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Underachieving Gifted Students: A Social Cognitive Model

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ABSTRACT

The purpose of this study was to examine the relationships among students' self-perception, attitudes toward school, study and organizational skills, achievement motivation, attributional style, gender, parental involvement and style, parental income and parental level of education, and students' academic performance or achievement. Using previous research in motivation and gifted achievement a model was developed to represent the relationships among the student and parent variables and achievement. Structural equation modeling techniques were used to examine the model. Achievement levels were measured using students' math and language arts scaled scores on the Stanford-9 achievement test, as well as their average GPA in math and language arts over three semesters. The remaining variables were measured using Likert-type survey instruments. A non-probability sample of 369 students was drawn from six school districts located in Arkansas, Utah, and Virginia. Students were sixth through ninth graders who had been identified as intellectually gifted by their school district, excluding students identified as gifted learning disabled.

Findings indicated that there were no meaningful gender differences on any of the indicator variables. Students' socioeconomic status was found to have the strongest relationship with academic achievement followed by achievement motivation, study and organizational skills, and parental involvement and responsiveness. Students' attitudes toward school influenced academic achievement both directly and indirectly through an influence on achievement motivation. Students' self-perceptions had strong influences on achievement motivation and study and organizational skills. Students who had more internal attributional styles were more likely to have more positive self-perceptions about their mathematics and verbal ability. Parenting involvement was significantly correlated with attitudes toward school, socioeconomic status, and self-perceptions. Results suggest that achievement motivation does not serve as a mediator between parental involvement and style and achievement, or between socioeconomic status and achievement. Students' attributional style was not found to influence study and organizational skills.

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EXECUTIVE SUMMARY

The National Commission on Excellence in Education (NCEE, 1984) estimated that 10% to 20% of high school dropouts are gifted, and approximately 50% of gifted students' achievement levels do not match their abilities. Based on studies of delinquent gifted students, Seeley (1984; 1987; 1993) estimated that 18% to 40% of identified gifted middle school students are at risk for school failure (i.e., dropping out of school) or academic underachievement (as measured by grades). The NCEE and Seeley only estimates the percentage of gifted high school dropouts and gifted students at risk for underachievement; however these estimates suggest that there may be a larger population of gifted underachievers than may have been recognized in the past. The National Association for Gifted Children (NAGC) addresses the population of gifted underachievers in the Gifted Program Standards (NAGC, 1998). According to the NAGC standards, schools meeting the exemplary levels of these standards should be providing underachieving gifted learners with specific guidance and counseling services that address the issues and problems related to underachievement and should be providing specialized intervention services to gifted learners who do not demonstrate satisfactory performance in regular and/or gifted education classes. To meet these exemplary standards, educators must have a thorough understanding of the construct of gifted underachievement.

In an effort to explain gifted underachievement, this study combined research on gifted underachievement and motivation to formulate and test a model of achievement using a sample of gifted students. Through an examination of conceptions of giftedness, theory and research on gifted underachievement, and theory and research on motivation, a social-cognitive model of underachievement was derived. The findings from motivation and gifted underachievement research suggest a complex relationship among students' ability, self-perceptions, value of a task, expectations for success, cognitive and self-regulatory strategies, motivation, success and failure attributions, gender, parental involvement and style, parental socioeconomic status (income, level of education and marital status), and students' performance or achievement. Focusing on gifted children limits the variability in students' ability, making this variable less of a concern. The relationship among the remaining variables, with the exception of gender, is presented in a model shown in Figure 1. Gender was excluded from the model due to lack of support as to which variables gender influenced; however since research has suggested some relationship between gender and achievement (Dweck, Goetz & Strauss, 1980; Eccles, Wigfield, Harold, & Blumenfield, 1993; Marsh, 1989; Wigfield, Eccles, MacIver,

