AN INVESTIGATION OF THE EFFECTS OF GENDER AND ACADEMIC SELF- EFFICACY ON ACADEMIC RISK-TAKING FOR ADOLESCENT STUDENTS

By

DEBRA J. HOUSE

Bachelor of Arts
University of Arkansas
Fayetteville, Arkansas
1983

Master of Education
University of Arkansas
Fayetteville, Arkansas
1985

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Thesis Approved:

Diane Montgomery

Thesis Advisor

Charles Robert Davis

J Barbara Wilkerson

Janice Miller

Timothy J. Pettitone

Dean of the Graduate College

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CHAPTER I

INTRODUCTION

The courses students take in secondary school and the degree to which the students master these subjects effect the choices open to them for years to come. College acceptance, scholarship offers, and employment opportunities can hinge on student course-taking decisions and subsequent performance. Gender equality in schools has been the focus of intense research over the last several years due to the apparent impact of gender on secondary course selections, intensity of study, and preplanned career development, patterns, and goals. Works such as *Gender Gaps: Where Schools Still Fail Our Children* (American Association of University Women, 1998), Orenstein's (1994) *SchoolGirls*, and Spenders (1980) *Learning to Lose* pushed to the forefront of educational research, the need to investigate ways to equalize educational experiences and opportunities for female students. Research findings (American Association of University Women, 1998; Orenstein, 1994; Spender, 1980) alerted educators to gross gender differentiation in schools. After lagging for decades, girls' high school course enrollment patterns are beginning to look more like boys' due to new insights concerning underachievement, and the development of a range of educational initiatives aimed at raising girls' achievement (Horgan, 1995). However, the continued failure of girls to take more advanced level math, science, and computer courses remains an

obstinate problem (Boaler, 1997; Hackett, Betz, O'Halloran, & Romac, 1990; Lent, Lopez, & Bieschke, 1991; MittelbergLilach Lev-Ari, 1999; O'Brien, 1996; Rop, 1998; Shibley-Hyde, Fennema, Ryan, Frost, & Hopp, 1990).

MittelbergLilach Lev-Ari (1999) reports that the percentage of girls completing high school is higher than that of boys, and the girls' rate of achievement at the end of high school is generally higher than that of boys. Yet, the percentage of boys studying advanced mathematical subjects and their achievement in these areas are higher than those of girls. Data on college majors and degrees earned indicate that girls may not make the transition from high school math and science courses to advanced postsecondary courses in math, science, and computer fields (AAUWEF, 1998; Betz & Hackett, 1983; Marsh, Byrne, & Shavelson, 1988; O'Brien, 1996; Rop, 1998). This persistent educational pattern threatens to eliminate opportunities for women in the technology industry of the 21st century, and keep women underrepresented in high-salaried, intellectually challenging careers.

To address this concern, researchers continue to search for ways to maximize academic performance, while examining gender differences as important components of the larger network of educational equity. Since learning in classrooms involves internal cognitive processing for learners, under investigation is the concept that the differences in achievement may have their genesis in differential desires to engage in tasks that promote academic achievement. One factor that has been associated with the continued educational underachievement of girls is risk-taking as it relates to test-taking, academic, and classroom behavior. Risk is pervasive and seemingly inescapable in academic life. Moreover, the positive and negative consequences of student's academic actions in the

presence of risk are often detrimental to later academic pursuits. This link between risk-taking and academic achievement has been documented in various studies (Clifford, 1988; Clifford & Chou, 1991; Clifford, Chou, Mao, Lan, & Kuo, 1990; Clifford, Lan, Chou, & Qi, 1989; Jones & Gerig, 1994; Orenstein, 1994; Ramos & Lambating, 1996b; Rop, 1998; Streitmatter, 1997; Urdan, Midgley, & Anderman, 1998; Verma & Sharma, 1990). However, a need for investigating the nature and effects of academic achievement and risk-taking continues to exist in the literature. To ensure equal chances for all students to learn, excel, and achieve educationally the possibility of gender specific cognitive schemas which effect risk-taking in the classroom needs to be further investigated.

Risk-Taking and Academic Achievement

Several theorists investigating human motivation have presented risk-taking behavior as a significant behavioral characteristic. These theorists attest that moderate risk-taking behavior is a universal tendency that beneficially enhances human behavior. Developmental theorists have long argued and repeatedly demonstrated that optimal challenge is a prerequisite for maximizing intelluctual development. Moderate risk-taking (.50 probability of success) and optimal challenge emerged as key determinants of social, motivational, and cognitive benefits. Risk-taking is a multidimensional, substantially subjective, construct defined by Yates and Stone (1992) as a situation of behavior whereupon a decision maker has to decide how desirable it is to expose himself to the uncertainty of possible failure in the pursuit of a desired goal. Risk-taking may be seen more globally as the perception of possible threats to individual goals involving physical well-being, mental well-being, and/or social well-being (Singleton & Hovden, 1987).

Several factors derived from theories of economics and psychology have been linked to risk-taking behavior. Theorists have postulated that moderate risk-taking encourages positive responses to error-making and failure (Kim & Clifford, 1988), develops ability to tolerate and learn from failure (Clifford, 1984; Zinkhan & Karande, 1991), involves individual personality differences regarding the achievement of success and the avoidance of failure (Atkinson, 1957; Leondari, Syngollitou & Kiosseoglou, 1998), involves individual differences regarding the quest for and avoidance of definite information about one's own capabilities (Kuhl, 1978; Sorrentino, Short & Raynor, 1984; Trope, 1975; Weiner & Kukla, 1970), may involve erroneous beliefs about individual ability levels (Hammond, Keeney, & Raiffa, 1998; Leondari, et al., 1998; Singleton & Havden, 1987), maximizes task satisfaction (Atkinson, 1957; Atkinson, Bastian, Earl, & Litwin, 1960; Myers, 1965) includes individual differences concerning self-efficacy expectations (Bandura, 1977a) and controllability concerns (Singleton & Havden, 1987; Smith & Torstensson, 1997), embroils ethnic identity issues (AAUWEF, 1998; Zinkhan & Karande, 1991), involves varying degrees of the attributional tendency egotism (Hale, 1987; Lopes, 1994; Snyder, Stephan, & Rosenfield, 1976; Urban, et al, 1998), facilitates cognitive growth (Fischer, 1980), affects performance levels (Clifford, et al.,1989), is not related to the impulsivity-reflectivity dimension (Kopfstein, 1973), and encompasses individual differences in the relationship preference for challenging tasks and pleasure (Harter, 1974; Weiner & Kukla, 1970). The basic risk concept has been shown to vary across demographic variables such as gender (Greenberg & Schneider, 1995; Hargreaves & Davies, 1996; Horgan, 1995; Jack & Dill, 1992; Kass, 1964; Kronsberg, Schmaling, & Fagot, 1985; Singleton & Hovden, 1987; Slovic, 1966; Smith & Torstensson, 1997; Urban, et al, 1998; Verma & Sharma, 1990;

Zinkhan & Karande, 1991), age (Hargreaves & Davies, 1996; Kass, 1964; Slovic, 1966), race (AAUWEF, 1998; Jackson, 1998), and culture (McInerney, Roche, McInerney, & Marsh, 1997; Zinkhan & Karande, 1991). Risk-taking desirabilities has also been shown to vary across variables related to personality-based characteristics (Apter, 1992; Singleton & Hovden, 1987; Trimpop, 1994; Yates & Stone, 1992).

Although student achievement has been positively correlated with the same variables as risk-taking (i.e., self-efficacy expectations, ethnic identity, cognitive growth, gender), the construct of risk-taking on academic achievement has been insufficiently addressed by educational researchers. Many task, situational, and individual variables likely to affect academic risk-taking have not yet been examined. Risk-taking is not commonly associated with educational pedagogies and academic achievement. Educators are more concerned with maximizing success and minimizing failure and error-making than with ensuring moderate risk-taking. Error-making and failure are often thought to be detrimental to students' self-esteem, motivation, and learning. The importance of investigating the nature, determinants, and consequences of the educational practice of minimizing error-making in school settings has given rise to academic risk-taking research.

Educational research investigating academic risk-taking is designed to identify the determinants and effects of academic risk-taking among children and adults. Academic risk-taking is defined as the selection of school-related tasks that vary in difficulty and probability of success (Clifford, et al., 1989; Clifford & Chou, 1991; Clifford, et al., 1990; Ramos & Lambating, 1996b). The concept of academic risk-taking encompasses a complex process involving the willingness of a student to pursue a course

of academic action with an uncertain outcome. These activities may include answering questions in which the student is uncertain of the answer, asking questions in the classroom, speaking up in class to request the teacher further clarify the subject matter, undertaking a course of study in which the student is not sure of their success or failure, engaging in class discussions, and response style on multiple-choice format assessments (Ben-Shakhar & Sinai, 1991; Clifford & Chou, 1991; Clifford, et al., 1989; Clifford et al., 1990; Horgan, 1995; Jones & Gerig, 1994; Orenstein, 1994; Ramos & Lambating, 1996b; Rop, 1998; Streitmatter, 1997). The ability to take academic risks is a critical component of maximizing academic achievement. Risk-taking tasks facilitate learning and appear to elicit increased effort expenditure (Clifford, 1991; Clifford & Chou, 1991), as well as, encourage strategy development and implementation (Clifford, 1984; Elliott & Dweck, 1988). Pupils that are hesitant to initiate academic risk-taking are hindering their chances of future success. Students who are active participants in their own education tend to be higher achievers (Clifford & Chou, 1991; Clifford et al., 1990; Hardiman, Drew, & Egan, 1996; Horgan, 1995; Ramos & Lambating, 1996a; Jones & Gerig, 1994; Orenstein, 1994; Streitmatter, 1997; Urban, et al, 1998).

Efforts to increase students' academic risk-taking tendencies may greatly increase the quality and quantity of learning. Many students, particularly students comprising special populations, are failing to achieve due to a limited understanding of academic risk-taking and how to learn from failure (Clifford, 1984; Hardiman, et al., 1996; Horgan, 1995; Orenstein, 1994; Silverman, 1993).

Theoretical Framework

Two evolving theories provided the theoretical framework for this study. These two theories are Clifford's (1984) Theory of Constructive Failure and Bandura's (1977a) Theory of Self-Efficacy.

The Theory of Constructive Failure (Clifford, 1984) postulates that moderate risk-taking is positively correlated with constructive responses to failure. This theory predicts that failure outcomes on moderately difficult tasks will produce relatively constructive responses (e.g., error correction, change in problem-solving strategy, help seeking). It predicts that individuals who have a high tolerance for failure will be more likely to expose themselves to challenge or risks. Empirical evidence supportive of this relationship has been reported (Kim & Clifford, 1988).

Bandura (1977a) proposed that moderate risk-taking fosters self-efficacy which is defined as an individual's belief in how well he or she can successfully enact behavior required to accomplish some task. Self-efficacy is believed to affect initiation, energy expenditure, persistence, and choice of activities and settings. Individuals with high levels of self-efficacy use their attention and effort to meet the demands of situations and overcome ensuing obstacles, whereas those with lower levels of self-efficacy may fail to successfully transform their knowledge into action. Self-efficacy research has extended to the study of academic achievement and has suggested that self-efficacy influences risk-taking behaviors of both men and women (Bandura, 1977a). Specifically, research has indicated that self-efficacy beliefs are generally predictive of a range of classroom behaviors concerning academic achievement (Bandura, 1977a; O'Brien, Martinez-Pons, & Kopala, 1999; Pajares, 1996; Schunk, 1981; Zimmerman, Bandura, & Martinez-Pons,

1992). Levels of academic self-efficacy have been found to affect individuals' performance in math, science, and English classes (Canary & Hause, 1993; Lopez & Lent, 1992; O'Brien, 1996; Pajares, 1996; Randhawa, Beamer, & Lundberg, 1993; O'Brien, et al., 1999). Although evidence is beginning to emerge to support some conjectures regarding risk-taking and self-efficacy, little work has been reported that examines hypothesized effects in the context of academic risk-taking and academic self-efficacy.

Experimental research has identified a few factors that encourage relatively moderate academic risk-taking in certain situations. Factors identified thus far that most consistently encourage relatively moderate risk-taking include: the familiarity of the setting and task (Hargreaves & Davies, 1996), the use of variable payoff and feedback (Clifford, et al., 1989; Maneesri, 1990), and a game contest over testing context for the task (Lan, 1990). Future use (Maneesri, 1990) and a multi-level competence criterion (Lan, 1990) appear to have positive, but less powerful effects.

A scrutiny of the academic risk-taking studies reveals that most of the research has been conducted on college students or elementary school aged children (Chou, 1992; Clifford, 1988; Clifford & Chou, 1991; Clifford, et al., 1989; Clifford, et al., 1990; Fick, 1994; Ginsburg & Miller, 1982; Lan, 1992; Maneesri, 1990; Mao, 1991; Ramos & Lambating, 1996b). Academic risk-taking behavior of adolescents is seriously under represented in the research (Verma & Sharma, 1990).

Gender Differences and Academic Risk-Taking

National reform efforts have focused on increased awareness of gender inequality as a critical pedagogical strategy. Many of the educational changes initiated by gender

specific research findings have been successful at raising girls' achievement and narrowing the unequal academic achievement pattern that, though narrowing, continues to exist between boys and girls. An unequal mathematical and science based achievement pattern continues to develop between male and female students, particularly during the adolescent years (AAUW, 1998; Betz & Hackett, 1983; Boaler, 1997; Horgan, 1995; James, Chavez, Beauvais, Edwards, & Oetting, 1995; Marsh, et al., 1988; MittelbergLilach Lev-Ari, 1999; O'Brien, 1996; O'Brien, et al., 1999; Ramos & Lambating, 1996b; Randhawa, et al., 1993; Rop, 1998; Shibley-Hyde, et al., 1990; Skelton, 1998; Streitmatter, 1997). Differences in the academic achievement of male and female students appear as early as age nine, and often persist throughout an individual's educational career (Rop, 1998). Surveys by the National Science Foundation (1990) revealed that women earned only about thirty-four percent of the doctorates in biological sciences, twenty-one percent in chemistry, seventeen percent in earth sciences, seventeen percent in mathematics, and nine percent in engineering (Rop, 1998).

The reliance of educators on standardized tests is hypothesized to be another deteriant to female educational achievement (Ben-Shakhar & Sinai, 1991; Boaler, 1997; Ramos & Lambating, 1996a). Standardized testing can have a profound effect on the opportunities students will be afforded during their educational careers. Scores on tests such as the Scholastic Apptitude Test (SAT) and the Graduate Record Exams (GRE) can aid or prevent an individual's entrance into desired colleges and universities. Academic risk-taking involves the willingness of a student to take a chance in answering a question they are not certain of. Standardized tests employing a correction-for-guessing formula

are biased against those individuals who are not deemed high risk takers and this affects certain groups more than others.

Some studies attempting to investigate this persistent educational and career achievement gap have indicated that one explanation involves greater academic risk-taking desirabilities in boys than girls (Canary & Hause, 1993; Chou, 1992; Clifford, 1988; Clifford, et al., 1990; Fick, 1994; Rop, 1998; Streitmatter, 1997). These studies however fail to sufficiently explain the reasons behind their findings. Fick (1994) hypothesized that a possible explanation for the difference in academic risk-taking between genders is that the cognitive processing involving perceived self-efficacy for males and females is dissimilar. Fick's (1994) research findings supported the literature stating that males are more effected by external cues, while females are more effected by internal or self generated cues. On going research has continued to support male reliance on external cues and the female reliance on internal cues. (Leondari, et al., 1998; Marsh, Walker, Debus, 1991). Research has also examined the stereotypical belief that males perceive themselves as more skilled at mathematical tasks, while females view themselves as more skilled at verbal tasks (Daubman & Sigall, 1997; Marsh, et al., 1991; O'Brien, 1996; O'Brien, et al., 1999; Pajares, 1996; Rop, 1998; Shibley-Hyde, et al., 1990). Jack and Dill (1992) targetted their research toward further understanding of gender specific cognitive schemas and the need to create and maintain safe perceptions of one's environment.

Jack and Dill's study (1992) indicated that gender inequality is structured in thought to affect everyday interactions. A study by Hargreaves and Davies (1996) indicated that gender differences exist in the perception of functional and structural

concepts of a safe environment. These perceptual concepts affected day to day behavioral interactions. Further studies (Shibley-Hyde, et al., 1990) have continued to investigate the differing gender perceived categories of thought that guide behavior. Other researchers examined the role gender plays in teacher-student classroom interaction (Irvine, 1986; James, et al., 1995; Leinhardt, Seewald, & Engel, 1979; MittelbergLilach Lev-Ari, 1999; Orenstein, 1994; Schunk & Lily, 1984; Tobin & Garnett, 1987).

These studies consistently indicate an obscurity of female students and a dominance of male students in teacher-student classroom interactions. Kronsberg, Schmaling, and Fagot (1985) investigated the role parenting plays to possibly explain the gender differences commonly seen in risk-taking behaviors. However, no published studies examine the role academic risk-taking plays in the complex issue of setting female students up for obscurity and male students up for dominance in classroom interactions. Very little research has been conducted that investigates gender specific motivational cognitive mechanisms and perceived self-efficacy which facilitate the development of academic risk-taking desirability. There continues to be a lack of attention to the development and elaboration of these theories as they pertain to academic risk-taking. Further scientific attention to basic psychological and cognitive processes associated with academic risk-taking across genders is warranted (Clifford & Chou, 1991; Clifford et al., 1990; Fick, 1994).

Self-Efficacy and Academic Risk-Taking

Self-efficacy influences several aspects of behavior that are important to learning. Among these are choice of activities, effort, persistence, learning, and achievement

(Bandura, 1977a; Bandura, 1977b; O'Brien, 1996; Schunk, 1981; Zimmerman, et al., 1992). The Self-Efficacy Theory suggests that a person's self-efficacy expectation concerning the ability to successfully perform a given task is a reliable predictor of whether the person will attempt the task, how much effort he or she will spend, and how much the person will persevere in pursuing the task in the face of unforeseen difficulties (Bandura, 1977a). A successful completion performance of the chosen task is hypothesized to reinforce positive self-efficacy development (Bandura, 1986). Self-efficacy is measured by asking subjects to judge their capability of succeeding at specific tasks within the domain or subdomain being tested (Marsh, et al., 1991). A bounty of literature investigates the impact of mathematical self-efficacy on academic achievement. The impact of verbal self-efficacy on academic achievement is found to a much lesser degree in the literature. Consistent findings in studies involving mathematical tasks are that girls, because of their significantly lower perceptions of mathematics self-efficacy, are at a far greater risk for academic underachievement than boys (O'Brien, 1996; O'Brien, et al.,1999; Randhawa, et al., 1993).

Although perceived self-efficacy has been shown in research (Bandura, 1977a; Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980; Bandura, Reese, & Adams, 1982; Jinks & Morgan, 1999; Lent, Brown, & Gore, 1997) to be an important self-referent factor that influences the interrelationship between knowledge and performance, no literature is available relating the self-efficacy construct to academic risk-taking. A need exists for research in this area so that educators will be better prepared to meet the needs of underachieving students. Jinks and Morgan (1999) stated that individual self-efficacy beliefs may be strengthened through influential self

related information relating to successful task performances and once established enhanced self-efficacy generalizes to other situations. It is a reasonable hypothesis that academic risk-taking desirabilities in students may be strengthened by further investigating differences in student academic risk-taking desirabilities as a function of academic self-efficacy beliefs and gender.

In summary, moderate risk-taking serves as a major component of human motivation. Motivation theorists contend that moderate risk-taking helps ensure satisfaction and enjoyment, provides maximum information about competence, increases intrinsic motivation, enhances cognitive development, and promotes constructive responses to failure. Understanding risk-taking and its relationship to academic achievement is important for the role it may play in diminishing the persistent educational achievement gap that continues to exist between genders. Self-efficacy has been shown to be linked to both risk-taking and academic achievement. Gender differences in risk-taking desirabilities and academic self-efficacy have also been noted in the literature. However, to date, academic risk-taking research is lacking in its relationship to perceived self-efficacy and gender (Clifford, 1984; Fick, 1994). Continued research is needed to further investigate differences in risk-taking desirabilities initiated by gender and self-efficacy characteristics.

