 136 female items. On a random sample of 240 students from an original population of 4,200 students, reliability estimates based on Hoyt's analysis of variance technique were .94 for males and .93 for females.[15] The total M-Scale correlated .56 and .49 with the grade-point average criterion for both validation and cross-validation for males. For females the correlations were .40 and .48 respectively.[16]

M-Scale, Form C

Because it was desirable to analyze both male and females together, it was necessary to have a test with only items that would be reliable for both sexes. For this reason Form C of the M-Scale was developed. This scale of sixty-eight items was made up of all the items from the original

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[15]William Farquhar et al., Motivational Factors Related to Academic Achievement, p. 98.

[16]Ibid., p. 130.

scale which were found to be reliable for both males and females. The distribution between the sub-tests was as follows:

Table 5. Distribution of items for the M-Scale, Form C

Sub-Test	Items
Generalized Situational Choice Inventory	12
Preferred Job Characteristics Scale	10
Word Rating List	34
Human Trait Inventory	12
Total	68

Although the total number of items for both male and females was cut almost in half, the author of the M-Scales, Dr. Farquhar, did not believe that the precision of the scales would be greatly affected.[17]

Multiple Discriminant Analysis

Description

The multiple discriminant analysis is a statistical technique for analyzing data which consist of several measures on each of several individuals in each of several groups. Discriminant analysis is a procedure for estimating

[17]Personal conversation with Dr. Farquhar.

the position on a line that best separates classes or groups. The estimate is obtained as a linear function of the individuals test scores. Since one line may not exhaust the predictive power of the test battery in distinguishing among the classes, additional discriminant function may be fitted. The maximum number of discriminant functions is indicated by the lesser of either the total number of groups minus one (9-1), or the total number of variables (P).

The multiple discriminant analysis is analogous to the analysis of variance--except that there is more than one measure per group--in that it may be used in testing group differences. It is analogous to factor analysis--except when more than one group is involved--in that it provides a basis for interpreting the nature of group differences in terms of dimension. And finally, it is analogous to multiple correlations--except that the criterion is group membership and not a linear variate--in that the results of the analysis may be used to predict group membership of an unclassified individual.

Computation Procedures

Multiple-discriminant functions are computed as the vectors associated with the latent roots of the determinantal equation.[18]

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[18]William W. Cooley and Paul R. Lohnes, Multivariate Procedures for the Behavioral Sciences (New York: John Wiley & Sons, 1962), p. 117.

$$| W^{-1} A - \lambda I | = 0$$

Where: I = An Identity Matrix

W = The Pooled Within Groups Deviation Scores Cross-Product Matrix

λ = The Latent Roots of the System

In addition: A = T - W

Where: T = The Total Sample Deviation Score Cross-Products Matrix

The matrix equation

$$(W^{-1} A - \lambda I)v = 0$$

Where: v = The Laten Vectors, or Discriminant Coefficients

is derived from the partial derivatives of the ratio

$$\lambda = \frac{V_i' A v_i}{V_i W v_i}; \quad i = 1, 2, 3, \ldots r$$

Where: r = The Lesser of Group - 1 or Number of Variables

which is to be maximized in order that the among groups sums of squares $v_i' A v_i$ may be large relative to the within-groups sums of squares $v_i W v_i$ on the discriminant function represented by the root λ_i (called eigenvalues) and their associated vectors v_i (called eigenvectors). The relative size of the eigenvalues indicate the extent to which the associated discriminant functions distinguish among the groups.

In general, there is more than one solution or "discriminant function" for a problem. The number discriminant function possible is the smaller of G - 1 or M.

Where: G = Total Number of Groups

M = Total Number of Variables

The solution for which λ is largest defines the "first discriminant function." The next largest λ defines the "second discriminant function." And so forth. The "first discriminant function" defines the linear combination of the M measures which maximizes the ratio of the among- to the within-group dispersions. The "second discriminant function" maximizes the ratio of among- to within-groups dispersions for that component of the among-group dispersion which is not accounted for by the first discriminant function, and so forth.

Wilks' Lambda criterion (Λ) for the discriminating power of the test battery may be derived as the functions of W - A as follows:

$$\Lambda = \prod_{i=1}^{v} \left[\frac{19}{x + \lambda} \right]$$

the significance of Λ can be tested with the use of F approximation developed by Rao.[19]

Let $s = (p^2g^2 - 4) / (p^2+g^2 - 5)$

$m = n - (p + g + 1) /2$

$\lambda = -(pg - 2) /4$

$r = pg/2$

$y = \Lambda 1/S$

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[19] C. R. Rao, Advanced Statistical Methdds in Biometric Research (New York: John Wiley & Sons, 1952), pp. 258-272.

