

AN ABSTRACT OF THE THESIS OF

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Students

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This study examined the relationship of Piagetian cognitive development and test anxiety to academic performance in disadvantaged college students. The purpose of the study was to determine if cognitive reasoning ability had a more significant relationship to academic performance than test anxiety. The study also sought to determine the predictability of academic performance based on cognitive reasoning ability and level of test anxiety.

The data were obtained from 31 college students (23 women, 8 men) participating in the Student Support Services project at Emporia State University. Each of the participants in this study completed the Arlin Test of Formal Reasoning (ATFR), The Test Anxiety Inventory (TAI) and a questionnaire designed to obtain self reported data on other extraneous variables believed to have a possible impact on the dependent variable (academic performance).

Results obtained from the ATFR indicated that only 35% of the students scored at the formal reasoning level. While correlations were found between the ATFR scores and grade point average, and between level of test anxiety and grade point average, none of these relationships were found to be significant. A multiple regression model was used to determine the predictability of academic performance based on the predictor variables cognitive reasoning and level of

test anxiety. While the results supported the alternative hypothesis that cognitive reasoning ability has a stronger effect on academic performance than test anxiety, again, the level of significance was not sufficient to conclusively support this hypothesis.

While the findings in this study supported the null hypothesis, they also suggest that there may be a stronger association between cognitive reasoning and academic performance and a weaker association between level of test anxiety and academic performance than previously believed. It was concluded that the sample size was insufficient to yield conclusive results in this study. It was recommended that further research be conducted in this area utilizing sampling procedures which will result in a useful sample size. In spite of the lack of influence that the independent variables had on academic performance, it is strongly suggested that further research be conducted on these factors.

The Relationship of Piagetian cognitive Development,
and Test Anxiety to Academic Performance in
Disadvantaged College Students

A Thesis

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CHAPTER 1

Introduction

A college education is an important part of the American dream. America's commitment to helping citizens realize that dream, regardless of race, ethnic background, or socio-economic status led to the founding and funding of Special Programs for Students from Disadvantaged Backgrounds, also known as TRIO programs. Student Support Services (SSS) is a TRIO program that provides academic support services to college students who meet federal eligibility guidelines. SSS programs are committed to the retention of high risk college students and to helping them persist until graduation.

For the purposes of TRIO/SSS projects, a high-risk student is identified as a one who 1) is a first generation college student (neither parent received a 4-year college degree); 2) meets federal income guidelines (low-socioeconomic status); and/or 3) has a documented or visible disability. These particular sub-groups have been targeted for educational intervention for some very good reasons. First of all, there have been certain factors identified which contribute to risk and attrition among college students. These factors are influenced by a variety of interdependent variables - parental background and educational levels, socioeconomic status, the degree of cognitive stimulation and preparation provided at home and school early in the developmental cycle, physical and mental health, and racism and discrimination (Jones & Watson, 1990). Statistics show high-risk students are typically at the lower end of the scale for each variable. Second, America's educational institutions are failing to educate many students, particularly students from disadvantaged backgrounds. Evidence of the system's failure to educate high-risk students can be seen by the high rates of attrition and by the wide gap in achievement that exists between

low-risk and high-risk populations (Applebee, Langer, & Mullis, 1989; Jones, 1989). Third, class, racial, sexual, disability and even cultural discrimination influence the quality and quantity of materials taught in schools due to low expectations, lower standards and lack of resources on the part of the educators. Many low-income and minority students attend overcrowded and inner-city schools where the tax base is low and expenditures for education is subsequently lower. Probably the most important reason for targeting low-income, first-generation and students with disabilities for educational intervention and support is that the successful education of high-risk students will have a profound impact upon society. While the immediate impact is on the students and the institutions that serve them, the long-term impact falls on society. Educators, administrators and counselors at colleges and universities are challenged to prevent a shortage of labor by helping high-risk populations persist in fields that provide the skills required for the occupational structure that will exist in the year 2000 and beyond. It is imperative to continue these existing strategies and adopt new ones which will help in reducing attrition and to neutralizing risk. This is what we must strive for if America is to continue to grow and develop potential accomplishments of our broader society.

During the past several years, an abundance of research has been conducted on the topics of retention, risk, and attrition. Numerous theories have been suggested in an attempt to explain the magnitude, nature and causes of problems that lead to high dropout and failure rates among high risk students. In spite of all serious attempts to analyze risk and attrition, the problems still persist. Students in colleges and universities invariably encounter risk, and that risk takes on many forms. For some students, risk may involve a higher probability of a low grade point average, a relatively poorer probability of choosing a major or career

field that will be marketable in the 21st century, and/or a higher measure of attrition risk.

The belief and understanding that high-risk students need considerable academic enhancement is indoctrinated into SSS programs at colleges and universities throughout the country. These TRIO projects have established a number of programs over the years in an effort to upgrade the academic achievement of high-risk students by helping students obtain and enhance the general skills that lead to academic success. More often than not, academic success is defined by the students' ability to perform in the testing or evaluation situation. The problem with this is that many high-risk students do not perform well in testing or evaluation situations. The inability to perform well leads to low academic performance, in turn leading to higher risk of dropout, failure, and attrition. The most common explanation for why students do not perform well in the testing situation is test anxiety.

In the current literature, there is a plethora of research that exists on test anxiety and college students. However, there is very little in the research that addresses test anxiety and its relation to academic performance in high risk students. As discussed in the literature review (Chapter 2), most of the treatments and techniques that have been very successful in reducing test anxiety from a cognitive-behavioral perspective have proven to be ineffective in improving academic performance. This perspective provides Student Support Services (SSS) counselors with few guidelines for tailoring interventions to individual student needs. Studies show these approaches contribute little to the understanding of the forces which aid in the reduction of test anxiety or in the improvement of the academic performance of high test-anxious, low performing students (see literature review).

SSS providers have been quick to respond to the disparate needs of high-risk students with a variety of programs and courses designed to enhance the students' probability of success. For example, study skill instruction, which is very popular in SSS programs across the nation, is implemented to promote academic performance. The approach that SSS directors and counselors have used, either teaching study skills or providing counseling to high risk/high test-anxious, is supported by the assumption that poor academic performance can only be the result of poor study skills or poor test taking skills related to test anxiety. This assumption ignores the range of cognitive abilities and deficits experienced by participants in SSS programs. Acceptance of this assumption leads one to believe test anxiety is the result of either retrieval deficits (due to interference caused by test anxiety) or encoding and organization deficits (reflected by poor study skills).

This assumption becomes problematic for the SSS counselor providing services to high-risk students with a broad range of cognitive, emotional and financial barriers to succeeding in college. Of particular concern is the population of high risk students who receive supportive counseling, extensive tutoring, and study skills instruction; yet, despite all intensive efforts, they continue to struggle academically, often resulting in academic probation, loss of financial aid, or academic withdrawal. Furthermore, the assumption denies the effect that deficits in cognitive abilities have on academic performance even when the student has good study skills and has been appropriately treated for test anxiety. As a result, researchers have begun to question the presumed relationship between test anxiety and performance that appears to form the basis of most test-anxiety interventions and to call for research aimed at identifying variables that might be differentially associated with test anxiety and academic performance.

Test anxiety among college students has been widely researched and SSS directors and counselors have explored various approaches to address the factors which cause students to perform poorly on tests and exams.

Nonetheless, there is good reason to believe cognitive and intellectual factors can provide better explanations for mediocre or low academic performance. Students' cognitive factors are related to the acquisition of information and the development of critical thinking skills. Therefore, a better understanding of how different students process information and how their cognitive levels differ according to background and opportunity can provide greater insight into strategies that will help reduce attrition and risk.

For SSS counselors, coordinators and directors who are responsible for facilitating the education of high-risk students, it is imperative to understand how high-risk students develop intellectually (Jones & Watson, 1990). Piaget proposed four developmental stages of cognitive development (Wadsworth, 1971) :

- "1. During the sensori-motor period, from birth to two years of age, the foundations of intellectual development take place...
2. During the preoperational thought period (ages 2 to 7 years), the child evolves from one who functions primarily in a sensori-motor mode to one who functions primarily conceptual-symbolic mode. The child becomes increasingly able to internally represent events (think) and become less dependent on his [sic] direct sensori-motor actions for direction of behavior...
3. During the period of concrete operations (ages 7 to 11), the child's reasoning processes become logical. That is, the child evolves logical though processes that can be applied to concrete problems...

4. During the period of formal operations, approximately ages 11 to 15 years, the child develops the ability to solve all classes of problems that can be solved through logical operations. According to Piaget, the child's cognitive structures reach maturity during this period... " (pp 78-80)

Piaget's cognitive development theory explains that abstract thinking is associated with formal operational thought. Formal operational thought in turn facilitates greater readiness for abstract concepts and complex problem solving skills necessary to be academically successful in the college environment (Wagner, 1977). Research suggests the cognitive development of many high-risk students appears to be arrested at the concrete operations stage because their learning experiences may have failed to develop their analytic capabilities beyond routine levels (Wagner, 1977). If it is true high-risk students tend to be at the lower, concrete-operational level of cognitive reasoning, then it follows that significant academic performance difficulties will be experienced by these students because they lack the ability to think analytically and critically when necessary. Development of a more comprehensive and differential approach to helping high-risk students suffering from test-anxiety and/or low academic performance would promote the development of counseling and instructional interventions that would more reliably improve academic performance as well as reduce test anxiety.

Statement of the Problem

High-risk students continue to struggle academically despite intense efforts on the part of SSS counselors and instructors. While study skills instruction and supportive counseling has had some success, there are many students who continue to receive low grades even with frequent tutoring, intense study hours and weekly counseling appointments. Again, one of the most

commonly accepted explanations for why students do not perform well in testing situations is test anxiety. However, very little has been done to explore the relationship of test anxiety and academic performance to the level of cognitive reasoning in high risk students. While it is a real possibility many high-risk students may be suffering from test anxiety, a measure of their level of cognitive reasoning may be a better predictor of future academic difficulty. Test anxiety in high-risk students may be a function of past experience with failure in the testing and evaluation situation. Identifying which students are operating at concrete or transitional levels of cognitive reasoning is imperative to reducing risk and attrition among high-risk students.