Statement of the Problem

Schools are making progress toward equitable treatment of boys and girls concerning school policies, curriculum design practices, teaching strategies, questioning policies, classroom design, test construction, and numerous other segments of educational instruction. Unfortunately, concerns regarding equitable student

achievement across genders still remain. To ensure equal opportunities for all students to maximize their academic potential, and achieve educationally, further research is needed concerning academic achievement and gender differences. The importance of understanding the relationship between a student's academic achievement and gender lies in the effects that it could have on the student's future.

Risk-taking has been linked to academic achievement (Chou, 1992; Clifford, 1984, Clifford & Chou, 1991; Clifford et al., 1989; Horgan, 1995; Orenstein, 1994; Ramos & Lambating, 1996b; Streitmatter, 1997). Early research on academic risk-taking has demonstrated that students have relatively little tolerance for error-making or failure on academic tasks. Among the variables most clearly identified as determinants of academic risk-taking are variable versus fixed payoffs, game versus test context, feedback versus no feedback, task familiarity, and goal orientation. Although these variables relevant to risk-taking in educational settings have been examined, there is need of more information on this topic. A limiting factor in the research is that the majority of academic risk-taking studies have been conducted on college and elementary school students.

The persistent achievement gap that currently exists between boys and girls, despite numerous educational reforms, is explained by some studies as the possession of greater academic risk-taking desirability for boys than girls. These studies however fail to offer sufficient explanitory answers behind their descriptive findings.

Bandura's (1977a) Self-Efficacy Theory proposes that moderate risk-taking fosters self-efficacy which is defined as an individual's belief of how well he or she can successfully enact behavior required to accomplish some task. Bandura (1977a)

contends that efficacy is best strengthened by performing challenging tasks. Self-efficacy research has been extended to the study of academic achievement and has suggested that self-efficacy influences classroom behaviors concerning academic achievement (Bandura, 1977a; O'Brien, 1996; O'Brien, et al., 1999; Schunk, 1981, 1984, 1985, 1989; Zimmerman, et al., 1992). The Self-Efficacy Theory suggests that a person's self-efficacy expectation concerning the ability to successfully perform a given task is a reliable predictor of whether the person will attempt the task, how much effort he or she will spend, and how much the person will persevere in pursuing the task in the face of unforeseen difficulties (Bandura, 1977a). The literature indicates that self-efficacy is gender related with boys usually reporting higher math self-efficacy, while girls usually report higher verbal self-efficacy (Canary & Hause, 1993; Randhawa, et al., 1993).

The link between risk-taking and academic achievement has been documented in various studies (Clifford, et al., 1989; Clifford & Chou, 1991; Clifford, et al., 1990; Jones & Gerig, 1994; Orenstein, 1994; Streitmatter, 1997). The link between self-efficacy and academic achievement have been investigated in numerous other studies (Bandura, 1977a; O'Brien, 1996; Schunk, 1981, 1984; Zimmerman, et al., 1992). The link between gender differences and academic risk-taking have been noted in still other studies (Chou, 1992; Clifford, 1988; Clifford et. al., 1990; Fick, 1994). However, currently there exists almost nothing in the literature that investigates risk-taking as it relates to learning (i.e., academic risk-taking), academic self-efficacy, and gender in relationship to academic achievement in one study.

Purpose of the Study

The purpose of this study is to extend the research exploration of determinants of academic risk-taking on adolescent seventh, eighth, and ninth grade students. Research has shown that academic risk-taking impacts academic achievement, as does self-efficacy beliefs. Research has indicated that both risk-taking desirabilities and self-efficacy are gender related. Yet, very little exists in the literature that brings all three of these constructs together for investigation. The findings are intended to explore the possible relationship among academic self-efficacy and gender on academic risk-taking for adolescent students. The findings are intended to have both theoretical and practical implications and serve as a basis for further delineating principles of academic risk-taking. Academic risk-taking research results involving self-efficacy beliefs may provide the means to help strengthen efficacy expectations, facilitate educational achievement and increase student academic risk-taking desirabilities.

Research Question

The specific research question investigated was, "What are the effects of gender and academic self-efficacy on academic risk-taking for adolescent students?"

CHAPTER II

REVIEW OF RELEVANT LITERATURE

The purpose of this study is to explore the relationship among academic self-efficacy and gender on academic risk-taking for adolescent students in seventh, eighth, and ninth grade (ages twelve to fifteen). The review of the literature begins with a focus on gender differences and education as it relates to academic achievement. Following is a review of theories of risk-taking developed from empirical research findings that are relevant for understanding the fundamentals of academic risk-taking. Academic risk-taking and how it relates to academic achievement is addressed, as is self-efficacy research and its relationship to learning. The following sections will specifically address: (1) theories of gender differences in education, (2) theories of risk-taking, (3) oppositional theories of risk taking, (4) academic risk-taking research, (5) academic risk-taking and gender research, (6) self-efficacy related research, (7) academic self-efficacy and gender research, and (8) academic self-efficacy and academic risk-taking research. The chapter concludes with a summary of the presented literature.

Gender Differences In Education

Since the early 1970's research on gender and education has become increasingly popular among academics, undergraduates and postgraduate students, practicing teachers, administrators, and counselors. Educational research related to gender issues has been in response to the escalating concern regarding the failure of many female students to reach

their full potential during their educational careers (AAUWEF,1998; Jones & Gerig, 1994; Marsh et al., 1988: Spender, 1980; Streitmattter, 1997). In their pioneering review of the literature on sex differences, Maccoby and Jacklin (1974) concluded that there was a gender difference favoring girls in verbal ability, and there were differences favoring boys in quantitative and spacial abilities. These implications of sex differences in cognitive abilities made by Maccoby and Jacklin continue to be widely studied and researched. A well-developed body of empirical evidence indicates that the reasons for female underachievement in school may be many and complex. In response to this continuous research, that has provided continuous educational reforms, gender differences in academic achievements has declined precipitously over the years. However, the assumption that equal access to education is sufficient to ensure quality between the sexes continues to be challenged by evidence that yet more reforms are needed to continue to reshape the unequal balance accorded the two genders in educational settings (Anderson, 1998). The important exception to diminishing gender differences in education is the upper levels of performance on high school mathematics, and the continuing low enrollment of women in math and science post secondary degree programs (AAUWEF, 1998; Boaler, 1997; Feingold, 1988; Marsh et al., 1988; Orenstein, 1994).

Much of the literature in the field of gender differences continues to support the claim that males perform better than females in mathematics (Boaler, 1997; Ramos & Lambating, 1996b) and science (Anderson, 1998; Tobin & Garnett, 1987). Some of the factors that have been found to be closely correlated with this difference are (a) innate differences in mathematics ability between males and females (Burton, 1986; Feingold, 1988; Marsh et al., 1988), (b) differential coursework and the number of mathematics

courses one has taken (Boaler, 1997, Feingold, 1988; Verma & Sharma, 1990), (c) the role played by parents, teachers, and peers (Anderson, 1998; Boaler, 1997, Feingold, 1988; Jones & Wheatley, 1990; Streitmatter, 1997), (d) a student's attribution of success and failure in these domains (Boaler, 1997; Ramos & Lambating, 1996b; Spratt, Sherman, & Gilroy, 1998), (e) higher levels of confidence in males (Jones & Wheatley, 1990; Ramos & Lambating, 1996b), (f) individualized learning behavior and learning styles (Boaler, 1997; Ramos & Lambating, 1996a), (g) differentiated application of knowledge abilities (Anderson, 1998; Tobin & Garnett, 1987), (h) childhood training and experience (Feingold, 1988), and (i) gender differences in classroom interactions between teachers and their students (Jones &Wheatley, 1990; Orenstein, 1994; Streitmatter, 1997). Within this extremely complicated aspect of human development, the variable of risk-taking is another variable that has been shown to be related to gender differences in the mathematics and science fields (Ramos & Lambating, 1996a; Streitmatter, 1997; Verma & Sharma, 1990).

Theories of Risk-Taking

A common dictionary definition of risk is, a chance of possible loss, (Webster's Student Dictionary, 1999, pg. 398). However, researchers investigating the risk concept perfer the more detailed definition that describes risk as a multidimensional, inherently subjective construct (Trimpop, 1994; Verma & Sharma, 1990; Yates & Stone, 1992). Moderate risk-taking (i.e., selection of tasks with .5 probability of success) is expected to maximize satisfaction (Atkinson, 1957), enhance self-efficacy (Bandura, 1977a), provide valued competence information (Kuhl, 1978; Trope, 1975), and elicit constructive responses to error-making and failure (Clifford, 1991). Substantial risk-taking research has focused on the behavioral, cognitive, affective, and perceptual patterns of individuals in relation to

physical sensation (Apter, 1992; Singleton & Hovden, 1987), games and lotteries (Kass, 1964; Lopes, 1994; Slovic, 1966; Wärneryd, 1996), accidents (Singleton & Hovden, 1987), investments (Krahnen, Riech, & Theissen, 1997), and health and safety concerns (Greenberg & Schneider, 1995; Hargreaves & Davies, 1996). The motivational and emotional aspects of psychological risk have largely been ignored (Singleton & Hovden, 1987). The empirical evidence that does exist concerning psychological risk strongly supports a conclusion that risk-taking varies across populations and situations due to individual differences in risk-taking desirabilities and attitudes (Ginsberg & Miller, 1982; Hale, 1987; Kopfstein, 1973; Slovic, 1966; Trimpop, 1994; Wärneryd, 1996; Yates & Stone, 1992). Cognitive based risk-taking literature consists of theories developed from researching choice among achievement tasks (Atkinson, 1957; Trope, 1975; Weiner & Kukla, 1970).

Achievement Motivation Theory (Atkinson, 1957) was developed from early theories that suggested that cognitively manifested goals direct behavior (Tolman, 1955; Lewin, 1951). This early research emphasized the cognitive development of expectancies through information processing, and the control of behavior by those expectancies, and the individualized interpretations of situational causes and effects (Petri, 1996). Achievement Theory assumes that the tendency to engage in a particular activity is related to the strength of an expectation (belief) that the behavior will lead to a particular consequence. Subsequent revisions of The Achievement Theory had theoriests focusing on how individuals process information relating to their perception of cause and effect, and the value of that consequence to better understand individual behavior (Crandall, Katkovsky, & Crandall, 1965; Crandall, Katkovsky, & Preston, 1962).

An extension of Atkinson's Theory of Achievement Motivation, The Attributional Approach Theory (Weiner & Kukla 1970) suggests that the intensity of affective reactions depends on the probabilities of the outcomes. According to The Attributional Approach Theory affective reactions to achievement behavior are extremely important, and are determined by the inferences made about the causes of outcomes. The affective reactions are more intense when attributed to internal causes (ability and effort) rather than to external causes (difficulty and luck). Studies (Harter, 1974; Trope & Brickman, 1975) indicate that the greatest gratification is derived from the solution of the most challenging problems, whereas easily solved problems provide relatively little pleasure. People are primarily oriented toward maximizing the amount of information about their ability (Strube, Lott, Lê-Xuâ-Hy, Oxenburg & Deichmann, 1986; Trope & Brickman, 1975). This subjective sense of mastery requires further attention by researchers (Harter, 1974).

Theorists have attempted to frame the question of motivation in terms of self-conceptions (Leondar, Syngollitou, & Kiosseoglou, 1998). These theorists represent an attempt to link self-concept to behavior. Possible selves are regarded as the interface between motivation and the self-concept. Possible selves are thought to influence the motivation process in two ways: by providing a clear goal to strive for, and by energizing an individual to pursue the actions necessary for attaining that goal (Leondari, et al., 1998). Further research investigating motivation factors behind the acquisition of self-knowledge conclude that people are highly motivated to acquire social feedback that confirms their self-conceptions (Strube, et al., 1986). Both males and females prefer self-confirmatory feedback. The data suggests that people's preference for self-confirmatory feedback may generate an entire family of processes through which they verify and sustain their images of

themselves. Researchers often find that girls outperformed boys in academic achievement and task persistence. However, girls are significantly different from boys in perceiving themselves as possessing a negative possible self. Although the girls outperform the boys they still suffer from substantially lower self-esteem (Leondari, et al., 1998; Streitmatter, 1997).

Oppositional Theories of Risk-Taking

In this section, two conceptual interpretations of risk-taking regarding performance outcomes within the framework of the Theory of Achievement Motivation (Atkinson, 1957) and Attribution Theory (Weiner & Kukla, 1970) are presented. The two adverse interpretations to be discussed are the self-enhancement view and the self-assessment view. According to both the self-assessment and self-enhancement viewpoints, individuals have a keen awareness of the dignostic implications of task performance (Strube, et al., 1986).

Self-enhancement goals imply interest in strengthening and protecting self-esteem (Synder, Stephan, & Rosenfield, 1976; Trope 1975, 1982). Self-enhancement interpretations of attribution phenomena further suggest that attributions for internal and external causes are biased so as to enhance pride through a positive value, reflecting the intensity of experienced pride, whereas failure has a negative value, reflecting the intensity of experienced shame (Trope, 1975). Empirical evidence indicates that individual differences in personal standards of excellence affects a person's preference function for attempting achievement related tasks (Kuhl, 1978). This self-enhancement view postulates that in choice behavior an individual's goal is to maximizie pride or minimize shame (Trope, 1979). Students focusing primarily on self-enhancement goals and error avoidance select academic risk-taking items that they *know they know* (Strube et. al., 1986; Clifford, et al., 1990). A task will be attractive if it can

demonstrate one's high ability, but it will be avoided if it may betray one's low ability (Trope, 1982).

The self-assessment view is a fundamentally different conception of the value of performance outcome. This theory stresses an individual's goal involving the acquisition of information concerning their abilities. According to this theory people strive to attain a realistic assessment of their weaknesses and strengths in order to be better able to predict and effectively cope with their environment (Elliott & Dweck, 1988; Trope, 1975). The self-assessment view claims that all outcomes can have positive value insofar as their occurrence satisfies their goal of reducing one's uncertainty about their ability level (Trope, 1982). The higher the diagnosticity of an outcome, whether success or failure, the higher the attractiveness of the task (Trope, 1982). Success-oriented persons are presumed to be more interested than failure-threatened persons in obtaining information about their own ability (Sorrentino, et al., 1984). Do women feel more failure-threatened and if so why? Some psychologists contend that a major reason for an individual's preference for moderately difficult tasks is the personal, skill-related information such tasks provide (Clifford, 1988). Individuals who focus on self-assessment goals are expected to take moderate risks (Clifford, et. al., 1990). The literature suggests that the motive to evaluate abilities accurately is a powerful one (Stube et al., 1986)

From this motivation research cognitive theorists have developed the view that risk-taking is a special kind of decision problem (Singleton & Hovden, 1987; Jamieson, 1969; Kass, 1964; Kopfstein, 1973; Slovic, 1966; Trimpop, 1994; Yates & Stone, 1992). Individuals are viewed as a decisionmaker seeking to maximize the subjective expected value of performance outcomes. Since the cognitive revolution, cognitive theorists have

seen people as systems for encoding and processing information (Lopes, 1994). Decisionmakers have been shown to use subconscious routines to cope with the complexity inherent in most decisions (Hammond, et al., 1998). Existing literature within cognitive theorists indicates that risk-taking behavior is strongly influenced by an individual's intrinsic pursuit of a desired outcome or goal (Elliott & Dweck, 1988; Kuhl, 1978; Trimpop, 1994). These outcomes can involve positive or negative physical, mental, and/or social consequences (Hale, 1987). A second influencing factor on risk-taking is the extent to which the risk-taking outcome promises to reduce uncertainty about one's ability level (Trope, 1982). Another factor shown by cognitive researchers to strongly influence risk-taking behavior is an individual's level of dependent behaviors (Jamieson, 1969). One of these dependent behaviors investigated by researchers is the development and assessments of cognitive strategies (Anderson & Jennings, 1980).

The fact that cognitive models failed to fully explain decision-making behavior led to the development of risk-taking theories emphasizing individual differences and situational variables. Researchers investigating risk-taking began to examine how perceived risks are combined with perceived benefits into an overall evaluation of decision alternatives (Singleton & Hovden, 1987). A belief developed through continued research stating that the extent to which risk will be emphasized by individuals is dependent upon the benefits that the individual perceives.

Theories of Academic Risk-Taking

Evidence of risk-taking tendencies on school-related tasks is much more scarce than that related to social or game-like tasks (Clifford, 1988, Clifford, et al., 1989; Clifford, et al., 1990). Games, betting tasks, puzzles, chance events, hypothetical situations, and physical

skill activities have been, and continue to be the preferred tasks among risk-taking researchers (Clifford, 1991; Clifford & Chou, 1991; Clifford, et al., 1990; Wärneryd, 1996). There is little empirical evidence that is directly relevant to intellectual risk-taking. Thus, theories which specifically address risk-taking and the role it plays regarding academic achievement is severely underrepresented in the literature. However, Clifford (1991) states, "...if most economic and social behavior can be explained by risk-taking models, why shouldn't learning, a social process by which knowledge and skills, are acquired, be explained by such models?" (pg. 266). Academic risk-taking is defined as student selection of school achievement tasks that vary in probability of success and are accompanied by feedback or the expectation of feedback (Clifford, 1991). Academic risk-taking exposes individuals to the possibility of failure, criticism, and embarrassment (Daubman & Sigall, 1997). Pursuing a challenging and rigorous academic program is a venture fraught with risks. There is more opportunity for failure with high level math, technology, and science courses. Levels of academic risk-taking are assessed by evaluating the task difficulty of a school-like task and response accuracy (Clifford & Chou, 1991).

Findings of risk-taking research designed to understand risk-taking in general are relevant for understanding fundamentals of academic risk-taking. Information about academic risk-taking can be partially extracted from research on risk-taking and task-choice studies, characteristic of achievement motivation theory (Clifford, et al, 1989). Cognitive based risk-taking literature consists of theories developed from researching choice among achievement tasks (Atkinson, 1957; Trope, 1975; Weiner & Kukla, 1970).

The Theory of Constructive Failure (Clifford, 1984) predicts that optimum challenge elicits constructive responses to error making and failure. Failure, defined as performance

below goal level (Clifford, 1984). Kim and Clifford (1988) showed support for this prediction when failure at a practice-teaching task of moderate difficulty yielded significantly greater expectations for advice seeking, practice, and persistence than did failure at an easy practice-teaching task. Kim and Clifford explained the appearance of positive responses to failure at moderately difficult tasks by a strategy orientation evoked by such tasks rather than attributing student performance to effort. This belief in moderately difficult tasks eliciting strategy attributions springs from earlier research. Clifford (1984) showed evidence that strategy attributions for failure produce expectations for subsequent success that are as high or higher than expectations elicited from subjects experiencing success only. Clifford (1986a) strengthened the evidence with foundings that numerous benefits were to be gained when students relied on a strategy orientation. Her study revealed that strategy attributions are more likely to evoke a reevaluation of the used strategy, a reexamination of the task, a search for a new strategy, a renewed attempt to meet the challenge, and a comparison and evaluation of the two or more strategies tested. Task engagement and self-directed performance evaluation also enhanced task-relevant knowledge, metacognition, and skill development (Lan, 1990).

That strategy attributions for failure do in fact produce constructive responses is empiracally strengthened in a series of studies conducted with students, teachers, and Navy recruits who were asked to judge and predict the behavior of students or peers who appeared to fail (Clifford, 1986b; Clifford, Kim, & McDonald, 1988; Kim & Clifford, 1988; Trope, 1982).

The literature reveals studies indicating evidence of low and gradually declining failure tolerance and academic risk-taking among grade school students (Clifford, 1988).