Where: p = number of variables

g = number of groups

q = q - 1

N = number of total sample

n = N - 1

and then $F^{2r}_{ms+2} = \left(\frac{1 - y}{y}\right)\left(\begin{matrix} ms + 2 \\ 2r \end{matrix}\right)$

The percentage of the total discriminating power of the test battery contained in each discriminant function is represented by

$$100 \cdot \left(\frac{\lambda}{\sum \lambda}\right)$$

The significance of each discriminant function may be tested by a method developed by Roa.[20]

$$\lambda^2 = \left[N - \tfrac{1}{2}(p+k) \quad \text{Log}_e (1 + \lambda)\right]$$

Where: N = the total sample

p = the total number of variables

k = the total number of groups

λ = the eigenvalues

The computed laten vectors (eigenvectors) are the coefficients of the discriminant functions. To show the relative contributions of the variables to the discriminant functions, these normalized vectors may be adjusted by multiplying corresponding elements by the square roots of the diagonal elements of the W matrix.

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[20] Ibid., pp. 370-378.

Factorial Multiple Discriminant Analysis

Saupe[21] has recently developed a factorial design for the Multiple Discriminant Analysis. The factorial, multiple discriminant analysis has all the advantages that are associated with the single variable factorial design including the possibilities of increasing the precision of experimental comparison and of examining several sources of variation, including interaction, at the same time.

Computation Procedures

If groups on which the multiple measures are taken are arranged in a factorial design and contain equal numbers of cases, the total among group matrix can be partitioned in a fashion analogous to that used in partitioning sums of squares and products in factorial analysis of variance and covariance. Thus:

$$A = A_1 + A_2 + - - - - - + A_s,$$

where A_i arises from a specific source of dispersion, either a "main effect" or an "interaction effect."

The individual A_i may then be substituted for the total A in the basic discriminant-analysis equasions $(W^{-1} A - \lambda I) v = 0$, and each of the following equations may be solved for λ and v.

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[21] Joe Saupe, Factorial Design Multiple Discriminant Analysis: A Description and an Illustration, A paper presented at the American Education Research Association, Chicago, Illinois, February, 1964.

$$(A_1 - \lambda_1 W)\ v_1 = 0$$

$$(A_2 - \lambda_2 W)\ v_2 = 0$$

$$(A_s - \lambda_s W)\ v_s = 0$$

Where: W = Original Pooled Within Groups Deviation Scores Cross Products Matrix

The results of the factorial design consist of a set of λ's and v's for each source of dispersion. Saupe[22] describes the characteristics of the results as follows:

1. The number of non-zero discriminant functions resulting for each source of dispersion will be the smaller of the number of measures and the number of degrees of freedom, in the analysis of variance sense, associated with the source. If the number of measures employed is at least one less than the total number of groups, the total number of discriminant functions that can be expected to result from the factorial analysis will be the same as the number to be expected were the differences among the original groups examined by the simple, multiple discriminant procedures.

2. The several functions resulting for each source of dispersion may be ordered, on the basis of their associated λ's, with respect to the maximization of differences associated with the source.

3. Each function for a given source of dispersion is independent of the other functions for that source, but a

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[22] Ibid., p. 4.

function for one source is not necessarily independent of the functions for other sources.

4. The sum of the λ's over functions and sources for the factorial analysis is equal to the sum of the λ's over functions that would result if the simple multiple discriminant procedure were used with the same data. The factorial analysis accounts for the same total dispersion among groups as the simple analysis. It is the manner of organization of this dispersion into functions which distinguishes the two approaches.

5. If certain assumptions are met, the hypothesis that the population value of any given λ is zero may be tested and the assumption of real differences associated with sources of dispersion is thereby established.

6. The interpretation of λ's and of significant discriminant functions and the use of them in classification situations is essentially analogous to the procedures followed in the simple, multiple discriminant analysis.

Summary

The population of the present study consisted of all the adult evening students enrolled in the academic curriculum of the Lansing Public School District in 1956-1963. The academic curriculum is designed for adult students who wish to complete their high school education. Before the sample was drawn, the population was stratified into four different

groups according to persistence and sex. A random sample of ten persons was selected from each of the four groups.

The instruments used in the study were The Differential Apptitude Test-Verbal Reasoning, The Socio-Economic Scale, and The Michigan State M-Scale. The Michigan State M-Scale is composed of four sub-scales entitled The Generalized Situational Choice Inventory, The Word-Rating List, The Human Trait Inventory, and The Preferred Job Characteristics Scale. All instruments were assumed, on the basis of prior research, to have sufficient validity and reliability to be included as criterion measures for the study.

Multiple discriminant analysis was used to analyze the data. The discriminant analysis is a statistical technique for analyzing data which consists of several measures on each of several individuals in each of several groups. The solution to a determinantal equation yields the linear combinations of variables which maximize the differences among groups and minimizes the differences within groups.

Factorial Multiple Discriminant Analysis developed by Joe Saupe at Michigan State University was incorporated into the design. The factorial analysis increases the precision of the experiment and allows the examination of several sources of variation, including interaction, at the same time.

In addition to the Multiple Discriminant Analysis, intercorrelation among the different variables and univariate analysis of variance were computed.

The results of the analysis are presented in Chapter V.

CHAPTER V

ANALYSIS OF DATA

The data was initially analyzed to determine group status on each of the variables and inter-relations among the variables. As a matter of record, group means and standard deviations of the variables used in the study are presented in Appendix A. A clear understanding of the basic relationship among the instruments is not only helpful in explaining group differences, but is equally useful in the interpretation of the multivariate linear combinations of variables in the discriminant functions.

