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Tradition to transition: A look at 7th grade female students’ self-esteem and math scores

Kaufman, Janet Burch, Ed.D.
The University of Arizona, 1990
TRADITION TO TRANSITION: A LOOK AT 7TH GRADE FEMALE STUDENTS' SELF-ESTEEM AND MATH SCORES

by

Janet Kaufman

A Dissertation submitted to the Faculty of the DIVISION OF TEACHING AND TEACHER EDUCATION

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In the Graduate College

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1990
As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Janet Kaufman entitled Tradition To Transition: A Look At 7th Grade Female Students' Self-Esteem and Math Scores and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Education.

Donald C. Clark
4/3/90

Sally Clark
4/3/90

Janice Streitmatter
4/3/90

Oscar Christensen

Richard Erickson

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Donald C. Clark
4/3/90
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ABSTRACT

The purpose of this study was to empirically investigate the transition process of a K-8 school vs. a 7-8 school as it relates to 7th grade female's attitudes, self-esteem and grades in the area of mathematics.

The experimental hypotheses were designed to answer the following questions: (1) What are the transitional effects on female students' self-esteem? (2) Is there any difference in math attitudes between K-8 female students and middle school (7-8) female students regarding the importance of math for their future? (3) What are the transition effects on female students' math grades?

The research design included the fall population of female 7th grade students from one 7-8 middle school (School A) and two K-8 schools (B-1 and B-2). A questionnaire composed of self-esteem measures and a math attitudes survey were administered five weeks after the start of the 1989-90 school year, and again, three weeks prior to the end of the 1989-90 semester.

The findings of this study indicated that there are no transitional group differences relating to self-esteem. Transition effects, as reported by Occasion 1 and 2 data, yielded no visible effects of self-esteem by the transition, with Group A and Groups B-1 and B-2 reporting similar effects.
For math attitudes, pre-transition effects were significant but the group differences were not. However, when looking at the K-8 separately it was noted that math attitudes had decreased significantly from pre-transition to post-transition whereas there were non-significant differences noted for middle school students on all four variables.

It was noted that pre-transition math grades were related to post-transition math grades, however, the group effect (K-8 vs. middle school) evidenced no statistical differences on transitional effects as they relate to math grades.

The results of this research concludes that there is no difference in 7th grade females regarding self-esteem, math attitudes and grades regardless of what type of school structure--K-8 or middle school.
CHAPTER 1
THE PROBLEM

Introduction

. . . the predominant message seems to be that most highly competent and otherwise achievement motivated young women, when faced with a conflict between their feminine image and expressing their competencies or developing their abilities and interests, adjust their behaviors to their internalized sex-role stereotypes. We have seen that even within our achievement-oriented society the anticipation of success, especially in interpersonal competitive situations, can be regarded as a mixed blessing if not an outright threat. Among women, the anticipation of success especially against a male competitor poses a threat to the sense of femininity and self-esteem and serves as a potential basis for becoming socially rejected (Horner, 1972, p. 173).

Seventeen years ago Matina Horner wrote those words. Unfortunately, research shows that today, they still hold true.

The research of Simmons, Rosenberg, and Rosenberg (1973) raised the possibility that girls were particularly at risk during early adolescence. At about age 12, some children experience a distinct decrease in self-esteem and self-concept stability and, similarly, sharp increases in depression and self-consciousness (Elliott, 1984). Beane, Lipka, and Ludewig (1980) support these findings citing that self-perceptions are to some extent age-related. Maccoby and Jacklin's (1974) comprehensive review of psychological sex differences suggested
that many of the "established" sex differences emerged during early adolescence.

Petersen and Crockett (1985) state that self-esteem and self-concept may be a part of the developmental process.

... grade in school also indexes a set of norms characteristic of young people at a particular grade level. These norms, reflecting in part the expectations of the broader society concerning behavior at a particular grade level as well as the opportunities and limitations imposed on young people by school policies, are also shaped by the young people making up the particular grade cohort. At a junior high school, the seventh-graders may have a specific identity distinct from that of the eighth graders, in part because of the unique prior and current experiences of the cohort. Somewhat different behavioral norms may prevail in the two grade cohorts, differences that may be tapped by the variable grade in school (pp. 203-204).

Thornburg and Jones (1982) in their analysis of the social characteristics of the early adolescents support the idea that, "age is a more potent mediator of adolescent psychosocial development than either grade or structural transition" (p. 238). In addition, they promote focusing on "the nature of the early adolescent" over "organizational and administrative features" (p. 238).

Researchers such as Johnson and van der Werf (1987), found that females held more negative attitudes toward mathematics and science. These negative attitudes may contribute to low expectations for success and participation and to the perception that mathematics is a male domain (in Sabers, Cushing, & Sabers, 1987).
van der Werf (1987) found that sex stereotyping of a subject appears to influence achievement in mathematics. Research has shown that girls make higher demands on themselves with tasks that they consider as appropriate for their own sex and tend to avoid those tasks they consider appropriate for boys.

A strong relationship has been found between self-confidence and mathematics achievement for both boys and girls. Girls, more than boys have an extreme lack of self-confidence, and these feelings can hinder the learning of mathematics and can contribute to its avoidance (Tobias & Weisbrod, 1980; van der Werf, 1987).

Rosenberg and Simmons (1975), state that:

The adolescent girl is considerably more sensitive than the boy to others' opinions. The adolescent girl appears to be more self-conscious (i.e., concerned with the self in social situations), more concerned with others' opinions of her, more eager to avoid behavior eliciting negative reactions, and more vulnerable to others' negative reactions. In every case the difference between boys and girls either emerges or grows stronger during the adolescent period (p. 154).

During a female's adolescent stage, it is important to take classes that support her "feminine role". The area of mathematics is not one of those classes willingly chosen. Stein and Bailey (1973) concluded that females have lower achievement motivation in academic areas not considered sex-appropriate.
Whitbeck's (1987) research on self-efficacy of early adolescents found that the self-efficacy of boys is more strongly affected by perceived parental efficacy than is the self-efficacy of girls. His research findings are consistent with research on gender differences in self-concept. Whitbeck states:

Males consistently are more likely to describe themselves in terms of mastery, control, achievement, and efficacy, while females are more likely to describe themselves in terms of interpersonal characteristics such as nurturance, consideration for others and expressiveness. Also, there is considerable evidence that boys are socialized towards achievement and mastery and girls toward nurturance and interpersonal relationships. These different gender expectations may cause boys to be more sensitive to efficacious models for task performance and coping with new or frustrating situations. Gender role expectations for girls, on the other hand, may cause them to be more responsive to quality of interaction (p. 175).

Fennema and Sherman's (1978) findings show that boys perceived mathematics as being more useful than did girls. Their research found that this difference began in middle school and became significant in high school. Further findings lead to their conclusion that:

There is an accumulation of evidence which points to the conclusion that sexual stereotyping of mathematics as a male domain operates through a myriad of subtle influences from peer to parent and within the girl herself to eventuate in the fulfillment of the stereotyped expectation of a 'female head that's not much for figures.' This stereotyped, as well as the attitudinal patterns of students (both self-image and peer group) are unfortunately reinforced by the expectations of teachers (1976, p. 599).
In summary, there would seem to be a complex network of forces associated with the development of different patterns of sex roles for boys and girls, that are imposed on children by the home, the school and the peer group. It is paramount that educators recognize these patterns and promote equality amongst the sexes in all academic areas but especially in the middle school level where attitudes are most subject to change.

Rationale

In the 1978 *Journal for Research in Mathematics Education*, Elizabeth Fennema and Julia Sherman commented:

As early as the 6th grade, girls express less confidence than boys in their ability to do mathematics, and the subject was clearly sex-typed male, especially by the boys. In the high school years these differential attitudes influences continued and were joined by a host of other negative attitudinal influences, such as girl's perceptions of mathematics as being less useful to them and girl's perception of less favorable attitudes on the part of their teachers and parents, especially the fathers (p. 202).

Meece, Parsons, Kaczala, Goff, and Futterman (1982) also support this view by stating that research underscores the need for a comprehensive approach to the problem and for early intervention while children's personal value orientations and occupational interests are developing before students unknowingly or unnecessarily restrict their career options by choosing to limit their background in mathematics.
Statement of the Problem

This study investigated and compared the performances among groups of female students (Group A = 7-8 school; Group B = K-8 school) relative to middle school transition and how this transition affected their self-esteem as well as their math achievement.

Research Questions

The following questions provided structure for the study:

1. What are the transitional effects on female students' self-esteem?
   
   Ho : $X_{1.1} - X_{1.2} = 0$
   
   $H_A : X_{2.1} - X_{2.2} = 0$

   **New School**
   
   Where $X_{1.1}$ = pre-transition and self-esteem
   
   Where $X_{1.2}$ = post-transition and self-esteem

   **Same School**
   
   Where $X_{1.2}$ = post-transition and self-esteem
   
   Where $X_{2.2}$ = post-transition and self-esteem

2. Is there any difference in math attitudes between K-8 female students and 7-8 middle school female students regarding the importance of math for their future?
   