Risk avoidance tendencies become more pronounced with each grade level, especially when fixed payoffs were provided (Clifford, 1991). Other findings indicate that the use of variable payoffs appears to eliminate the developmental decrease observed with fixed payoffs (the scoring system common in schools), external constraints (teacher evaluation) reduce academic risk-taking, academic risk-taking is higher on unfamiliar tasks, and failure tolerance decreases with grade (Clifford, et al., 1990).

Theories Relating to Academic Risk-Taking and Gender

A deeper understanding of academic risk-taking is needed to validate and reinforce the female version of experiences to better equip girls for lifelong learning and achievement. Academic risk-taking has an affective, as well as, a cognitive substructure and neither area has been comprehensively researched. The motivational and emotional, or affective, components of academic risk-taking have been largely ingnored, and little research has been directed at an analysis of the intuitive feelings of risk and their function in human decision-making (Trimpop, 1994).

Researchers investigating risk-taking behavior across genders differ in their findings concerning the cultural stereotype that males take more risks than females. Arenson (1978) found no gender differences among his fifty-seven boys and fifty-five girls, ages five to thirteen, in his probability preference study. The children were divided into three age groups, five to seven years, eight and nine years, and ten to thirteen years. An analysis of variance by the method of unweighted means was performed on the transformed percentages for the last thirty trials for each board game probability. There were no significant effects of sex for any probability. Apter (1992) in his study involving survey questionnaires distributed to 4,000 men and women across the United States found minimal risk-taking gender

differences. His study's implication was that if male and female are different in their excitement seeking desirabilities, that difference is not in terms of how long they spend in an excitement seeking state, but in terms of the specific things they do to raise or lower their excitement seeking arousal levels.

Studies investigating gender differences in academic risk-taking also indicate inconsistent findings. The effects of gender on academic risk-taking have been examined in less than ten published studies (Clifford, 1991; Clifford, et al., 1989; Fick, 1994; Lan, 1990; Maneesri, 1990; Mao, 1991, Verma & Sharma, 1990). Clifford, a prominent researcher in the area of academic risk-taking found inconsistent results concerning academic risk-taking and gender differences. A 1989 study (Clifford, et al.) involving one hundred twenty-one 3rd-, 4th-, and 5th-grade American students (sixty-two boys and fifty-nine girls) and two hundred 4th and 5th-grade Chinese students (eighty-four boys and one hundred sixteen girls) showed no gender differences for both American and Chinese students. In this study the American subjects were administered the Academic Risk-Taking (ART) measure and the School Failure Tolerance (SFT) scale. The Chinese students were administered the School Failure Tolerance (SFT) scale and the Cognitive Skills-Risk (CS-Risk) measure. Data from these two studied populations offer support for the belief that academic risk-taking varies little with gender.

Analysis of a set of data from nearly 2,000 third through sixth graders showed small, but highly consistent, gender differences: Girls appeared to take lower academic risks at all four grade levels, and on all three ART subtasks (Clifford, Chou, Mao, Lan, & Kuo, 1990).

Early academic risk-taking studies suggest that sex differences in academic risk-taking are relatively trivial in magnitude (Clifford, 1988; Clifford & Chou, 1991; Clifford, et

al., 1989). One explanation for the absence of gender findings in earlier studies may be the fact that earlier studies were primarily observational in nature, and did not include the manipulation of factors intended to increase academic risk-taking (Fick, 1994).

Verma and Sharma (1990) found in their study of two hundred adolescents that academic streams did not appear to contribute towards differences in risk-taking behavior. However, sex and academic streams jointly did appear to affect risk-taking of adolescents in a significant way. Three conclusions were drawn from their study investigating academic achievement as a function of risk-taking behavior and gender: 1) male adolescents have significantly higher risk-taking tendency than female adolescents, 2) adolescents studying in arts and science streams do not differ significantly with respect to their risk-taking behavior, 3) the joint effect of sex and academic streams was found to be significant with regard to risk-taking behavior.

Some evidence is reported in the literature that offers relatively strong evidence that boys take greater academic risks as defined by both difficulty and accuracy (Chou, 1992; Clifford, et al., 1990; Fick, 1994). Research conducted to investigate gender differences in academic guessing situations (i.e., multiple-choice tests) indicates that males are greater risk-takers (Ben-Shakhar & Sinai, 1991).

Ben-Shakhar and Sinai (1991) in their study of ninth-grade boys and girls demonstrated how confidence weighting favored boys who are were more willing to take more risks than the girls. It was hypothesized that males would show greater guessing tendencies than females. Significant results among the adult subjects were found in both the verbal and mathematical subtests. This study's results further confirmed previous indications that females tend to omit more items than males on multiple-choice assessment

formats. A significant difference was found (at the .01 level) in the number of responses omitted between boys and girls, with girls omitting more responses than boys.

Wainberg and Steinberg (1992) demonstrated the multple choice format of the mathematical section of the Scholastic Aptitude Test (SAT) favored their male test-takers, because it appeared to call into play risk-taking strategies which characterized the learning behavior of more of the male subjects. These same gender specific findings were found in a study by Jones & Gerig (1994). This study addressed classroom interactions between teachers and students, as well as, students and students during classroom discussions and question/answer sessions. This academic risk-taking behavior was examined in one hundred one sixth-grade middle schoolers. The results indicated a significant difference between genders. Females significantly demonstrated to be silent students and avoid the risk of interacting in the classroom at any time.

Orenstein (1994) reported her classroom and home observation, and interview data of over one hundred fifty middle school girls in California during 1992-1993. The research focused on girls in two middle schools, a suburban school with mostly white students, and an urban school with poor and ethnic minority students. The girls in this study repeatedly displayed a reluctance to be risk-takers. Orenstein states, "They [the boys] are more risk-taking than the girls, so they'll do better on tests every time, even if the girls turn in all their work and the boys don't" (p.20). Another observation made by Orenstein during this study was that although many of the female subjects spoke of themselves in terms of grit and independence, those qualitites were rarely observed in the classroom.

The correlation between gender and mathematical performance has been investigated in various studies involving multiple choice tests and the risk-taking behavior of guessing. A study conducted by Ramos and Lambating (1996a) was designed to test two hypothesis: (1) Males are greater risk takers on mathematics tests that imply a correction-for-guessing formula, and (b) The greater propensity for taking risks an individual displays is significantly related to their performance on the SAT-M.

Subjects in this study were administered a risk-taking test. The instructions called for no guessing (a one third point penalty was assessed for any questions that was answered incorrectly). Omitted questions were not assessed this penalty. The time limit for the test was fifteen minutes and it consisted of twenty-three questions each having four choices (A, B, C, and D).

As predicted, males manifested greater risk-taking behaviors on the mathematics test in which risk-taking played a role. Furthermore, gender and risk-taking behavior were shown to be related to performance on the SAT-M. The relationship between the numbers of omissions and performance on the SAT-M was found to be especially true for females. The risk-taking behavior displayed by females in this study provided a stronger relationship with performance on the SAT-M than it did for males. In this study females omitted significantly more items than males. The results of this study may help explain why females perform just as well as males on the mathematics grades they receive in the classroom, but do not perform as well as boys on standardized mathematical tests that employ a correction-for-guessing formula. Females omitted more questions when instructions were consistent with those used on standardized mathematical tests which penalize for guessing. Thus, the difference that

exists between females and males in their performance on standardized mathematical tests appear to be related to differences in their risk-taking behavior.

Boaler's (1997) three year longitutinal study of one hundred sixty-three math students, age thirteen to age sixteen, in two separate schools, found that boys were much more willing to guess at an unknown answer. The majority of girls in the study were much more concerned with gaining a better understanding of the problem so that they could better understand why a particular answer should be chosen. Boys were much more willing to simply risk guessing on an unknown question.

Gender differences may be more pronounced in experimental studies constructed with a manupulation of the factors designed to increase academic risk-taking. Explanations for such inconsistencies may only be advanced by research that focuses on situational, cultural, and personality variables thought to mediate the presence and absence of sex differences (Chou, 1992; Clifford et al., 1990; Fick, 1994).

The motivational and emotional components of risk have been largely ignored and little research has been directed at an analysis of the intuitive feelings of risk and their function in human decision-making across genders (Hargreaves & Davies, 1996; Trimpop, 1994). Various researchers studying risk-taking from a sensation seeking perspective indicate a tendency for males to score higher on sensation seeking scales (Zuckerman, M., Brown, R.H., Fischler, G.L., Fox, G.A., Lathin, D.R. & Minisian, A.J., 1979). In the classroom this sensation seeking desirability is often perceived by teachers as a *go for it* attitude and is displayed more often by boys than girls (Barker, 1997). Irvine (1986) reports that boys have a much higher propensity toward call-outs than females. Irvine (1986) found that teachers have a much higher tolerance for male call-outs than female call-outs.

Research findings also indicate that girls are more conservative than boys in their risk-taking behavior when the former perceive the situation as ambiguous, and have to make decisions under uncertainty (Jack & Dill, 1992; Zinkhan & Karande, 1991). In the classroom this propensity toward conservative decision making often leads to the development of the use of silence to avoid risk, and to control the classroom environment (Jones & Gerig, 1994; Spratt, Sherman, & Gilroy, 1998).

Self-Efficacy Related Research

Moderate risk-taking is expected to enhance self-efficacy (Bandura, 1977a). Self-efficacy is defined as the self-perceptions of one's skills and capabilities to execute courses of action required to deal with perspective situations (Bandura, 1986; Schunk, 1981). This motivational force is not concerned with what skills individuals have, but with the judgments made by individuals concerning what they can do with they skills they believe they possess (Bandura, 1977b, 1986). Bandura (1977a) believes self-efficacy to be a major mediator of behavior and behavior change. Knowledge, transformational operations, and component skills are necessary for performance accomplishments. Self-efficacy is thought to be primarily strengthened through the experiencing of success at challenging tasks. Bandura (1977b) states:

> "To succeed at easy tasks provides no new information for altering one's sense of self-efficacy, whereas mastery of challenging tasks conveys salient evidence of enhanced competence. Individuals who experience periodic failures but continue to improve overtime are more apt to raise their perceived efficacy than those who succeed but see their performance leveling off." (p.201)

The Self-Efficacy Theory (Bandura, 1977a) states that efficacy expectations determine how much effort people will expend, and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy, the more active the efforts. People fear and tend to avoid threatening situations they believe exceed their coping skills, whereas they get involved in activities and behave assuredly when they judge themselves capable of handling situations that would otherwise be intimidating. "The experience of finding and managing optimal challenges satisfies people's intrinsic need to be competent and self-determining" (Deci & Porac, 1978, p.151). Theoretically, peoples' self-efficacy beliefs are expected to vary depending on the particular activity domain or situation under consideration. The development of feelings of competence and positive self-efficacy are derived from past and present success or failure experiences with an activity. Knowledge about one's self-efficacy is based on four principal sources of information: (a) performance accomplishments, (b) vicarious experiences, (c) verbal persuasion, and (d) emotional arousal (Bandura, 1977b). Performance accomplishments are based on individuals' personal experiences of success or failure at given tasks. Vicarious experiences enable people to raise or lower self-efficacy expectations based on their observing others who are able to master comparable activities.

Verbal persuasion is used to talk people into believing that they possess the capabilities they need to succeed at given tasks. Individuals also read their somatic arousal or physical reactions to tasks as indicators of their ability to perform efficaciously (Bandura, 1986). Performance accomplishments have been considered the most influential source of one's self-efficacy because they are based on one's ability to master experiences (Bandura, Adams, & Beyer, 1977). Vicarious experiences have been found to be somewhat effective in

increasing self- efficacy (Bandura, Adams, Hardy, & Howells, 1980; Bandura, et al., 1982). Verbal persuasion has been found to be fairly effective in increasing individuals' self-efficacy beliefs (Anderson & Jennings, 1980; Chambliss & Murray, 1979). Emotional arousal appears to be more benefical for individuals that already possess a strong self-efficacy belief, while those with weak self-efficacy have found emotional arousal to be debilitating (Barrios, 1983).

Strength of expectations ranges from weak, those easily extinguished by disconfirming experiences, to strong, those sustained despite intervening obstacles (Bandura, 1977a). The efficacy judgments found to be most functional are those that slightly exceed what individuals are ordinarily capable of doing (Bandura, 1986). People who overestimate their efficacy are at risk for suffering needless failures, whereas those who underestimate their efficacy may limit their personal potential. Individuals with strong self-efficacy expend vigorous and persistent effort, whereas those with weak self-efficacy lessen their efforts, and give up easily when faced with difficulties.

The Theory of Self-Efficacy has proven to be a prolific framework for furthering study of academic behavior. Both perceived self-efficacy and outcome expectation are critical elements in the classroom because they are learned perceptions that affect student motivation (Jinks & Morgan, 1999). Much of the available literature on academic self-efficacy beliefs has been stimulated by Hackett and Betz's (1981) assertion that these beliefs help determine educational behavior. Current literature suggests that students who believe they are capable of performing academic tasks use more cognitive and metacognitive strategies, and persist longer than those who do not; consequently leading them to greater academic achievement (Jinks & Morgan, 1999; Pintrich & DeGoot, 1990).

Two types of efficacy are commonly described in the academic achievement literature. Global self-efficacy is generalized attitudes about capabilities (Pajares, 1996). Global self-efficacy studies transform self-efficacy beliefs into a generalized personality trait rather than the context-specific judgments suggested by Bandura (Pajares, 1996). Various researchers have assessed global academic self-perceptions of competence (Jinks & Morgan, 1999; Lent, et al, 1997; Schunk, 1981; Skaalvik & Rankin, 1990). The essence of such studies is that students generate judgments about their overall academic capilities and act accordingly. Schunk (1984, 1985, 1989) found that a heightened sense of efficacy sustains task involvement, and results in greater achievement. Lower perceptions of efficacy lead to less persistence, and lower achievement (pg. 92). Bandura (1986) is particularly critical of global mesures of self-efficacy. According to Bandura an overemphasis on global measures impairs the ability to understand and predict behavior in particular situation, and does not take into account the complexity and variation of self-efficacy perceptions.

A second type of efficacy is specific self-efficacy. This type of efficacy allows for task or domain specific belief of how well a circumscribed task can be accomplished. Bandura (1986) strongly supports domain-specificity within his Theory of Self-Efficacy. Self-efficacy appears to be more informative as it relates to judgments about specific tasks, rather than as a global indicator (Pajares & Miller, 1994). Theoretically people's self-efficacy beliefs are expected to vary depending on the particular activity domain or situation under consideration. In academic settings self-efficacy research has focused primarily on two major areas: mathematics self-efficacy (Lopez & Lent, 1992; O'Brien, et al., 1999; Randhawa, et al., 1993; Schunk & Lily, 1984) and verbal self-efficacy (Canary & Hause, 1993; Hackett & Campbell, 1987; Hackett, et al., 1990; Marsh, et al., 1991; Rubin, Martin,

Bruning & Powers, 1993). Mathematical self-efficacy is the perceived capabilities in mathematical related tasks. Betz and Hackett (1983) identified three relevant domains of mathematics self-efficacy: computing math tasks used in everyday life, such as balancing a check book; evaluating one's ability in mathematics-related college course work; and solving math problems, such as those on standardized mathematical aptitude and achievement tests. Verbal self-efficacy is the perceived capabilities in language related tasks and interpersonal communication (Canary & Hause, 1993; Hackett & Campbell, 1987; Rubin, et al., 1993) Research strongly indicates that math and verbal self-efficacy are related to gender (Betz & Hackett, 1981, 1983; Hackett, 1985; Hackett, et al., 1990; Hackett & Campbell, 1987; O'Brien, et al., 1999; Randhawa, et al., 1993).

Both global and specific self-efficacy serve as a conceptual belief system where expectations of personal mastery affect both initiation and persistence of coping behavior. Self-efficacy beliefs have been shown to be instrumental in accomplishing interpersonal goals (Rubin, et al., 1993). What is of interest to educators is the existence of gender specific factors effecting perceived academic self-efficacy, whether global or specific, in regards to academic achievement and motivation. The literature suggests that self-efficacy contributes substantially to student achievement, and research is needed to develop effective methods for enhancing students' academic self-efficacy (Christie & Segrin, 1998; Lent, et al., 1997).

Academic Self-Efficacy And Gender Research

As theorists have begun to provide a detailed analysis of gender as a socially constructed, psychological variable there is some indication that males and females differ in their self-efficacy perceptions (Betz & Hackett, 1981; Hackett, 1985; O'Brien, et al., 1999; Streitmatter, 1997). Research investigating the role of academic self-efficacy and academic

achievement has indicated that males have a higher perceived specific self-efficacy in relationship to mathematics (Betz & Hackett, 1983; Hackett & Campbell, 1987; Lent, et al., 1997; O'Brien, et al., 1999; Pajaras, 1996: Randhawa, et al., 1993), while females often possess a higher perceived specific self-efficacy concerning language related tasks (Canary & Hause, 1993). Deficits in mathematics self-efficacy, that is belief in one's ability to successfully perform work in mathematics, has been determined to be a major factor contributing to the low numbers of women and minorities pursuing high level mathematics courses and careers in science and engineering.

Betz and Hackett (1981) studied the self-efficacy of one hundred thirty-four female and one hundred one male undergraduates using math and English subtest scores from the American College Test. Results indicated significant and consistent sex differences in self-efficacy with regard to mathematical versus verbal skills. Males reported significantly higher levels of self-efficacy with regard to mathematics than females. In O'Brien, et al. (1999) research on the relations among mathematics self-efficacy and gender and interests in careers in engineering or science for adolescent girls found that mathematics self-efficacy is predicted by academic performance. In this study adolescent girls showed a significantly lower mathematics self-efficacy rating than their male counterparts. Hackett and Campbell (1987) found that male college-students exhibit significantly greater self-efficacy in mathematics and science than do female college students, and that self-efficacy engenders greater interest in science and mathematics on the part of male students. Lopez and Lent (1992) concluded, following their study of college students voluntarily enrolled in advanced and nonrequired math courses, that excessive math fears may be alleviated through direct encouragement and social support from peers and adults. This study showed no gender

differences in mathematics self-efficacy. Another study indicating that there are no gender differences involved in math self-efficacy is Schunk and Lily's (1984) study of sixty students drawn from two middle schools. The results in this study revealed no sex difference in students' demonstrated skills or in their attributions for their problem-solving progress. Zimmerman, and Martinez-Pons (1990), in a study of ethnically diverse students, found that girls and boys had comparable mathematics self-efficacy. Schunk and Lily (1984) found that sixth- and eighth-grade boys had more self-efficacy than girls in judging their ability to solve math problems. No gender differences were found in students' skills or in their attributions for solving problems. Lent, Lopez, and Bieschke (1991) studied the four informational sources of efficacy (i.e., performance accomplishments, vicarious experiences, verbal persuasion, and emotional arousal) in regard to mathematics self-efficacy. Results indicated that personal performance accomplishments were the only predictors of mathematics self-efficacy to explain unique variance in self-efficacy after controlling for gender.

Gender differences are not as strong in the literature related to verbal self-efficacy as they are in the literature related to math self-efficacy. Research indicates that differences in verbal self-efficacy perceptions vary widely according to the type of verbal task (e.g., vocabulary versus analogy measures) and other moderators (Hackett, et al., 1990). Anagram related tasks have indicated a stronger verbal self-efficacy pattern for males over females (Hackett, et al., 1990), while interpersonal related tasks often indicate a stronger verbal self-efficacy pattern for females (Canary & Hause, 1993; Rubin, et al., 1993). Females have been shown to have a marked preference for verbal related tasks over math related tasks (Canary & Hause, 1993; Hackett, et al., 1990). Some researchers, due to the inconsistent findings

regarding gender and verbal self-efficacy, consider tasks involving verbal self-efficacy to be gender neutral (Hackett & Campbell, 1987).