Correlation Analysis

Separate correlation matrix were computed for five different sample combinations. These combinations were: (1) total sample, (2) males, (3) females, (4) persisters, and (5) non-persisters.

Table 6 contains the correlations for the total sample. As would be expected, the total M-Scale and its four sub-tests are highly intercorrelated. In the total sample, the M-Scale correlates from .61 to .91 with its four sub-tests. A correlation coefficient of .26 is significant

Table 6. Correlation matrix - total sample

Variable		1	2	3	4	5	6	7	8
1	Differential Aptitude Test-Verbal Reasoning								
2	Total M-Scales	.24							
3	Generalized Situational Choice Inventory	*.33	*.75						
4	Preferred Job Characteristics Scale	*.44	*.61	*.49					
5	Word Rating List	.02	*.91	*.58	*.32				
6	Human Trait Inventory	*.40	*.75	*.54	*.64	*.48			
7	Age	*.32	.21	*.29	.08	.16	.18		
8	Socio-Economic Scale	.18	.21	.15	-.04	*.28	.07	*.43	

*.26 is significant at .05 level.

at the .05 level. The four sub-tests also show positive significant correlations among each other ranging from .32 to .64.

The Differential Aptitude Test-Verbal Reasoning (DAT-VR) was significantly correlated with three of the sub-tests: The Generalized Situational-Choice Inventory (GSCI) --.33, The Preferred Teacher Characteristics Scale (PJCS) --.44, and The Human Trait Inventory (HTI)--.40. However, the Word Rating List (WRL) with a coefficient of .02 was not significant and hence the Total M-Scale was also not significantly correlated with the DAT-VR with a coefficient of .24. The Socio-economic scale was positively correlated with the WRL (.28) and age (.43).

Tables 7 and 8 contain the correlation matrix for male and female samples. The major difference between the two samples is in correlation of the various measures with the DAT-VR. Females show no correlation between the DAT-VR and any of the other variables used in the study. Males, on the other hand, show a significant correlation between the DAT-VR and the Total M-Scales (.46), the CSCI (.61), the PTCS (.60), the HTI (.52) and age (.44). Females also showed no significant correlation between age and the other variables, while males showed significant correlations between age and the DAT-VR (.44), the Total M-Scales (.46), the PJCS (.44), and the HTI (.40).

Table 7. Correlation matrix - males.

Variable		1	2	3	4	5	6	7	8
1	Differential Aptitude Test-Verbal Reasoning								
2	Total M-Scales	*.46							
3	Generalized Situational Choice Inventory	*.61	*.65						
4	Preferred Job Characteristics Scale	*.60	*.66	*.49					
5	Word Rating List	.22	*.92	*.43	*.42				
6	Human Trait Inventory	*.52	*.78	*.51	*.59	.54			
7	Age	*.44	*.46	.30	*.44	.37	*.40		
8	Socio-Economic Scale	.33	*.39	.23	.35	.34	.30	*.48	

*.38 is significant at .05 level.

Table 8. Correlation matrix - females

Variable		1	2	3	4	5	6	7	8
1	Differential Aptitude Test-Verbal Reasoning								
2	Total M-Scales	-.00							
3	Generalized Situational Choice Inventory	.00	*.84						
4	Preferred Job Characteristics Scale	.35	*.60	*.49					
5	Word Rating List	.21	*.91	*.71	.29				
6	Human Trait Inventory	.29	*.73	*.56	*.68	*.44			
7	Age	.23	.01	.30	-.10	.03	.06		
8	Socio-Economic Scale	.02	.10	.10	-.25	.22	-.08	*.40	

*.38 is significant at .05 level.

Table 9. Correlation matrix - persisters

Variable		1	2	3	4	5	6	7	8
1	Differential Aptitude Test-Verbal Reasoning								
2	Total M-Scales	.05							
3	Generalized Situational Choice Inventory	.24	*.72						
4	Preferred Job Characteristics Scale	*.38	*.69	*.68					
5	Word Rating List	-.16	*.89	*.47	.33				
6	Human Trait Inventory	.24	*.61	*.47	*.70	.27			
7	Age	.33	.04	.27	.05	-.02	-.05		
8	Socio-Economic Scale	.06	.08	-.07	-.35	.10	*-.40	*.44	

*.38 is significant at .05 level.

Table 10. Correlation matrix - non-persisters

Variables		1	2	3	4	5	6	7	8
1	Differential Aptitude Test-Verbal Reasoning								
2	Total M-Scales	.31							
3	Generalized Situational Choice Inventory	.36	*.75						
4	Preferred Job Characteristics Scale	*.43	*.49	.28					
5	Word Rating List	.08	*.91	*.60	.20				
6	Human Trait Inventory	*.46	*.77	*.53	*.56	*.50			
7	Age	.25	.31	.27	.02	.28	.30		
8	Socio-Economic Scale	.21	.33	.27	.03	.35	.21	.33	

*.38 is significant at .05 level.

Both males and females exhibited a significant correlation between the socio-economic scale and age (.48 for males and .40 for females). However, only males were found to have a significant correlation between the Socio-Economic Index and the Total M-Scales (.39).