   Ho : $X_{1.1} - X_{1.2} = 0$
   
   $H_A : X_{2.1} - X_{2.2} = 0$
New School
Where $X_{1.1}$ = pre-transition and attitudes
Where $X_{1.2}$ = post-transition and attitudes

Same School
Where $X_{2.1}$ = pre-transition and attitudes
Where $X_{2.2}$ = post-transition and attitudes

3. What are the transitional effects on female students' math grades?
$H_C : X_{1.1} - X_{1.2} = 0$
$H_A : X_{2.1} - X_{2.2} = 0$

New School
Where $X_{1.1}$ = pre-transition and grades
Where $X_{1.2}$ = post-transition and grades

Same School
Where $X_{2.1}$ = pre-transition and grades
Where $X_{2.2}$ = post-transition and grades

Assumptions

For the purpose of this study, the following conditions were assumed:

1. All of the instruments used in this study are reliable and valid.
2. The early adolescents involved in this study are valid sources of data.
3. The data collected will be applicable within the context of this research problem.
4. The students selected for this study provided honest answers to the test measures.

Limitations

The study was limited by the following:

1. The study was restricted geographically to two school districts in the southwestern part of Arizona.
2. The study included only seventh grade female students enrolled in three schools selected for the study.
3. The study was limited to the measurement of grades and the affective dependent variables of self-esteem and math attitudes.

Definition of Terms

Duration. The period of time that students may be affected by a school transition.

Intermediate Educational Environment. A school which combines into one organization and facility certain school years, usually grades 5-9, between the elementary and high school configurations.

Junior High School. A transitional school serving students in the preadolescent years with an organization and program structured around "junior" high school content and activity, usually in a 7-8 or 7-9 configuration.
Middle School. A transitional school concerned with the most appropriate programs to cope with the personal, social, and educational needs of emerging adolescent learners, usually in a 5-8 or 6-8 configuration.

Middle School/Junior High Schools. The unique population of 10-14 year-olds (the years most usually involved), including older children, preadolescents, emerging and early adolescents, and adolescents who will experience a wide range of developmental tasks at different times during these years.

Self-Esteem. "Positive or negative attitude toward a particular object, namely the self. The evaluation which the individual makes and customarily maintains with regard to himself" (Rosenberg, 1965, p. 30).

Transition. Developmental progression from one grade level to another.
CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

A review of the literature pertinent to the study is presented in this chapter. The review consists of four parts: sex differences in math, sex roles and self-esteem, the transition from elementary to middle school as it relates to females and math, and structural differences between a K-8 school and a 6-8 school in relation to females, math and self-esteem.

Sex Differences in Mathematics

Fauth and Jacobs (1980) present evidence suggesting that sex-related differences in studying and learning math cannot be explained fully by any difference in cognitive abilities between the sexes. Their research showed that even the small differences in performance on spatial visualization tasks cannot account for the very large (numerical) discrepancy between males and females who study math. They suggest that more attention be given to the wide range of variables identified as socio-culture or affective factors. Likewise, Stein and Smithells (1969) found that mathematics is not considered as masculine until adolescent
years, when the view of mathematics as masculine is held more strongly by males than by females.

Eccles (1983) argues that while girls' generalized expectations are lower than boys', their specific expectations like those of boys' are largely determined by performance history. Consequently, if girls are required to participate in a given achievement activity, it is probable that their expectations will rise. Eccles (1983) and Parsons (1980) found that sex differences are evident in students' expectations for more unfamiliar tasks such as future math courses or math contests. Eccles contends that since girls have lower future expectations than boys, it can be predicted that girls will be less likely to enroll in advanced math courses than boys.

Given that achievement expectations play such a significant role in students' academic choices, it is important to identify factors that influence expectations. Eccles (1983) suggested that five attitudes and beliefs were potentially critical mediators of expectations for future math performance: (a) self-concept of ability; (b) estimates of task difficulty; (c) interpretations of previous achievement experiences; (d) identification with masculine and feminine sex roles; and (e) actual performance in mathematics.
Eccles' (1983) research supports this contention:

... self-concept of math ability had a significant direct effect on expectations, which in turn had a direct effect on enrollment plans in future math courses. Students with the highest self-concepts of math ability in 1978 had the highest expectations for success in future math courses in 1979. Thus, it appears that self-concept of ability is an important mediator of students' decisions regarding participation in mathematics (p.100).

McGuinness (1985) believes that measurable sex differences arise as mathematics becomes more abstract:

because of other factors, possibly due to direct or indirect biological differences, it is easier for males to acquire skills in higher mathematics. Because it is more difficult for females, the environment will have a greater impact on female performance. ... In mathematics, females are 'at risk' to environmental influences to a much greater degree than males (p. 130).

While few studies have tested for sex differences in perceived task difficulty, those that have find that junior and senior high school girls rate mathematics as more difficult than their male peers (Brush, 1980; Eccles, et al. 1983; Heller et. al., 1978). The consistency of this pattern suggests that girls' perceptions of task difficulty may be interfering with their participation in mathematics. Since females think mathematics is more difficult than boys, perhaps their perceptions of the difficulty of mathematics work in conjunction with their low self-concepts of math ability to lower their expectations for success.
Fennema and Sherman (1978) found sex-related differences in five math related affective variables: mathematics confidence; stereotyping mathematics as a male domain; attitude toward success; perceptions of mother's and father's attitudes toward them as learners of mathematics, and usefulness of mathematics. Moreover, as early as sixth (6th) grade, girls expressed less confidence than boys in their ability to do mathematics, and the subject was clearly sex-typed male, especially by the boys. Further research showed that in the high school years these differential attitudes influences continued and were joined by a host of other negative attitudinal influences, such as girls' perceptions of mathematics as being less useful to them and girls' perception of less favorable attitudes on the part of their teachers and parents, especially the fathers. Beginning in the tenth (10th) grade, these attitudes had undoubtedly contributed to an increasing differential in the enrollment of the two sexes in advanced mathematics classes.

Maccoby (1966) found that society encourages males and females in the subjects and tasks that will benefit them in their future role. According to this view, boys "forge ahead" in math because their teachers and parents know they may become engineers or scientists; while the girls know they are unlikely to need math in the occupations they will take up when they leave school. In other words, sex
differences in mathematics achievement are direct effects of sex-typed interests.

Keeves (1973) reported a need for new patterns of child-rearing and socialization. He cites differences between the sexes in participation in education and in the nature of the educational activities in which boys and girls excel. Keeves states that not only are career choices and opportunities for employment limited for women, but subtle prejudice inequalities do exist as they relate to women and career encouragement as well as choices.

In 1980, Benbow and Stanley created considerable controversy when they published an article in Science which reported, "a large sex difference in mathematical ability in favor of boys was observed in every talent search" (p. 1262). Given that the thirteen-year-old students had taken the same number of mathematics courses, these researchers concluded, "This male superiority is probably an expression of a combination of both endogenous and exogenous variables" (p. 1263). The endogenous (or internal) variable that they cited was spatial ability, which then was thought to be very influential in mathematical ability and possibly genetic.

Benbow and Stanley (1980), stated:

A substantial sex difference in mathematical reasoning ability (score on the mathematics test of the Scholastic Aptitude Test) in favor of boys was found in a study of 9927 intellectually gifted junior high school students. Our data contradict the hypothesis that differential course-taking
accounts for observed sex differences in mathematical ability, but support the hypothesis that these differences are somewhat increased by environmental influences. It is notable that we observed sizable sex differences in mathematical reasoning ability in seventh (7th) grade students. Until that grade, boys and girls have presumably had essentially the same amount of formal training in mathematics" (pp. 1262-1263).

In the intervening years, a number of relevant studies have taken place. Recent reviews have concluded that the sex-related differences in mathematics achievement and spatial ability are smaller and found less frequently than in the past. In addition, researchers at the University of Michigan found that the publicity surrounding the original paper had a negative effect on mothers' estimates of their daughters' mathematics ability. One might conclude that an environment that is strongly encouraging of education can foster girls' ability.

Lazarus (1974) contends that by far the most important single determinant of a child's attitudes and values are those of their parents. What is important to the parents will, as a rule, become important to the child; what the parents disdain, the child will also disdain. Lazarus states that there is a disturbing possibility of people—especially parents and teachers—minimizing the importance of mathematics within earshot of the young. He refers to "mathophobia" or the fear of mathematics. Lazarus feels if mathophobia arises early in school, it constitutes a problem
because the child will find almost all of mathematics a mystery and will be handicapped. And if it turns up in sufficient strength at any level, it constitutes a problem because it makes all of mathematics repugnant (p. 17). As Hilton and Berglund (1974) stated: "greater achievement results from an increase in interest and greater results from greater achievement" (p. 234).