Academic Self-Efficacy and Academic Risk-Taking Research

The concept of academic self-efficacy expectations appears to have importance for both understanding and modifying the processes of educational decision-making. Bandura (1977a) suggests in his Self-Efficacy Theory that interventions designed to change behavior are effective because and to the extent that they increase an individual's expectations of self-efficacy with respect to the problematic, e.g., previously avoided, behavior. Recent research has shown that many girls are reluctant to take risks in academic situations (AAUWEF, 1998; Boaler, 1997; Fick, 1994; Silverman, 1993; Skelton, 1998; Streitmatter, 1997). Theorists of psychosocial development strongly supports the idea that in order for persons to understand fully who they are and achieve their identity, they must experiment and take risks. No literature exists that examines academic self-efficacy in relation to academic risk-taking.

Summary

Clearly the effects of gender and self-efficacy on academic risk-taking is complex. Academic self-efficacy is a relevant factor for educational research. Pajares and Miller (1994) concluded, "researchers and school practioners should be looking to students' beliefs about their capabilities as important mediators and predictors of performance" (p. 201). Self-efficacy has also been offered as a starting place for understanding the often theoretical sex and gender differences that are noted in various achievement variables (Canary & Hause, 1993). Gender differences in academic self-efficacy expectations within certain task domains, if substantial in degree, may help explain why girls are less inclined to engage in

academic risk-taking. The exact nature of the effects of gender and self-efficacy on individual student academic risk-taking desirabilities remains unclear. Do the factors, gender and academic self-efficacy, have a significant effect on academic risk-taking? Does the level of academic ability a student possess in the given subject area effect the development of their academic self-efficacy? A clearer understanding of these effects is the purpose of this study. The lack of studies investigating academic risk-taking and adolescent studies also justifies a need for this study.

Predictions

The focus of this study is to explore possible relationships among the variables gender and academic self-efficacy (mathematical and verbal) on academic risk-taking for adolescent students displaying various levels of academic abilities (remedial, general, honors). Thus, based on Self-Efficacy Theory, Theory of Constructive Failure, and related research on gender and academic risk-taking, the major predictions to be tested are as follows:

1. There will be significant gender effects, males displaying different ability levels in mathematics and English outperforming females displaying different ability levels in mathematics and English, when examining the dependent variable, academic risk-taking as defined by difficulty.
2. There will be significant academic self-efficacy effects as measured by mathematic self-efficacy scores when examining the dependent variable academic risk-taking.
3. There will be significant academic self-efficacy effects as measured by verbal self-efficacy scores when examining the dependent variable academic risk-taking.

CHAPTER III

METHOD

The purpose of this study was to explore the effects of academic self-efficacy and gender on academic risk-taking for adolescent students. This chapter describes the subjects that were invited to participate in the study, assessment instruments used in the study, the procedure followed by the researcher, and the designs that were used for the statistical analysis of the assessment information.

Subjects

After securing appropriate approval from Oklahoma State University's Institutional Review Board for research with human subjects (Appendix A) and permission from building principals (Appendix B) students in the seventh, eighth, and ninth grade from two school districts, one in Arkansas and one in Oklahoma, were invited to participate in the study. All seventh, eighth, and ninth grade students were strongly encouraged to participate. Seventh, eighth, and ninth grade students were chosen because this is a population that has not been previously represented in academic risk-taking studies. School districts were chosen based on equal proportionality of male and female students, representation of different ethnic groupings, and various academic ability levels (remedial, general, honors). Both schools selected were suburban junior highs, however, the Oklahoma school was a small school

with a total enrollment of 598 junior high students. Eighty percent of the student body were white students, twenty percent Native American students, and at the time of testing no African American students were enrolled in the school district. The Arkansas junior high was larger with a total enrollment of 1061 students. Sixty percent of the student body were white students, thirty percent African American, eight percent Hispanics, and two percent other. Both schools had a low percentage of students classified as honor students.

Parental/Guardian consent forms (Appendix C) were signed by parents and participant assent forms (Appendix D) were signed by the participating student.

Instruments

The instruments used in this study were: (1) the Academic Risk-Taking (ART) measure (Clifford, 1988) which yielded two separate scores, one for difficulty (DIF) and one for accuracy (ACC) for each of the two subtasks of mathematics and language usage (spelling and vocabulary); (2) the Self-efficacy Scale (Sherer & Maddux, 1982) which was modified and developed into two separate scales, one that measured math self-efficacy and one that measured verbal self-efficacy; (3) a demographic survey; and (4) academic ability placement (remedial, general, honors) was scaled.

Academic Risk-Taking (ART) Measure

The ART consists of a booklet including two pages each of math computation (MATH), spelling, and vocabulary problems (VERBAL). The two primary variables derived from this achievement instrument and assumed to reflect academic risk-taking are difficulty, defined as the mean row level for selected problems, and accuracy, defined as the percentage of success achieved on selected items. High levels of success are assumed to represent low risk-taking. The problems are presented in multiple-choice format. The

items were drawn from retired forms of the Iowa Tests of Basic Skills (ITBS) (Hieronymus & Lindquist, 1971a, 1971b; Hieronymus, Lindquist, & Hoover, 1978a, 1978b, 1979a, 1979b) and Iowa Tests of Educational Development (ITED) (Feldt, Forsyth, & Lindquist, 1979, 1983). Each of the six problem pages contains eight rows of problems with four problems per row with a total of thirty-two problems per page. The problems were selected and arranged so item-difficulty increased approximately by one grade level with each successive row. Item difficulty was determined by national norms derived from a fall administration of the ITBS and ITED from which the items were selected. Problem difficulty for all items within a row was moderate. That is, approximately 45% to 55% of the norming sample solved each problem. The first row of problems on each page contains second-grade items successfully solved by about half of the norming sample. The last row contains ninth- or tenth-grade items successfully solved by about half of the norming sample. Because of these items characteristics, it can be argued that in terms of national norms, the math, vocabulary, and spelling items in a given row are reasonably comparable in difficulty. At the end of each row is a number signifying the value of a correct response for each problem in that row. The value of one is assigned to the first row on each page and the value of each successive row increases by one point over the preceding row.

The cover sheets for the ART contains a statement indicating that problems are arranged by difficulty. An explanation of the point values printed at the end of the rows is also given. In addition, sample problems are used to illustrated how each type of content problem is worked.

Subjects were instructed to select and work any five of the thirty-two problems appearing on each page, for a total of ten problems in each of the three academic areas, and a total of thirty problems in the ART booklet.

The ART yields two dependent variables (Difficulty and Accuracy) for each of the three subtasks: math, spelling, and vocabulary. For this study the scores from the subtasks of spelling and vocabulary were combined into one score termed Verbal.

1. Difficulty (DIF): defined as the mean of row levels for the selected problems in each of the three subtasks.
2. Accuracy (ACC): defined as the percentage of correctly solved problems among the selected problems in each of the three subtasks.

Clifford (1988) assumed that optimum risk-taking can be evidenced in two ways: (1) ART-Difficulty scores representative of problems at, or just slightly above, students' achievement (i.e., grade-placement) level and (2) ART-Accuracy scores of approximately 5, representing fifty percent correct responding in each content area. The ART-Difficulty score is defined by the mean of the difficulty levels of students' choices in the ART. The ART-Accuracy score is defined by the percentage of the correct answers for selected items.

The Self-efficacy Measure

The Self-efficacy Measures (Appendix E and F) consist of 17 items per instrument, each accompanied by a five-point agree-disagree Likert response scale (1=strongly agree, 5=strongly disagree). A sample question reads: *When trying to learn some new math (or verbal) concept, I soon give up if I am not initially successful.* Scores are obtained by summing the items. High scores indicate high efficacy expectations (Sherer & Maddux, 1982). Scores range from seventeen points to eighty-five points. This instrument assesses

efficacy expectations drawn from past experiences and tendencies to attribute succcess to skill rather than chance factors. The scale was developed by generating items reflecting willingness to initiate behavior, willingness to expend effort in completing behavior, and persistence in the face of adversity. For this study these subfactors (initiate behavior, expend effort, and persistence) will be combined into one efficacy score. Internal consistency reliability for the generalized scale is reported to be .86 (alpha).

Evidence for construct validity for the generalized scale of the Self-efficacy Scale has been reported (Sherer & Adams, 1983; Sherer & Maddux, 1982). The scale has been correlated with measures of a number of personality characteristics that are related to the construct of self-efficacy. The Generalized scale has been found to be moderately related to scores on the Locus of Control Scale, the Ego Strength Scale, the Interpersonal Competency Scale, and the Rosen Self-Esteem Scale (Sherer & Maddux, 1982). Positive correlations with both Self-efficacy subscales and the Masculinity scale of the Bem Sex-Role Inventory and high scores on the Rathus Assertiveness Inventory have been interpreted as consistent with the conceptualization of self-efficacy as a willingness to persist in and initiate behavior (Sherer & Maddux, 1982). Criterion validity for the scale has been established by comparing scores with past successes in vocational, educational, and military areas.

The seventeen items of the Self-efficacy Scale were modified into two separate instruments. One modification was designed to measure math specific self-efficacy and the other modification was designed to measure verbal specific self-efficacy. The modification consisted of inserting either, involving math assignments, or, involving English assignments, within the original statement. For example, the original statement read: "I avoid facing difficulties". Modifications for the Self-efficacy Scale that was designed to measure

mathematical specific self-efficacy made the statement read: "I avoid facing difficulties *involving math assignments*". Modifications for the Self-efficacy Scale that was designed to measure verbal specific self-efficacy made the statement read: "I avoid facing difficulties *involving English assignments*". The alpha for the modified Self-efficacy Scale measures is reported to be .86.

Demographic Survey

The demographic data sheet (Appendix G) was designed for this study so that the students were able to indicate gender as it was a study variable. In addition, the students provided the following information: age, grade, ethnicity, favorite school subject, feelings concerning their math or English class, career aspirations, handedness, community activities they participate in, school activities they participate in, and how many hours a week they spend playing video games. These variables have been shown to affect self-efficacy and risk-taking in studies conducted in the past (Arenson, 1978; Clifford, 1988; Clifford et al., 1989; Irvine, 1986; Jamieson, 1969; Zimmerman & Martinez-Pons, 1990). Numerous variables were incorporated into the data gathering process for a more comprehensive study.

Academic Ability Placement

The three academic ability placements (remedial, general, honors) were scaled to make this a quanitative variable for this study. Placement in math was determined by the subjects enrollment in either a remedial, general, or honors math class. Placement in English was determined by the subjects enrollment in either remedial, general, or honors English class

Procedure

Institutional Review Board approval was obtained through an expedited special population review process (Appendix A). IRB approval required written permission from participating school building administrators (Appendix B) allowing the researcher to conduct the study. The researcher visited seventh, eighth, and ninth grade English classes and read students Solicitation to Volunteer Participants (Appendix H). Parental/Guardian Consent forms (Appendix C) were sent home with all students. A week later an assessment packet containing: (a) Participant Assent Form (Appendix D), Academic Risk-Taking measure, two modified Self-efficacy Scales, one to measure math self-efficacy (Appendix E) and one to measure verbal self-efficacy (Appendix F), and Demographic Survey (Appendix G) were presented to those students that had returned signed Parental/Guardian Consent Forms (Appendix C). The assessment packages were handed out, by the researcher, to the volunteers during their English class. Students that were not participating in the study were instructed by the teacher to read silently. The researcher verbally reminded all students of their rights as set forth by the Institutional Review Board, as stated in both the parental consent form and the participant assent form, and read the Procedural Script (Appendix I) prior to distributing the assessment packets. The assessment packet took approximately 20 minutes to complete. Completed assessment packages were collected by the researcher, and the data gathering procedure was concluded.

Design

Path analysis was chosen as the most appropriate procedure for exploring the possible relationsip among the variables identified as having a possible effect on academic risk-taking. The gender-related differences pursued in this study are academic self-efficacy

and academic risk-taking, because of the identification in the literature of both these variables hypothesized to influence academic achievement. Path analysis techniques allowed this study to move beyond simple or multiple correlations to exploring the ordering of the variables, gender and academic self-efficacy, which were hypothesized to influence academic achievement on the basis of Self-Efficacy Theory and Clifford's Theory of Constructive Failure.

The path analysis consisted of three stages: (a) development of a scheme or path model specifying the hypothesized relationships among the variables, (b) computation of path coefficents and elimination of nonsignificant paths in the original model, and (c) specification of a reduced path model consistent with the data. Path coefficients were computed via a series of multiple regression analyses based on the hypothesized model, were statisticallty identical to standardized multiple regression coefficients, and represented the direct effects of one variable in the model on another, when the influences of all other prior variables are controlled (Leclair, 1981).

For this study the exogenous variables were the students' ability placement in mathematics class and ability placement in English class. This variable was incorporated into the model because self-efficacy expectations are developed from the experiences of the effects of past behavior (Bandura, 1977b). It was expected that students in remedial level mathematics or English classes may exhibit low self-efficacy for those subject due to their past experiences with these subjects. The endogenous variables were the students' mathematics self-efficacy score, verbal self-efficacy score, academic risk-taking difficulty score for verbal and mathematics, and academic risk-taking accuracy score for verbal and mathematics. Based on Self-Efficacy Theory, Clifford's Theory of Constructive Failure, and

related research on academic achievement, the full path model tested, separate for males and females, was as follows: ability placement in mathematics and English class (i.e., remedial, average, honors) was hypothesized to influence verbal and math self-efficacy , as measured by the Verbal Self-efficacy and Math Self-efficacy scales; verbal self-efficacy and math self-efficacy was hypothesized to influence academic risk-taking as measured by the Academic Risk-Taking measure which obtained scores for verbal difficulty, verbal accuracy, math difficulty, and math accuracy. The proposed path diagrams were recursive models. The theoretical path diagrams for adolescent females and males, respectively, are shown in Figures 1 and 2.

Separate one way Between Subjects ANOVA's (Analysis of Variance) were conducted to investigate the effects of gender on subjects' academic risk-taking for the three academic ability levels. These ANOVA's were run to address Prediction 1 of this study. Prediction 1 states: There will be significant gender effects, males displaying different ability levels in mathematics and English outperforming females displaying different ability levels in mathematics and English, when examining the dependent variable, academic risk-taking as defined by difficulty. Academic risk-taking, as defined by verbal or math difficulty, served as the dependent variable. Gender and academic ability placement (honors, general, remedial) served as the independent variables.

Summary

After securing written approval from the proper authorities, the researcher visited two school districts to invite all seventh, eighth, and ninth grade students of various academic ability levels to participate in this study. The students were encouraged to seek parental/guardian permission to answer a variety of questions related to mathematical self-

efficacy, verbal self-efficacy, and personal demographics. Students were also invited to complete an academic risk-taking measure consisting of a variety of mathematical, spelling, and vocabulary questions. Those students that returned their parental/guardian permission slips completed the packet of assessment instruments in approximately twenty minutes during their English class time at school.

Path analysis was chosen as the most appropriate analytical procedure for exploring the possible relationship of gender and academic self-efficacy on academic risk-taking for adolescent students. Theoretical path diagram, separate for females and males, were constructed based on Self-efficacy theory, Clifford's Theory of Constructive Failure and related research on academic achievement. The proposed path diagrams were recursive models. The theoretical path diagram for adolescent females appears in Figure 1. The theoretical path diagram for adolescent males appears in figure 2.

ANOVA's were used to determine gender effects and test Prediction 1 for this study. Separate Between Subjects ANOVA's were run with academic risk-taking, as defined by English and math difficultyserving as the dependent variable. Gender and academic ability level (honors, general, remedial) serving as the independent variables.

Figure 1. Theorized path diagram for adolescent females.

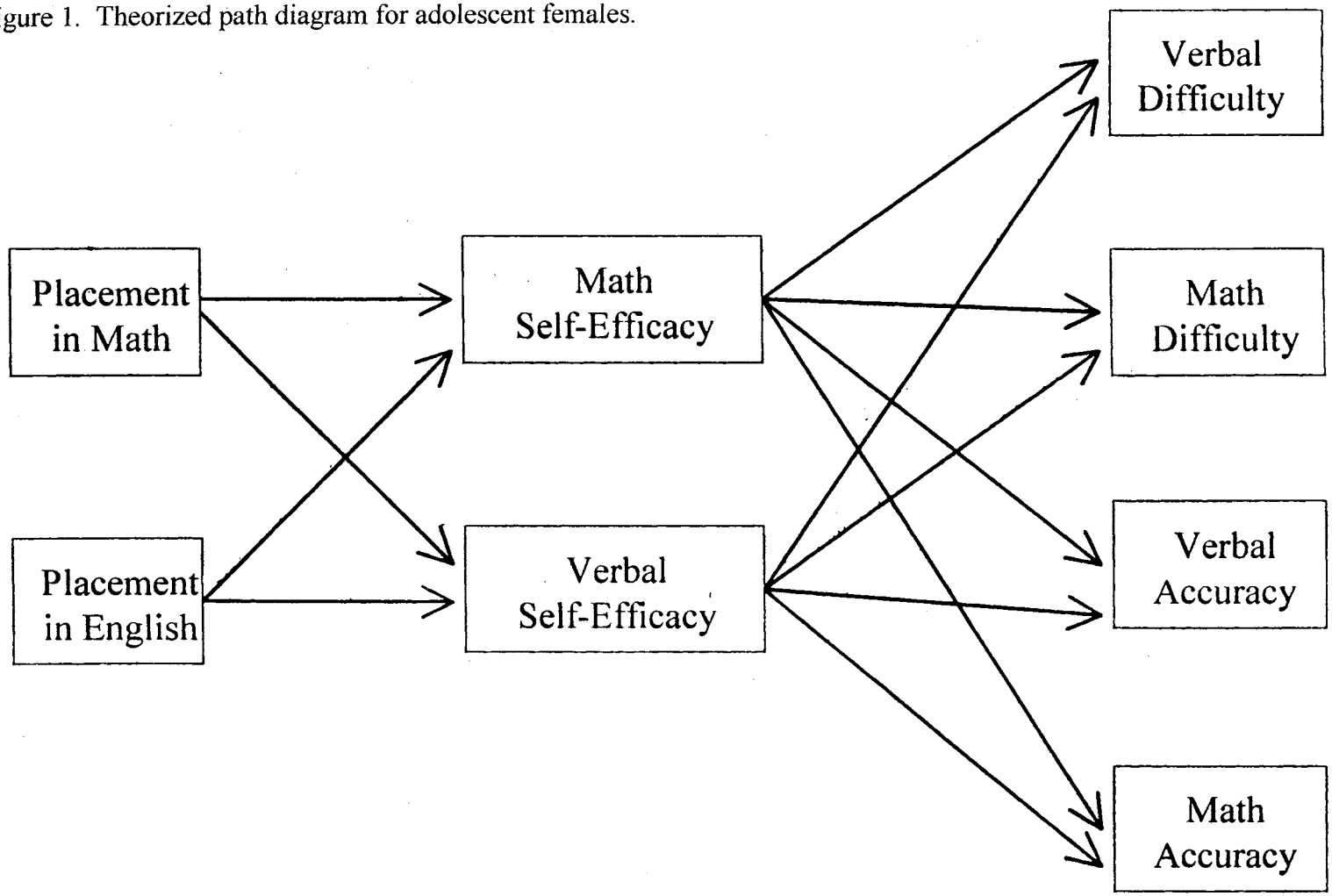
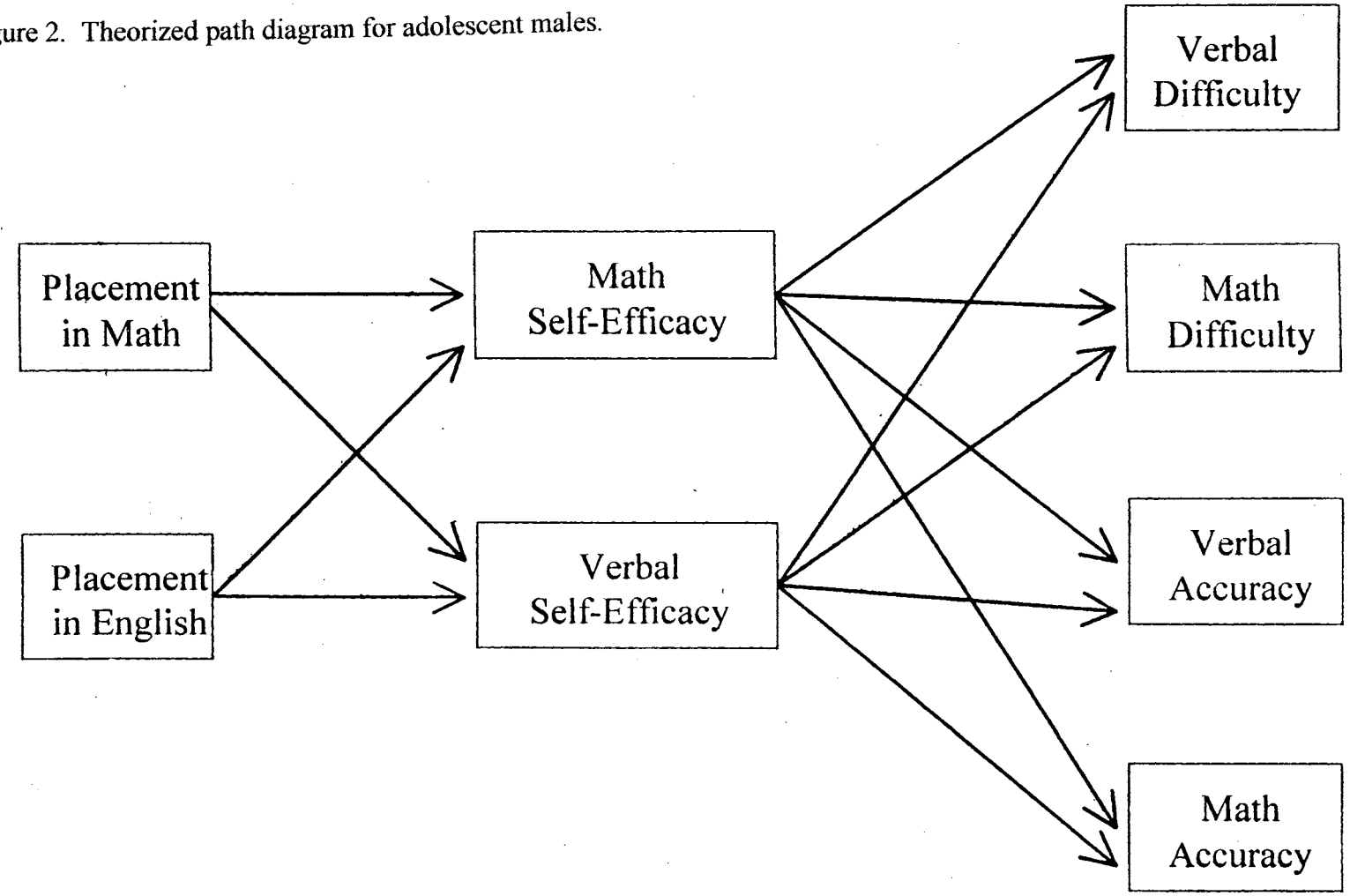