Tables 9 and 10 contain the correlation matrix of the sample classified according to persistence. There are only a few differences between the intercorrelation for the persister and non-persister samples. In general, there were few significant correlations between variables for either sample. For both samples there is a high intercorrelation between the Total M-Scales and its four sub-tests. In addition, both persister and non-persister samples demonstrated a significant correlation between the sub-test PJCS and the DAT-VR (.43 and .44, respectively). The non-persisting sample also showed significant correlation between the DAT-VR and the Word Rating List (.46). Interestingly, the persisting sample exhibited a significant negative correlation between the Socio-Economic Index and the Human Trait Inventory.

Univariate Analysis of Variance

Univariate analysis of variance was conducted on the data to determine group status on each of the variables used in the study. This analysis is also helpful in interpreting the significant discriminants function, if the hypothesis of no difference is rejected.

The analysis of variance was computed for seven different combinations of the total sample. The following diagram will be helpful in understanding the different combinations.

SEX	Persistence: non-persistence	Persistence: persistence
Males	Group 1	Group 2
Females	Group 3	Group 4

Table 11	(1)	(2)	(3)	(4)	= total sample
12	(12)		(34)		= sex
13	(13)		(24)		= persistence
14	(1)		(2)		= males
15	(3)		(4)		= females
16	(1)		(3)		= non-persisters
17	(2)		(4)		= persisters

The total sample analysis of variance in Table 11 indicated that none of the variables significantly discriminated between the four groups. The next step would therefore be to examine the two-group analysis of the samples classified according to persistence and sex. Table 12 reveals that none of the variables significantly discriminated between the sample classified by sex. The analysis for

Table 11. Univariate analysis - total sample

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	67.800	83.583	.81	NS
2	Total M-Scales	230.700	102.217	2.26	NS
3	Generalized Situational Choice Inventory	3.625	3.669	.99	NS
4	Preferred Job Characteristics Scale	5.967	2.878	2.07	NS
5	Word Rating List	59.267	44.739	1.32	NS
6	Human Trait Inventory	13.225	5.758	2.30	NS
7	Age	115.000	112.972	1.02	NS
8	Socio-Economic Scale	780.367	370.889	2.10	NS

F .05 = 2.86

Table 12. Univariate analysis - sex

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	.900	84.513	.01	NS
2	Total M-Scales	.000	115.050	.00	NS
3	Generalized Situational Choice Inventory	.625	3.746	.17	NS
4	Preferred Job Characteristics Scale	4.900	3.068	1.60	NS
5	Word Rating List	12.100	46.748	.26	NS
6	Human Trait Inventory	.025	6.499	.00	NS
7	Age	2.500	116.039	.02	NS
8	Socio-Economic Scale	84.100	410.763	.20	NS

F .05 = 4.10

persistence, Table 13, however, yields four significant variables--Total M-Scales, PJCS, HTI, and Socio-Economic Index.

The univariate analysis for males and females, Table 14 and Table 15, offers an explanation as to why there were no significant variables in the four-group analysis and the two-group analysis for sex. Table 15 discloses that with the exception of socio-economic scale, none of the variables discriminate between female persisters and female non-persisters. On the other hand, five of the variables were significant in the analysis for males classified according to persistence. Two of the variables, the Total M-Scale and the HTI were significant at the .01 level. The PJCS, the WRL, and age were significant at the .05 level.

Tables 16 and 17 indicate that there were no significant variables for the group of persisters and non-persisters classified according to sex.

Multiple Discriminant Analysis

The Control Data 3600 computer at Michigan State University was used to compute the multiple discriminant analysis. A discriminate analysis program developed at Harvard University by William W. Cooley[1] was adapted for use

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[1]This program is presented in Chapter VI of Multivariate Procedures For The Behavioral Sciences by William W. Cooley and Paul R. Lohnes, John Wiley & Sons, 1962.

Table 13. Univariate analysis - persistence

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	129.600	81.126	1.60	NS
2	Total M-Scales	562.500	100.247	*5.61	.05
3	Generalized Situational Choice Inventory	9.025	3.525	2.56	NS
4	Preferred Job Characteristics Scale	12.100	2.879	*4.20	.05
5	Word Rating List	129.600	43.653	2.97	.05
6	Human Trait Inventory	30.625	5.693	*5.38	.05
7	Age	102.400	113.411	.90	NS
8	Socio-Economic Scale	1932.100	362.132	*5.34	.05

F .05 = 4.10

Table 14. Univariate analysis - males

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	198.450	107.604	1.84	NS
2	Total M-Scales	616.050	66.494	*9.26	.01
3	Generalized Situational Choice Inventory	8.450	3.117	2.71	NS
4	Preferred Job Characteristics Scale	9.800	1.778	*5.51	.05
5	Word Rating List	151.250	33.917	*4.46	.05
6	Human Trait Inventory	36.450	3.294	*11.06	.01
7	Age	328.050	60.983	*5.38	.05
8	Socio-Economic Scale	336.200	316.256	1.06	NS