Reuman, & Midgley, 1991), gender will be reviewed as related to all the variables in the model.
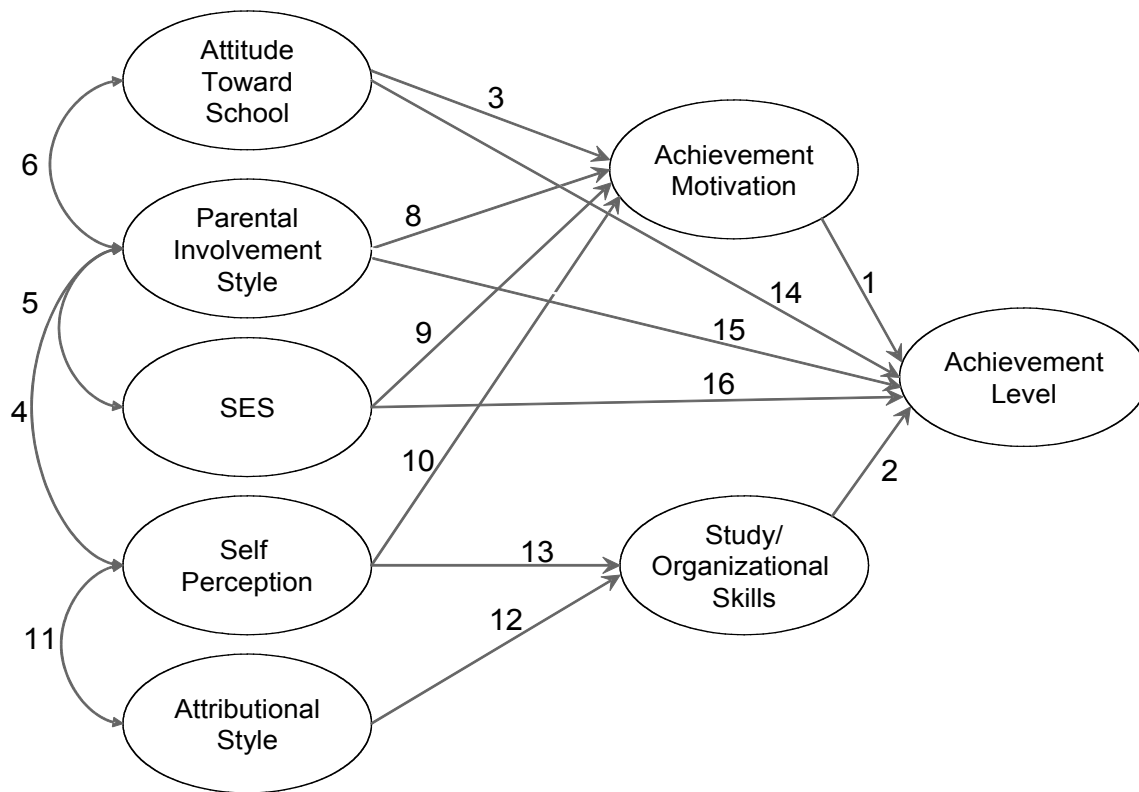

Figure 1. A social cognitive model of achievement.

In the model straight arrows represent a direct effect while curved arrows represent a bi-directional relationship. The arrows are labeled according to the relationship/effect that they represent. The model suggests that achievement level is directly influenced by (1) achievement motivation and (2) study/organizational skills (Baker et al. 1998; Carr et al., 1991, Ford, 1992; McCoach & Siegle, 2001). Achievement motivation is affected by how much a student values the task, which in this case is measured by (3) attitude toward school, as school is the task at hand (Meece et al., 1990). Parents' involvement/style is related to the (4) students' self-perception (5) students' attitude toward school, and the (6) parents socioeconomic status, which all affect (3,8,9,10) achievement motivation (Bandura, 1986; Borkowski & Thorpe, 1994; Hetherington & Clingempeel, 1992; Marchant et al., 2001; Meece, 1997; Meece et al., 1990; Paulson, 1994; Stipek & Ryan, 1997). Students' self-perceptions are related to their (11) attributional style, which both affect (12,13) study/organizational skills (Carr et al., 1991; Pintrich & DeGroot, 1990). The model also contains direct relationships between (14) attitude toward school and achievement (Meece et al., 1990), (15) parental involvement and achievement (Paulson, 1994), and (16) socioeconomic status and achievement (Borkowski & Thorpe, 1994; Stipek & Ryan, 1997) in order to determine

the extent to which achievement motivation is a mediator for these variables and achievement in a gifted population.

Examining this model with a gifted population in order to test the fit of the model as well as the strengths of the paths will bring further insight into the understanding of gifted underachievement. It will also contribute to further examination of models of motivation, particularly as these models relate to gifted underachievers.