Significance of the Problem

The research suggests that students' performance, whether good or poor, in testing situations requiring the use of abstract concepts and critical thinking skills may be linked to development of abstract and concrete tendencies in processing information. Systematic changes are needed to help students go beyond the basic skills to more critical and analytical thinking skills -- those skills needed to succeed in college and enter the work force prepared. Such changes require long-term cultivation through skilled instruction by SSS counselors and academic coordinators in the structure of knowledge required by subjects like mathematics and science. It is the responsibility of SSS administrators to provide these needed skills and knowledge inventories to high-risk student populations. The results of this study will provide information which may be useful in designing intervention strategies to facilitate test-anxiety reduction and performance improvement among the academically less successful, high risk student.

Purpose of Study

The purpose of this study is to examine the relationship between cognitive development (using Piaget's model), test anxiety and academic performance in high risk college students. The study is designed to provide data which supports the hypothesis that the link between test anxiety and academic performance may be weaker than previously assumed. In addition, it is hypothesized that cognitive reasoning levels are more strongly associated with academic performance than is test anxiety in high risk students. This study seeks to identify the levels of cognitive reasoning which may underlie test anxiety and academic performance of high risk college students.

Hypothesis

The hypothesis for this study is that there is a stronger correlation between cognitive development and academic performance than between test anxiety and academic performance among high-risk students.

CHAPTER 2

Literature Review

An abundance of research exists on test anxiety and college students. However, there is very little in the research that addresses test anxiety and its relation to cognitive development and academic performance in high-risk students. Sapp (1990) defines anxiety as a thought or thing that causes concern regarding some event, future or uncertain, which disturbs the mind and keeps it in a state of painful uneasiness. In essence, anxiety is an emotion that pervades our daily lives. Sieber (1990) describes anxiety as a vital adaptive mechanism that forewarns us of possible danger and triggers innate and learned coping responses. One's response to anxiety is dependent upon past experiences, the context of the problem, and the level of anxiety being experienced at a particular given moment (Sieber, 1990). Those who respond to anxiety with effective problem solving experience anxiety as part of a positive experience. Conversely, those who respond with ineffective problem solving experience anxiety as distress, confusion, fear, physical malaise, worry or failure. Anxiety which does not lead to effective problem solving diminishes the probability of developing effective problem solving habits.

In the beginning, theories of anxiety were primarily rooted in the experiences of the clinical worker and the insights of the sensitive observer of people as they go about their day-to-day activities (Sarason, 1980). During the 1930s and 1940s increasing efforts were made to study the problem of anxiety from an experimental prospective. During the 1950s researchers began to attempt to study and assess anxiety quantitatively. This marked the growth of anxiety scales, questionnaires and measures (Sarason, 1960).

In an effort to create a foundation for the study of anxiety in a definable situational context, researchers began to focus their attention on specific sources of anxiety, such as social anxiety, anxiety over public speaking, and test anxiety (Sarason, 1980). Test anxiety has become the most widely studied of these specific anxieties. Test anxiety has been the focus of research and discussion within the fields of education, psychology and counseling for many years. The reason for such intense interest in the study of test anxiety is twofold (Sarason, 1980). First, the universality and extensive use of testing situations which are experienced by everyone makes test anxiety a significant educational, social and clinical problem. Second, researchers find the performance evaluation (i.e., the testing situation) highly useful for studying the effects of anxiety.

What is Test Anxiety?

Test anxiety has been defined as a set of responses to a class of stimuli that have been associated with one's experience of evaluation and/or testing. Test anxiety is a special case of general anxiety. It refers to the phenomenological, physiological, and behavior responses that accompany concern about possible failure (Sieber, 1980) and it involves cognitive and behavioral responses related to the fear of failure (Hembree, 1988).

When a person perceives a testing event as threatening, he or she may respond with widespread bodily symptoms, such as heart palpitations, profuse sweating, and breathing difficulties, as well as psychological symptoms such as inability to concentrate, difficulty in decision making, and a pervasive feeling of discouragement (Erwin, 1983). According to Smith, Arnkoff, and Wright (1990), students with heightened test anxiety tend to perform worse than their low-test anxiety counterparts. Studies conducted in the past 30 years have generally supported the notion that high test anxiety is correlated with performance

decrements (Benjamin, McKeachie, Lin & Holinger, 1981; McKeachie, 1984; McKeachie, Pollie, & Spiesman, 1955).

Theoretical Models of Test Anxiety

Traditional theoretical models of test anxiety and academic performance are divisible into two groups: those that are cognitive-attentional models and those that can be called dual deficit models (Smith, Arnkoff, & Wright, 1990). The cognitive attentional models include the State-Trait Model, the Worry-Emotionality Model and other current cognitive attentional models. The dual deficit models include Meichenbaum and Butler's (1980) Conceptual Model and the Information Processing Model.

Cognitive-Attentional Models of Test Anxiety

Cognitive attentional theories employ the "direction of attention" hypothesis which states that the explanation for poor performance among highly test-anxious individuals lies in the different attentional foci of high- and low-test-anxious persons (Wine, 1980). This model hypothesizes that high-test-anxious students inappropriately direct attention to self-preoccupied worry and task irrelevant cues while the low-test-anxious person focuses more fully on task-relevant variables. Thus, highly test-anxious individuals tend to be generally negatively self-preoccupied, describing themselves in self-devaluing terms in testing or evaluation situations (Many & Many, 1975; Sarason, 1960; Sarason & Ganzer, 1963; Sarason & Koenig, 1965). Cognitive attentional theories of test anxiety such as the state-trait model and the worry-emotionality model have dominated the research until recent years.

The State-Trait Model

In 1966, Spielberger introduced the state-trait model of test anxiety. The state-trait model is the most widely researched cognitive-attentional model of test anxiety. For clarification, Spielberger distinguishes between two

meanings of the term "test anxiety": anxiety as a state and anxiety as a trait. State anxiety is a transitory state of anxiety that occurs when the individual perceives stimuli of a test and responds with certain emotions and behavior. Trait anxiety refers to a relatively stable personality characteristic -- the disposition to perceive as threatening a wide range of the stimuli that are associated with tests and the tendency to respond to these with extreme A-state reactions. In essence, Spielberger is stating that some individuals are prone to the tendency to experience state anxiety in a variety of situations while others experience short-lived bouts of tension, apprehension and activation of the autonomic nervous system in specific situations. The performance decrease in high A-trait persons is attributed to two factors; the emotionality or high drive level associated with the elevated A-state, and the worrying and other self-centered interfering responses that are cued by the A-state reaction (Wine, 1980). The worrying responses and their interference with task orientation have been examined extensively by Liebert and Morris (1967).

The Worry-Emotionality Model

As a result of their investigation of worry and emotionality as components of Spielberger's state test anxiety, Liebert and Morris introduced a two-component conceptualization of anxiety into the test anxiety literature in 1967. According to this model, the experience of anxiety is separable into at least two major components, worry and emotionality. Worry refers to the cognitive elements of the anxiety experience, such as negative expectations and cognitive concerns about oneself, the situation at hand and the potential outcomes or consequences. Emotionality refers to one's perception of the physiological-affective elements of the anxiety experience. Emotionality can be further described as indications of autonomic arousal and unpleasant feeling states such as nervousness and tension.

In the Worry-Emotionality model, cognitive and emotional components are theorized as being conceptually independent, although they are expected to co-vary in stress situations because the situations contain stimuli related to the arousal of each of the two components (Morris, Davis, & Hutchings, 1981). Worry and emotionality are theorized to be conceptually independent in the sense that the two anxiety components are aroused and maintained by different situational conditions. This hypothesis was supported by findings in the following studies:

1. Deffenbacher (1978): Subjects receiving ego-involving instructions associated with anagrams task had significantly higher worry scores, but no higher emotionality scores than subjects receiving reassuring instructions.
2. Morris & Liebert (1973): The failure threat used by these researchers aroused worry but had no effect on emotionality.
3. Morris & Liebert (1969): A difficulty-of-items manipulation aroused worry but had no effect on emotionality.
4. Morris & Liebert (1970); Liebert & Morris (1967). Both studies showed consistent results indicating that performance expectancies held by students as they enter test situations are highly related to worry scores but are unrelated or less strongly related to emotionality scores.
5. Speigler, Morris & Liebert (1968): Among students facing a very important examination, the researchers found that worry scores were elevated to pretest levels as much as 5 days before the test with no corresponding elevation in emotionality.

It has been well documented that students with high trait test anxiety tend to perform poorer in testing or evaluative situations. However, the relationship between anxiety and performance has perplexed researchers for decades (Morris, Davis and Hutchings, 1981). The hope that applying the worry-

emotionality distinction would lead to better understanding and prediction of performance difficulties and to better treatment techniques for test-anxious students stimulated further research. Later findings which contradicted the earlier hypothesis that worry and emotionality were independent of one another (Holroyd, 1978; Holroyd, Westbrook, Wolf, & Badhorn, 1978; Morris & Fulmer, 1976; Smith and Morris, 1976; 1977) created the impetus for further research and the development of the revised and expanded cognitive-attentional theoretical models.

Current Cognitive-Attentional Models

Among the more current cognitive-attentional theorists are Sarason (1980), who emphasizes self-preoccupation as the major element involved in the experience of test anxiety and its effect on performance, and Wine (1980), who provides a cognitive-attentional view of performance decrements. Sarason posits that the relatively poor performance of highly test-anxious students in testing or evaluation situations is not due to low intelligence but rather to the cognitive interference of a personalized, self-centered approach to evaluational situations (Sarason & Stoops, 1978).

In her model of test anxiety, Wine attempts to "fill in the holes in the evidence through educated guesswork" (Wine, 1980, p.376). She points out that the cognitive structures and self-statements of the low-test anxious individual are not simply the opposite of that of the highs but rather different qualitatively. For example, she states, "whereas high-test anxious individuals are negatively self-preoccupied, it is highly unlikely that low test anxious persons are positively self-preoccupied" (p. 376). Wine claims that the bi-directional cognitive-attentional model she proposes goes far beyond the existing information and bears detailed research examination. Wine distinguishes high- and low-test-anxious students in an effort to provide more information regarding the "content consciousness of

the low-test-anxious person" (p.355) in addition to the plethora of information that exists regarding the contents of consciousness of highly-test-anxious individuals.