In spite of reports about differences in boys' and girls' math performances, the fact is that any particular girl has about the same statistical chance of being good at math as a boy, report (Kreinberg & Stenmark, 1984). They continue by saying that another statistic, however, shows that girls—even able ones—tend to drop out of mathematics once it becomes an elective in high school, usually after tenth grade. Teachers reported:

(1) Girls don't think math will be important in their future lives: it has no relevance for them. (2) Girls don't see math as a ticket to a wider range of career choices. (3) Girls may not have as much self-confidence as boys do when dealing with unfamiliar material. (4) Girls are less willing than boys to be wrong and less likely to experiment with different ways to solve a problem. (5) Girls often are not encouraged by their mothers, whose expectations for their daughters are dampened because of their own low achievement (p. 94).

Aiken (1976) found that the late elementary and early junior high grades are viewed as being particularly important to the development of attitudes toward mathematics. He found that the differences in both
attitudes and achievement in mathematics are frequently found to favor boys over girls at the junior high level and beyond (Hilton & Berglund, 1974; Keeves, 1973; Eccles, 1983). It has also been reported that mathematics test anxiety is appreciably higher for eighth-grade girls than for eighth-grade boys.

Ernest (1976) did an extensive study on the far west coast and the far east coast including grades 2-12 on mathematics and gender. He stated that his study confirms the hypothesis of the sociologist Lucy Sells, that mathematics is a "critical filter" tending to eliminate women from many fields, from chemistry, physics, and engineering, to architecture and medicine. Ernest questioned school children concerning from whom they received help in the various subjects. Beginning in the sixth grade the father becomes the "authority" on mathematics and continues this role through high school. Ernest feels that this fact alone must have its subtle influence on a young girl's (or boy's) attitude.

Martha Smith, a mathematician at the University of Texas, wrote Ernest:

I once heard a sociological theory to the effect that the crucial factor in whether a young woman became an 'academic achiever' was her father's attitude towards her - the attitude most conducive to producing an academic achiever being one which showed approval of both his daughter's 'feminine' pursuits and of her intellectual ones. Reflection on my own situation and that of friends who are
women and mathematicians doesn't cause me to doubt this theory - e.g., my father seemed equally pleased when I baked an apple pie, accomplished some academic achievement, or helped him saw wood (p. 597).

As Aiken (1976) refers, it is hardly a new psychological insight that our parents have a tremendous influence on our personality development. His research supports that a child's attitude toward mathematics is strongly influenced by his or her parent.

In order for a student to be successful in any learning experience, the student must believe "I can do this." Too many students have their natural curiosity and creativity destroyed in mathematics and the obvious result is that many students are electing not to take high school mathematics, according to Wallace (1986a). Her data shows that this leads to lower standardized test scores, decreased career preparation and career opportunities. These results have a disproportionate impact on female students.

Fennema and Sherman (1977) have studied how sexual stereotyping affects attitudes and proficiency in mathematics. They concluded that there is an accumulation of evidence which points to the notion that sexual stereotyping of mathematics as a male domain operates through a myriad of subtle influences from peer to parent and within the girl herself to eventuate in the fulfillment of the stereotyped expectation of a "female head that's not
much for figures". In a similar vein, Ernest (1976) believe that "this stereotype, as well as the attitudinal patterns of students (both self-image and peer group) are unfortunately reinforced by the expectations of teachers" (p. 599).

Meece et al. (1982) completed quite an extensive study on biological or societal differences being the direct cause for women not entering the field of mathematics. Their studies support the hypothesis that socializers treat boys and girls differently in a variety of ways that might be linked to mathematics and course selection. In these studies, encouragement from parents emerged as an important causal factor in girls' decisions to elect advanced mathematics courses in high school. As they also stated, their previous research demonstrated a strong relation between parental perceptions and expectations and their children's plans to continue taking math courses. Their findings also have demonstrated that few sex differences in their perceptions of math ability are found among elementary school children; large and more consistent differences are found among adolescents. As was stated earlier, Ernest, Fennema, Sherman, Meece, et al, state that this research underscores the need for a comprehensive approach to the problem and for early intervention while children's personal
value orientations and occupational interests are developing.

Burnss and Lash (1988) discuss the teacher's role in encouraging students in the area of mathematics. They found that the majority of the seventh grade math teachers tended to focus more on showing students how to do mathematics than on getting students to understand something new on their own. The irony is that organizational styles, which begin to free teachers from management concerns and allow more time for thinking about teaching (in general) may, at the same time, enable teachers to fall back on default teaching techniques that are not always the best techniques for the subject matter being presented.

In the 1988 issue of the Arithmetic Teacher, Lappan, et al., give suggestions to all teachers of mathematics. They state that teachers need to begin to deal with the issue of equity by studying the achievement patterns within their classrooms, schools, and school districts. If the achievement of certain groups of students is not what it should be, a variety of actions are possible. They list four: Teachers' becoming aware of their own attitudes; teachers' becoming aware of the attitudes of their students; understanding various levels of student independence; and teachers' starting to analyze what is going on in their classroom during a mathematics lesson.
Wallace (1986) states that current research shows that teachers have biases about student gender and ethnicity, and that their interactions with students are influenced by these biased expectations. "All teacher interactions, such as discipline, proximity, grading, etc., are influenced by these attitudes" (p. 38). She concludes that classroom monitoring reveals that teachers at all grade levels spend more time interacting with white male students than with others, specifically in math classes. White male students also receive more questioning and high-level questions than other students. "It is very important for educators to first be sensitive to disparities in the classroom and then to monitor teacher interactions in order to provide equitable opportunities for learning within the classroom" (Wallace, 1986, pp. 38-39). Wallace emphasizes that all teachers must learn to use classroom practices that nurture positive attitudes about mathematics and develop comfort and confidence in mathematics.

Brush (1980) in quoting Lucy Sell's Fact Sheet on Women in Higher Education states "A study of admission applications of Berkeley freshman (1976) shows that while 57% of the boys had taken four years of high school math (first year algebra, geometry, second year algebra, trigonometry and solid geometry), only 8% of the girls had done so" (p. 3). Women are entering mathematics courses
less often than men. Brush (1980) goes on to suggest that this can be explained by lower mean scores on mathematical ability among women, more negative attitudes, perception of mathematics as less useful, and discouraging influences of the social milieu. Brush concludes by making recommendations that school systems should pay attention to the especially serious need among girls for information about opportunities in mathematics and the sciences, and initiate programs which are convincing for their students. This means convincing parents and school staff alike of the need, and talking frequently to students about careers throughout middle and high school in every regular mathematics class and in special programs outside of the regular curriculum.

Harnisch (1984) states that to improve the participation of females in the male-dominated arena of mathematics, greater encouragement and assistance must be given to females. Casserly (1980) notes that the most successful programs for increasing females' performance in mathematics are the ones that rely on older females to counsel, encourage, and tutor younger females.

"As educators, we are learning a great deal about what should be done to increase the number of female students participating and achieving success in mathematics," according to Krienberg (1986, p. 94). She goes on to say
that one of the most difficult problems facing education today is to make the issue of increased access to math, science, and technology a priority in our schools and among parents and students. Kreinberg views teachers as the key to providing quality and equity in mathematics, science, and technology. But, she concludes, they cannot accomplish it by themselves.

The research has clearly shown the need for parental involvement and awareness regarding children and mathematics. The National Association of Elementary School Principals along with the National PTA stated in a letter (Aug. 1989) sent to over 30,000 PTAs presidents and building principals: "Americans need to change the way they think about math, and a good place to start is in the home. Parents and students alike need to stop perpetuating the myth that math is too hard for most students. Instead, they --and their teachers and principals--need to expect and insist that every student be successful in math". The PTA is requesting that classroom math instruction be reinforced at home. Materials have been sent to schools for the express purpose of involving parents with the math instruction. The goal being to make the United States literate in math. The involvement of parents, as the research has shown, is crucial, especially for females.
Sex Roles and Self-Esteem

According to Rosenberg and Simmons (1975), the adolescent girl is considerably more sensitive than the boy to others' opinions. The adolescent girl appears to be more self-conscious (i.e., concerned with the self in social situations), more concerned with others' opinions of her, more eager to avoid behavior eliciting negative reactions, and more vulnerable to others' negative reactions. In every case, the difference between boys and girls either emerges or grows stronger during the adolescent period. The onset of adolescence is a time of great disturbance in self-concept development. At about 12 years children show a distinct decrease in self-esteem and self-concept stability and, similarly, sharp increases in depression and self-consciousness.

According to Simmons and Rosenberg (1975), among children 12-14, 41% of girls exhibit high self-consciousness in comparison to only 29% of boys, 43% of the girls report highly unstable self-images in contrast to 30% of the boys, and 32% of the girls score very low on self-esteem compared to 26% of the boys. The major difference appears to be a marked increase in self-consciousness for girls in adolescence, an increase which the boys in the sample do not equal (p. 232-233).

Openshaw, et al, (1983) concluded that during the life of the adolescent, self-esteem is more a function of social interaction and the reflected appraisals of significant others than of modeling the parent's self-esteem. Their
research found that it is highly important for interaction between the adolescent and parent of the opposite sex for increased self-esteem but that interaction between the adolescent and the same-sex parent is of equal relevance.