Methods

Population and Sample

A non-probability sample of 369 students was drawn from six school districts located in Arkansas, Utah, and Virginia. Students were sixth through ninth graders who had been identified as intellectually gifted by their school district, excluding students identified as learning disabled. The school districts involved in the study identified students for gifted services through a screening process using ability tests administered in primary grades, and/or achievement tests administered in later grades. Students could also be identified through nominations in most of the school districts. The final sample after missing cases were deleted was distributed across grade levels as follows: 71 sixth graders, 11 seventh graders, 7 eighth graders, and 253 ninth graders. The final sample consisted of 178 males and 164 females.

Design

A model was developed in order to address the research question: To what extent do parenting style and involvement, socioeconomic status, students' attitudes toward school, students' self-perception, students' study/organizational skills, students' attributional style and students' achievement motivation affect achievement in gifted students? The structural model consisted of eight latent variables: academic achievement (ACACH), achievement motivation (AMOT), study/organizational skills (ORG), parental style/involvement (PARENT), self-perception (SELF), attitudes toward school (SCATT), attributional style (ATT), and socioeconomic status (SES). Latent variables are variables which cannot be directly measured and are therefore indirectly measured by a specified indicator. Although, the latent variables cannot be directly measured, structural equation modeling (SEM) techniques allow for the analysis of the paths between the latent variables.

Instrumentation

In this study, survey instruments were used to gather data on parents' income and level of education, as well as students' self-perception, attitudes toward school, achievement motivation, attributional style, study/organizational skills, and students' perceptions of parents' involvement and parenting style.

Measurement Model

The following scales were used as indicators of the latent variables.

1.   Academic Motivation (AMOT)
   - Achiever scale of Achievement Motivation Profile (ACH)
   - Motivation scale of Achievement Motivation Profile (MOT)
   - Goal orientation of Achievement Motivation Profile (GOAL)

2.   Organization/Study Skills (ORG)
   - Planning & Organization scale of Achievement Motivation Profile (PLAN)
   - Study habits scale of Study Attitudes and Methods Survey Revised (HABITS)
   - Study anxiety scale of Study Attitudes and Methods Survey Revised (ANX)

3.   Self-perception (SELF)
   - Verbal scale of Self Description Questionnaire II (VERBAL)
   - Math scale of Self Description Questionnaire II (MATH)
   - General school scale of Self Description Questionnaire II (SCH)
   - General self scale of Self Description Questionnaire II (GEN)

4.   Attitude Toward School (SCATT)
   - Arlin-Hills Attitude Toward Teacher (TEACH)
   - Arlin-Hills Attitude Toward Learning (LEARN)
   - Arlin-Hills Attitude Toward Math (ATMAT)
   - Arlin-Hills Attitude Toward Language (ATLANG)

5.   Parental Influence (PARENT)
   - Students' reports on involvement scale of Parenting Style and Parent Involvement (INV)
   - Students' reports on demandingness scale of Parenting Style and Parent Involvement (DEM)
   - Students' reports on responsiveness scale of Parenting Style and Parent Involvement (RES)

6.   Attributional Style (ATT)
   - Cognitive domain scale (unknown control) of the New Multidimensional Measure of Children's Perception of Control (UNCONT)
   - Cognitive domain scale (powerful others control) of the New Multidimensional Measure of Children's Perception of Control (OTCONT)

- Cognitive domain scale (internal control) of the New Multidimensional Measure of Children's Perception of Control (INTERN)

Academic achievement (ACACH) was measured using students' average GPA in math (GPAM) and language arts (GPAV) courses over the past three semesters, as well as their previous grade scores on the Stanford-9 tests for math and language (STANM, STANV). Socioeconomic Status (SES) was measured by the parent/guardian level of education (EDU) and the parent/guardian annual income (INC). A visual representation of the measurement model is presented in Figure 2.

Figure 2. Measurement model (this model is not hierarchical).