As shown by the preponderance of research based upon the aforementioned theories of test anxiety, cognitive-attentional variables such as worry, task-irrelevant thinking and negative self-preoccupation foster test anxiety and impair test performance. While ample evidence indicates that cognitive processes play an important role in performance and test anxiety (e.g., Arnkoff & Smith, 1990; Bruch, Kaflowitz, & Kuethe, 1986), they do not sufficiently explain the preponderance of the criterion variance (Smith, Arnkoff, & Wright, 1990). Yet, the cognitive models have historically dominated the literature and research in the area of test anxiety. Since that time, more focus has been placed upon the dual-deficit models of test anxiety.

Dual Deficit Models of Test Anxiety

Dual deficit models posit a role for both cognitive and academic skills variables. In 1980, Meichenbaum and Butler proposed a more comprehensive formulation of test anxiety which was dual-deficit in nature. Shortly thereafter, Benjamin, McKeachie, Lin and Holinger (1981) introduced an information processing model which was also dual-deficit in nature. Each of these models will be reviewed separately.

A Conceptual Model of Test Anxiety: Meichenbaum & Butler

As they introduce their conceptual model of test anxiety, Meichenbaum & Butler (1980) explain their view of test anxiety as being more than physiological arousal, more than negative self-preoccupation, more than poor study habits, and more than a deficit in stress-related coping skills. They describe what they call an evidential model of human behavior. The model includes the concepts of cognitive structures, internal dialogue, behavioral acts and behavioral outcomes. An individual's internal dialogue refers to the conscious thoughts, self statements

and images which he or she can report to someone else. A review of the test anxiety literature indicates that most of the research has focused on the role of internal dialogue in relation to test performance (Deffenbacher, 1978; Hollandsworth, Glazeski, Kirkland, Jones & van Norman, 1978; Holroyd, Westbrook, Wolf, & Badhorn, 1978; Houston, 1978; & Sarason & Stoops 1978). Meichenbaum and Butler (1980) summarize the maladaptive thinking processes of high-test-anxious individuals in the following aspects of the internal dialogue: (1) it is self-oriented rather than task-oriented, which serves to deflect attention from the task at hand; (2) its basic orientation is negative rather than positive, which serves to deflate motivation; and (3) it has an automatic, stereotyped, "run-on" character, which has the effect of escalating rather than controlling anxiety (Meichenbaum & Butler, 1980)

The concept of behavioral acts focuses on directly observable behaviors. These behavioral acts are classified into three categories. The first class of behavioral acts refers to study habits which have been shown to be related to academic performance. A second class of behavioral acts is identified as interpersonal behavior in preparation for stressful evaluative situations (i.e., their interpersonal communications with faculty and fellow students prior to the examination. The third class of behavioral acts is defined as actual test-taking behavior (i.e., multiple choice strategies, selection of essay questions, organization of material and so on). Though they discuss the three classes of behavior acts separately, Meichenbaum and Butler believe that such behaviors are intimately interconnected and may interact in a variety of ways to contribute to test anxiety. These researchers state that while such behaviors have received little attention in the test anxiety literature, they are worthy of further investigation.

The behavioral outcomes concept is closely akin to the concept of behavioral acts. The concept of behavioral outcomes encompasses a wide range of events to which the individual has some type of cognitive or behavioral reaction. These reactions may include praise, respect, criticism, a grade or other feedback one receives on an examination. Behavioral outcomes also refers to any internal events such as physiological reactions, mood states and so on. In the context of their model, Meichenbaum and Butler describe cognitive structures which focus on what they call the individual's "meaning system" (p. 197). This meaning is considered as part of a broader network of concerns or important issues in an individual's life and the position he or she takes in relation to them. The meaning system functions to set behavior in motion, to guide the choice and direction of particular sequences of thought and behavior and to determine their continuation, interruption or change of direction. Meichenbaum and Butler state that their model was designed in an attempt to frame questions, the answers to which would lead to a more comprehensive understanding and treatment of test anxiety.

An Information Processing Model

Benjamin et al. (1981), Tobias (1977) and Mueller (1980) suggested the use of an information processing model that combines the cognitive interference components and study-habits models for the analysis of test anxiety. They believed that such a model would explain the performance deficits of highly test-anxious students in terms of problems in encoding and organizing information as well as in retrieval of this information in a testing situation. Support for the encoding deficit hypothesis came from results showing that highly test-anxious students did poorly on a take-home examination that did not emphasize retrieval. Benjamin et al. (1981) suggest that these results imply the worry reported by highly test-anxious students may not simply be a personality characteristic but

may be due to inadequate knowledge of the subject matter. Their position is that highly test-anxious students do not have as good an organization of course concepts, even in a non-evaluative situation, and as a result they perform poorly. Thus, the poor academic performance of highly test anxious students is probably caused by a deficit in organization of the material studied.

Furthermore, Benjamin et al. (1981) hypothesized that the academic performance of highly test-anxious students with poor study skills might be affected both directly, by their lack of knowledge, and indirectly by the cognitive distraction created by thinking about this poor knowledge in the test situation itself.

Summary of Theoretical Models

As this review illustrates, it has been difficult for researchers to come to grips with such a global concept as test anxiety. Cognitive attentional models have attempted to explain poor academic performance among high test-anxious students by exploring differences between attentional foci of low- and high-test anxious students. Such models include State-Trait, Worry-Emotionality, Self-Preoccupation, and Bi-Directional. Dual deficit models combine the cognitive interference components with the assessment of study habits to analyze and explain test anxiety. The conceptual model of test anxiety proposed by Meichenbaum and Butler suggests that an effective model should address cognitive structures, internal dialogue, behavioral acts and behavioral outcomes in addition to physiological arousal, study habits and deficits in stress-related coping skills.

Although the cognitive point of view seems currently to be the most influential theoretical force in the research of test anxiety, a variety of theories have had an impact in the field. The diversity of these perspectives is quite evident as is the difficulty of arriving at a comprehensive definition of test

anxiety. Nonetheless, great strides have been made in the study of test anxiety which have provided sources of insight and guidance to those who seek to find effective treatments and interventions for those distressed with test anxiety.

Interventions and Treatment Strategies

There are as many treatment and intervention techniques employed today as there are theoretical models explaining the phenomena of test anxiety. Those treatments most commonly utilized in experimental studies will be discussed in this section. Early studies of test anxiety focused on cognitive-behavioral strategies aimed at reducing the worry and emotionality components of test anxiety. Spielberger (1980) found cognitive-behavioral strategies to be very effective in reducing test anxiety. For example, relaxation therapy is effective in treating test anxiety (Ricketts & Galloway, 1984). Also, systematic desensitization has been shown to effectively treat the emotionality component of test anxiety but not the worry component (Deluga, 1981). This is also the case for relaxation therapy. Cognitive-behavioral treatments for test anxiety include cognitive-behavioral hypnosis, relaxation therapy, systematic desensitization and supportive counseling.

Cognitive Behavioral Strategies

Hypnotherapy

Many qualitative studies have investigated the effects of hypnotherapy on test anxiety. For example, Boutin (1978) used a case study to demonstrate the effectiveness of rational stage directed hypnotherapy in treating first year nursing students for test anxiety. Moreover, Cohen (1982) presented a narrative description in which hypnotherapy was utilized at a counseling center to treat clients who had test anxiety and academic difficulty. In another study, Cercio (1983) combined hypnotherapy with fantasy relaxation technique to treat test

anxiety. Finally, in a 1984 article, Herbert discussed how hypnotherapy was effective in treating test anxiety in medical students and residents.

Cognitive Behavioral Hypnotherapy

Cognitive behavioral hypnotherapy (CBH) is a generic term for applying cognitive-behavioral techniques to hypnotherapy (Golden, Down & Friedberg, 1987). The CBH model combines cognitive-behavioral strategies and hypnosis (Dryden, 1987; Spanos, 1991). The underlying assumption with CBH is that many psychological disturbances are the result of negative self-hypnosis, a term coined by Araoz (1981, 1982, 1985). Closely related to the concept of negative self-hypnosis are the principles advocated by Ellis (1985), who stated that many emotional disturbances are the result of irrational thinking. These principles can be applied to test anxiety in that test anxiety would be considered to be the result of irrational thinking concerning test taking. The goal of CBH in the treatment of test anxiety is to help clients learn to accept themselves in spite of the fact that they have failed or not done well on an exam. In addition, clients are taught to recognize self-defeating cognitions and to replace them with rational beliefs, which will result in behaviors that are self-enhancing (Sapp, 1993).

Supportive Counseling

According to Sapp (1993), supportive counseling is based on the work of Carl Rogers' person-centered theory. In this model the therapist must be genuine or real and his or her external behavior must match his or her internal feelings. In addition, the therapist shows acceptance of and demonstrates a caring attitude towards the client. When counseling a client who is suffering from debilitating levels of test anxiety, the therapist creates a supportive environment and facilitates change through a deep and empathic understanding of the client's plight. When treating clients, the counselor or therapist's role is to listen and reflect (Sapp, 1993). Sapp suggests that at least the first four sessions should

be focused on getting clients to explore their feelings towards test anxiety. The goal is to provide support and to promote problem solving achieved through empathic reflecting and by allowing clients to come up with methods of handling their test anxiety. One alternative method of handling test anxiety is to participate in relaxation therapy as a part of the counseling process.

Relaxation Therapy

There are essentially two distinct forms of relaxation therapy: behavioral relaxation therapy and cognitive relaxation therapy. One purpose of the therapy is to help the client recognize the difference between tension and relaxation. Understanding the distinction between the two will help the client learn to relax during test situations and perform at his or her best level. Behavioral relaxation therapy teaches clients to sequentially tense and subsequently relax twenty muscle groups (Sapp, 1993). When practiced twice daily, relaxation therapy helps build confidence and increase motivation in the client's ability to reduce general anxiety and specifically the anxiety related to effective study and testing situations. Cognitive relaxation therapy, produced by mentally relaxing and letting go, does not involve any physical tension as a precursor to relaxation. Closely related to the concepts of relaxation therapy is systematic desensitization.