Figure 2. Theorized path diagram for adolescent males.



CHAPTER IV

RESULTS

The purpose of this study is to explore the effects of gender and academic self-efficacy (mathematical and verbal) on academic risk-taking for adolescent students. This chapter describes the subjects that participated in the study and the results of the statistical analysis of the assessment data collected in response to the research question: What are the effects of gender and academic self-efficacy on academic risk-taking for adolescent students? First, a description of the subjects that participated in the study is provided. This is followed by descriptive statistics for the data collected for each separate assessment instrument. A discussion of the path analysis and consequent refinement of the gender based models follows the descriptive statistics. A final path model for each gender completes the regression analysis. A discussion of the ANOVA's follows the multiple regression analysis. The chapter concludes with a summary of the results of the study.

Subjects

One hundred and thirty-three male and female seventh, eighth, and ninth grade subjects from two school districts, one from Arkansas and one from Oklahoma, participated in this study. Despite strong encouragement from the researcher a small percentage of the student population from each school volunteered for this study. The school in Oklahoma had 6% of their student body participate in this study, and the school

in Arkansas had 9% of their student body participate. The final sample consisted of seventy-three female adolescents and sixty male adolescents. The number of female and male subjects that represented each grade level are shown in Table 1.

Table 1

Grade Level Representation for Female and Male Subjects (N= 133)

	7th Grade	8th Grade	9th Grade
Female	21	46	6
Male	20	32	8

Subjects representing three academic ability levels in mathematics and English classes were assessed. Academic ability was determined by whether the subject was enrolled in a mathematics or English class at the remedial, general, or honors level. The number of female and male subjects that represented each mathematics and English class academic ability level appear in Table 2.

Table 2

Gender Representation of Academic Levels for Mathematics and English Classes

	Math Class		English Class	
	Female (n=73)	Male (n=60)	Female	Male
Remedial	3	3	3	6
General	64	50	68	50
Honors	6	7	2	4

Descriptive Statistics

Math Self-efficacy Measure

Subjects' math self-efficacy scores were obtained from the math self-efficacy instrument shown in Appendix F and described in Chapter 3. A subject's math self-efficacy score was obtained by totaling 17 item responses, each made on a 5-point agree-disagree Likert scale. High scores signify high math self-efficacy and low scores signify low math self-efficacy Table 3 (Female) and Table 4 (Male) contain the mean and standard deviation for the Math Self-efficacy Measure.

Table 3

Female Means and Standard Deviations for the Math Self-Efficacy Measure (n=73)

	Mean	Standard Deviation
Remedial (n=3)	59.5	2.1
General (n=64)	58	6.2
Honors (n=6)	59.5	6.1

Table 4

Male Means and Standard Deviations for the Math Self-Efficacy Measure (n=60)

	Mean	Standard Deviation
Remedial (n=3)	51	1.9
General (n=50)	53.5	6.7
Honors (n=7)	59	3.3

Verbal Self-efficacy Measure

Subjects' verbal self-efficacy scores were obtained from the verbal self-efficacy instrument shown in Appendix F and described in Chapter 3. A subject's verbal self-efficacy core was obtained by totaling 17 item responses, each made on a 5-point agree-disagree Likert scale. High scores signify high verbal self-efficacy and low scores signify low verbal self-efficacy. Table 5 (Female) and Table 6 (Male) contain the mean and standard deviation for the Verbal Self-efficacy Measure.

Table 5

Female Means and Standard Deviations for the Verbal Self-Efficacy Measure (n=73)

	Mean	Standard Deviation
Remedial (n=3)	57.5	.8
General (n=68)	60.5	8.5
Honors (n=2)	59.5	7.5

Table 6

Male Means and Standard Deviations for the Verbal Self-Efficacy Measure (n=60)

	Mean	Standard Deviation
Remedial (n=6)	48.5	10.5
General (n=50)	59.5	6.5
Honors (n=4)	62.5	.05

Academic Risk-Taking (ART) Measure

Four separate ART scores were obtained for each subject. One score was a Math Difficulty (MDiff) score, one a Math Accuracy (MAcc) score, one a Verbal Difficulty (VDiff) score, and one a Verbal Accuracy (VAcc) score. Each accuracy score was

obtained by separately totaling up the number of correctly answered questions pertaining to either the verbal or mathematical subtest. Each difficulty score was obtained by separately (math or verbal) averaging the levels of difficulty selected for each problem chosen to answer by the subject. The correctness of the answer did not matter for the difficulty scores.

Table 7 (Female) and Table 8 (Male) contain the means and standard deviations for the Academic Risk-Taking Measure for Math Difficulty and Math Accuracy. Table 9 (Female) and Table 10 (Male) contain the means and standard deviations for the Academic Risk-Taking Measure for Verbal Difficulty and Verbal Accuracy.

Table 7

Female Means and Standard Deviations for the Academic Risk-Taking (ART) Measure for Math Difficulty and Math Accuracy (n=73)

	Mean	Standard Deviation
Remedial (n=3)		
Accuracy	1.0	1.5
Difficulty	3.2	.12
General (n=64)		
Accuracy	.8	.15
Difficulty	5.2	1.9
Honors (n=6)		
Accuracy	.9	.15
Difficulty	3.2	1.9

Table 8

Male Means and Standard Deviations for the Academic Risk-Taking (ART) Measure for Math Difficulty and Math Accuracy (n=60)

	Mean	Standard Deviation
Remedial (n=3)		
Accuracy	.8	.2
Difficulty	4.4	2.3
General (n=50)		
Accuracy	.7	.16
Difficulty	3.7	2.2
Honors (n=7)		
Accuracy	1.0	.1
Difficulty	5.5	2.0

Table 9

Female Means and Standard Deviations for the Academic Risk-Taking (ART) Measure for Verbal Difficulty and Verbal Accuracy (n=73)

	Mean	Standard Deviation
Remedial (n=3)		
Accuracy	1.0	.03
Difficulty	2.3	2.2
General (n=68)		
Accuracy	.8	.03
Difficulty	2.0	.01
Honors (n=2)		
Accuracy	.83	.18
Difficulty	3.2	2.0

Table 10

Male Means and Standard Deviations for the Academic Risk-Taking (ART) Measure for Verbal Difficulty and Verbal Accuracy (n=60)

	Mean	Standard Deviation
Remedial (n=6)		
Accuracy	.8	.05
Difficulty	2.6	1.5
General (n=50)		
Accuracy	.9	.01
Difficulty	5.8	2.0
Honors (n=4)		
Accuracy	1.0	.01
Difficulty	7.2	.7

Multiple Regression Analysis

A path analysis was used to investigate the possibility of a relationship between class placement in English and mathematics, gender, mathematics self-efficacy, English self-efficacy, and academic risk-taking. The predictor placement in mathematics and English class (remedial, general, or honors) was made quantitative by scaling this variable. The scores derived from the self-efficacy measures provided the quantitative predictor of mathematics and verbal self-efficacy. The criterion variables were academic

risk-taking as measured through separate scores for verbal difficulty, mathematics difficulty, verbal accuracy, and mathematics accuracy. Separate regressions were run for male and female subjects. The correlation matrix for each gender and the self-efficacy measures appears in Tables 11 and 12. The correlation matrix for each gender and the mathematics subtest of the academic risk-taking measure appears in Tables 13 and 14. The correlation matrix for each gender and the verbal subtest of the academic risk-taking measure appears in Tables 15 and 16.

Table 11

Correlation Matrix for Female Subjects and the Self-Efficacy Measures

Female (n=73)	Placement in Math	Placement in English	Math Self-Efficacy	Verbal Self-Efficacy
Placement in Math	1.0000	0.7499**	0.0425	0.1490
Placement in English	---	1.0000	-0.0119	0.0637
Math Self-Efficacy		---	1.0000	0.36047*
Verbal Self-Efficacy			---	1.0000

*p< .01
**p< .001

Table 12

Correlation Matrix for Male Subjects and the Self-Efficacy Measures

Male (n=60)	Placement in Math	Placement in English	Math Self-Efficacy	Verbal Self-Efficacy
Placement in Math	1.0000	0.71782**	0.2620	0.33466*
Placement in English	---	1.0000	0.2248	0.1361
Math Self-Efficacy		---	1.0000	0.44733**
Verbal Self-Efficacy			---	1.0000

*p< .01
**p< .001

Table 13

Correlation Matrix for Female Subjects and the Mathematics Subtest of the Academic Risk-Taking Measure

Female (n=73)	Placement in Math	Placement in English	Math Difficulty	Math Accuracy
Placement in Math	1.0000	0.7499**	0.1457	-0.0046
Placement in English	---	1.0000	-0.0066	-0.0407
Math Difficulty		---	1.0000	-0.2816
Math Accuracy			---	1.0000

*p< .01
**p< .001

Table 14

Correlation Matrix for Male Subjects and the Mathematics Subtest for the Academic Risk-Taking Measure

Male (n=60)	Placement in Math	Placement in English	Math Difficulty	Math Accuracy
Placement in Math	1.0000	0.71782**	0.37300*	0.1441
Placement in English	---	1.0000	0.38766*	0.0490
Math Difficulty		---	1.0000	-0.37559**
Math Accuracy			---	1.0000

*p< .01
**p< .001

Table 15

Correlation Matrix for Female Subjects and the Verbal Subtest of the Academic Risk-Taking Measure

Female (n=73)	Placement in Math	Placement in English	Verbal Difficulty	Verbal Accuracy
Placement in Math	1.0000	0.7499**	0.1436	0.0690
Placement in English	---	1.0000	0.0051	0.0071
Verbal Difficulty		---	1.0000	-0.30059*
Verbal Accuracy			---	1.0000

*p< .01
**p< .001

Table 16

Correlation Matrix for Male Subjects and the Verbal Subtest for the Academic Risk-Taking Measure

Male (n=60)	Placement in Math	Placement in English	Verbal Difficulty	Verbal Accuracy
Placement in Math	1.0000	0.71782**	0.37119*	0.1549
Placement in English	---	1.0000	0.41667**	0.1117
Verbal Difficulty		---	1.0000	0.1322
Verbal Accuracy			---	1.0000

*p< .01
**p< .001

The theoretical linkage presumed to exist among the variables is graphically presented in a reprint of Figure 1 for adolescent females and Figure 2 for adolescent males. Both models were tested with conventional path analysis. Figure 3 contains the estimated path coefficients (standardized regression coefficients) presented along the unidirectional arrows for the female model. The relative size of each coefficient is indicative of that variable's predictive importance in the model. Figure 4 contains the estimated path coefficients presented along the unidirectional arrows for the male model. For the various models R^2 ranged between .3977 and .3338 for females and .4563 and .3056 for males. Table 17 examines the differences of the male and female path coefficients, significant paths at $p < .01$ are bolded. Figure 5 visually represents the data contained in Table 17 in the form of a bar graph.

Figure 1. Theorized path diagram for adolescent females.

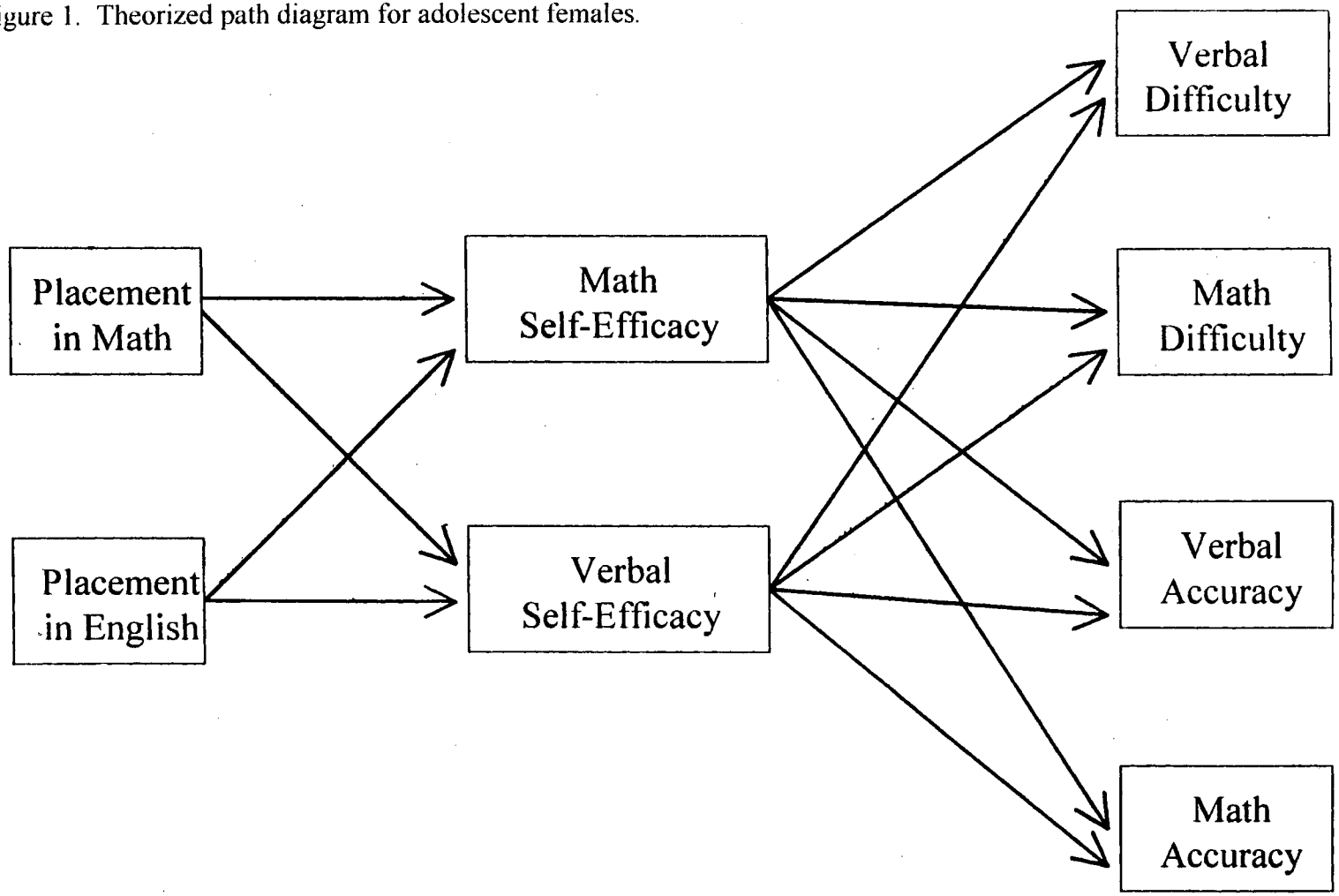


Figure 2. Theorized path diagram for adolescent males.

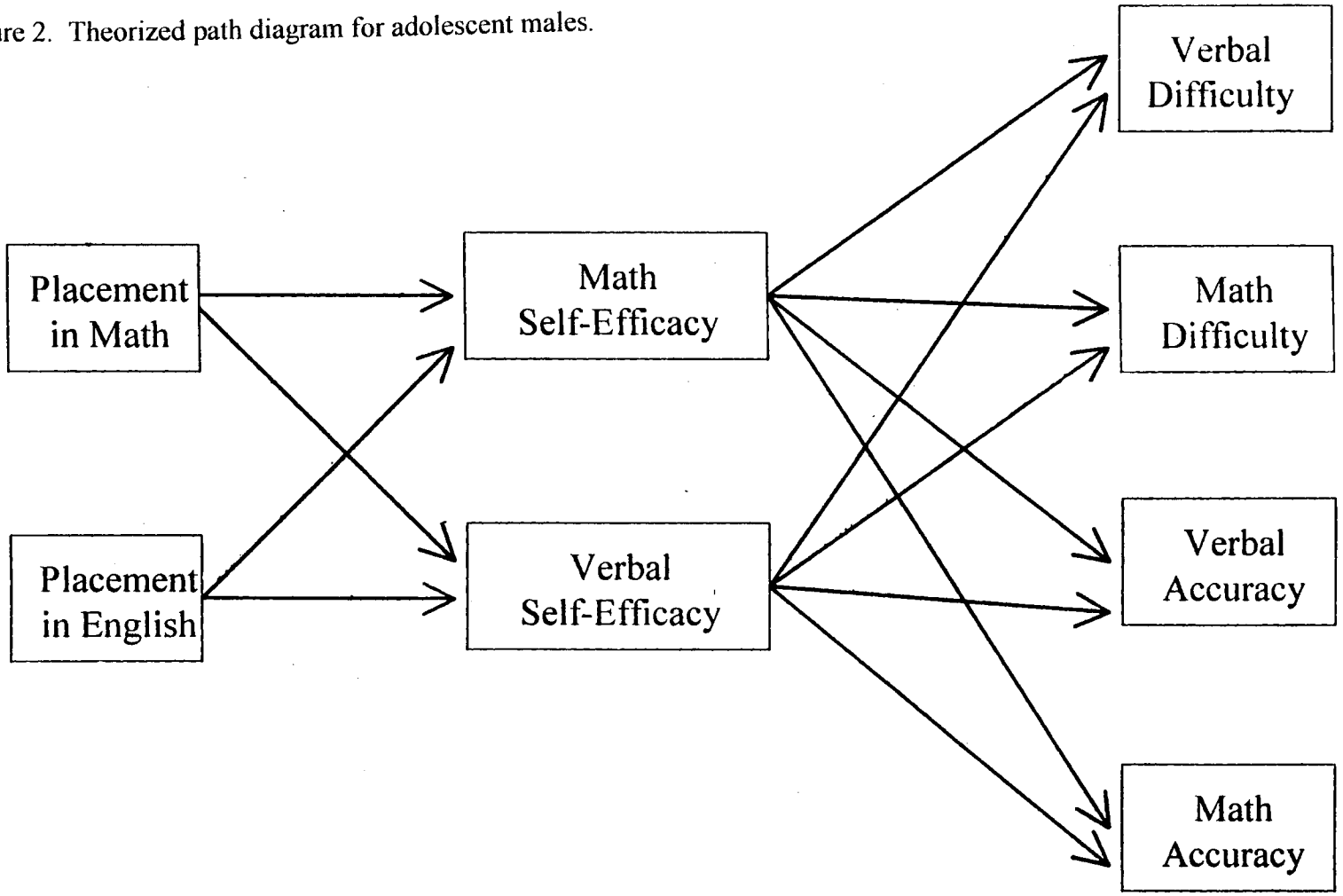


Figure 3. Calculated path coefficients for female model.