*F .05 = 4.41, F .01 = 8.28

Table 15. Univariate analysis - females

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	4.050	59.472	.07	NS
2	Total M-Scales	76.050	137.939	.55	NS
3	Generalized Situational Choice Inventory	1.800	4.222	.43	NS
4	Preferred Job Characteristics Scale	3.200	3.978	.80	NS
5	Word Rating List	14.450	55.561	.26	NS
6	Human Trait Inventory	3.200	8.222	.39	NS
7	Age	14.450	164.961	.09	NS
8	Socio-Economic Scale	1920.800	425.522	*4.51	.05

*F .05 = 4.41

Table 16. Univariate analysis - non-persisters

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	28.800	95.122	.30	NS
2	Total M-Scales	64.800	70.800	.92	NS
3	Generalized Situational Choice Inventory	1.800	3.133	.57	NS
4	Preferred Job Characteristics Scale	5.000	2.067	2.42	NS
5	Word Rating List	3.200	35.089	.09	NS
6	Human Trait Inventory	5.000	2.378	2.10	NS
7	Age	96.800	146.222	0.66	NS
8	Socio-Economic Scale	369.800	534.189	.69	NS

F .05 = .441

Table 17. Univariate analysis - persisters N = 20

Variables		df = 3 and 36			
		Among Mean Sqr	Within Mean Sqr	F Ratio	P
1	Differential Aptitude Test-Verbal Reasoning	45.000	72.044	.62	NS
2	Total M-Scales	64.800	133.633	.48	NS
3	Generalized Situational Choice Inventory	.050	4.206	.01	NS
4	Preferred Job Characteristics Scale	.800	3.689	.22	NS
5	Word Rating List	45.000	54.389	.83	NS
6	Human Trait Inventory	4.050	9.139	.44	NS
7	Age	145.800	79.722	1.83	NS
8	Socio-Economic Scale	39.200	207.589	.19	NS

F .05 = 4.41

with the 3600 computer. The resulting discriminant scores and vectors are presented in Appendix B of this study. The Willer Lambda criterion (Λ) needed to test the overall discriminating power of the test battery was computed. The resulting at .658 was not significant. To be significant a with 21 and 86 degrees of freedom would have to be larger than 2.11 at the .01 level of significance and 1.70 at the .05 level.

The discriminant scores of the three discriminant functions were tested by the Roa method outlined in Chapter IV. The results of this test presented in Table 18 indicated that none of the discriminant functions were significant. Hence, the hypothesis, <u>there are no differences in academic motivation, aptitude, socio-economic status, and age, among adult students classified according to persistence and sex</u>, could not be rejected.

Table 18. Chi square analysis of the discriminant functions

Function	Discriminant Scores	2	D.F.	Significant Level
1	.3089	8.917	10	.50
2	.1447	3.543	8	.95
3	.0141	3.373	6	.80

To check the accuracy of the program two separate test decks were run with the Harvard program using the 3600 computer. Both of these sets of data indicated that there was a small error in the above program. However, the error was not large enough to affect the decision to accept the null hypothesis. Therefore, it did not seem feasible to spend the great amount of time and effort necessary to locate the source of the error.

Discussion

Although the null hypothesis of no differences could not be rejected on the basis of the discriminant analysis, the analysis of variance indicated that there were significant differences within the male population. This analysis revealed that while none of the variables used in the study could discriminate between the total sample classified according to sex and persistence, five of the variables discriminated between the male population classified according to persistence. On the other hand, only one variable--socioeconomic status--discriminated between the female population classified according to persistence. Hence, although significance differences did exist in the male population when considered alone, the fact that there were almost no differences in the female population suggested that in the discriminant analysis the differences within the male and female sample offset each other. Therefore, the test for the

overall discriminating power of the criterion variables would show no difference among the four groups.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this investigation was to study the various factors related to the persistence of adults who enroll in the academic curriculum of an adult evening school. The variables considered in relation to persistence were academic motivation, aptitude, socio-economic status, sex, and age. Accordingly, the following hypothesis was formulated and tested.

It is possible to differentiate among groups of adults students classified by persistence and sex on the basis of objective measures of academic motivation, aptitude, socio-economic status, and age.

Methodology

The population consisted of all the adults students enrolled in the academic curriculum of the Lansing Adult Evening Program from 1956-1963. The population was stratified into four different groups according to sex and persistence, and a random sample of ten students was selected from each group.

The instruments used in the study were The Michigan State M-Scale, The Differential Aptitude Test-Verbal Reasoning, and The Socio-Economic Scale. The Michigan State M-Scale is composed of the following sub-scales: The Generalized Situational Choice Inventory, The Word Rating Test, The Human Trait Inventory, and The Preferred Job Characteristics. All instruments were assumed, on the basis of prior research, to have sufficient validity and reliability to be included as criterion measure for the study. Simple correlations, analysis of variances, and multiple discriminant analysis were used to analyze the data.