Systematic Desensitization

Systematic Desensitization (SD) is also a cognitive behavioral technique which has been found useful in the treatment of test anxiety. Systematic desensitization is based on the notion that clients cannot be tense and relaxed simultaneously (Sapp, Durand & Farrell, 1989). There are three steps to systematic desensitization. Students are taught muscle relaxation techniques. Then students are taught to construct a test anxiety hierarchy, a list of images, emotions, and situations that produce test anxious behavior. Items on the test

anxiety hierarchy are ranked from the least anxious to the most anxious behavior. Once the student relaxes, he or she is asked to imagine items from the test anxiety hierarchy that produce the least amount of anxiety. Students are asked to imagine as many items of their test anxiety hierarchy until they can do so without anxiety. The desensitization process is repeated until the client is able to imagine all items on his or her hierarchy without reporting any increase in anxiety.

Summary of Interventions and Treatments

Cognitive-behavioral approaches to reducing test anxiety have been widely applied and studied. Cognitive behavioral techniques have been shown to be effective in treating test anxiety (Stanton, 1993). However, if the ultimate goal of treatment is better academic performance of the client, these strategies have not fared well at all. Studies have shown that treatments directed toward relaxation or toward reducing emotional reactions to testing have been successful in reducing test anxiety but have produced a relatively insignificant effect on academic performance (Tyron, 1980). Furthermore, Denny (1978) noted that 67% of studies involving systematic desensitization have failed to find differences between treatment and control conditions on performance measures of test anxiety. This discrepancy between the reduced level of test anxiety and the continued poor academic performance raised new questions for researchers. Specifically, researchers began to explore the question of what causes decrements in performance. Numerous researchers have investigated the causes of these performance decrements. Desiderato and Koskinen (1969), Wittmaier (1972), and Culler and Hollahan (1980) concluded that the poor academic performance of highly test anxious students was due, at least in part, to inadequate study skills, resulting in poor knowledge of the relevant material. This theory gave rise to new approaches to treating clients with test anxiety.

As the lack of correspondence between anxiety reduction and concomitant improvement in test anxiety led researchers to conclude that other variables were being overlooked, many begin to employ the skills-acquisition approaches to help high test-anxious students perform better.

Skills Acquisition Approaches and Interventions

In 1971, Wine posited that rather than being viewed as an anxiety-related disorder, ineffective test performance can be conceptualized as a skills deficit. As this position was further supported by the research of others (Kirkland & Hollandsworth, 1979) it gave rise to a new model of skills acquisition approaches. The most common approach to skills acquisition intervention is study skills instruction. When utilizing the skills acquisition approach, the emphasis is on the acquisition of effective test-taking behaviors rather than on inhibiting an undesirable set of responses related to emotionality and worry (Deffenbacher, 1978). Study skills instruction, which has proven effective in promoting academic performance (Armbruster & Anderson, 1981), has gained a great deal of popularity in recent years. Others who have studied the role of intellectual ability and study habits in academic performance for low- and high-test anxious students have had results indicating that high-test anxious students have poorer ability and poorer study skills (Culler & Hollahan, 1980; Lin & McKeachie, 1970; Wittmaier, 1972;). Benjamin et al., 1980, concluded that the problems that high-test anxious students have are not only in the retrieval of information during the test situation but also in the learning (encoding of) the information in the first place. In another study conducted by Kirkland and Hollandsworth in 1980, the results suggested skills-acquisition treatment, which viewed test anxiety as a skills deficit rather than an anxiety-based disorder and involved training for effective test taking behaviors, resulted in significant improvements in academic performance.

Though skills acquisition treatment has gained popularity due to its proven ability to help students improve their performance on exams, many researchers have questioned the ability of this model to explain the academic disadvantage of highly test anxious students. For example, Tobias (1985) raised several questions regarding the model that claims study-skills deficit is by itself an adequate model. He argued the skills-deficit hypothesis model assumes students who are poorly prepared for exams have elevated levels of test anxiety. This elevation in anxiety is due to their cognitive awareness of inadequate mastery of the content area of the subject matter. If it is true that anxiety is caused by a knowledge of inadequate preparedness then it is logical to assume anxiety should decrease when skills acquisition is improved or enhanced. Tobias argues this explanation makes it difficult to understand the research of others (Benjamin et al, 1981; Culler & Hollahan, 1980) where students with good study skills were also highly test anxious. In essence, he is arguing something other than a deficit in skills must be involved to explain the anxiety of these students. This position is further supported by the work of Naveh-Benjamin (1991). The results obtained in this study supported the claims that both retrieval deficits (probably due to interference) and encoding and organization deficits (reflected by poor study skills) might be the cause for the relatively poor performance of high test-anxious students. However, Benjamin points out, the results also led to the rejection of the claim that either one of these models alone can cover the range of test-anxiety phenomena. Benjamin suggests test anxiety is manifested by a range of cognitive deficits, starting with the original learning of information, continuing during organization of the information while reviewing it and ending with retrieving it on the examination. The implication of the results obtained in studies suggesting a more complex model of test anxiety which takes into account, cognitive ability, study habits, cognitive interference and

social learning will have a profound impact upon the methods employed by Trio counselors to meet the needs of economically and educationally disadvantaged college students. Of particular importance is the consideration of the levels of cognitive reasoning among high risk students as a measure of predicted academic success.

Cognitive Development

Every college course is an endeavor that requires a great deal of thinking and much of this thinking is logical (Phillips, 1981). Critical thinking involves the process of actively and skillfully conceptualizing, applying, analyzing, synthesizing and evaluating information gathered from or generated by observation, experience, reflection, reasoning or communication, as a guide to belief and action (Kennedy, 1991). Critical thinking can be seen as having two components: 1) a set of information and belief generating and processing skills and abilities, and 2) the ability and practice of using those skills and abilities to guide behavior. Critical thinking goes beyond the mere acquisition, memorization and retention of information and beliefs because it involves a specific way in which information and beliefs are attained and retained (Kennedy, 1991). Critical thinking also goes beyond the mere possession of a set of skills because it requires not only continual use of the those skills but also an acceptance of their results.

King and Kitchner (1994) refer to this higher order, critical thinking as reflective judgment. In an article published in 1992, King used the reflective judgment model to describe a sequence of changes in thinking that affects the way students justify their beliefs and make judgments. Unlike other models of reflective or critical thinking, the reflective judgment model is grounded in the underlying assumptions of the cognitive developmental perspective articulated by Piaget and Kohlberg (King, 1992). According to King and Kitchner (1994),

reflective thinking involves tolerance of intellectual ambiguity and access to one's own voice on the part of the learner. At this stage, the learner is able to define and defend his or her own intellectual discoveries and authority resides in the self-as-knower and in the ability to test one's own hypotheses.

In order to think critically abstractly and reflectively, one must make explicit use of specific mental processes. Piaget (1953) broadly summarizes the stages of cognitive development which lead up to this highest level of cognitive development. For the purposes of this study, we are only interested in the later two of the four stages: the period of concrete operations and the period of formal operations. During the period of concrete operations, the individual develops the ability to apply logical thought to concrete problems; whereas in the period of formal operations, the individual is able to apply logic to all classes of problems (Wadsworth, 1971). In Piaget's theory of cognitive development, the transition from concrete operational stage of reasoning to the formal operational stage (the highest level), is marked by the ability of an individual to form propositions which then become a part of cognitive structure that owes its existence to past experience but makes possible hypotheses that do not correspond to any particular experience. For example, the concrete operational child always starts with experience and makes limited interpolations and extrapolations from the data available to his senses. The Formal Operational individual, however, begins with the possible and then checks various possibilities against memorial representations of past experience.

Piaget's theory of cognitive development proposes that concrete operational reasoning ends at approximately 12 years of age or at the beginning of adolescence. However, research studies have shown that many late adolescents and adults are still reasoning at the concrete operational levels of reasoning and thinking (Bart, 1971; Kuhn, 1979; Logan & Dungan, 1990).

Furthermore, there have been studies indicating that the cognitive development of students from disadvantaged backgrounds is influenced by environmental forces and that these environmental forces can either delay or enhance the developmental and cognitive growth of students (Haney & Hooper, 1973; Wasik & Wasik, 1971). In a 1993 study, Sameroff, Seifer, Baldwin and Baldwin concluded that social and family risk factors had a significant influence in the intellectual development of children, particularly those coming from disadvantaged backgrounds. To compound the social and family risk factors, Knapp and Sheilds (1991) discussed the impact of educators upon the learning potential of students from disadvantaged backgrounds. They posit that by focusing on what they perceived to be students' deficits, educators risk making inaccurate assessments of children's strengths and weaknesses. In the worst case, "educators have low expectations for disadvantaged students and set standards that are not high enough to form the foundation for future academic success" (p. 10).

From these studies, it becomes easier to understand how economically and educationally disadvantaged college students, due to their backgrounds and environmental influences, may not have successfully made the transition to the formal operational stage of cognitive development necessary to perform well in a college setting. While it has been estimated that approximately 40 to 45% of college students are not functioning at the formal operational reasoning level (Dungan & Logan, 1992; King, 1992; McMillan, 1987), it seems to be logical to assume that the estimate would nearly double among students coming from disadvantaged backgrounds. These statistics may seem overwhelmingly dismal to an individual charged with providing academic and counseling support to disadvantaged students, but, these barriers to academic success in college are not impossible to overcome. While their characteristics of lower level cognitive

thinking are not consistent with critical thinking or reflective reasoning, where they are now is a starting point for future intellectual growth. Their assumptions about knowledge and how knowledge is gained are the building blocks for subsequent ways of understanding, knowing and resolving problems (King, 1992).

In an effort to assist students in their learning endeavors, we must strive to go beyond the constructs of theory and consider the social aspects of learning and knowledge and how these aspect impact students in the classroom setting. While Piaget's theory helps us to understand various levels of cognitive levels, we must not omit the consideration that there are different ways of knowing and that epistemological foundations also have their place in understanding how students perform in an academic setting. For example, Billig (1996) provides a different perspective using a dichotomous approach. He proposes sociological and anthropological constructs which can be viewed as useful in examining the contrasting levels of abstract thinking that Piaget describes in his theory.