Wylie (1979) states that

beginning in adolescence, males and females diverge in their paths toward self-esteem. For boys, achievement is the paramount source of self-esteem in childhood and remains so in adolescence, heterosexual affiliation surpasses achievement as the dominant source of self-esteem. Thus, in adulthood the self-regard of males is rooted primarily in achievement and secondarily in affiliation, whereas the situation is reversed for females" (p. 256).

Schunk and Lilly (1984) looked at sex differences and self-efficacy. Their data support prior evidence of sex differences in students' achievement expectancies and helps to clarify this evidence. When confronted with a novel mathematical task, sixth-and eighth-grade girls judged their self-efficacy for learning how to solve problems lower than boys; "however, this sex difference was eliminated as a result of receiving performance feedback in the context of an instructional unit. No sex differences were obtained in students' demonstrated skills or in their attributions for their problem-solving progress" (p.204).

As Wallace, et al. (1984) state: "there appears to be an increasing body of empirical data to support the position that self-esteem increases with age during adolescence" (p.254). They go on to say that this is the time increase
in self-esteem during early adolescence results from the increased sense of competence gained as a result of marked physical growth in this period.

The correlation between self-esteem and learning has been well established. Maslow's Five Basic Needs lists self-esteem as the fourth need preceding the fifth and final need, self-actualization (e.g. self-fulfillment) can be achieved (Maslow, 1970). Adler assigns the greatest percentage of learning to positive self-esteem and Brookover (1964) determined that there is a high correlation between self-concept and grade point average.

Kindred, et al, (1981) feel that the person with an adequate self-view will behave more effectively and intelligently and will set realistic goals. They state that such an individual will be a more responsible person, will have the capacity to work harmoniously with others in whatever role is required, and will not be overly concerned with conformity.

Several investigators have suggested that gender-role appropriate activities may become more important to children during puberty, as they try to conform more to gender-role stereotypes for their behavior (Eccles, 1987; Eccles & Bryant, 1978; Hill & Lynch, 1983). This suggests that gender-role intensification is a likely occurrence during early puberty. In terms of children's achievement beliefs,
Wigfield, et al. (1987) state that this gender role intensification may lead children to become less involved and interested in school subjects that they see as less appropriate for their own gender. In support of this hypothesis, girls' beliefs and attitudes about mathematics in particular become more negative following the transition to junior high while their attitudes toward other subjects remain quite positive. Their research on self-esteem shows that for most children, self-esteem scores increase across adolescence.

The self-esteem of the early adolescent female is particularly vulnerable. This is a critical time for the development and consolidation of attitudes toward self, values, and aspirations that impact on choices.

It would appear that to increase the female's self-esteem during adolescence, and decrease the gender stereotype, she needs to be encouraged from the school, home, and community to explore all career options especially those in the math and sciences.

Transition from Elementary to Junior High/Middle School

Simmons, Rosenberg, and Rosenberg (1973) found heightened self-consciousness, greater instability of the self-image, slightly lower self-esteem, and a less favorable view of the opinions held of them by significant others.
among their sample of early adolescents. Evidence is presented suggesting that the child's environment may have a stronger effect than his/her age in producing such changes. Children who had entered junior high school appeared more disturbed along these lines than their age-peers still in elementary school. This movement from the eleven year old group to the twelve year old group is the only one-year period in which the children show an increase of disturbance on all measures (e.g. self-consciousness, self-image, self-esteem, perceived self). All four measures show the largest yearly increase in disturbance up to that age. "The twelve year olds in junior high school have lower global self-esteem, lower specific self-esteem, higher self-consciousness, and greater instability of self-image than their age-peers in elementary school. For example, 41% of the twelve year olds in junior high school indicate low global self-esteem in contrast to only 22% of those in elementary school; 43% of the former manifest high self-consciousness compared to only 27% of the latter. All but one of these differences are statistically significant beyond the .05 level" (p. 561). They conclude that the transition into junior high school seems to represent a significant stress along several dimensions of the child's self-image. Within the same school class, age makes little difference; but within the same age group, school class
makes a great difference. The results as a whole suggest that a twelve year old child who moves from one elementary school to another may not find the experience as stressful as does the twelve year old who has entered a junior high school the past year. Incidentally, the transition from junior to senior high school does not show a parallel effect on the self-image; fifteen year olds in senior high school do not show more disturbed self-images than fifteen year olds in junior high school (Simmons, Rosenberg & Rosenberg, 1973, pp.563-564). Blyth (1983) in his study of late adolescents, hypothesized that the transition into a senior high school and had longer lasting effects than a K-8 transition into senior high school (pp.111-119).

Simmons, et al., (1973) conclude by saying that movement into junior high school at puberty is a significant event for the child. He/she moves from a protected elementary school where he/she usually has one teacher and one set of classmates, to a much larger, more impersonal junior high where his/her teachers, classmates, and even his/her rooms are constantly shifting. He/she moves from a setting where the teacher is a parent-surrogate, to a more impersonal environment. Here he/she is expected to behave more independently and more responsibility.

Schulenberg et al., (1984) asked questions to sixth graders and in the fall of their seventh grade year, asked
the same questions concerning transition. For most students it appeared that the transition seemed a bit more difficult than easy. The transition to junior high school was somewhat problematic for the students in terms of overall grades and attitudes toward some of their classes. Furthermore, the timing and number of transitions may be related to grades. It was also indicated that sex differences were found in preferences for the various classes. These differences, they conclude, follow a fairly typical sex-role stereotype in that males preferred math and science classes while females were more likely to prefer literature and language arts.

Blyth et al., (1981) state the presence of older students can affect attitudes, behaviors, and experiences of younger students, particularly their perceptions of school environment participation and substance use. Research on differences between K-8 elementary school and 7-9 junior high school has also indicated that there are significant negative consequences for the self-image, participation, and victimization of seventh graders in the junior high schools. When analyzing the transition from middle level education to high school, the students are in a stage of late early adolescence with a majority of the pubertal changes behind them. Simmons et al. (1973) and Blyth et al. (1983, 1978) did not find the same disturbances of self-image in older
early adolescents, those making the transition from junior to senior high school, that they found in a 6th to 7th grade transition (Smith, V. C., 1986).

Looking at females and entry into various school structures, the Baltimore study (Simmons et al., 1979) identified a key developmental year at the beginning of adolescence as disturbing for the self-image, isolated females as being most vulnerable to this disturbance (transition) and suggested that part of the problem was due to a marked change in the child's school environment at that point.

Simmons et al.'s (1979) data have shown that both K-8 and junior high school(s) seventh grade girls have lower self-esteem than do boys; however, only in junior high school is the difference large enough to reach statistical significance.

This longitudinal analysis also points to the junior high girl as being at special risk. . . . it is the self-esteem of the junior high girls which changes the most. In fact, only junior high girls experience an adjusted mean loss in self-esteem between sixth and seventh grade. All other groups appear to increase their level of self-esteem. The clearest finding of this study, then, is that girls who have entered junior high school are at greater risk for negative self-esteem than are other types of children" (pp. 963-965).

Midgley and Feldlaufer (1987) suggest that there is a "developmental mismatch" between maturing children and the classroom environments they experience before and after the
transition to junior high school. This mismatch may be related to the negative changes in student beliefs and behaviors that have been observed when students enter junior high school. They report:

Both students and teachers report fewer actual decision-making opportunities after the transition to junior high school than before. In most cases students express a preference for more decision-making opportunities after the transition than before; in contrast, post-transition teachers believe students should have fewer decision-making opportunities than do pre-transition teachers. Finally, students become less congruent after they move to the junior high school, while both pre- and post-transition teachers are highly congruent" (p. 236).

The adolescent female that physically moves from a protected, one teacher environment to that of having four-to-six teachers and changing classrooms is particularly vulnerable to stresses as well as experiencing a decline in self-esteem.

Structural Differences

Clark and Clark (1982) looked at grades 7-9, 6-8, K-8, 5-8, and 6-7 schools and the areas of self-esteem, preferred teacher characteristics, dating behavior, and perceived victimization; as well as why school districts selected this school structure. They found that enrollment changes within districts, recognition by educators of the earlier onset of puberty, and a greater concern for the emotional and social needs of the early adolescent were determining factors. They go on to say:
Many educators also felt that by adjusting the grade level, the emerging emotional and social needs of the middle level child could be better met. However, the extent to which a change in school structure has led to success in meeting the early adolescent's need for developing self-esteem, feelings of security, and new social and sex roles is not clear" (p. 242).

Their findings did indicate, however, that the 6-8 structure along with 5-8 and K-8 structures appear to be more favorable structures in the area of self-esteem and perceived victimization. "Students in these three structures register the highest self-esteem scores and the lowest perceptions of threat or victimization" (p. 243).

Harter, et al. (1987) looked at the effects of transitions on children's perceptions of competence and motivational orientation. Their findings reveal that self-perceptions of academic ability decline as students make the transition to junior high school (Simmons, Blyth, & Carlton-Ford, 1982; Simmons, Rosenberg, & Rosenberg, 1973). They have documented that the biggest shift (from intrinsic motivation in third grade to extrinsic motivation in junior high school) occurs between the sixth grade elementary school students and the seventh grade junior high students. Their work suggests that as students advance to higher grades, the school environment becomes more impersonal, more formal, more evaluative, and more competitive.