Test of the Hypothesis

On the basis of the multiple discriminant analysis the null hypothesis could not be rejected and therefore was accepted. However, the analysis of variance performed on the data indicated that difference did exist between some of the groups on some of the variables. Male persisters and non-persisters were found to differ significantly on five of the criterion variables: The Total M-Scales, The Generalized Choice Inventory, The Preferred Job Characteristics Scale, The Word Rating List, The Human Trait Inventory and The Socio-Economics Scale. Female persisters and non-persisters differed significantly on the Socio-Economic Scale. There were no significant differences between non-persisting males and females, and persisting males and females.

Conclusions

The study generated the following conclusions all of which must be interpreted within the limits of the research design:

1. Male persisters and non-persisters differed significantly on five of the criterion variables--the Total M-Scale and three of its four sub-tests, and the Socio-Economic Scale.

2. Female persisters and non-persisters differed significantly on the Socio-Economic Scale.

3. Male persisters and non-persisters did not differ significantly on the Differential Aptitude Test-Verbal Reasoning, the Generalized Situational Choice Inventory, and Age.

4. Female persisters and non-persisters did not differ significantly on the Differential Aptitude Test-Verbal Reasoning, the Total M-Scale and its four sub-tests, and Age.

5. Persisting males and females did not differ significantly on any of the criterion variables.

6. Non-persisting males and females did not differ significantly on any of the criterion variables.

Discussion

The theory on which this study was based--that there is a relationship between academic motivation and persistence--was supported by the male sample but not by the female sample. This was not too surprising as Farquhar and associates in their study of academic motivation and achievement also found major differences between male and female samples.

In contrast, it is difficult to explain the lack of relationship between aptitude and persistence, in either the

male or female population. This is contradictory to much of the research in this area.

On closer examination of the socio-economic variable, which was related to persistence in both the male and female sample, it appears that there may be some confounding involved. Because those students who finish their high school diploma tend to move up higher in the social and economic strata, an ex post facto study such as this would tend to be biased towards the persisting sample.

Generalizations

Within the limitations of the study the following generalizations can be derived from the above conclusions:

1. Socio-economic status is an important factor in adult persistence.
2. Academic motivation affects persistence in males but not females.
3. Age and aptitude do not seem to be factors in adult persistence.

Recommendations

The following is offered as a guide for others who may be interested in further investigation of the area of adult persistence.

1. It would be desirable to use the same basic design of this study on different adult populations--for

example, a community college population.

2. Further research should be directed toward an understanding of why male and female adult students differ with respect to persistence.
3. A longitudinal study in which information and test scores are secured upon the student's enrollment would eliminate many of the weaknesses of the present study.
4. Further research is needed concerning the relationship between aptitude and persistence, especially since the findings of this study contradict much of the existing research.

BIBLIOGRAPHY

Agate, Grace B. "Persistence in College as Related to Intelligence, Economic Background, and Present Occupation." Unpublished Doctoral dissertation, University of Louisiana, 1941.

Allport, Gordon. "The Trend in Motivational Theory," American Journal of Orthopsychiatry, Vol. 23 (1953), 107-119.

Altus, William D. "A College Achiever and Non-Achiever Scale for MMPJ," Journal of Applied Psychology, Vol. 32 (1948), 385-397.

Anderson, Jack. A Study of the Relationship Among Academic Motivation, Level of Aspiration, Level of Expectation, and Gain or Loss in Achievement in a College Reading Improvement Situation. East Lansing, Michigan: Michigan State University, 1962.

Anastasi, Anne. Psychological Testing. New York: The Macmillan Company, 1961.

Atkinson, John Williams. Motives in Fantasy, Action and Society. Princeton, N.J.: Van Nostrand, 1958.

Atkinson, J.W. "Motivational Determinants of Risk-Taking Behavior," Psychological Review, Vol. 63 (1957), 359-372.

Atkinson, J.W. "Personality Dynamics," Annual Review of Psychology, Vol. 2 (1960), 255-290.

Atkinson, J.W. and Litwin, G.H. "Achievement Motives and Test Anxiety as Motives to Avoid Failure," Journal of Abnormal and Social Psychology, Vol. 60 (1960), 52-63.

Birney, Robert C. (ed.). Measuring Human Motivation. New York: D. Van Nostrand Co., 1962.

Brookover, Wilbur, Paterson, Ann and Thomas, Sheiler. Self-Concept of Ability and School Achievement. East Lansing: Office of Research and Publications, College of Education, Michigan State University, 1962.

Caliver, Ambrose. "The National Concern for Adult Education," Reprint. School Life, May, 1957, Washington: Office of Health, Education and Welfare, 1958.

Coleman, Herbert. "The Relationship of Socio-Economic Status to the Performance of Junior High School Students," Journal of Experimental Education, Vol. 9, No. 1 (1940), 61-63.

Cook, Lloyd Allen. A Sociological Approach to Education. New York: McGraw-Hill Book Company, 1950.

Cooley, William and Lohnes, Paul R. Multivariate Procedure for the Behavioral Sciences. New York: John Wiley & Sons, 1962.

Cronbach, Lee J. Essentials of Psychological Testing. New York: Harper & Brothers, 1960.

Curry, Robert L. "Certain Characteristics of Under-Achievers and Over-Achievers," Peabody Journal of Education, Vol. 39, No. 1 (1961), 41-45.