Piaget believed that acquisition of concrete and formal operations was primarily a maturational phenomenon and that training had little effect upon its development (Campbell & Ramey, 1990). Subsequent research has shown, however, that young children can be trained to think at the concrete operational level (Gelman & Baillargeon, 1983). Studies have shown that early educational intervention positively affects cognitive ability (measured IQ) and because Piagetian tasks are known to be correlated with standard measures of intelligence (Gottfried & Brody, 1975; Kaufman, 1971), it was hypothesized that early intervention would also influence performance on a Piagetian test such that students who received educational intervention would outperform those high risk students not receiving early educational intervention. In a recent study conducted by Roth and Milkent (1991) the possibility of developing proportional

reasoning strategies by concrete operational college students was put to the test. The results of their experiment showed that a training program could be developed which would help students to acquire complex problem solving skills. Seventeen of the 23 non-formal operational students reached the formal operational level of reasoning by the end of the experiment and the remaining six subjects reached a level corresponding to a transitional stage between concrete and formal operational stages. These results are of particular import and value to the SSS counselor who may need to consider the implementation of a critical thinking skills component to the overall package of services provided to high-risk students. Such a targeted approach to accommodating disadvantaged students would enhance efforts to meet retention and graduation objectives.

Summary

Historically, SSS counselors have operated under the assumption that chronic low performance of students in the testing situation can be attributed to high levels of test anxiety. The term "test anxiety" refers to a set of responses that have been associated with a person's phenomenological, physiological and behavioral responses that accompany concern about possible failure on an exam. Test anxiety is a widely studied phenomenon among psychologists, educators and counselors because of the universality and extensive use of testing as a measurement of ability and knowledge attainment.

There are numerous theoretical and intervention models in the literature which attempt to explain chronic poor performance by students in testing situations. Among the most widely used theoretical models are the cognitive attentional models are the state-trait, worry-emotionality, bi-directional and pre-occupational models. Recent research has led to more current models of test anxiety theory such as Meichenbaum and Butler's conceptual model and the

Information Processing model. One of the treatment strategies most prevalent in the literature is the cognitive-behavioral approach aimed at reducing worry and emotionality. The cognitive-behavioral strategies include hypnotherapy, cognitive-behavioral hypnotherapy, relaxation therapy, supportive counseling and systematic desensitization. As the lack of correspondence between anxiety reduction and academic performance improvement continued to prevail, new intervention techniques began to focus on other variables which were previously being overlooked. These new interventions have focused on skills acquisition which are designed to teach students adequate study skills so that they can become better able to prepare themselves for examinations and hence, improve their academic performance.

The variety and plethora of research in the literature illustrate how difficult it has been for researchers to adequately explain such a global concept as test anxiety. It has also been difficult for researchers to arrive at a comprehensive definition of test anxiety. This difficulty is further compounded by the inability to identify an intervention or treatment strategy which both reduces the level of anxiety that a student experiences while concurrently improving academic performance; yet, they have not addressed cognitive factors which influence learning and academic performance.

Academic success in college requires a particular level of cognitive skills. A great deal of logical and critical thinking is required in college. Such critical thinking involves more than mere memorization and recalling of facts and information during the testing situation. It involves the ability to think reflectively and make judgments about abstract concepts and theories. The reflective judgment model of critical thinking is grounded in the underlying assumptions of Piaget's theory of cognitive development. In Piaget's model, critical or abstract thinking occurs when one reaches the formal operational level of reasoning. At

this stage the learner is able to tolerate intellectual ambiguity and move beyond the concrete towards the abstract.

For counselors charged with assisting disadvantaged students to successfully navigate themselves through the educational process, the phenomena of test-anxiety and academic performance is profoundly perplexing. For some students, intense study routines, numerous hours of tutoring, intense study skills instruction, as well as supportive counseling still has been unfruitful in improving their ability to perform well in the testing situation. The complexity of test anxiety and its underlying causes are intensely compounded by the educational background and cognitive growth experiences of low income, first generation and physically or mentally disabled students, particularly if they are functioning at cognitive levels below that which is required to be successful in post-secondary educational institutions. Perhaps it is time for support counselors to take a closer look at the cognitive reasoning levels of disadvantaged students and identify ways of addressing or compensating for any deficiencies that exist for those who have not reached the formal operational level of thinking.

A thorough investigation into the cognitive abilities of high risk students will provide SSS counselors with much needed insight into factors influencing academic performance. While it is conceded that many high risk students who are struggling academically will have high levels of test anxiety, it is anticipated that critical thinking skills or formal reasoning abilities (cognitive development) will be a better predictor of future academic performance. Many high risk students are required to repeat those courses which mandate critical, reflective or abstract thinking and thus their level of anxiety may be further intensified by past experience of failure. Further exploration of the relationship between test anxiety, cognitive development and academic performance will assist SSS

counselors in identifying better predictors of academic performance and in targeting more effective interventions to accommodate high-risk students.

CHAPTER III

Methodology

Purpose of Study

The purpose of this study was to examine the relationship between cognitive development (using Piaget's model), test anxiety and academic performance in high risk college students. The study was designed to provide data which supports the hypothesis that the link between test anxiety and academic performance may be weaker than previously assumed. In addition, it was hypothesized that cognitive reasoning levels are more strongly associated with academic performance than is test anxiety in high risk students. This study sought to identify the levels of cognitive reasoning which may underlie test anxiety and academic performance of high risk college students.

The methods used in this study are described in the following sections. Included are descriptions of the population and sample, the design, external and internal validity factors, procedures, instrumentation, statistical design and summary.

Participants

The population studied in this research consisted of high risk college students participating in the Student Support Services (SSS)/Project Challenge program at Emporia State University. Participants of SSS programs were considered a unique population because all participants must have met one of three criterion. To be eligible as a participant in an SSS program a student must either a) be a first generation college student (neither parent received a 4-year college degree; b) meet federal income guidelines; or c) have a visible or documented disability. The study sample consisted of a the total population of SSS/Project Challenge participants from Emporia State University (n=179).

Design

The interest of the researcher was to establish whether or not a relationship exists between levels of cognitive development, levels of test anxiety and levels of academic performance in high risk students. Specifically, the researcher sought to determine whether there is a stronger correlation between test anxiety and academic performance or a stronger correlation between cognitive development and academic performance. Because certain students who receive tutoring, mentoring, supportive counseling and study skills instruction continue to struggle academically despite these interventions, it is imperative other underlying causes of poor academic performance are explored. With this type of information, SSS providers would be better able to provide the appropriate interventions and make predictions that will help SSS participants set reasonable and appropriate academic goals for themselves.

In order to establish a reasonable association between cognitive development, test anxiety and academic performance, the research was descriptive, utilizing a multivariate, correlational design. This design was chosen because it was believed to be the best way to investigate the possibility of the relationships between variables and to measure the significance of the relationships. Utilizing correlational multiple regression and ANOVA models, the researcher compared scores on one variable with scores on another variable and determined whether or not a positive or negative correlation existed. These results were also used to identify which, if either, of the relationships were more significant. The data collected in this study was used to describe the degree to which these three variables are related. Multivariate techniques were utilized to describe the relationship between the variables and offer some insight on predictions that can be made in the future about the potential academic performance of high risk students.

Internal Validity

Threats to internal validity in this particular study included subject, characteristics, instrumentation, and testing (Fraenkel & Wallen, 1996). Each of these threats were addressed individually.

With respect to subject characteristics, there was the possibility that other characteristics of the study participants may explain any relationships that were found. Some of these other characteristics included amount of time spent studying per class, amount of time spent in tutoring, amount of supportive counseling received and test anxiety reduction therapy received. The researcher provided questions attached to one of the instruments which asked for a self-reported measure of the number of hours spent studying for each subject area. The number of hours spent in tutoring and/or supportive counseling was retrieved from the Project Challenge statistical records. To control for these confounding factors, the researcher investigated the possible relationships between the dependent variable and the extraneous variables by running correlations among each of the dependent, independent and extraneous variables. By doing so, the researcher was able to more effectively examine the correlation between the dependent variable (g.p.a.) and the independent variables (cognitive reasoning and test anxiety) with the effect of these nuisance variables taken under consideration. A limitation to the internal validity of the study is that students who experience higher test anxiety may have scored lower on the ATFR as a result of their test anxiety. This is one nuisance variable that could not be controlled.

Instrumentation threats can be divided into three categories: instrument decay, data collector characteristics and data collector bias. In this particular study, instrument decay was not of concern as the instruments used were only administered once for data collection purposes. Data collector characteristics

become a threat to internal validity when different persons administer both instruments; therefore, both instruments were administered by the same individual. Data collector bias becomes a threat when both instruments are given or scored by the same person. This was controlled for by having the instruments administered and scored by different individuals.

Often in correlational studies, testing can be a threat when the experience of responding to the first instrument influences participant responses to the second instrument. In this particular study, however, the two instruments being utilized to measure levels of cognitive development and test anxiety were not closely enough related in subject matter to pose a reasonable threat to the internal validity of this study.

External Validity

It is the contention of the researcher that the external validity of this study was highly acceptable. Because the SSS participants in this study must meet the same eligibility criterion as all SSS participants throughout the country, the researcher was confident that this sample is representative to the population of interest. The open admissions policy of the Kansas Regent institutions makes generalizability of the sample population even more feasible. The open enrollment status has a profound impact upon the risk level of students participating in SSS programs throughout Kansas. Furthermore, since there are many college students who meet one of the three eligibility criterion mentioned previously who do not receive support services through Trio, this sample is also representative of other first-generation, low-income and disabled college students who would also be considered high risk students. For the purposes of this study, however, the generalizability of the sample was limited to SSS participants attending Emporia State University.

Research Question

The research question posed in this study was "Is there a correlation between cognitive reasoning, test anxiety and academic performance in high risk students?" If a statistically significant multiple correlation between the three variables were found, the results of this study could be used by SSS professionals to make predictions about the needs and future academic performance of high risk students participating in their projects.