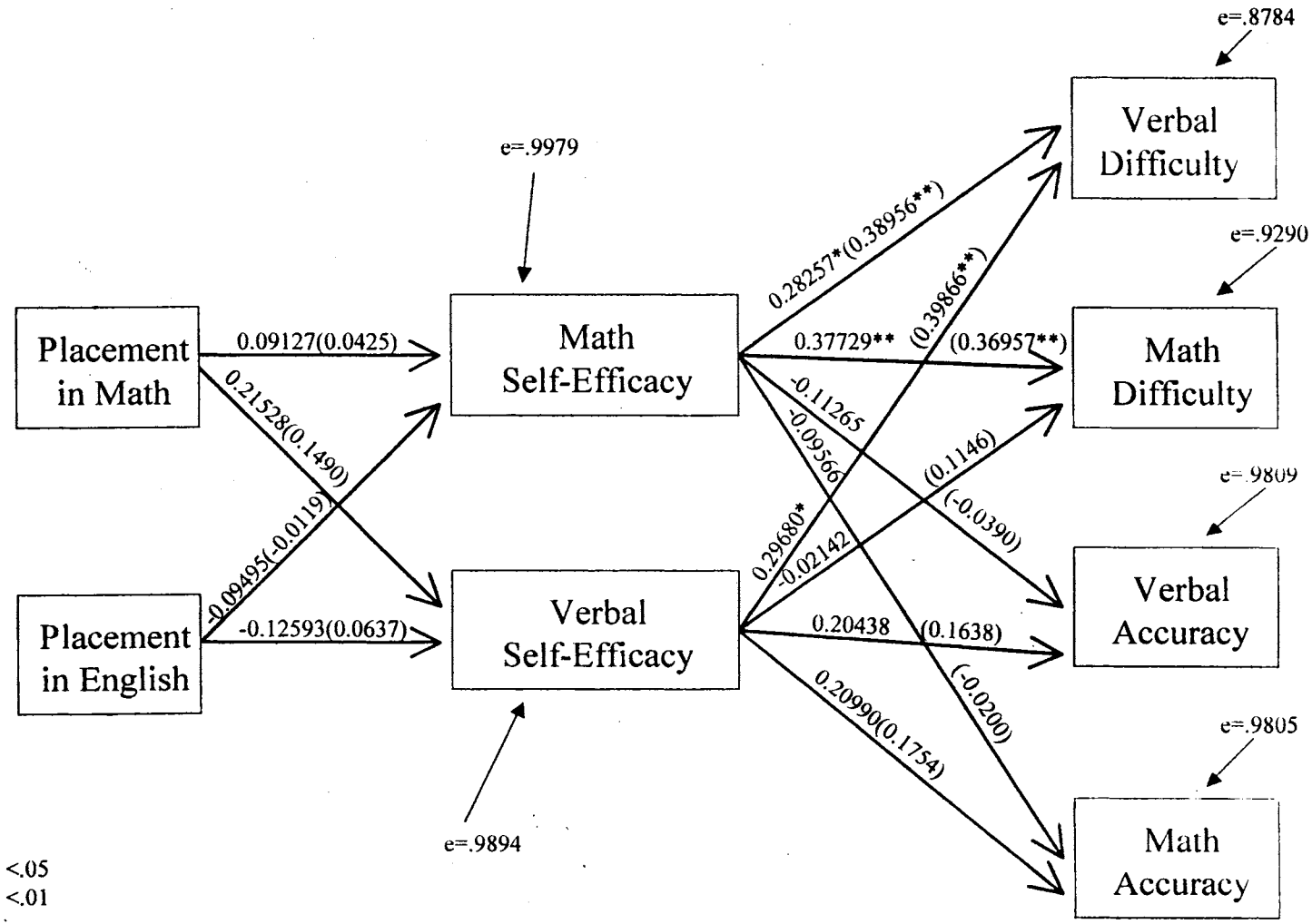


Figure 4. Calculated path coefficients for male models.

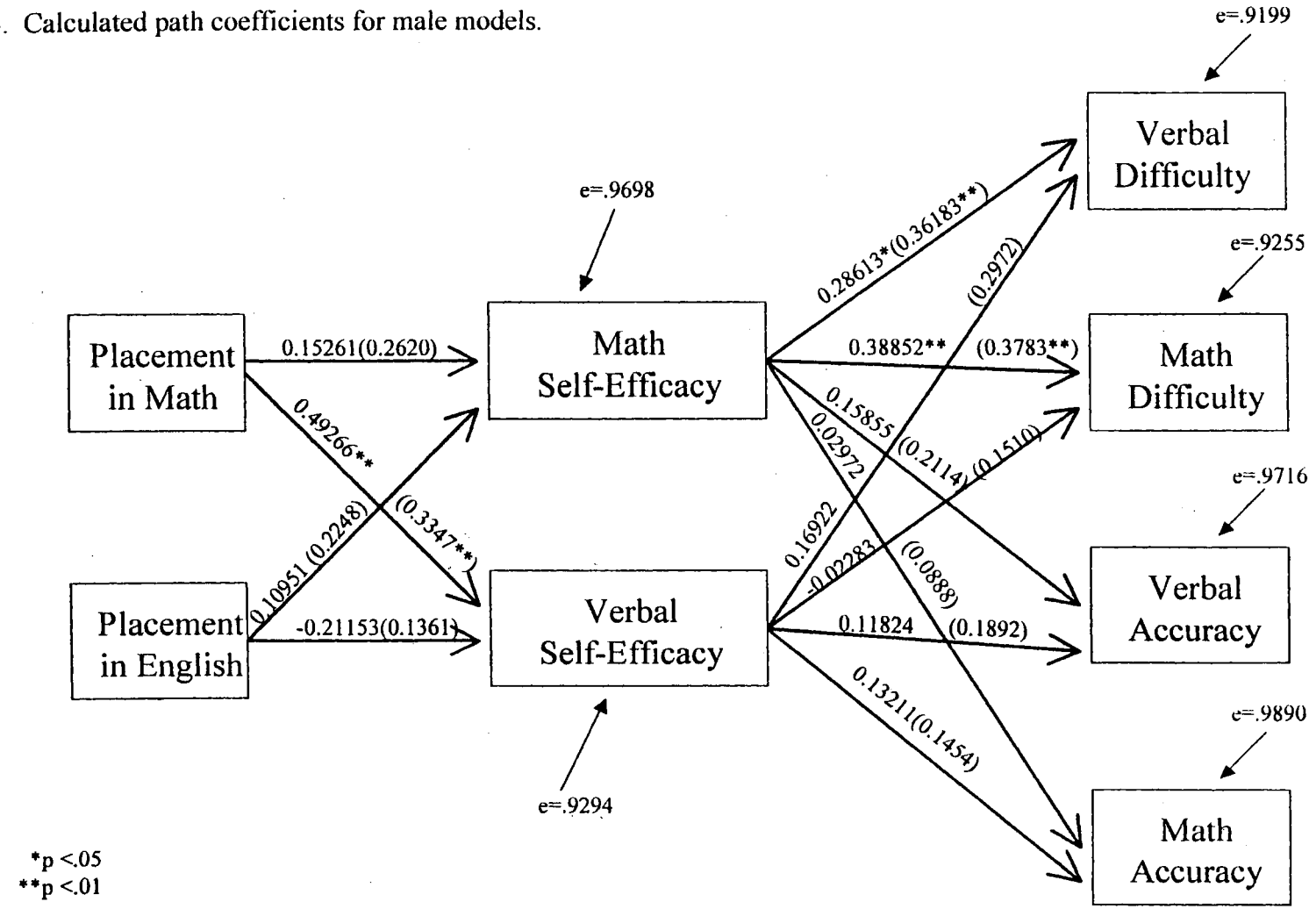


Table 17

Comparison of Male and Female Path Coeficients

	Male (n=60)	Female (n=73)	Difference
P-Math → Math Self-Efficacy	**.15261**	.09127	.06134
P-Math →Verbal Self-Efficacy	.49266	.21528	.27738
P-English → Math Self-Efficacy	.10951	-.09495	.20446
P-English → Verbal Self-Efficacy	-.21153	-.12593	-.0856
MSE → Verbal Difficulty	**.28613**	**.28257**	.00356
MSE → Math Difficulty	**.38852**	**.37729**	.01123
MSE → Verbal Accuracy	.15855	-.11265	.2712
MSE → Math Accuracy	.02972	-.09566	.12538
VSE → Verbal Difficulty	.16922	**.29680**	.12758
VSE → Math Difficulty	-.02283	-.02142	.00141
VSE → Verbal Accuracy	.11824	.20438	.08614
VSE → Math Accuracy	.13211	.20990	.07779

Significant paths at p< .01 are bolded.

P= Placement

MSE = Math Self-Efficacy

VSE = Verbal Self-Efficacy

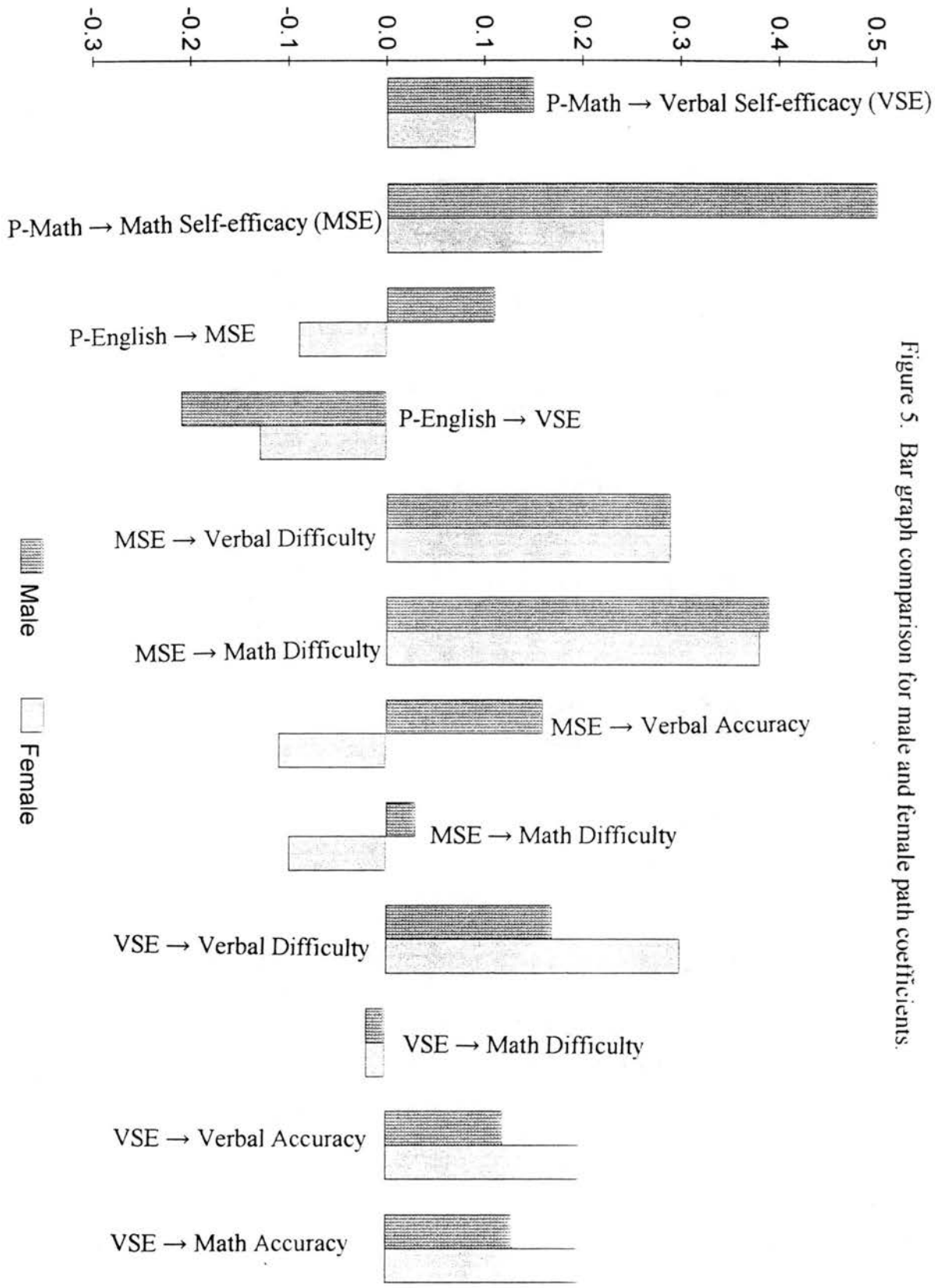


Figure 5. Bar graph comparison for male and female path coefficients.

The significant predictors on the female model at $p<.05$ were math self-efficacy and verbal self-efficacy on verbal difficulty. The significant predictor at $p<.01$ were math self-efficacy on verbal difficulty, math self-efficacy on math difficulty, and verbal self-efficacy on verbal difficulty. These significant path coefficients can be seen in the Female Reduced Model shown in Figure 6.

A Goodness of Fit test was conducted on the Female Reduced Model. The test results failed to reject the reduced model. The value of Q was .9041. The closer to 1 the Q value is the better the fit for the model. The Q value (.9041) for the reduced model indicates that that model had a very good statistical fit. R Squared was .3977. This indicates that 40% of variance of the female students' performance on the Academic Risk-Taking measure could be accounted for by academic self-efficacy.

The significant predictor on the male model for $p<.05$ was math self-efficacy on verbal difficulty. The significant predictors on the male model for $p<.001$ were placement in math on verbal self-efficacy and math self-efficacy on math difficulty and verbal difficulty. The significant path coefficients can be seen in the male reduced model in Figure 7.

A Goodness of Fit test was conducted for the male reduced model. The test failed to reject the reduced model. The value of Q was .78298. The value of Q is not as close to one as the Q value for the female reduced model; however, a .78298 value is statistically acceptable. R Square was .4563. This indicates that 46% of variance of the male students' performance on the Academic Risk-Taking measure could be accounted for by academic self-efficacy.

Figure 6. Female Reduced Model

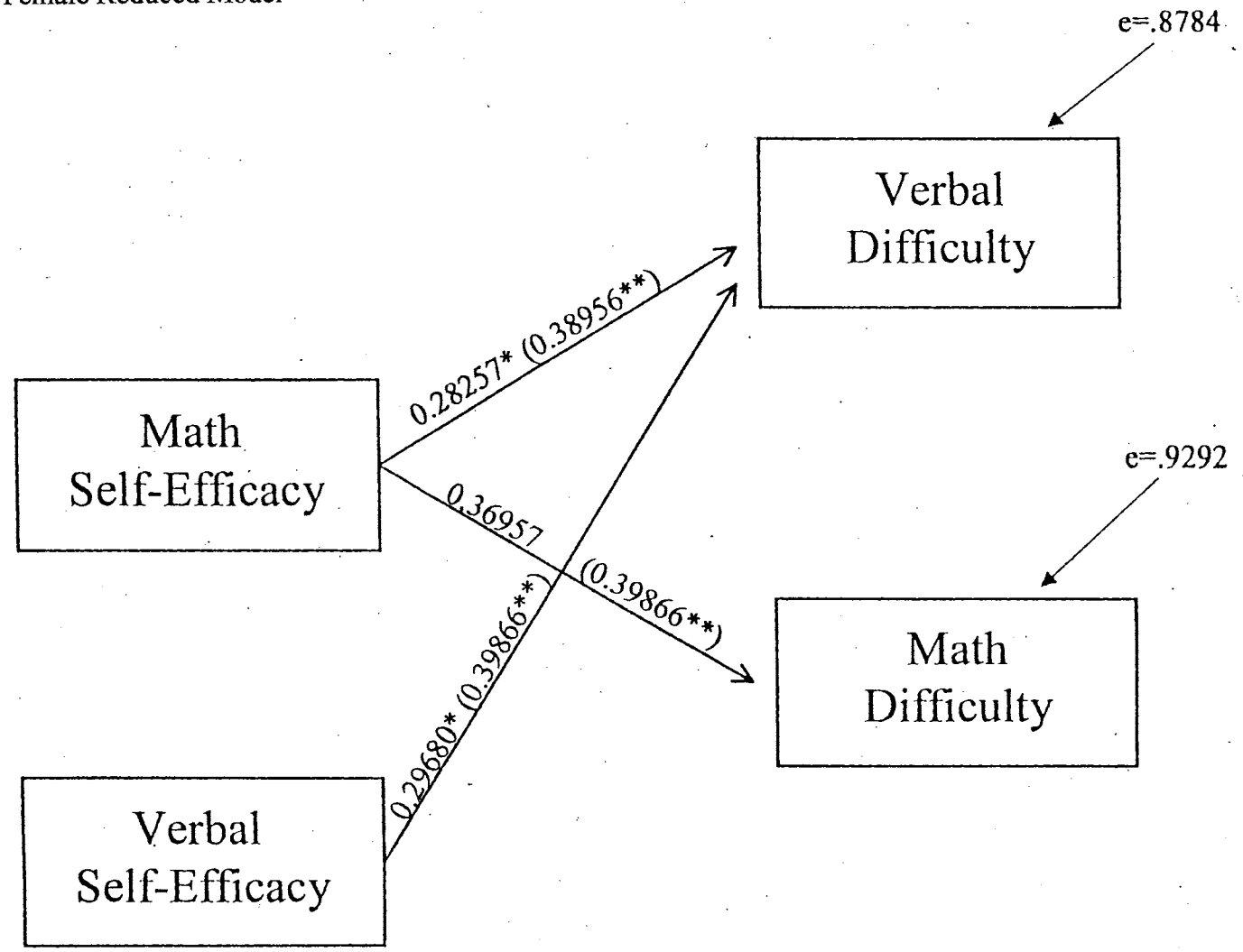
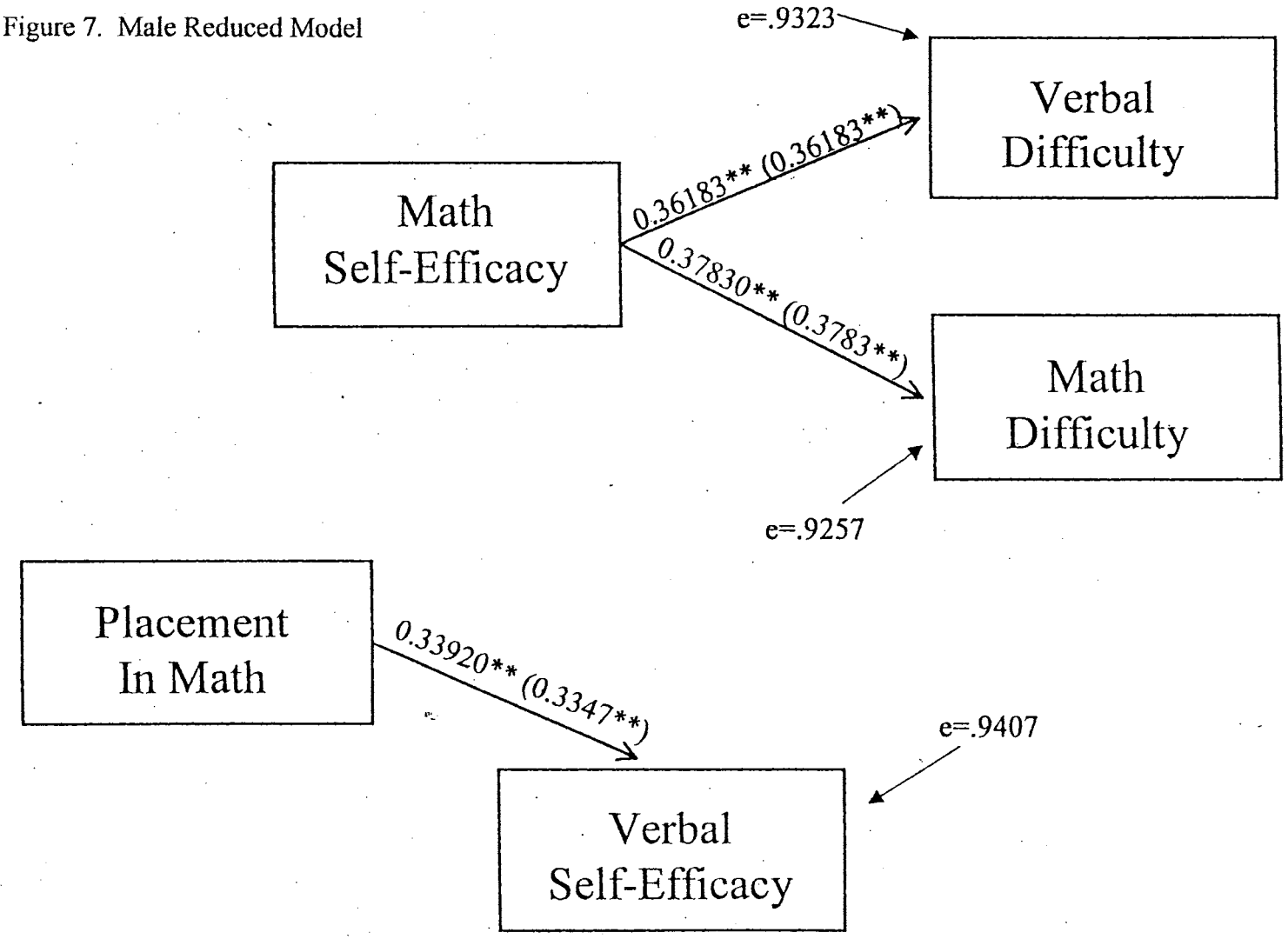