Moreover, the teacher is perceived as having increasing control over evaluative outcomes. Eccles, et al, feel that these changes, which are
particularly dramatic during the shift from elementary school to junior high school, are primarily responsible for the documented changes in student motivation (p. 3)

Additional research showed that

while self-evaluations in the form of judgments about one's scholastic competence appear to be grade-related, students' affective reactions appear to be more related to the switch of schools, independent of grade. The findings revealed that the two groups of students required to switch schools (5th grade elementary to 6th grade middle school, and 6th grade elementary to 7th grade junior high school) felt worse about their performance than the two groups who remained within the same school setting (p. 22).

They conclude by saying that competence judgments appear more related to grade changes, independent of school setting switches, whereas affective reactions appear more highly related to switches in school setting than to grade change.

Feldlaufer, et al, (1988) countered results by Simmons, Blyth, Van Cleave & Bush, 1979, which stated that the transition to a new school would be less damaging if it did not occur when children were also undergoing the physiological and psychological changes associated with puberty. Feldlaufer, et. al, suggest that less attention needs to be paid to the timing of the transition to junior high school and more attention needs to be paid to the nature of the junior high school classroom environment.

If, as this study shows, a deterioration in the student/teacher relationship when students move to the junior high has a negative effect on their motivation and values in math, then more attention
should be paid to providing an environment in which teacher support of students can flourish (p. 8).

George and Oldaker, (1986), looked at data from 130 exemplary (middle-level) schools and determined that changing to middle school organization positively affects student achievement and personal development, learning climate, faculty morale, staff development, and parental community involvement.

Clark and Clark (1981) state that continuous progress education is a program well suited to meet the needs of early adolescents. When properly implemented, it makes provision for individual needs and learning styles, offers opportunities for individual assistance and advising from teachers, and establishes procedures for the careful monitoring of student progress through the learning sequence. Continuous progress education can be the curricular design that will allow middle schools to finally achieve their goal of meeting the special needs of early adolescents (p. 145).

The physical shift from one building to another during early adolescence could have significant negative impact on females. Staying at the same school and entering in a transition to a seventh (7th) grade might have less of a stressing impact on females'.

Classroom environment is crucial in determining student success and motivation, be it a K-8 school or a 7-8 school. Meeting the unique needs of the early adolescent appears to be the answer regardless of grade configuration.
Summary

For over a decade, the underrepresentation of girls and women in math, science, and technology fields of study and work has concerned educators.

Research has shown that young people begin to consider or eliminate career possibilities in pre-adolescence. By 7th grade, a large number of students, but particularly females, have decided that mathematics and science are not subjects for them.

Research has also shown that the transition period, ages 10-14, is a time when children undergo physiological and psychological changes associated with puberty. It would appear as if the two go hand-in-hand: females go through transition, that affects their self-esteem, which, in turn, makes them vulnerable to sex-role identification. This equates to not entering a field of study that is unfeminine, such as mathematics. Parents, too, must become aware of how important their attitudes are in affecting children's behaviors, academically.

Progress can be slow in dealing with issues that call traditional attitudes into question. Change, in any form, takes time, as people (educators) must gain confidence that they will be benefited rather than harmed by "new" ideas or strategies. When teachers are helped and encouraged to use
their knowledge and expertise, they can be vital, creative influences and effective in the classroom.

If females don't become as comfortable and knowledgeable about mathematics as males, they won't be able to participate in fields of study and work that increasingly rely on mathematics technology.

It is clear that educators play a critical role in eliminating the gender-role stereotyping. The early adolescence needs to be provided a nurturing environment. Their teachers must be knowledgeable about their unique characteristics and re-structure their classrooms to meet these needs.
CHAPTER 3

METHODS

The following methodology was utilized to examine the effect of transition on seventh (7th) grade female mathematics scores and self-esteem.

Population

The three schools that were selected for the study are located in the southwestern part of Arizona. The population included students from two educational environments - School A, a 7-8 grade configuration; and School B-1 and B-2 which have a K-8 grade configuration. The fall population of School A with 103 female 7th graders; the population of School B-1 with 45 female 7th graders; and B-2 with 55 female 7th grade students. Students from all schools were similar in terms of socio-economic backgrounds. Most family structures were two-parent working/career or one-parent families.

Sample

The sample consisted of the fall population of seventh grade females in School A and School B-1 and B-2.

Questionnaire Instrument

The Personal Opinion Survey (Appendix A) was developed by Jones (1984) to identify transition effects on early
adolescents, relative to their self-image. The POS was formulated to correspond to earlier studies by Simmons et al. (1973, 1975, 1978, 1979) and Blyth et al. (1978, 1983) which measured self-consciousness, stability of self-image, content of self-image, perceived self-image, self-esteem, victimization, and anonymity. The measures were reproduced verbatim except to alter responses from an interview format to a questionnaire format. Questions were also added to elicit information about the number of schools students had attended, and "the number of different teachers they had prior to entering the middle-level environment" (Jones, 1984, pp. 103-105).

Under the larger umbrella of self-concept, or "Who am I?" (perception of self), is self esteem, or how an individual feels about him/herself, either positively or negatively. The Simmons et al. (1973) Self-Esteem Scale is a six-item Guttman index which measures "the individual's general overarching feeling toward himself" (p. 556). Based on this definition, the individual with high self-esteem considers himself to be a worthy person, though not necessarily above others. On the other hand, a person with low self-esteem has a negative attitude about himself, one of rejection, dissatisfaction, or contempt. Jones (1984) indicated that the Simmons self-esteem instrument yields acceptable correlations (r=.75, .72) with the Rosenberg
(1965) and Savin-Williams and Demo (1983) Self-Esteem Scales (Convergent Validity) respectively, and additionally reported internal consistency at alpha = .77.

The ten-item Rosenberg Self-Esteem Scale (1965) (or slight modifications thereof) has been employed extensively in adolescent self-concept research. According to Jones (1984), Rosenberg's (1965) effort to create a unidimensional measure of global self-regard has repeatedly proven highly successful as all ten items generally address a favorable or unfavorable attitude toward self despite the scale's less than scientific construction. Subsequent analyses confirm the psychometric appropriateness of Rosenberg's (1965) self-esteem scale. The following are reported estimates of internal consistency: Jones (1981), alpha = .73; McCarthy and Hodge (1982), alpha = .74; Jones (1984), alpha = .85. Additionally, Jones (1984) indicated that the Rosenberg self-esteem instrument shares an acceptable correlation (r = .75, .82) with Simmons and Savin-Williams and Demo Self-Esteem Scales (Convergent Validity) respectively.

The Savin-Williams and Demo (1983) Self-Esteem Scale is composed of 25 items that address perceptions of self in conjunction with familial expectations, self-confidence, popularity, contentment, self-consciousness, and emotional stability. Information related to the psychometric properties of this instrument was provided by Jones (1984)
indicating that the Savin-Williams and Demo self-esteem instrument shares an acceptable correlation \( r = .82, .72 \) with the Rosenberg (1965) and Simmons (1973) Self-Esteem Scales (Convergent Validity) respectively. Additionally, Jones reported coefficient alpha = .88.

Math Attitudes

The math attitudes survey came from the University of California at Berkeley (see Appendix C). There are no reliability and validity measures available for this instrument.

Math Achievement

Individual student course grades in mathematics were used. The grades reflected are immediately prior to transition and immediately after the transition. (June 1989 and January 1990).

Procedure

Three schools were selected, one a 7-8 middle-level school and two, K-8 schools both located in the southwestern part of Arizona with the same socio-economic group of female students.

Districts involved were contacted and the researcher asked permission to administer a survey to their seventh grade female students in their respective schools as well as look at the math grades earned by these same students prior to the transition to middle-school and again, look at their
math grades after the first semester of their seventh grade year, after the transition as well as readminister the surveys.

These data were then coded and prepared for computer analysis.

**Data Analysis**

The researcher generalized the internal consistency analysis and interscale correlations to insure that the previously established psychometric properties were pertinent to this sample. Assuming that these estimates are adequate the analyses for hypothesis testing was conducted.

1. What are the transitional effects on female students' self-esteem?

   \[ H_0: \alpha_1 \beta_1 = \alpha_2 \beta_2 = 0 \]

   \[ H_A: \alpha_1 \beta_1 \neq \alpha_2 \beta_2 = 0 \]

   **New School**

   Where \( X_{1.1} \) = pre transition and self-esteem

   Where \( X_{1.2} \) = post transition and self-esteem

   **Same School**

   Where \( X_{2.1} \) = pre transition and self-esteem

   Where \( X_{2.2} \) = post transition and self-esteem

This question was addressed using MANOVA. The multiple measures of self-esteem (Simmons, Rosenberg, Savin-Williams, et al.) were entered as dependent measures and school-type represents the independent measure (transition vs. no
transitional effects for each of the three measures.