Procedures

Arrangements were made with the SSS Director at Emporia State University to obtain address labels for the participants. The researcher had complete access to the study participants and their demographic and academic background information. The first step in implementing this study was to get approval from the Institutional Review Board (a copy of the completed Human Subjects form is included in the Appendix A). One stipulation to made by the Institutional Review Board was that administration of the instruments must be conducted by someone other than the researcher so as to assure participants that their participation in the study would in no way impact their status or eligibility as a Project Challenge participant (see Appendix B). Once approval was obtained, then letters were sent out to study participants informing them that they had been selected to participate in this study if they chose to. Included in the initial mailing was a cover letter of endorsement from the project director which explained the significance of the study and why the results are important to students participating in Project Challenge (see Appendix C). Also included in the mailing was an informed consent form. The letter provided them with details about the time, date and location of the first two testing sessions. The initial mailing was sent 2 weeks prior to the testing date. A follow up call was placed to participants who had not responded within one week. Those who did not

participate in the first two testing sessions received a post card in the mail informing them of a third testing session. After the third testing session, there was some concern on the part of the researcher that the number of respondents was not sufficient to complete the study. At this point, phone calls were placed to all PC participants who had not responded to the invitation to participate in the study offering another group testing date. A fourth testing date was arranged, but only 3 students participated. Participants who indicated that they could not attend the testing sessions due to schedule conflicts but were willing to participate were sent the instruments in the mail along with a cover letter. A follow-up call was placed to those who had not returned their instruments within two weeks. Although there were only 31 respondents in the study at this time, the researcher concluded that all reasonable attempts to gain study participants had been exhausted and was concerned that any further attempts to urge students to participate would be viewed as undue pressure by the Institutional Review Board.

Instrumentation

During testing, participants were administered the Arlin Test of Cognitive Development (Arlin, 1984) and the Test Anxiety Inventory (Spielberger, 1969). The first test administered in this study was the Arlin Test of Formal Reasoning (ATFR). The ATFR is designed as a group test to assess cognitive abilities associated with the formal operations stage according to Inhelder and Piaget (1958). Based on the score received on the ATFR, the student's cognitive level can be assessed as being at one of five levels: concrete, high concrete, transitional, low formal, and high formal. The ATFR contains 32 items and is in a multiple-choice format. For each item, four choices are given and the test taker chooses an answer and checks the response on a separate answer sheet. The instructions for the test are simple and clear. It is very much like multiple-choice

tests that students take frequently in regular classroom settings. The required time for the test is 45 minutes; however, there was room for flexibility if more time was needed.

According to the manual, cross-validation of the test has been done by using two methods of administration. A paper and pencil version was given to a large group and individual clinical interviews were conducted with a sample randomly chosen from this group. The validity coefficients are reported to range from .55 to .74. Test-retest reliabilities (8-week to 6-month intervals between the two testings) range from .76 to .89. The Hoyt estimates of reliabilities range from .71 to .89, and the Cronbach alphas for the total composites are reported to range from .70 to .73 (Fakouri, 1990).

After the ATFR was completed, the Test Anxiety Inventory (TAI) was administered (Spielberger, Anton & Bedell, 1976). The TAI consists of 20 items that describe reactions before, during and after examinations. Respondents indicated how they generally feel by stating how frequently they experience each reaction which is on a Likert scale (almost never, sometimes, often, almost always). The TAI is primarily a trait measure scale restricted to a specified class of situations centering around examinations (Anastasi, 1988). The TAI has total score of test anxiety proneness and subscores that measure the two major components of test anxiety identified through factor analysis, worry and emotionality (Sapp, 1993).

Normative data are available for the total TAI scores and the subscores. Spielberger (1980) reported validity coefficients of .82 for males and .83 for females. Reliability coefficients have been reported at .80 for three weeks and .81 for one month intervals. Tables of norms are used to convert the raw scores from the TAI into standardized t-scores with a mean of 50 and a standard deviation of 10. According to Sapp (1993), there are significant negative

correlations among grades and the TAI. They have a lower range of -.18 and an upper range of -.31 which indicates the TAI has good psychometric properties.

Statistical Design

The variables investigated in this study were level of cognitive reasoning, level of test anxiety and level of academic performance. Academic performance was measured using the student's current cumulative grade point average (g.p.a.). As the researcher posited that academic performance is dependent upon cognitive level of reasoning and level of test anxiety, the level of academic performance was studied as the dependent variable in this study. The levels of test anxiety and cognitive development were the independent variables. The scores of the sample on the ATFR were used to categorize the sample into two groups: formal reasoning vs. non-formal reasoning. Sample means were computed for each of the variables. To establish an association between the three variables, multiple regression techniques were utilized to measure degree the predictability of academic performance dependent upon level of cognitive reasoning and level of test anxiety. The data collected in this study was analyzed using a student version of the SPSS statistical software.

Hypothesis

In this study, the researcher hypothesized there are significant statistical differences between the academic performance of students with high and low levels of test anxiety as measured by the Test Anxiety Inventory. Further, the researcher also hypothesized there are significant statistical differences between the academic performance of formal operational students and non-formal operational students. The researcher posited there is a significant relationship between the level of test anxiety and the level of academic performance and even more significance between the level of cognitive reasoning and academic performance.

Summary

This study was designed to explore the relationship of cognitive reasoning and test anxiety to academic performance in high risk students. For the purpose of this study, high risk students were defined as having met one of three eligibility criterion for Student Support Services projects: 1) first generation college student; 2) low-income college student; and/or 3) student with a documented or visible disability. The student's level of cognitive reasoning was measured using the ATFR and levels of test anxiety was measured using the TAI. Academic performance was measured using the students' current cumulative grade point averages. Levels of cognitive reasoning and level of test anxiety were correlated with academic performance to test the significance of any relationship that may exist between the three investigative variables.

The population for this study was comprised of undergraduate college students participating in Student Support Services project at Emporia State University. The sample population consisted of 159 students. The sample was asked to complete the ATFR and the TAI.

Scores from the ATFR and the TAI were correlated with academic performance using a multiple regression model to determine if any relationship exists between each of these independent variables and the academic performance and to determine predictability between the dependent and independent variables.

CHAPTER IV

Results

The purpose of this study was to examine the relationship between Arlin Test of Formal Reasoning (ATFR) scores, Test Anxiety Inventory (TAI) scores and academic performance (g.p.a.) in a sample of disadvantaged college students participating in the Student Support Services (SSS) project at Emporia State University. This chapter presents the results of the study. Included is the demographic data gather from the sample, the distribution of their scores on the ATFR and TAI. Also the results of multivariate correlational computations, multiple regression output are reported.

Demographics

Of the 159 SSS students invited to participated in this study, usable responses were received from 31 (19.5%). Of those who responded, 23 (74.2%) were female, and 8 (25.8%) were male. Of the respondents, 14 (45.2%) were freshmen, 7 (22.6%) were sophomores, 9 (29%) were juniors and 1 (3.2) was a senior. Twenty (64.7%) of the respondents were traditional aged college students between the ages of 18 and 25; and 11 (35.3%) were non-traditional age college students between the ages of 25 and 48. Twenty-eight of the respondents were Caucasian, one was African-American and one was Hispanic American. In addition, 18 (58.1%) of the respondents qualified for SSS as a First Generation and Low Income participant, 7 (22.6%) qualified as First Generation Only, 1 (3.2%) qualified as Low Income Only, 2 (6.5%) qualified as Disabled Only and 3 (9.7%) qualified as Disabled and Low Income. Table 1 presents the distribution of respondents by gender, classification, race, and qualification as

Table 1

Demographic Data for the Sample

	n	percent
Gender		
Male	8	25.8
Female	23	74.2
Classification		
Freshman	14	45.2
Sophomore	7	22.6
Junior	9	29.0
Senior	1	3.2
Racial Demographics		
Caucasian	28	
African American	1	
Hispanic	1	
Entry Qualification		
First Generation & Low Income	18	58.1
First Generation Only	7	22.6
Low Income Only	1	3.2
Disabled	2	6.5
Disabled & Low Income	3	9.7

Table 2

Age Frequency of Respondents

AGE	Frequency	Percent	AGE	Frequency	Percent
19	6	19.4	29	2	6.5
20	3	9.7	34	1	3.2
21	6	19.4	35	2	6.5
22	3	9.7	41	1	3.2
23	2	6.5	43	1	3.2
25	1	3.2	47	1	3.2
27	1	3.2	48	1	3.2

Note: n = 31

an SSS participant. Table 2 presents the age frequency distribution for the sample

ATFR and TAI Results

Levels of cognitive reasoning are determined by classifying individual ATFR scores at one of five levels of reasoning: Concrete (0-7), High Concrete (8-14), Transitional (15-17), Low Formal (18-24) and High Formal (25-32). The score for establishing level of cognitive reasoning using the Arlin Test of Formal Reasoning is obtained by accumulating the sum of correct responses. The distribution of raw scores for the ATFR is provided in Table 3. Of the total possible score of 32 on the ATFR, the respondents' scores ranged from 9 to 26. The mean, median and mode of the scores were 16.45, 16, and 14 respectively and the standard deviation was 4.27. Measures of central tendency for the ATFR are provided in Table 4. The number of respondents scoring in the non-formal reasoning range (below 18) was 20 (65%) and the number scoring in the formal range (18 or above) was 11 (35%). A frequency distribution for levels of formal and non-formal reasoning is provided in Table 5.

Table 3

Score Distributions on the Arlin Test of Formal Reasoning (ATFR)

<u>Raw Score</u>	<u>Frequency</u>	<u>Percent</u>
9.00	1	3.2
10.00	1	3.2
11.00	2	6.5
12.00	2	6.5
13.00	2	6.5
14.00	4	12.9
15.00	2	6.5
16.00	2	6.5
17.00	4	12.9
18.00	1	3.2
19.00	1	3.2
20.00	3	9.7
21.00	2	6.5
22.00	2	6.5
24.00	1	3.2
<u>26.00</u>	<u>1</u>	<u>3.2</u>
Total 31	100.0	100.0

Table 4

Mean, Median, Mode and Standard Deviations of ATER and TAI Scores

Test	Mean	Median	Mode	SD
Arlin Test of Formal Reasoning	16.45	16.00	14.00	4.27
Test Anxiety Inventory	45.93	47.00	61.00	12.02

Table 5

Number of Students in Cognitive Levels of the ATFR

Level	Frequency	Percentage
Formal (18 or above)	11	35
Non-Formal (below 18)	20	65

The score for establishing levels of Test Anxiety using the TAI is obtained by accumulating the sum responses. Levels of test anxiety were determined by using normed cutoff scores to indicate high and low levels of test anxiety. A score below 50 was classified as a normal or low level of test anxiety and a score of 50 or above was classified as high level test anxiety. The distribution of raw scores for the TAI is provided in Table 6.