Figure 7. Male Reduced Model



The residuals in this study's models are considered very high. A list of the residuals for the models appear in Table 18 and Table 19. When the error is high this usually indicates model misspecification. Model misspecification occurs when something is left out of the model or something is put in that does not belong. The variable that does not belong is usually found to be nonsignificant. Therefore, when model misspecification occurs researchers usually hypothesize about what variable or variables may have been left out of the model.

Table 18

List of Residuals from Female and Male Hypothesized Path Models

	Female	Male
Math Self-efficacy	.9979	.9698
Verbal Self-efficacy	.9894	.9294
Verbal Difficulty	.8784	.9199
Math Difficulty	.9290	.9255
Verbal Accuracy	.9809	.9716
Math Accuracy	.9805	.9890

Table 19

List of Residuals from Female and Male Reduced Path Models

	Female	Male
Verbal Difficulty	.8784	.9323
Math Difficulty	.9292	.9257

ANOVA Analysis

Separate Between Subjects ANOVA's (Analysis of Variance) were conducted to investigate the effects of academic ability placement (honors, general, remedial) and gender on academic risk-taking, defined verbal difficulty and math difficulty. There were no significant effects for gender or academic ability level at $p < .05$ or $p < .01$. Table 20 contains the ANOVA Summary Table for Verbal Difficulty between Males and Females for Remedial. Table 21 contains the ANOVA Summary Table for Verbal Difficulty between Males and Females for General. Table 22 contains the ANOVA Summary Table for Verbal Difficulty between Males and Females for Honors. Table 23 contains the ANOVA Summary Table for Math Difficulty between Males and Females for Remedial. Table 24 contains the ANOVA Summary Table between Males and Females for General. And Table 25 contains the ANOVA Summary Table between Males and Females for Honors.

Table 20

Analysis of Variance for Verbal Difficulty Between Males and Females for Remedial. (N = 9) (Female n = 6), (Male n = 3)

Source	Hypoth SS	Error SS	Hypoth MS	Error MS	F Ratio	F Prob
Verbal Difficulty	2.494	28.722	2.494	4.103	.61	.46

Table 21

Analysis of Variance for Verbal Difficulty Between Males and Females for General. (N = 118). (Female n = 50), (Male n = 68).

Source	Hypoth SS	Error SS	Hypoth MS	Error MS	F Ratio	F Prob
Verbal Difficulty	.8478	468.342	.848	4.037	.21	.65

Table 22

Analysis of Variance for Verbal Difficulty Between Males and Females for Honors. (N = 6). (Female n = 4), (Male n = 2).

Source	Hypoth SS	Error SS	Hypoth MS	Error MS	F Ratio	F Prob
Verbal Difficulty	18.253	10.160	18 .253	2.540	7.19	.06

Table 23

Analysis of Variance for Math Difficulty Between Males and Females for Remedial. (N = 6). (Female n = 3), (Male n = 3).

Source	Hypoth SS	Error SS	Hypoth MS	Error MS	F Ratio	F Prob
Math Difficulty	.007	18.087	.007	4.521	0.0	.97

Table 24

Analysis of Variance for Math Difficulty Between Males and Females for General. (N = 114). (Female n = 50), (Male n = 64).

Source	Hypoth SS	Error SS	Hypoth MS	Error MS	F Ratio	F Prob
Math Difficulty	.995	467.026	.995	4.170	.24	.63

Table 25

Analysis of Variance for Math Difficulty Between Males and Females for Honors. (N = 13). (Female n = 7), (Male n = 6).

Source	Hypoth SS	Error SS	Hypoth MS	Error MS	F Ratio	F Prob
Math Difficulty	8.320	39.228	8.320	3.566	2.33	.15

Summary

The responses of one hundred thirty-three seventh, eighth, and ninth grade students to two academic self-efficacy questionnaires and an academic risk-taking measure generated data for this study. The data were separated according to gender (seventy-three females and sixty males) and academic ability levels (remedial, general, and honors) for mathematics and English classes. The descriptive statistics for each assessment instrument separated by gender and academic ability levels for both mathematics and English classes were presented. The analysis of the path models exploring the interrelationships of the variables introduced in Chapter III, a comparison

of the path coefficients of the female and male models, and the metamorphosis of a final path model for each gender was discussed. The results of six separate Between Subjects ANOVA's were investigated. Separate ANOVA's were run comparing gender, ability placement, on academic risk-taking, as defined by verbal or math difficulty. No significant results were found in any of the ANOVA analyses.

CHAPTER V

SUMMARY OF RESULTS, IMPLICATIONS, AND CONCLUSIONS

The purpose of this study was to investigate the possible relationship among the variables of gender and academic self-efficacy (mathematical and verbal) on academic risk-taking for adolescent students. This chapter summarizes the findings as they relate to the three predictions outlined earlier in the study, discusses conclusions drawn from the findings, and offers implications for educational practice, further research, and theory.

Summary of the Findings

One hundred and thirty-three seventh, eighth, and ninth grade adolescents provided data related to academic self-efficacy in the areas of math and verbal abilities, and academic risk-taking tendencies. The data were divided by gender (seventy-three females and sixty males) separate multiple regressions, in the form of path analysis, and six Between Subjects Analysis of Variance (ANOVA) were run on the data. The full path model tested, separate for males and females, was as follows: ability placement in math and English class (remedial, general, honors) was hypothesized to influence verbal and math self-efficacy, as measured by the Verbal Self-efficacy and Math Self-efficacy scales, verbal self-efficacy and math self-efficacy was hypothesized to influence academic risk-taking as measured by the Academic Risk-Taking measure which obtained scores for verbal difficulty, verbal accuracy, math difficulty, and math accuracy. The ANOVA's run used academic risk-taking, defined as math or verbal difficulty as the dependent variable, and gender and academic ability

placement (remedial, general, honors) as the independent variables. The following section discusses the findings of the data obtained as it relates to this study's three predictions:

1. There will be significant gender effects, males outperforming females, when examining the dependent variable, academic risk-taking as defined by difficulty.
2. There will be significant academic self-efficacy effects as measured by mathematic self-efficacy scores when examining the dependent variable academic risk-taking.
3. There will be significant academic self-efficacy effects as measured by verbal self-efficacy scores when examining the dependent variable academic risk-taking.

Gender Effects on Academic Risk-Taking

Gender differences, as predicted, were not demonstrated on the Difficulty subtest of the Academic Risk-Taking measure. The prediction was that males would outperform females on the Difficulty subtest of the Academic Risk-Taking measure. The results of the ANOVA's indicated that there were no significant effects for males outperforming females in any of the three academic ability levels in either mathematics or verbal. Therefore, Prediction 1 was not supported by the results. Generalizability findings cannot be drawn from the remedial or honors ability level groups due to the low number of subjects within those subgroups. However, a greater number of subjects represented the general math ability level so those findings hold more generalizability. An interesting side note for this study is that female adolescent students attempted more difficult mathematical problems than male adolescent students, and their accuracy scores were higher than their male counterparts accuracy on the less difficult problems.

Mathematical Self-Efficacy and Academic Risk-Taking

Math self-efficacy is the belief in one's ability to successfully perform work in mathematics. It was predicted that there would be significant academic self-efficacy effects as measured by mathematic self-efficacy scores when examining the dependent variable academic risk-taking. The results of this study indicate that adolescent students of both genders place a high value on mathematical abilities. The level of difficulty for both verbal and mathematical tasks males and females choose in their academic pursuits appears to be directly influenced by their mathematical self-efficacy. Academic ability levels (remedial, general, honors) did not appear to be a variable affecting the student's math self-efficacy. The means for both genders at all ability levels were in the high mathematical self-efficacy range.

This study's findings do not support findings from past studies investigating gender differences and academic self-efficacy. Research investigating the role of academic self-efficacy and academic achievement has indicated that males place a strong emphasis on specific self-efficacy in relationship to mathematics while females often possess a higher perceived specific self-efficacy concerning language related tasks over mathematical tasks. (Betz and Hackett, 1983; Hackett and Campbell, 1987; Lent, et al., 1997; O'Brien, et al., 1999; Pajaras,1996; Randhawa, et al., 1993.

Verbal Self-Efficacy and Academic Risk-Taking

Verbal self-efficacy is the belief in one's ability to successfully perform work in language related activities (spelling, reading, writing). It was predicted that there would be significant academic self-efficacy effects as measured by verbal self-efficacy scores when examining the dependent variable academic risk-taking. The results of this study indicate

that only female adolescents place a high value on verbal abilities. Gender differences appeared in the present study's results that indicated that females' verbal self-efficacy influenced their level of difficulty for their academic risk-taking on verbal tasks, while males were solely influenced in their academic risk-taking by mathematical self-efficacy. Academic ability levels (remedial, general, honors) did not appear to be a variable affecting the students' verbal self-efficacy. The means for both genders at all ability levels were in the high verbal self-efficacy range.

Conclusions

This study's findings may indicate that educational reforms are being successful in elevating the perception female students have of their academic abilities. Further research should continue to investigate possible gender differences in academic risk-taking and examine the possibility that the female perception of the academic ability levels is indeed changing for the better. Future research will be needed to examine the extent to which gender differences in academic risk-taking are a function of academic self-efficacy. Another avenue for future research is to see if the same results are replicated across various ethnic groups.

Deficits in mathematics self-efficacy has been sited as a major factor contributing to the low numbers of females pursuing high level mathematics courses (Canary and Hause, 1993). The present study disputes the claim of low mathematics self-efficacy among female students. This study supports the findings of Schunk and Lily (1984) and Zimmerman and Martinez-Pons (1990). Both these studies showed no gender differences in mathematic self-efficacy. Two studies, Lopez and Lent (1992) and Hackett and Campbell (1987) did find that their male subjects exhibited significantly greater self-efficacy in mathematics than their

female subjects. A major difference in the two studies that did not find significant gender differences and the two studies that did, involve the age of the subjects. The Schunk and Lily study (1984) and the Zimmerman and Martinez-Pons (1990) study used young adolescent students as subjects. The Lopez and Lent (1992) study and Hackett and Campbell (1987) study used college students as subjects. The present study's findings add support to the conclusion that girls may not make the transition from high school math to advanced postsecondary courses in math (AAUW, 1998). Further research should investigate the transitional period from high school mathematical classes to college level. Comparing the classroom culture of high school mathematical classes to college mathematical classes is an essential research area. Research should study and compare secondary and post-secondary mathematical class structure, dynamics, instructional curriculum, and pedagogy to determine which factors are promoting achievement for females and which factors are undermining achievement.

Females have been shown to have a marked preference for verbal related tasks over math tasks (Canary & Hause, 1993; Hackett & Campbell, 1987). This study indicates females have strengthened their mathematical self-efficacy, but not at the expense of their verbal self-efficacy. Perhaps the educational reforms of the past few decades are teaching female adolescents how to effectively develop both a strong verbal self-efficacy and a strong mathematical self-efficacy. More research is needed to determine the exactly how the educational reforms are facilitating the growth of academic self-efficacy for female students.

Limitations of Study

A limitation in the present study is the low representation of participants. There were only seventy-three subjects for the female model and sixty for the male model. Path analysis

is a large sample technique. The low subject count affects other areas of the study. The low representation of remedial and honors ability level participants is a serious limitation. Conclusions with strong generalizability regarding academic ability placement as a variable cannot be drawn from this study. Replication studies with a larger representation of mathematical and English honor and remedial ability level adolescent students is necessary to determine the importance of ability placement as a variable.

There was a low representation of ninth grade students in the present study. Ninth grade is the final more generalized curriculum grade before the more specialized curriculum of high school. The specialized curriculum of high school begins to prepare students for post-secondary pursuits. Replication studies with a larger representation of ninth grade students is necessary to strengthen the generalizability of this study's findings concerning the strength of math self-efficacy within each gender and its importance as a variable.

There exists the possible limitation that important gender differences in academic risk-taking and academic self-efficacy were not sufficiently measured with the instruments used in this study. This is the first documented study conducted using the Academic Risk-Taking (ART) measure and an Academic Self-efficacy scale. Replication studies involving other instruments claiming to measure academic risk-taking and academic self-efficacy should be conducted. More research is needed to see how far such gender differences can account for, or be useful in predicting academic risk-taking behaviors and the pursuit of academic and educational goals.

Limitations, due to the use of path analysis, include the time precedence set up in the models. When a variable is placed before another variable it does not necessarily mean that the first variable caused the second variable. A third or fourth variable may be responsible

for the influence of the first variable on the second. Tied in with this limitation is the limitation brought on by model misspecification. A second variable may have been left out of the model. Future researchers should add other variables into both the original models and the reduced models for both genders. A limitation to any study involving the use of path analysis involves the fact that correlation is no proof of causation. Path analysis is only suggestive of causal linkages and patterns (Leclair, 1981).

The models in this study are static and capture only to a limited degree the processes underlying the development of academic self-efficacies and attitudes. Self-efficacy theory suggests on ongoing and reciprocal interaction between learning-related efficacy expectations, anxiety, and learning interests (Hackett & Betz, 1981). The very high residuals in the models used in this study support the concept of the models being static and capture only a limited amount of the complexity behind learning. static nature of the model Therefore, other recursive and some nonrecursive models including models incorporating the variables used in this study, as well as more of the hypothesized variables, must be developed and tested, and studies of a longitudinal nature need to be conducted to build a model that will come closer to reflecting the process of developing strong academic risk-taking tendencies.

Implications

One of my aims in this study has been to further the understanding of students' behavioral, cognitive, and affective patterns in academic risk-taking situations through attempting to explore a possible relationship between academic self-efficacy and academic risk-taking. Another intention for this study was to give voice to the proposed relationship of academic self-efficacy and academic risk-taking to strengthen the continued progress towards

maximizing female educational achievement. The conflicts between psychological theories regarding risk-taking and educational practices could possibly be a threat to the development of our intellectual resources. If risk-taking plays as central a role in current theories of human motivation and cognitive development as is postulated, there is evidence to indicate that it can play a pivotal role in improving educational success for a variety of students.

Implications for Education

As educators, our definitive goal is to provide each individual student with the most appropriate learning situation. To accomplish this, means the identifying and implementing of different motivational techniques that encourage every student to reach their educational potential.

Based on the gender findings from this research, it was found that males and females rely on the strengths of different academic self-efficacies in academic risk-taking situations. This study's findings showed that female students drew upon both their verbal self-efficacy and math self-efficacy feelings when engaging in an academic risk-taking situation. Male students appeared to only rely on their math self-efficacy when involved in an academic risk-taking situation. It can be concluded that educators need to develop both a strong math and strong verbal self-efficacy within their female students as a stepping stone to developing stronger academic risk-taking desirabilities. The development of strong math self-efficacy in all students needs consideration by teachers when developing strategies for instruction.

It is also important as educators, to identify instances of academic risk-taking (answering a question when you are not sure of the answer, guessing on a test, etc.) to students and discuss how weak academic risk-taking desirabilities can hinder a student's educational potential. When students obtain a stronger understanding of what academic risk-

taking is, what the consequences of strong risk-taking desirabilities or weak risk-taking desirabilities are, and how academic self-efficacy plays a role in developing stronger academic risk-taking desirabilities, then the gender differences in education will diminish further.

Results of this study may have significant influence on future development of educational programs that focus on developing academic risk-taking desirability and strategies. Effective methodological changes can only be obtained through a thorough understanding of the complex set of behaviors that make up the concept of academic risk-taking. A better understanding of academic risk-taking may provide stronger proof for a school environment characterized by tolerance for error making, reinforcement for error correction, and encouragement for risk-taking—characteristics rarely found in today's classrooms.

Implication for Research

It was my intention for this study to address the area of academic risk-taking and the motivational variable of perceived competence, as well as, variables associated with learning and cognitive development. Finally, this study was intended to extend current findings involving development patterns for academic risk-taking. Evidence of developmental patterns in academic risk-taking is limited because (a) samples often include one or two grade levels (e.g., Clifford & Chou, 1991; Clifford et al., 1989); (b) subjects abilities are not adequately controlled (e.g., Clifford, 1988); or (c) grade level has not been analyzed (Lan, 1988).

Education research needs to focus further on academic risk-taking and further develop the theories regarding this psychological phenomenon as it relates to educational

pedagogies and classroom culture. It is imperative that efforts be made to identify the determinants of academic risk-taking and to identify practical techniques or principles for facilitating moderate risk-taking on academic achievement tasks. New theories designed to refute and replace ineffective and outdated educational policies and practices must be developed. In our search for excellence in education this study's findings indicate that the correlation of academic self-efficacy and academic risk-taking is an avenue of research to pursue.

An area needing investigation is female self-perception and perceptions of how others are affected by individual academic risk-taking. Research indicates that males and females make different inferences about how their own performances affect others' feelings and others' attraction toward them (Daubman & Sigall, 1997).