2. Is there any difference in math attitudes between K-8 female students and middle school (7-8) female students regarding the importance of math for their future?

\[ H_0: X_{2.1} - X_{2.2} = 0 \]

\[ H_A: X_{2.1} - X_{2.2} \neq 0 \]

**New School**

Where \( X_{1.1} \) = pre transition and attitudes

Where \( X_{1.2} \) = post transition and attitudes

**Same School**

Where \( X_{2.1} \) = pre transition and attitudes

Where \( X_{2.2} \) = post transition and attitudes

In order to examine transitional effects on math attitudes a one-way analysis of variance using math attitudes scores as the dependent measure and school-type (transition vs. no transition) was conducted.

3. What are the transition effects on female students' math grades?

\[ H_0: X_{3.1} - X_{3.2} = 0 \]

\[ H_A: X_{3.1} - X_{3.2} \neq 0 \]

**New School**

Where \( X_{1.1} \) = pre transition and grades

Where \( X_{1.2} \) = post transition and grades
In order to address the impact of transition of female students' math grades, analysis of variance was used. Semester/quarter math grades were extracted for each student immediately prior to transition and at the end of the first semester/quarter following transition. These scores represent the dependent measure in a repeated measures design where school type (K-8 vs. 7-8) is the independent variable. By comparing school types (i.e. transition vs. no transition) the impact of transition of female math achievement was ascertained.

Additionally, analyses were conducted to look for change within each group over time.
CHAPTER 4
RESULTS

This chapter summarizes the results of statistical procedures utilized to address the hypotheses and research questions presented in Chapter 3. Prior to presenting those findings, however, several preliminary analyses were conducted to ensure that the measures selected for this study are psychometrically sound. Specifically, Cronbach coefficient alphas were generated for each of the three scales; Rosenberg Self-Esteem, Savin-Williams Self-Esteem, and math attitudes. Next, interscale correlations were generated between those three scales as well as with math grades. These analyses were calculated separately for pre-transition data, and for post-transition data.

Table 1 summarizes the psychometric analyses for the pre-transition data. As shown in Table 1, the Rosenberg Self-Esteem Scale yielded a Cronbach alpha coefficient of .90. This is in line with similar estimates presented in previous studies. For example, McCarthy and Hodge (1982) found an alpha of .74; and Jones (1984) found an alpha of .85. For the Savin-Williams Self-Esteem scale, the alpha coefficient was .89. This estimate is supported by the findings of Jones (1984) in which he found an alpha
Table 1. Reliability estimates and interscale correlations depicting the relationship between self esteem (Rosenberg Self-Esteem, Savin-Williams Self-Esteem) math attitudes and math grades - Pre-Transition.

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>1. RSE</td>
<td>.90</td>
<td>.80</td>
<td>.33</td>
<td>.10</td>
</tr>
<tr>
<td>2. SWSE</td>
<td>.89</td>
<td>.26</td>
<td>-.05</td>
<td></td>
</tr>
<tr>
<td>3. Math Attitudes</td>
<td></td>
<td></td>
<td>.82</td>
<td>.21</td>
</tr>
<tr>
<td>4. Math Grades</td>
<td></td>
<td></td>
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<td>---</td>
</tr>
</tbody>
</table>

Note: Diagonal elements are Alpha coefficients; off-diagonal elements are Pearson correlation coefficients.
coefficient of .88. For math attitudes, previous reliability analyses are not available. The estimate generated from this data was .82, indicating acceptable levels of internal consistency. All of these coefficients indicate that these scales are internally consistent--they are reliable. The off-diagonal elements (Tables 1 and 2) are Pearson's correlation coefficients. For time 1 (pre-test, Table 1) data, the Rosenberg Self-Esteem Scale correlated with Savin-Williams; at $r = .80$. $R^2$ (squared) suggests that 64% of variability in one measure is shared by the other, while 36% remains unique to each. This is strong evidence of convergent validity for the two self-esteem scales. The Rosenberg correlation with math attitudes was $r = .33$, indicating some overlap but more uniqueness than similarity. Rosenberg's measure correlated with grades, $r = .10$, indicating that one percent (1%) of the validity was shared, 99% unique. Math grades correlated with math attitudes at $r = .21$, suggesting that there is a relationship.

Table 2 summarizes identical analyses for post-transition data. Again, estimates of internal consistency were quite acceptable and they are in line with those that emerge from the time 1 (pre-test) analyses as well as pervious reports. Correlation coefficients were basically similar as well, indicating strong convergence between the two self-esteem measures. Sixty-six percent of variability
in one measure is shared by another, while 34% remains unique to each. This section details that the measures are behaving as expected, given previous uses and estimates of reliability and convergence.

Table 2. Reliability estimates and interscale correlations depicting the relationship between self-esteem (Rosenberg Self-Esteem, Savin-Williams Self-Esteem) math attitudes and math grades - Post Transition.

<table>
<thead>
<tr>
<th>Scale</th>
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<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RSE</td>
<td>.88</td>
<td>.83</td>
<td>.37</td>
<td>.21</td>
</tr>
<tr>
<td>2. SWSE</td>
<td>.90</td>
<td>.34</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>3. Math Attitudes</td>
<td></td>
<td>.83</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>4. Math Grades</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
</tr>
</tbody>
</table>

Note: Diagonal elements are Alpha coefficients; off-diagonal elements are Pearson correlation coefficients.
Table 3 simply correlates pre-transition with post-transition scores. As shown in Table 3 there is stability of measurement over time. If these correlations were perfect 1.00, we would expect to find no change over time. It is shown that Rosenberg's measure yielded the highest correlation which appears to be the most stable, followed by the other self-esteem measure of Savin-Williams.

Table 3. Pearson correlation coefficients depicting a scale stability over time.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pre- with Post-Transition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSE</td>
<td>.74</td>
</tr>
<tr>
<td>SWSE</td>
<td>.69</td>
</tr>
<tr>
<td>Math Attitudes</td>
<td>.53</td>
</tr>
<tr>
<td>Math Grades</td>
<td>.50</td>
</tr>
</tbody>
</table>

The first three tables simply demonstrate the acceptability of appropriateness of these measures for addressing the research questions. Given that they are all acceptable, these measures were deemed appropriate for testing those questions.

Research question 1 asked: "What are the transitional effects on female students' self-esteem?" The analyses
which were conducted to address research question 1, are presented in Table 4, for Rosenberg Self-Esteem scores and Table 5 for Savin-williams Self-Esteem scores.

In both instances, as expected, the covariate or pre-transitional self-esteem scores were significantly related to the post-transition self-esteem scores. Once the covariates were removed, the differences in both cases failed to reveal group differences. When looking at the group difference for the Rosenberg Self-Esteem, the \( F = .36 \); for Savin-Williams the \( F = .24 \). Based on these results there are no differences in either measure of self-esteem.

The \( F = .36 \) for Rosenberg's measure, when looking at cell-means, indicate that the K-8 group had a mean self-esteem score of 35.98. The middle school group obtained a mean score of 34.34. This represents a 4.6% difference between the groups ignoring pre-transition effects. By controlling those pre-transition effects (i.e., when the covariate goes out) the K-8 mean decreases to 35.63, and the middle school mean increases to 35.00. This represents a difference of 1.8%. Thus, there is no significant difference. A similar pattern emerged for the Savin-Williams Self-Esteem scores. The K-8 group scored a little higher with a mean of 80.69 than the middle school group with a mean of 77.50.
Table 4. ANCOVA results depicting the relationship between self-esteem, RSE, and transitional condition (K-8 vs. middle school).

<table>
<thead>
<tr>
<th>Covariate</th>
<th>df</th>
<th>Ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-transition SE</td>
<td>1</td>
<td>2470.52</td>
<td>105.54*</td>
</tr>
</tbody>
</table>

Main Effect

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>Ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>8.38</td>
<td>.36</td>
</tr>
<tr>
<td>Residual</td>
<td>89</td>
<td>23.41</td>
<td></td>
</tr>
</tbody>
</table>

*p<.001

Table 5. ANCOVA results depicting the relationship between self-esteem, SWSE, and transitional condition (K-8 vs. middle school).

<table>
<thead>
<tr>
<th>Covariate</th>
<th>df</th>
<th>Ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-transition SE</td>
<td>1</td>
<td>9076.38</td>
<td>80.24*</td>
</tr>
</tbody>
</table>

Main Effect

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>Ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>1</td>
<td>26.86</td>
<td>.24</td>
</tr>
<tr>
<td>Residual</td>
<td>89</td>
<td>113.12</td>
<td></td>
</tr>
</tbody>
</table>

*p<.001
This reflects a difference of 4.0%, again indicating that the K-8 group had self-esteem levels which were 4.01% higher than the middle school girls. However, when controlling for the pre-transition self-esteem scores the K-8 mean decreases to 79.98 the middle school mean increases to 78.84. This difference is 1.4%. Regardless of which self-esteem measure was used, there is apparently no effect due to transition. Therefore, in response to question number 1, what are the transitional effects on female students' self-esteem--there are none.