Of the total possible score of 80 on the TAI, the respondents' scores ranged from 26 to 68. The mean, median and mode of the scores were 45.94, 47, and 61 respectively and the standard deviation was 12.03. Measures of central tendency for the TAI are also provided in Table 4. The number of respondents scoring in the low level test anxiety range (below 50) was 20 (65%) and the number scoring in the high level test anxiety range (50 or above) was 11 (35%). A frequency distribution for high and low levels of test anxiety is provided in Table 7.

Relationships Between Extraneous and Dependent Variables

To determine the influence of extraneous variables on the dependent variable, a series of correlations was conducted. The correlation matrix provided in Table 8 provides correlation coefficients on each variable in the study. As shown in the correlation matrix, there were no significant relationships found among the dependent, independent and extraneous variables. In addition, Table 9 provides the mean and standard deviation of g.p.a. between groups of non-formal reasoning (mean = 2.71; sd=.725), formal reasoning (mean= 3.02; sd=.394) , low test anxious (mean= 2.75; sd=.651), and high test anxious students (mean= 2.85; sd=.669). Table 9 also provides correlation coefficients for cognitive reasoning level and academic performance ($r = .3411$) and for level of test anxiety and academic performance ($r = -.1217$). There were no statistical differences between groups ($p > .05$).

Table 6

Score Distributions on the Test Anxiety Inventory

Raw Score	Frequency	Percent
26.00	1	3.2
29.00	2	6.5
30.00	1	3.2
31.00	1	3.2
33.00	2	6.5
35.00	1	3.2
37.00	1	3.2
38.00	1	3.2
41.00	1	3.2
42.00	1	3.2
43.00	1	3.2
45.00	1	3.2
46.00	1	3.2
47.00	2	6.5
48.00	2	6.5
49.00	1	3.2
50.00	1	3.2
51.00	1	3.2
52.00	1	3.2
53.00	1	3.2
60.00	1	3.2
61.00	3	9.7
64.00	1	3.2
66.00	1	3.2
68.00	1	3.2

Table 7

Number of Students with High and Low Levels of Test Anxiety

Level	Frequency	Percentage
High(50 or above)	11	35
Low (below 50)	20	65

Table 8

Correlation Matrix of Extraneous Variables

Variable	Correlation Coefficients									
	AGE	CLASS	GENDER	GPA	GROUP	RELAX	STUDY	TAI	QUALIF	TUTOR
AGE	1	0.4633	0.3614	0.1306	-0.0125	-0.0266	-0.0864	0.1205	-0.2938	-0.1057
P=		0.009	0.046	0.499	0.947	0.887	0.6560	0.5180	0.1090	0.5720
CLASS	0.4633	1	-0.2203	0.0044	-0.3092	0.1511	-0.1600	-0.2914	-0.2748	-0.2555
P=	0.009		0.234	0.982	0.091	0.417	0.4070	0.1120	0.1350	0.1650
GENDER	-0.3614	-0.2203	1	-0.0134	-0.1247	-0.0916	-0.0247	-0.2899	-0.5790	-0.1452
P=	0.046	0.234		0.945	0.504	0.624	0.8990	0.1140	0.7570	0.4360
GPA	0.1306	0.0044	-0.0134	1	0.2474	0.1761	0.0792	0.0671	-0.2377	
P=	0.499	0.982	0.945		0.196	0.361	0.6950	0.7290	0.2140	
GROUP	-0.0125	-0.3092	-0.1247	0.2474	1	-0.1065	0.0534	0.6499	0.0632	0.2800
P=	0.947	0.091	0.504	0.196	-0.1065	0.568	0.7830	0.0000	0.7360	0.1270
RELAX	-0.0266	0.1511	0.0916	0.1761	-0.1065	1	0.3062	-0.1379	-0.1729	0.1812
P=	0.887	0.417	0.624	0.631	0.568		0.106	0.459	0.352	0.329
STUDY	-0.0864	-0.16	-0.0247	0.0792	-0.0534	0.3062	1.00	-0.08	0.00	0.06
P=	0.656	0.407	0.899	0.695	0.783	0.106		0.70	1.00	0.77
TAI	0.1205	-0.2914	-0.2899	0.0761	0.6499	-0.1379	-0.0753	1.0000	0.2611	-0.0208
P=	0.518	0.112	0.114	0.729	0.000	0.459	0.6980		0.1560	0.9120
QUALIF	-0.2938	-0.2748	-0.0579	-0.2377	0.0632	0.1729	0.0012	0.2611	1.0000	-0.1741
P=	0.109	0.135	0.757	0.214	0.736	0.352	0.9950	0.1560		0.3490
TUTOR	-0.1057	-0.2555	-0.1452		0.28	0.1812	0.0559	-0.0208	-0.1741	1.0000
P=	0.572	0.165	0.436		0.127	0.329	0.7730	0.9120	0.3490	

Table 9
Mean G.P.A.s, Standard Deviation and Correlations Between ATFR and TAI Scores

Test	M	SD	Correlation
Non-Formal Reasoners	2.71	.725	
Formal Reasoners	3.02	.394	
Formal Reasoning			.3411
Low Test Anxiety Respondents	2.75	.651	
High Test Anxiety Respondents	2.85	.669	
Level of Anxiety			-.1217

To determine whether the predictability of academic performance based on level of cognitive reasoning and level of test anxiety, a multiple regression model was used with cognitive reasoning and level of test anxiety as predictor variables. The multiple regression model yielded the following significance levels for each of the independent variables: ; $F = 1.91679$; Significance of $F = .1673$; Significance of T (ATFR) = $.0655$; and Significance of T (TAI) = $.2582$. (see Table 10).

No statistically significant relationship was found between the predictor variables, cognitive reasoning and level of test anxiety, and the dependent variable, academic performance (g.p.a.). The data reported in this study supports the null hypothesis. Using a statistical table, it was determined that the F value with 2 degrees of freedom and a residual of 26, needed to be equal to or greater than 2.52. Since the F value of 1.917 does not meet this criteria, the null hypothesis is supported in this study. In addition, the significance of F also supports the acceptance of the null as it does not reach a significance level of $.05$. In measuring how far the observations differ from what we would expect under the null hypothesis, the test statistic T was used. It was determined that in order to reject the null the T value needed to be greater than 1.65 with a significance level of $.05$. As shown in table 10, the T value for the affect of cognitive reasoning (ATFR) is 1.923 which supports the rejection of the null and suggest that cognitive reasoning may have more affect on academic performance than test anxiety. However, the significance of T does not reach the $.05$ alpha level desired. Thus we can not say, statistically, that the probability of rejecting the null when it should be accepted is sufficient to reject the null in this study. In contrast, the T score for Test Anxiety (1.156), is consistent with the null, suggesting that test anxiety may have less of an impact on performance

than previously believed. In addition, the significance of the T score for Test Anxiety supports the acceptance of the null as it is far from reaching the desired alpha level of .05.

CHAPTER V

Discussion

The purpose of this study was to examine the relationship of Piagetian cognitive development and test anxiety to academic performance in disadvantaged college students. This study was undertaken to identify major factors influencing academic performance and to provide information about the predictability of academic performance with this population of college students. Presented in this chapter is a discussion of the results of this study, the implications of these results and recommendations for further study in this area.

Discussion

The present study attempted to establish relationships between cognitive reasoning ability, test anxiety and academic performance among disadvantaged college students. A review of the results in this study indicates there is a weak association among the independent and dependent variables and these associations are statistically insignificant. Upon closer examination of the data, however, there are some interesting findings which should be addressed.

In spite of the absence of significant correlations between cognitive reasoning ability and academic performance, the mean g.p.a. of those students who scored at the formal operational reasoning level were substantially higher (3.02) than those who score below the formal reasoning level (2.71) as shown in Table 9 of chapter four. In addition, the difference in mean g.p.a. for the high and low test anxious students was substantially lower. In fact, those students who had high levels of test anxiety also had the higher mean g.p.a. These findings were inconsistent with previous studies which found a negative correlation between test anxiety and academic performance (Desiderato & Koskinen, 1969; Culler & Holland, 1980; Arnkoff & Smith, 1990). Although the

sample size was not sufficient to produce statistically significant results, a comparison of the mean g.p.a. among the formal and non-formal reasoners was found to be consistent with the results of the multiple regression output data which showed that formal reasoning had more effect than test anxiety on academic performance. These results suggest there may be a stronger association between the variables than the present study reports.

Another issue addressed by this study was the possible effect of extraneous variables such as study time, tutoring, counseling etc. on academic performance. Again, there was absence of main effect for each of extraneous variables. Interestingly, there were negative correlations between study time and academic performance as well as between counseling and academic performance (although these correlations were not found to be statistically significant). This can be explained by the fact that those students who face more academic challenges and have the lower g.p.a.'s are the ones who work hardest and study the most. Similarly, those students who are at the lower end of academic performance are also those who are required to receive academic and personal support counseling through the Student Support Services Program. Therefore, the negative correlations are a result of student characteristics and academic circumstances rather than the effect of the extraneous variable on academic performance. One should not conclude that the more one studies, the worse they will perform in the college setting.

Limitations

It is impossible to draw any responsible conclusions from the present study due to the numerous limitations involved. While the findings allude to the possibility of a strong association between cognitive reasoning and academic performance, the size of the sample was insufficient to produce statistically significant results. The sampling procedure used in this study may have had

resulted in such a small size of respondents. In addition, as mentioned previously, the researcher had established rapport with most of the participants in the study but was unable to administer the instruments. The test administrator was unknown to the participants and therefore had not rapport established, which may have precluded some students from participating.