Academic risk-taking, in the area of guessing, also affects performance on standardized tests (Ramos & Lambating, 1996a). Standardized tests can have a profound effect on the opportunities students will be afforded in their education endeavors. Scores on tests such as the Scholastic Aptitude Test (SAT) and the Graduate Record Exam (GRE) can aid or prevent an individual's entrance into desired colleges, universities, and programs of study. These tests are often biased against those who are not deemed high risk takers (Ramos & Lambating, 1996a). These discriminating circumstances gives further support to the continued study of academic risk-taking.

Clifford (1991) expressed concern that there are five areas of theoretical significance relevant to education and risk-taking that warrant attention. First, there are motivational concerns, such as clarifying the reciprocal relations between academic risk-taking variables and variables associated with need achievement, attributions, goal-

setting, intrinsic motivation, and perceived competence and control. Second, there are information-processing concerns, such as clarifying the reciprocal relations between academic risk-taking variables and variables associated with learning, metacognition, memory, strategy development, and strategy use. Third, there are developmental concerns, such as clarifying the reciprocal relations between academic risk-taking variables and variables associated with cognitive development, the use of scaffolds, and the generalizing of cognitive skills across tasks and situations. Fourth, there are measurement concerns, such as devising more challenging types of objective items, developing valid methods for categorizing items by difficulty, establishing criteria for balancing formative evaluation (likely to encourage moderate risk-taking) and summative evaluation (likely to discourage risk-taking), devising formulas for estimating the reliability and validity of risk-taking instruments, and assessing the effects of incorporating risk-taking and standardized testing. Finally, there are curriculum development concerns, such as generating risk-taking activities for textbooks, devising means of ensuring immediate informational feedback for risk-taking activities, and developing risk-taking activities other than the multiple-choice tests (e.g., activities aimed at developing debate, writing, reading, athletics, and music skills).

Implications for Theory

Two evolving theories provided the theoretical framework for this study. These two theories were Clifford's (1984) Theory of Constructive Failure and Bandura's (1977a) Theory of Self-Efficacy.

The Theory of Constructive Failure (Clifford, 1984) postulates that moderate risk-taking is positively correlated with constructive responses to failure. This theory predicts

that failure outcomes on moderately difficult tasks will produce relatively constructive responses (e.g., error correction, change in problem-solving strategy, help seeking). It also predicts that individuals who have a high tolerance for failure will be more likely to expose themselves to challenge or risks. From this theory, Clifford has developed the concept of academic risk-taking. On going research has identified some variables as being determinants of academic risk-taking. This study's findings indicate that academic self-efficacy is another variable that is possibly a determinant of academic risk-taking for adolescent students. Fick's (1994) hypothesis that a possible explanation for the difference in academic risk-taking between genders is that the cognitive processing involving perceived self-efficacy for males and females is dissimiliar is supported by this study's findings. The findings that indicated that males relied only on mathematical self-efficacy, while females relied on both verbal and mathematical self-efficacy for academic risk-taking situations, adds some clarification to the basic psychological and cognitive processes associated with academic risk-taking.

The Self-Efficacy Theory suggests that a person's self-efficacy expectation concerning the ability to successfully perform a given task is a reliable predictor of whether the person will attempt the task, how much effort he or she will spend, and how much the person will persevere in pursuing the task in the face of unforeseen difficulties (Bandura, 1977a). The literature indicates that self-efficacy is gender related with boys usually reporting higher math self-efficacy while girls usually report higher verbal self-efficacy (Canary & Hause, 1993; Randhawa, et al., 1993). This study's findings indicate that although females have a higher verbal self-efficacy than males, mathematical self-efficacy is still important to develop within female students.

Concluding Remarks

The present study was conducted with seventh, eighth, and ninth grade male and female students to investigate a possible relationship among academic self-efficacy and gender on academic risk-taking for adolescent students. The high residuals in this study's models indicate possible model misspecification or the leaving out of one or more important variables that would otherwise account for the variance. Learning is a complex phenomenon and more research should be conducted involving academic self-efficacy and academic risk-taking.

The primary results indicated that for female adolescent students both math self-efficacy and verbal self-efficacy play a role in bolstering the academic risk-taking of girls. Male students indicated that only math self-efficacy plays a role in the academic risk-taking desirability of males. Research (Yates & Stone, 1992) has indicated that personalized training can encourage appropriate risk-taking within individuals. The finding that females require both a strong math and verbal self-efficacy, while males just need a strong math self-efficacy, helps educators design a more personalized training program for building academic risk-taking tendencies within deficient students.

Based on the present findings, it can be concluded that learning activities and assignments that promote the development of strong mathematical self-efficacy within students can yield positive growth in academic risk-taking tendencies. Consistent with theory, well developed academic risk-taking tendencies can be expected to enhance a student's educational potential. More specifically, to develop an understanding of academic risk-taking and the role it plays in educational and career choices, educators might (a) discuss

academic risk-taking with students, (b) design learning activities and assignments that promote the growth of a positive mathematical self-efficacy, and (c) design learning activities and assignments that promote the use of academic risk-taking.

The presents study's indications that female adolescent students and their male classmates do not differ in their academic risk-taking desirabilities must be further examined for all academic ability level students. The low representation of subjects at each academic ability level was a serious limitation within this study. Generalizability was seriously hampered by the low number of participants. Research goals should be: (a) further investigation of the affects of academic ability level, (b) replication of the study with more study participants, (c) further investigation of academic risk-taking and ninth grade students, (d) investigating academic risk-taking, academic self-efficacy and ethnicity, and (e) investigation of the transitional period from high school math classes to college level math classes.

Research has indicated that personalized training can encourage appropriate risk-taking within individuals (Yates & Stone, 1992). A systematic analysis of academic risk-taking behaviors as it relates to various male and female experiences may allow for the development of stronger individual needs oriented academic support systems. The development of academic support systems aimed at providing academic risk-taking instruction, similar to the problem-solving curriculum instruction of the past decade could be instrumental in bringing all students closer to their level of academic promise. Academic risk-taking instruction that validates and reinforces various versions of academic experiences may better equip all students for lifelong learning and achievement.

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APPENDIXES

Appendix A

Oklahoma State University's Institutional Review Board

Approval Form

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Date: March 7, 2000 IRB #: ED-00-194

Proposal Title: "AN INVESTIGATION OF THE EFFECTS OF GENDER AND ACADEMIC SELF-EFFICACY ON ACADEMIC RISK-TAKING FOR ADOLESCENT STUDENTS"

Principal Investigator(s): Diane Montgomery
Debbie House

Reviewed and Processed as: expedited (Special Population)

Approval Status Recommended by Reviewer(s): Approved

Signature: Carol Olson

Carol Olson, Director of University Research Compliance

March 7, 2000
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

Appendix B

School Building Administrator
Approval Forms

Date: Feb. 22, 2000

I JoEtta Terrell, Principal of Berryhill Jr. High
printed name name of school
have agreed to allow Debbie House administer the Academic Risk Taking test, a Math Self-efficacy scale, an English Self-efficacy, and a student information sheet to those 7th, 8th, and 9th grade students that have returned their parental consent forms. The administration of these instruments are in conjuncture to completing the requirements of Mrs. House's Ph. D. program at Oklahoma State University.

JoEtta Terrell
Signature

Date: Feb. 29, 2000

I Phil Winfield, Principal of Keystone Middle School
printed name name of school
have agreed to allow Debbie House administer the Academic Risk Taking test, a Math Self-efficacy scale, an English Self-efficacy, and a student information sheet to those 7th, 8th, and 9th grade students that have returned their parental consent forms. The administration of these instruments are in conjuncture to completing the requirements of Mrs. House's Ph. D. program at Oklahoma State University.

Phil Winfield
Signature

Appendix C

Parental/Guardian Consent Form

Code _____
ID# _____

Parent or Guardian Consent Form

Dear Parents,

I am a doctoral student at Oklahoma State University. Mrs. Terrell has given me permission to conduct research concerning student beliefs about how well they can do school related tasks and the difficulty of the problems in math or English that they choose to solve. This research will enable me to meet my Ph.D. requirements, as well as, further educators' understanding of the learning process.

I am interested in looking at how adolescent boys and girls differ in their views about how well they think they can perform math related tasks and English related tasks and how this effects their academic risk-taking desirability. Academic risk-taking is taking risks related to learning such as participating in class discussions, answering questions when one is not sure of the answer or taking a high level class when one is not sure of successfully completing class requirements. I will be asking 7th, 8th, and 9th grade students to take about 15 minutes to answer some questions relating to demographics, their beliefs in their own ability to do math and English related tasks and to demonstrate their own academic risk-taking desirabilities by completing the Academic Risk-taking (ART) measure. The Acaemic Risk-Taking (ART) measure is designed to measure a person's academic risk-taking by having them select and work 10 math problems from a provided 64 problems. The harder the problems selected the more of an academic risk-taker the student is supposed to be. The same concept exists with having the student solve 10 self-selected vocabulary problems and 10 self-selected spelling problems, as well.

Parental permission is required for students to participate in this study. Packets will be assigned coded numbers to guarantee anonymity and confidentiality. Your child's participation is strictly voluntary and your child may stop answering questions at anytime. It will be greatly appreciated if you would allow your child permission to answer the study questions.

You may contact me at (918) 446-1850 or Dr. Diane Montgomery at Oklahoma State University in Stillwater at (401) 744-9441 or Sharon Bacher from The Institutional Review Board for Oklahoma State University in Stillwater at (405) 744-5700 if you have any questions. Please complete the form below and have your child return it to the school office as soon as possible.

Thank you,

Debbie House, M. Ed.

My son daughter (Please circle the appropriate one)

_____ may participate in the study

_____ may not participate in the study

Parent/Guardian's signature _____

Parent/Guardian of _____

Appendix D

Participant Assent Form

Code _____
ID# _____

PARTICIPANT ASSENT FORM

An Investigation of the Effects of Gender and Academic Self-Efficacy on Academic Risk-Taking for Adolescent Students

Dear Participant:

I am interested in seeing your ideas about how well you think you can successfully complete a task. To do this, I am asking that you complete some tasks. One task will help me understand how you take risks related to learning. Another task is related to your math class(es) and requires you to work 10 self selected math problems. Another task concerns your English class(es) and requires you to answer 10 vocabulary and 10 spelling problems. The final task is answering some routine questions about yourself and your school. Your name will NOT appear anywhere on any of the papers. Parental consent is required for your participation in this study. It should take you about 15 minutes to complete all the questions. The information you provide can be helpful in helping teachers improve their classes.

I understand that:

1) The purpose of this study is to examine the role of gender and academic self-efficacy (individual student beliefs concerning their ability to succeed in school related tasks) on academic risk-taking desirabilities for adolescent students;

2) I will be requested to complete a survey measuring academic risk-taking, verbal self-efficacy and mathematics self-efficacy;

3) it will take approximately 15 minutes to fill out the instruments and demographic survey;

4) my name will NOT appear on any of the instruments or survey;

5) all records are anonymous;

6) parental consent is required before I can participate in this research study;

7) participation is completely voluntary and that I have the right to withdraw from this study AT ANY TIME;

8) I may contact Debbie House at (918) 446-1850, Dr. Diane Montgomery at (405) 744-9441 or Sharon Bacher from The Institutional Review Board, 305 Whitehurst, Oklahoma State University, at (405) 744-5700 should I wish further information.

I have read and fully understand the assent form. I sign it freely and voluntarily.

Date _____

Signature _____

Appendix E

Math Self-Efficacy Measure

Instructions:

Listed below are a series of statements. You will probably agree with some items and disagree with others. Please read each statement carefully. Then indicate the extent to which you agree or disagree by circling the number following each statement. The numbers and their meanings are listed below.

If you find that the numbers to be used in answering do no adequately reflect your own opinion, please use the one that is closest to the way you feel.

1 - Strongly Agree	2 - Somewhat Agree	3 - Neutral	4 - Somewhat Disagree	5 - Strongly Disagree

1. I avoid facing difficulties involving math assignments.	1	2	3	4	5
2. I give up on math assignments before completing them.	1	2	3	4	5
3. When I set important math goals for myself, I rarely achieve them.	1	2	3	4	5
4. When I have an unpleasant math assignment to do, I stick to it until I finish it.	1	2	3	4	5
5. When trying to learn some new math concept, I soon give up if I am not initially successful.	1	2	3	4	5
6. If a math assignment looks too complicated, I will not bother to try it.	1	2	3	4	5
7. I avoid trying to learn new math concepts when they look too difficult for me.	1	2	3	4	5
8. I am a self-reliant person when it involves math assignments.	1	2	3	4	5
9. One of my problems involving math assignments is that I cannot get down to work when I should.	1	2	3	4	5
10. Failing on math assignments just makes me try harder.	1	2	3	4	5
11. When I have a math assignment, I go right to work on it.	1	2	3	4	5

12. When I make plans concerning math assignments, I am certain I can make them work.	1	2	3	4	5
13. I do not seem capable of dealing with most problems that come up involving math assignments.	1	2	3	4	5
14. When unexpected problems occur involving math assignments, I don't handle them well.	1	2	3	4	5
15. If I can't do my math assignment the first time, I keep trying until I can.	1	2	3	4	5
16. I feel insecure about my ability to do my math assignments.	1	2	3	4	5
17. I give up easily on my math assignments.	1	2	3	4	5

Appendix F

Verbal Self-Efficacy Measure

Instructions:

Listed below are a series of statements. You will probably agree with some items and disagree with others. Please read each statement carefully. Then indicate the extent to which you agree or disagree by circling the number following each statement. The numbers and their meanings are listed below.

If you find that the numbers to be used in answering do no adequately reflect your own opinion, please use the one that is closest to the way you feel.

---

1 - Strongly Agree	2 - Somewhat Agree	3 - Neutral	4 - Somewhat Disagree	5 - Strongly Disagree

---

1. I avoid facing difficulties involving English assignments.	1	2	3	4	5
2. I give up on English assignments before completing them.	1	2	3	4	5
3. When I set important reading goals for myself, I rarely achieve them.	1	2	3	4	5
4. When I have an unpleasant English assignment to do, I stick to it until I finish it.	1	2	3	4	5
5. When trying to learn some new vocabulary words, I soon give up if I am not initially successful.	1	2	3	4	5
6. If an English assignment looks too complicated, I will not bother to try it.	1	2	3	4	5
7. I avoid trying to learn new vocabulary words when they look too difficult for me.	1	2	3	4	5
8. I am a self-reliant person when it involves English assignments.	1	2	3	4	5
9. One of my problems involving English assignments is that I cannot get down to work when I should.	1	2	3	4	5
10. Failing on English assignments just makes me try harder.	1	2	3	4	5
11. When I have an English assignment, I go right to work on it.	1	2	3	4	5

12. When I make plans concerning English assignments, I am certain I can make them work.	1	2	3	4	5
13. I do not seem capable of dealing with most problems that come up involving English assignments.	1	2	3	4	5
14. When unexpected problems occur involving English assignments, I don't handle them well.	1	2	3	4	5
15. If I can't do my English assignment the first time, I keep trying until I can.	1	2	3	4	5
16. I feel insecure about my ability to do my English assignments.	1	2	3	4	5
17. I give up easily on my English assignments.	1	2	3	4	5

Appendix G

Demographic Data Sheet

Code _____
ID# _____

Demographic Survey

INSTRUCTIONS: Please place a check ( ) in front of the response that best describes you or fill in the blank provided. Please do not leave any questions blank. If an answer is not provided that best describes you, please fill in what is more appropriate.

1. Gender: ( ) Male ( ) Female

2. Age: _____ 3. Grade _____

4. I am currently enrolled in ( ) remedial ( ) honors ( ) AP ( ) general math classes.

5. I am currently enrolled in ( ) remedial ( ) honors ( ) AP ( ) general English classes.

6. What do you estimate your current GPA to be? _____

7. I consider myself:
   ( ) White Caucasian
   ( ) African-American or Black
   ( ) Hispanic or Latino
   ( ) Native American or American Indian
   ( ) Asian American
   ( ) Middle Eastern
   ( ) Mixed _____ (please be specific)
   ( ) other _____ (please be specific)

8. I am: ( ) right handed ( ) left handed ( ) ambidextrous

9. My favorite subject in school is: _____

10. I ( ) like ( ) dislike ( ) feel neutral about math class.

11. I ( ) like ( ) dislike ( ) feel neutral about English class.

12. What is your first career choice? _____

13. I am currently in or have spent at least one year in these **school** activities: (Please check all that apply)
   ( ) band
   ( ) choir
   ( ) athletic programs
   ( ) clubs
   ( ) Student Council

14. I participate in the following community activities: _____

15. I spend about _____ hours a week playing video games (Sony PlayStation, Nintendo 64, GameBoy, Sega Genesis, games in arcades, etc.).

Appendix H

Solicitation To Volunteer Participants

Code _____
ID# _____

Solicitation to Volunteer Participants

Dear Participant,

I am interested in seeing your views concerning learning in the classroom and your beliefs about how well you think you can do math related tasks and English related tasks. To do this, I am asking that you complete 4 short pencil and paper tasks. One task is the Academic Risk-taking measure that will help me understand how well you like to take risks related to learning. One task is answering a few questions related to math classes and one task is answering a few questions concerning English classes. The final task is answering some routine questions about yourself and your school. Your name will NOT appear anywhere on any of the papers. It should take about 20 minutes to complete all the questions. The information you provide can be helpful in helping teachers improve their classes.

Your participation is entirely voluntary and is greatly appreciated. Remember, your name will NOT appear anywhere on any of the papers.

Thank you,

Debbie House

Appendix I

Procedural Script

Procedural Script

First, I want to thank you for taking the time to fill out this packet. Some of the questions concern information about you, such as your age and grade. Some of the questions deal with how well you think you can do math and English assignments. The only actual school type tasks that you will have to do is when you get to this part (hold up Academic Risk-Taking (ART) measure). Then you don't have to do all the problems, you just choose **5** problems on **EACH** page. Each row of problems is worth a different amount of points. If you look down the side of the page you can see that the first row is worth 1 point and the second row 2 points, and so on. If you work problems on rows worth more points than you get a much higher score—but the answer has to be correct to get the points.

So remember, **5** problems on each page. Completing this packet is strictly voluntary on your part and you may quit answering questions at anytime. In no way is any of this going to effect you grade in this class. Your name is nowhere on any of the assessment pages.

Please **DO NOT** put your name anywhere on any of the papers.

When you are finished answering all the questions please close your packet and wait quietly at your desk until I pick up your packet and you may find something quiet to do, such as reading.

Thank you again for your help. It is greatly appreciated.

You may begin when you are ready.

VITA 2

Debra House

Candidate for the Degree of

Doctor of Philosophy

Dissertation: AN INVESTIGATION OF THE EFFECTS OF GENDER AND ACADEMIC SELF-EFFICACY ON ACADEMIC RISK-TAKING FOR ADOLESCENT STUDENTS

Major Field: Special Education

Biographical:

Education: Graduated for Fayetteville High School, Fayetteville, Arkansas in May 1978, received Bachelor of Arts degree in History from the University of Arkansas, Fayetteville, Arkansas December 1983. Received Master of Education degree in Special Education for the University of Arkansas, Fayetteville, Arkansas August 1985. Received certification in secondary Social Studies from the University of Arkansas, Fayetteville, Arkansas May 1990. Attended classes in psychometry at Northeastern State University, Tahlequah, Oklahoma, January 1991 until December 1993. Completed the requirements for Doctor of Philosophy with a major in Special Education at Oklahoma State University, August 2002.

Experience: Employed by Fayetteville School District as a teacher assistant in the elementary level seriously emotional disturbed classroom while working on my teaching certification. Employed by Fayetteville School District (Fayetteville, Arkansas) August 1985 until June 1990 as a special education teacher. Employed by Tulsa Public School System (Tulsa, Oklahoma) August 1990 until May 1991 as a special education teacher. Employed as a preschool teacher (Tulsa, Oklahoma) August 1991 until February 1993. Employed by Surrey County School System (County Surrey, United Kingdom) as a special education teacher October 1998 to May 1999. Employed by Springdale Public schools as a long term (maternity leave) substitute teacher February 2001 until present.