Research question 2 asked: "Is there any difference in math attitudes between K-8 female students and middle school (7-8) female students regarding the importance of math for their future. The analysis is summarized in Table 6.

Table 6. ANCOVA results depicting the relationship between math attitudes and group.

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>Ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-transition SE</td>
<td>1</td>
<td>563.41</td>
<td>35.06*</td>
</tr>
<tr>
<td>Main Effect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>3.25</td>
<td>.20</td>
</tr>
<tr>
<td>Residual</td>
<td>89</td>
<td>16.07</td>
<td></td>
</tr>
</tbody>
</table>

*p<.001
Similar to the self-esteem findings, presented above, pre-transition effects were significant as evidenced by the covariate an F=35.06. However, the group difference was not significant. When looking at cell-means, for math attitudes, the K-8 group had a mean of 34.67 compared to the middle school group who obtained a mean of 32.44. This reflects a difference of 6.6% higher than the females in the middle school group. When adjusting for pre-transition covariates the K-8 mean decreases to 34.04 whereas the middle school mean increases to 33.61; a difference of only 1.3%. The F is equal to .20, which indicates that the groups are not significantly different on math attitudes and therefore the answer to question 2 is that female students in a 7-8 middle school do not feel any different from K-8 students regarding the importance of mathematics for their future career.

Research question 3 asked "What are the transition effects on female students' math grades? That analysis is presented in Table 7.

As reflected in the covariate, pre-transition grades were related to post-transition grades, however the group effect, or being in a K-8 school vs. a 7-8 middle school, yielded an F of .22 which is not statistically significant.

The mean math grade average of the K-8 students was 10.14 (=B). For the middle school students it was slightly
Table 7. ANCOVA results depicting the relationship between math grades.

<table>
<thead>
<tr>
<th>Covariate</th>
<th>df</th>
<th>Ms</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-transition SE</td>
<td>1</td>
<td>148.50</td>
<td>27.39*</td>
</tr>
<tr>
<td>Main Effect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>1.18</td>
<td>.22</td>
</tr>
<tr>
<td>Residual</td>
<td>81</td>
<td>5.42</td>
<td></td>
</tr>
</tbody>
</table>

*p<.001

higher at 10.53 (=B+). This reflects a difference of 3.8%. When controlling for pre-transition grades the K-8 students mean increases to 10.19 and the middle school students mean decreases to 10.44 reflecting a difference of 2.4% which is not significant. Thus, the answer to question 3 is that there are no transitional effects on math grades for female students in the study.

Summary

The analyses which focused on self-esteem yielded no group differences. The analyses which focused on math attitudes yielded no group differences. The analyses which focused on math grades yielded no group differences.
Additional analyses were conducted to examine change within these measures separately, within each group. When the K-8 students were examined, non-significant differences emerged from time 1 to time 2 (pre-test/post-test) on both measures of self-esteem and on math grades. However, when math attitudes were examined it was revealed that the K-8 students pre-transition mean was 35.68 compared to a post-transition mean of 34.67 yielding a $t$ of 2.35 which is significant at the .05 level. This indicates that for K-8 students math attitudes decrease significantly from pre-transition. When the middle school students were looked at separately, non-significant change was observed on all four of the variables.
CHAPTER 5
SUMMARY, DISCUSSION AND FUTURE RESEARCH

The purpose of this chapter is to summarize the study and to discuss related research. The limitations of the present study are also addressed and recommendations for future research are suggested.

Summary of the Study

The purpose of this study was to (1) measure the transitional effects on seventh grade female students' self-esteem, (2) measure the attitudes middle school females' vs. K-8 females have regarding mathematics, and (3) measure the transitional effects on seventh grade female students' math grades.

A sample of 203 seventh grade female students from the southwestern part of Arizona were selected for this study. School A being a 7-8 middle school configuration and School B being a K-8 school. A total of 102 girls actually completed both phases of this study (42 7-8 grade middle school girls and 60 K-8 females). Each student was administered a paper and pencil questionnaire consisting of 39 self-perception and 20 math attitude items. Females completed the questionnaire in the fall (four weeks following their seventh grade year) and again in the winter
(three weeks prior to the end of the first semester of their seventh grade year). The study spanned fifteen weeks.

**Questionnaire**

The Personal Opinion Survey (POS) (Appendix B) was developed by Jones (1984) to identify transition effects on early adolescents, relative to their self-image.

The math attitudes survey (Appendix C) was obtained through the EQUALS Project at the University of California at Berkeley. There are no reliability and validity measures available for this instrument.

A series of statistical analyses were conducted to examine the psychometric appropriateness of the self-esteem scale prior to hypothesis testing. All measures exhibited acceptable levels of reliability (internal consistency) and validity (convergent-discriminant).

In testing the hypothesis that transition affects female students' self-esteem, it was found that in both instances, the covariate or pre-transition self-esteem scores were significantly related to post-transition self-esteem scores. Once these covariates were removed, there were no group differences. Looking at math attitudes, once again pre-transition effects were significant but the group difference was not. In addition, pre-transition math grades were related to post-transition math grades, however the group effect, (i.e., being in a K-8 vs. a middle school)
evidenced no statistical differences on transitional effects as they relate to math grades. However, when math attitudes were examined it was revealed that the K-8 students yielded a t=2.35 from pre- to post-transition which is significant at the .05 level. This indicates that for K-8 students, math attitudes had decreased significantly from pre-transition. Non-significant differences were noted for middle school students on all four variables.

Discussion

The results of the present study indicate that (1) the analyses which focused on self-esteem yielded no group differences, (2) the analyses which focused on math attitudes yielded no group differences, and (3) the analyses which focused on math grades yielded no group differences. Previous research concluded that transition into junior high school seemed to represent a significant stress as it relates to students' self-image (Migley & Feldlauffer, 1987). Another study (Eccles, 1987; Eccles & Bryand, 1978; Hill & Lunch, 1983) identified a key developmental year at the beginning of adolescence as disturbing for the self-image, isolated females as being most vulnerable to transition (elementary to middle school) and suggested that part of the problem was due to a marked change in the child's school environment at that point. A longitudinal analysis (Simmons et al., 1979) pointed to the junior high girls changes the
most. The study went on to state that it was only junior high girls who experience an adjusted mean loss in self-esteem between sixth and seventh grade. It is interesting that all of the analyses for this study do not support these findings, but rather strongly states the opposite--there is no difference in self-esteem due to transition. Supporting this study are recent findings by Clark and Clark (1982) which state that students in a 6-8, 5-8 and K-8 structure register the highest self-esteem scores. Additional supporting evidence comes from Feldlaufer et al. (1986) which suggests that less attention needs to be paid to the nature of the junior high/middle school environment. Further supporting research (George & Oldaker, 1986) states that it was determined that changing to middle school organization positively affects student achievement and personal development. Thus, physical shift from one building to another during early adolescence does not appear to have any significant impact on females' self-esteem.

The analyses in this study yielded no significant difference in the attitudes of seventh grade female students and math. Research (Wigfield, et al., 1987) has shown that by seventh grade, a large number of female students have decided that math is not a subject in which they are interested. Much of the research (Aiken, 1976; Lazarus, 1974) points to parental attitudes which in turn affect
their children. If the parents have "mathaphobia" so will their children--especially the girls. Research has also found that sex differences in mathematics achievement are direct effects of sex-typed interests. McGuiness (1985) stated that females are at risk to environmental influences to a much greater degree than males in the area of mathematics.

In the analyses of math attitudes for this study, no significant differences were present. Supporting this finding, research (Kreinberg & Stenmark, 1984) has shown that any particular girl has about the same statistical chance of being good at math as a boy. Research has also shown that self-concept of math ability had a significant direct effect on expectations, which in turn had a direct effect on enrollment plans in future math courses. It was also stated (Wallace, 1986) that environment that is strongly encouraging of education can foster girls' ability.

Aiken (1976) found that late elementary and early junior high grades are viewed as being particularly important to the development of attitudes toward mathematics. He found that the differences in both attitudes and achievement in mathematics are frequently found to favor boys over girls at the junior high level and beyond. Further findings revealed that few sex differences in perceptions of math ability are found among elementary
school children; large and more consistent differences are found among adolescents. It was also reported that while in the classroom, teachers at all grade levels spend more time interacting with white male students than with others, specifically in math classes. It is important to note, that while looking at the statistical data for this paper, the sample mean of grades amongst the seventh grade females was a B+; which would indicate that females sampled were finding success in their math classes. In a recent study by Friedman (1989), research evidenced that the sex difference in favor of males is decreasing over short periods of time. This is evidence for explanations of sex difference, "for surely it is not biology but environmental influence that has been changing at the same time that sex differences have been decreasing. A substantial amount of concrete evidence has been brought to bear against the tenet that women are irreversibly inferior in mathematical capabilities" (p. 206). She refers to the changes in guidance, hiring and general admission practices which should accelerate in years to come.