Davis, Allison. Social Class Influences Upon Learning. Cambridge: Harvard University Press, 1960.

Davis, George Jr. "A Study of Classroom Factors Related to Drop Outs in Adult Education." Unpublished Doctoral dissertation, University of Florida, 1963.

Davis, James. Great Books and Small Groups. New York: The Free Press of Glencoe, 1961.

Ewigleben, Robert. "The Identification and Analysis of The Factors Contributing to the Drop Out Rate Among Participants in Classes of the Lansing Adult School Program." Unpublished Doctoral dissertation, Michigan State University, 1959.

Farquhar, William W. and Payne, David A. "A Comparison of Techniques Used in Selecting Under- and Over-Achievers." Michigan State University, 1961. (Mimeographed.)

Farquhar, William W., et al. Motivation Factors Related to Academic Achievement. East Lansing, Michigan: Office of Research and Publications, College of Education, Michigan State University, 1963.

Feather, N.T. "The Relationship of Persistence at a Task to Expectations of Success and Achievement Related Motives," Journal of Abnormal Psychology, Vol. 63 (1961), 552-561.

Feather, N.T. "The Study of Persistence," Psychological Bulletin, Vol. 59, No. 2 (1962), 94-115.

French, Elizabeth and Thomas, F.H. "The Relationship of Achievement Motivation to Problem Solving Effectiveness," Journal of Abnormal Social Psychology, Vol. 56 (1958), 46-48.

Gottlieb, David. "Sociology of Education," Review of Educational Research, Vol. 34 (Feb., 1964), Chapter 4.

Gough, H.G. "What Determines the Academic Achievement of High School Students," Journal of Educational Research, Vol. 46 (January, 1953), 321-331.

Greenburger, Lawrence. "Adult Education Through Evening High Schools," Unpublished Doctoral dissertation, University of Pittsburgh, 1936.

Greenwood, Walter. "A Study of Persistence of Public Evening High School Students." Unpublished Doctoral dissertation, University of Pennsylvania, 1932.

Guthrie, Anthony John. "A Study of Male Academic Achievement Motivation in a Self-Economy Context." Unpublished Doctoral dissertation, Michigan State University, 1961.

Havighurst, Robert and Neugarten, Bernice. Society and Education. Boston: Allyn and Bacon, 1962.

Hayden, Mary Lou. "The Validation of the Michigan State M-Scale with College Freshmen." Unpublished Doctoral dissertation, Michigan State University, 1962.

Hodgkinson, Harold L. Education in Social And Cultural Perspectives. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962.

Hollingshead, August. Elmstown's Youth. New York: John Wiley & Sons, 1949.

Herriott, Robert E. "Some Social Determinants of Educational Aspirations," Harvard Educational Review, Vol. 33 (Spring, 1963), 157-177.

Ikenberry, Stanley. "Factors in College Persistence," Journal of Counseling Psychology, Vol. 8, No. 4 (1961).

Ikenberry, Stanley O. "A Multivariate Analysis of the Relationship of Academic Aptitude, Social Background, Attitude, and Values to Collegiate Persistence." Unpublished Doctoral dissertation, Michigan State University, 1960.

Johnson, F., et al. "Vocational Values Inventory," Michigan State University, 1958. (Privately printed.)

Johnstone, John W. Volunteers For Learning. Chicago: National Opinion Research Center, Report No. 89, February, 1963.

Jones, M.R. (ed.). Nebraska Symposium on Motivation: 1955. Lincoln: University of Nebraska Press, 1955.

Kidd, J.R. How Adults Learn. New York: Associated Press, 1959.

Kirks, Henry B. "Drop Out in the Evening Adult School." Unpublished Doctoral dissertation, University of Southern California, 1955.

Lewin, Kurt. "Behavior and Development as a Function of the Total Situation," in L. Carmichael (ed.), Manual of Child Psychology. New York: Wiley, 1946, 791-844.

Lewin, Kurt. Dynamic Theory of Personality. New York: McGraw-Hill, 1935.

Lorge, Irving. "Adult Education," Review of Educational Research, Vol. 11 (December, 1941), 171-181.

McClelland, D., et al. The Achievement Motive. New York: Appleton-Century-Crofts, Inc., 1953.

McClelland, David C. Studies in Motivation. New York: Appleton-Century-Crofts, 1955.

McDonald, Keith Henry. An Investigation into the Relationship of Socio-Economic Status to an Objective Measure of Motivation -- The Michigan State M-Scale. East Lansing, Michigan: Michigan State University, 1962.

McQuary, John J. and Truax, William E. "An Under-Achievement Scale," Journal of Educational Research, Vol. 48 (January, 1955), 393-409.

Miner, John B. Adult Intelligence. New York: Springer Publishing Company, 1957.

National Education Association. A Study of Urban Public School Adult Education Programs. Washington, D.C.: NEA, 1952.

Novak, Benjamin and Weiant, Gwendolyn E. "Why Do Evening School Students Drop Out?," Adult Education, Vol. 13 (Autumn, 1960).

Preston, James. "A Study of Continuing and Non-Continuing Adult Students." Unpublished Doctoral dissertation, University of California, 1958.