Population characteristics should be taken into consideration when discussing limitations. Much can be learned from non-respondents as well as those who chose to participate. For example, while the ratio of women and men involved in the study is representative of the population of men and women eligible to participate, the study population is not representative in terms of the racial mix of the population. The accessible population consists of about nine percent African-Americans and five percent Hispanic Americans. In this study, only one African-American and one Hispanic American participated. The same cultural factors which influence how certain ethnic groups perceive counseling or how receptive they are to intervention may apply to this population.

Another interesting finding is that a large majority of the sample, whether traditional aged or non-traditional students, were freshmen. This may be attributed to the fact that freshmen may have more incentive to participate if they feel the results may have a positive impact on them during their remaining years at the institution. Another possibility is that the researcher, as Counselor of Student Support Services, typically establishes a strong rapport with freshmen due to teaching the freshmen seminar courses and to taking a more intrusive intervention approach with freshmen. Of the 31 students who participated in the study, all of them were in good academic standing and many of them had g.p.a.s of 3.0 or above. One could reasonably argue these students have fewer problems with organizational and time management skills. Many of the students who did not participate, in spite of their indicated interest and willingness, were

students who are struggling academically. It could also be argued that these students have less control of their time, and need to hone their organizational skills. As a result, the data in this study are somewhat skewed and do not completely encompass the entire spectrum of the population for which it was intended. Perhaps an alternative sampling procedure could have resolved this limitation.

In addition, the researcher was unable to distinguish between the types of classes and level of difficulty of subject matter upon which the participant's academic performance has been measured up to this point. It is reasonable to believe difficulty and background knowledge of the subject matter being taught would have an influence on the outcome of the student's performance in the class. Likewise, the teaching style of the instructor may have a similar influence on the student's performance particularly if the instructor had a preference for abstract or concrete teaching methods.

A final limitation that could not be addressed is the impact of test anxiety on the ATFR scores. Performance on the ATFR could have been influenced by the level of anxiety experienced by the student while taking the ATFR. Although the correlation between the TAI and the ATFR scores showed no significant relationship, there was a negative correlation which suggests that a more sizable population might result in a stronger negative correlation between the two variables.

Recommendations

It is recommended that Student Support Service projects at colleges and universities consider incorporating an Abstract Thinking course as a component of their existing curricula. Abstract thinking course should include those components which incorporate concepts of epistemology, empiricism, idealism, rationalism and interpretivism to help students understand how they know and

how they learn. The use of instruments which assess students levels of test anxiety and cognitive reasoning ability can serve as a useful early intervention tool.

Although the null hypothesis was supported in this study, there are some interesting findings which support the need for further research in this area. It is recommended that future research be conducted in this area utilizing a more productive sampling procedure such as cluster sampling or convenience sampling. Further studies should also incorporate measures to control for extraneous variables and cultural factors which may influence results. Another factor to consider in future research is the impact of subject matter and instructor teaching style upon the performance outcomes of students.

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Appendices

02/95

APPENDIX A

APPLICATION FOR APPROVAL TO USE HUMAN SUBJECTS

This application should be submitted, along with the Informed Consent Document, to the Institutional Review Board for Treatment of Human Subjects, Research and Grants Center, Campus Box 4048.

1. Name of Principal Investigator(s) (Individual(s) administering the procedures):

Cathy Terrell

2. Departmental Affiliation: Department of Counselor Education

3. Person to whom notification should be sent: Cathy Terrell, Project Challenge, Campus Box 16

Address: 914 Grand Avenue Telephone: 341-5097

4. Title of Project: The relationship between Piagetian cognitive development, test anxiety and academic performance in high risk college students.

5. Funding Agency (if applicable): _____

6. Project Purpose(s):

This study is designed to explore the relationship between cognitive development, test anxiety and academic performance in high risk students participating in the Project Challenge program at Emporia State University.

7. Describe the proposed subjects: (age, sex, race, or other special characteristics, such as students in a specific class, etc.)

The proposed subjects will be undergraduate students who have qualified to participate in Project Challenge/Student Support Services as either 1) a first generation college student, 2) low income or 3) having a visible or documented disability.

8. Describe how the subjects are to be selected:

The sample will consist of 100 Project Challenge participants

The 100 participants will

be randomly selected from an accessible population of 160.

9. Describe the proposed procedures in the project. Any proposed experimental activities that are included in evaluation, research, development, demonstration, instruction, study, treatments, debriefing, questionnaires, and similar projects must be described here. Copies of questionnaires, survey instruments, or tests should be attached. (Use additional page if necessary.)

The participants in this study will be asked to choose from one of three test dates.

During testing, the sample participants will be asked to complete the Arlin Test of Formal Reasoning and the Test Anxiety Inventory.

- 10. Will questionnaires, tests, or related research instruments not explained in question #9 be used?
 Yes No (If yes, attach a copy to this application.)
- 11. Will electrical or mechanical devices be used? Yes No (If yes, attach a detailed description of the device(s).)
- 12. Do the benefits of the research outweigh the risks to human subjects? Yes No This information should be outlined here.

There are no risks involved in this study.

- 13. Are there any possible emergencies which might arise in utilization of human subjects in this project?
 Yes No Details of these emergencies should be provided here.

- 14. What provisions will you take for keeping research data private?

Participants will be asked to provide only the last four digits of their social security number. Only the researcher and her advisor will have access to the data. After the data has been analyzed, all identifying marks will be removed.

- 15. Attach a copy of the informed consent document, as it will be used for your subjects.

STATEMENT OF AGREEMENT: I have acquainted myself with the Federal Regulations and University policy regarding the use of human subjects in research and related activities and will conduct this project in accordance with those requirements. Any changes in procedures will be cleared through the Institutional Review Board for Treatment of Human Subjects.

Cathy Terrell
Signature of Principal Investigator

7-18-96
Date

Faculty Advisor

Date



Dear PC Participant:

As a participant of Emporia State University's Student Support Services program, Project Challenge, you have been selected to participate in a research project currently being conducted by Cathy Terrell. This study could have ramifications for how well Project Challenge and other Student Support Services programs serve participants of SSS programs.

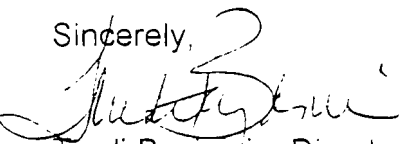
The research is designed to test levels of abstract thinking and levels of test anxiety in students participating in PC. We believe that this study will help us identify ways in which we can better meet the academic needs of students, particularly when those needs go beyond the provision of one-on-one tutoring and mentoring.

Participation in this study is absolutely voluntary and will in no way influence your status as a participant in Project Challenge. The instruments to be used in this study will be administered to you by another graduate student in the Student Personnel program who is not affiliated with Project Challenge.

Please agree to assist Cathy with her thesis research by participating in this study. Attached is a list of dates and times that you may choose from to participate. Please indicate which date you would like to attend and return it in the enclosed self-addressed, stamped envelope along with your signed informed consent document **no later than February 10, 1997.**

I fully support this research and hope that you will do so as well. If you have any specific questions about the study, please feel free to contact Cathy Terrell directly at 341-5097. You may also direct questions to her research advisor, Dr. Colette Dollarhide, Division of Counselor Education, 341-5793.

Sincerely,


Trudi Benjamin, Director
Project Challenge/SSS

Appendix B
Informed Consent Document

Dear Project Challenge Participant:

The Division of Counselor Education supports the practice of protection for persons participating in research and related activities. The following information is provided to you so that you can decide whether you want to participate in the present study. You should be aware that even if you agree to participate, you have the right to withdraw from the study at any time. If you do withdraw from the study, you will not be subjected to reprimand or any other form of reproach.

Procedures to be followed in the study:

You will be given two assessment instruments: The Arlin Test of Formal Reasoning and the Test Anxiety Inventory. The results of these instruments will be used for research purposes only and will not influence your status or eligibility as a Project Challenge participant. It will take approximately 90 minutes to complete both instruments.

Description of any attendant discomforts or other forms of risk involved:

There are no risks involved in participating in this study, however, participants sometimes experience minimal discomfort when answering survey questions.

Description of benefits to be expected from the study or research:

The results of this study can be used to help Project Challenge staff and staff of other Trio programs provide better services to students so that they can achieve desired levels of academic, career and personal success.

"I have read the above statement and have been fully advised of the procedures to be used in this project. I have been given sufficient opportunity to ask any questions I had concerning the procedures and possible risks involved. I understand the potential risks involved and assume them voluntarily. I likewise understand that I can withdraw from the study at any time.

Participant

Date



January 22, 1997

Cathy Terrell
Project Challenge
Campus Box 16

Dear Ms. Terrell:

The Institutional Review Board for Treatment of Human Subjects has evaluated your application for approval of human subject research entitled, "The Relationship Between Piagetian Cognitive Development, Test Anxiety and Academic Performance in High Risk College Students." The review board approved your application with the stipulation that the data be collected by someone other than yourself. You may begin your research with subjects as outlined in your application materials.

Best of luck in your proposed research project. If the review board can help you in any other way, don't hesitate to contact us.

Sincerely,

A handwritten signature in black ink, appearing to read "John O. Schwenn".

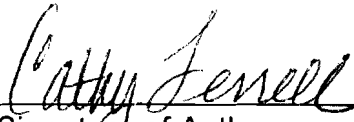
John O. Schwenn, Dean
Graduate Studies and Research

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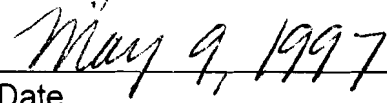
cc: Colette Dollarhide

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I, Catherine E. Terrell, hereby submit this thesis to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the Library of the University may make it available to use in accordance with its regulations governing materials of this type. I further agree that quoting, photocopying, or other reproduction of this document is allowed for private study, scholarship (including teaching) and research purposes of a non-profit nature. No copying which involves potential financial gain will be allowed without written permission of the author.

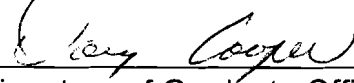


Signature of Author

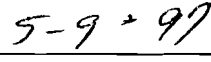


Date

The Relationship of Piagetian
Cognitive Development and Test
Anxiety to Academic Performance
in Disadvantaged College Students
Title of Thesis



Signature of Graduate Office



Date Received