Implications for Practitioners

The results of this research concludes that there is no difference in seventh grade females regarding self-esteem, math attitudes and grades regardless of what type of school structure--K-8 or middle school. However, over the past ten
(10) to fifteen (15) years a great deal of information has been gathered in favor of middle-level education. It is this researcher's opinion, supported by Feldlaufer (1986), that more attention needs to be paid to the nature of the junior high/middle school environment rather than grade configurations. Clark and Clark (1982) have been espousing this for years, throughout the country.

Recent research by Friedman (1989) states that a substantial amount of concrete evidence has been brought to bear against "the tenet that women are irreversibly inferior in mathematical capabilities" (p. 206). She goes on to add that changes in guidance, hiring, and general admission practices will benefit women in the area of math as a professional career.

This researcher would like to recommend the following to building administrators:

1. Educate parents as to the importance of encouraging their daughter(s) in the area of mathematics.

2. Inservice teachers, especially elementary teachers, as to what research has shown when instructing math lessons.

3. Discuss with elementary females, their personal future goals—encouraging the fields of math and science.
4. Have the PTA support and sponsor the Math Matters Program from the University of Pittsburgh. (Every school K-8 received a packet.)

5. Have teachers assigned to "follow" their female students for three years—encouraging them to take more math courses.

6. Involve senior citizens in the area to help tutor students (K-8) who appear to have difficulty understanding simple math concepts.

Limitations

In reporting the findings of this study, it is acknowledged that whatever generalizations may be drawn must be done so with caution. Generalizability of findings to populations other than the one described in this study would be suspect. The sample used in this study represents only a small portion of females located in the southwestern part of Arizona, who are predominately Anglo and from an upper-middle socioeconomic level.

Care must be taken with generalizing the self-esteem measure across samples. As discussed earlier, socioeconomic level and geographical location could affect the outcome of scores, posing a threat to external validity.

The study made use of the self-reporting method. Social desirability could affect these reports. The females surveyed could have responded in the manner that they
thought would "please" the teacher, even though they were
told that only the researcher would look at the surveys.

The study was limited to the measurement of grades and
the affective dependent variable of self-esteem and math
attitudes. None of the mathematics teachers were consulted
nor were any parents.

Recommendations for Future Research

1. A larger sample of seventh grade females from
various socioeconomic levels would be more desirable.
Multiple indicators of math attitudes, grades, and self­
esteeem would be desirable. It is more likely that
significant variance will be detected when large samples and
multiple measures are used.

2. The use of two or three self-esteem measures along
with a longer math attitudes survey should be incorporated
in future studies. These measures could be used to test the
reliability of the responses.

3. A longitudinal study should be done which would
follow these same female students through tenth (10th) grade
to ascertain if their math attitudes as well as grades
remain the same, decrease, or increase.

4. Mathematics teachers and mothers of these female
students should be surveyed as to their attitudes toward
females succeeding in math. Again, a longitudinal study
starting in seventh grade and incorporating yearly
assessment through tenth grade is desirable. It is important to design an instrument which only surveys attitudes and does not give leeway to differences in instruction and the intensity of pressure from feminist sources, which could lead to distortions of the results in a large group.
APPENDIX A

CONSENT LETTERS
Dear Parent/Guardian,

Your child has been invited to participate in a study which will help to further understand how self-esteem and math achievement may be affected by the transition (change to middle/junior high school). The study will be conducted by a doctoral candidate at the University of Arizona who is also the principal of Dunham elementary school in Tucson. Results of all tests will be confidential, and reports of the study will not include the names of any children.

This project has been approved by Tucson Unified School District and the school principal. If you are not willing to have your child participate in this study, please sign on the line below and return the form to your child's counselor. A self-esteem inventory will be administered, in class, in October. Your cooperation in this important project will be very much appreciated. Please feel free to call me at 798-2606.

Sincerely,

Janet B. Kaufman, M.Ed.
Doctoral Candidate
Principal, Dunham Elementary

I do not give my consent:

________________________________________
Students Name

________________________________________
Parent's Signature
Dear Parent/Guardian,

Your child has been invited to participate in a study which will help to further understand how self-esteem and math achievement may be affected by the transition (change to middle/junior high school). The study will be conducted by a doctoral candidate at the University of Arizona who is also the principal of Dunham elementary school in Tucson. Results of all tests will be confidential, and reports of the study will not include the names of any children.

This project has been approved by Peoria Unified School District and the school principal. If you are not willing to have your child participate in this study, please sign on the line below and return the form to your child's counselor. A self-esteem inventory will be administered, in class, in October. Your cooperation in this important project will be very much appreciated. Please feel free to call me at 798-2606.

Sincerely,

Janet B. Kaufman, M.Ed
Doctoral Candidate
Principal, Dunham Elementary

I do not give my consent:

________________________
Student's Name

________________________
Parent's Signature

Please return by October 25, 1989 if you do not wish your child to participate.
APPENDIX B

PERSONAL OPINION SURVEY
PERSONAL OPINION SURVEY

DIRECTIONS: Each of the following statements reflect personal feelings held by some people in this society. We are interested in how much you agree with each statement. Because these statements reflect personal feelings and attitudes, there are no right and wrong answers. The BEST response to each of the following statements is your PERSONAL OPINION. We have tried to cover many points of view. You may find yourself agreeing with some of the statements and disagreeing with others. Whether you agree or disagree with any statement, you can be sure that many other people feel the same way as you do.

RESPOND TO EACH STATEMENT, ACCORDING TO YOUR PERSONAL FEELINGS, BY CIRCLING THE ANSWER THAT BEST REFLECTS YOUR OPINION.

SA = STRONGLY AGREE
A = AGREE
N = NOT SURE
D = DISAGREE
SD = STRONGLY DISAGREE

SD D N A SA 1. Most people are better liked than I am.
SD D N A SA 2. I often wish I were someone else.
SD D N A SA 3. I often get discouraged at what I am doing.
SD D N A SA 4. I have a low opinion of myself.
SD D N A SA 5. Other people usually follow my ideas.
SD D N A SA 6. I can't be depended on.
SD D N A SA 7. There are many times when I'd like to leave home.
SD D N A SA 8. I get upset easily at home.
SD D N A SA 9. At this school, most students don't seem to know who you are or what your name is.
SD D N A SA 10. I am able to do things as well as most other people.
11. All in all, I am inclined to feel that I am a failure.

12. My family usually considers my feelings.

13. If I have something to say, I usually say it.

14. It's pretty tough to be me.

15. I feel I do not have much to be proud of.

16. I feel that I am a person of worth, at least on an equal plane with others.

17. It takes me a long time to get used to anything new.

18. My family expects too much of me.

19. At times, I think I am no good at all.

20. There are lots of things about myself I'd change if I could.

21. Things are all mixed up in my life.

22. I give in very easily.

23. My family understands me.

24. I'm popular with people my own age.

25. I feel that I have a number of good qualities.

26. At this school, the teachers don't seem to know who you are or what your name is.

27. Lots of kids don't know me at school because it is so large.

28. I take a positive attitude toward myself.

29. On the whole, I am satisfied with myself.
30. Things usually don't bother me.
31. This school has so many students in it that I feel I don't know lots of kids.
32. I certainly feel useless at times.
33. I wish I could have more respect for myself.
34. I can make up my mind without too much trouble.
35. I find it very hard to talk in front of a group.
36. I'm a lot of fun to be with.
37. I often feel upset about the work I do.
38. I'm not as nice looking as most people.
39. I usually feel as if my family is pushing me.

IF I WERE TO ASK YOUR PARENTS AND TEACHERS, HOW WOULD THEY RATE YOU ON THE FOLLOWING CHARACTERISTICS? USE THIS SCALE TO RECORD HOW YOU THINK YOUR PARENTS AND TEACHER WOULD RATE YOU:

<table>
<thead>
<tr>
<th>ABOVE AVERAGE</th>
<th>AVERAGE</th>
<th>BELOW AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

40. How smart would your mother say you are?
41. How smart would your father say you are?
42. How smart would your teachers say you are?
APPENDIX C
MATH ATTITUDE SURVEY
MATH ATTITUDE SURVEY

Name: ____________________ ___ School: ____________________

Directions: A number of statements which people have used to describe how they feel about math are given below. Read each statement and mark how you feel about it. Mark "T" for true if the statement describes how YOU feel about math. Mark "F" for false if the statement does NOT describe how you feel about math.

TRUE  FALSE

1. I think math is fun.  
2. I do as little work in math as possible.  
3. I like to do math puzzles.  
4. I put off my math homework until last.  
5. No matter how hard I study, I will get low grades in math.  
6. I'm sure I can do advanced classes in math.  
7. I think math games are boring.  
8. I will need math for my future work.  
9. I think everyone can learn math.  
10. I like to think about math problems after class.  
11. Math is not useful to me.  
12. I wish I were smarter in math.  
13. Math is hard for me.  
14. I guess a lot on math tests.  
15. Math is easy for me.
T  F  16. I will use math in many ways when I get out of school.
T  F  17. I think math is awful.
T  F  18. Most jobs require some math.
T  F  19. Knowing math helps me in many ways.
T  F  20. I hate word problems.
REFERENCES