Rao, C.R. Advanced Statistical Methods in Biometric Research. New York: John Wiley & Sons, 1952.

Reiss, Albert, Jr. Occupations and Social Status. New York: The Free Press of Glencoe, Inc., 1961.

Sauides, Harold. "An Identification of Some Characteristics of Students Who Complete and Students Who Drop Out of An Evening Technical Curriculum." Unpublished Doctoral dissertation, University of Wisconsin, 1960.

Saupe, Joe. "Factorial Design Multiple Discriminant Analysis; A Description and an Illustration." A paper presented at the American Education Research Association, Chicago, Illinois, February, 1964.

Schreier, Fred T. Human Motivation. Glencoe, Illinois: The Free Press of Glencoe, 1957.

Snyder, Louise. "Why Do They Learn?," The Journal of Higher Education, Vol. 2 (1940), 26-32.

Stefflre, Buford. "Concurrent Validity of the Vocational Values Inventory," Journal of Educational Research, Vol. 52 (May, 1959), 339-341.

Tatsuoka, Maurice M. and Tiedman, David V. "Discriminant Analysis," Review of Educational Research, Vol. 24, No. 5 (1954), 402-20.

Taylor, Ronald Gail. "Personality Factors Associated With Eleventh Grade Male and Female Discrepant Achievers." Unpublished Doctoral dissertation, Michigan State University, 1962.

Thomas, Francis H. "Visualization, Experience, and Motivation as Related to Feedback in Problem Solving," American Psychologist, Vol. 2 (1956), 444.

Thorpe, Marion Dennis. "The Factored Dimensions of an Objective Inventory of Academic Motivation Based on Eleventh Grade Male Over- and Under-Achievers." Unpublished Doctoral dissertation, Michigan State University, 1961.

Tiedeman, David V., et al. "The Multiple Discriminant Function--A Symposium," Harvard Educational Review, Vol. 21, No. 1 (1951), 71-95.

Verner, Coolie and Davis, George, Jr. "Completions and Drop Outs: A Review of Research," Adult Education, Vol. 14, No. 3 (Spring, 1964), 157-176.

Verner, Coolie and Newberry, John S., Jr. "The Nature of Adult Participation," Adult Education, Vol. 13 (Spring, 1963), 153-158.

Warner, Lloyd, Havinghurst, Robert and Leob, Martin. Who Should Be Educated. New York: Harper & Brothers, 1944.

Washburne, Normal F. "Socio-Economic Status, Urbanism, and Academic Performance in College," Journal of Educational Research, Vol. 53, No. 4 (1959), 130-137.

Watson, Gordon (ed.). No Room at the Bottom--Automation and the Reluctant Learner. Washington, D.C.: National Education Association, 1963.

Winterbottom, Marian R. "The Relation of Need for Achievement to Learning Experiences in Independence and Mastery," in J.W. Atkinson (ed.), Motives in Fantasy, Action and Society.

Wolfe, Thomas H. The Effect of Praise and Competition on the Persistent Behavior of Kindergarten Children. Monogr. No. 15, Institute of Child Welfare, University of Minnesota, 1938.

Zahn, Jane and Phillips, Laura. "A Study of Drop Outs in University Adult Education," Adult Education, Vol. 2 (Summer, 1961).

APPENDIX A

GROUP MEANS AND STANDARD DEVIATIONS

MEANS

Variable	Non-Persisting Males	Non-Persisting Females	Persisting Males	Persisting Females	Total
1	25.4	28.4	31.7	29.3	28.0
2	46.5	50.1	57.6	54.0	52.0
3	8.7	8.8	10.0	9.4	9.2
4	8.4	8.0	9.8	8.8	8.7
5	20.5	23.5	26.0	25.2	23.8
6	8.9	9.8	11.6	10.6	10.2
7	27.7	33.1	35.8	31.4	32.0
8	28.3	25.5	36.5	45.1	33.8

STANDARD DEVIATIONS

Variable	Non-Persisting Males	Non-Persisting Females	Persisting Males	Persisting Females	Total
1	10.6	5.6	10.6	9.3	9.0
2	9.5	13.2	6.4	10.0	10.5
3	2.0	2.0	1.4	2.0	1.9
4	1.8	2.0	.4	1.9	1.7
5	5.5	8.8	6.0	5.7	6.7
6	2.4	3.4	.7	2.0	2.5
7	7.3	10.2	8.2	14.9	10.6
8	13.1	15.5	21.4	24.6	20.0

APPENDIX B

DISCRIMINATE SCORE AND VECTORS OF THE MULTIPLE DISCRIMINATE ANALYSIS

	1st Function	2nd Function	3rd Function
Discriminate Scores	.3089	.1447	.0141
Vectors			
1. Differential Aptitude Test	.03	.09	.00
2. General Situational Choice Inventory	.42	.40	.29
3. Preferred Teacher Characteristics	-.38	-.14	-.53
4. Word Rating List	.71	.49	.04
5. Human Trait Inventory	-.40	.63	-.46
6. Age	.15	-.42	-.61
7. Socio-Economic Scale	.07	-.05	.22