Data Collection

Instruments were sent to the gifted coordinator in each school district. The gifted coordinator then distributed the instruments to the gifted resource teachers for administration. In one case the gifted coordinator administered some of the instruments. In another case, the researcher administered the instruments at one school. Each gifted resource teacher was provided with a set of standard administration instructions. On average, the instruments took one hour to complete. The instruments were returned to the researcher with the students' unique identification number labeled on the packet (no other identifying information was placed on the instruments). Parental income and level of education were collected in a short questionnaire that was mailed to the parents and

returned to the researcher. Students' gender, grade point average (GPA) in math and language arts courses, and Stanford 9 Language Arts, and Math exam scaled scores were collected from each district. One school district sent the student and parent surveys home with the students. The students returned the completed packet to their teacher and the students' achievement information was added to the packet. The complete packet was then mailed back to the researcher with only a unique identification number labeled on the packet. To maintain confidentiality, students were assigned a unique identification number and files with students' names were destroyed.

Analysis

Through the use of SEM, a set of relationships among independent variables (IVs) and dependent variables (DVs) can be examined. SEM allows for the examination of the latent structure underlying a set of observed variables (Byrne, 1998). In addition, relationships among the observed and latent variables can be examined. SEM is the method most appropriate for determining the relationship among the variables proposed in the model of achievement by testing the fit of the model and examining the path coefficients within the model.

The proposed model has been determined to be over-identified because there 378 data points and 60 parameters to be estimated. Since this is a large model, the number of data points was determined using the equation $p(p+1)/2$, where p is the number of observed variables (Tabachnick & Fidell, 1996).

The Bentler-Weeks method (Bentler & Weeks, 1980) was used as the method of model specification. Maximum likelihood was used as the estimation method. Once the model was tested, the path coefficients were examined, and several goodness of fit indices (χ^2, Goodness of Fit Index (GFI), Parsimonious Goodness of Fit Index (PGFI), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI)) were examined to determine the degree to which the model fit the data. Modification indices were examined for potential model modification. Listwise deletion was used to eliminate missing data. LISREL statistical software was used to specify, estimate and test the model. SPSS statistical software was used to run descriptive statistics. PRELIS was used to determine the covariance matrix and the asymptotic covariance matrix which were used in the LISREL analysis. SPSS and PRELIS were also used to examine skewness and kurtosis of the measured variables in order to examine multivariate normality.

Descriptive Statistics and Multivariate Normality

Prior to analysis, the 26 indicator variables were examined through various SPSS and PRELIS programs for fit between their distributions and the assumptions of multivariate analysis. All cases with missing values on any one variable were excluded from the sample. This resulted in the deletion of 27 cases, thus the final sample size was 342 students.

Scaled scores from the Stanford-9 achievement test were measured on a scale that was quite different from the other variable scales. Differences in the scales resulted in covariances of vastly different sizes, therefore the Stanford-9 scores were rescaled to better match the scales of other variables, using the rescaling method suggested by Tabachnick and Fidell (1996).

Multivariate and Univariate Normality

Multivariate and univariate skewness and kurtosis were analyzed in order to determine multivariate normality. This analysis yielded evidence of multivariate non-normality, as several variables were significantly skewed and/or kurtotic (see Table 12). Many of the variables did not follow a normal distribution, and a few variables had significant outliers. The school and general self-perception variables were excluded from the model due to their extreme skewness and kurtosis. A table of the excluded variables is presented in Appendix A.

Due to the non-normal distribution of the remaining variables robust maximum likelihood (RML) estimation techniques were used to examine the hypothesized model.

Results

Model Analysis

Before analyzing the model, one-way analysis of variance (ANOVA) were used to determine the effects of gender on the indicator variables. The one-way ANOVAs revealed several significant gender differences, after alpha was corrected for Type I error (see Figure 1). Cohen (1988) defined effect sizes as small if d≤0.20. All of the effects exhibited trivial effect sizes, much smaller than 0.2. Since gender was not found to have any meaningful effects on the variables in the model it was not analyzed further in relation to the hypothesized model.

Model Identification

The hypothesized model had 63 parameters, including 24 variances of measurement error, 24 factor loadings, 11 factor correlations, and 4 factor covariances. There were 24 indicators; resulting in 300 observations and 237 degrees of freedom. The measurement model was determined to be identified since there were more observations than parameters and at least two indicators for each latent variable. Recursive path models are always identified (Bollen, 1989). The structural model was recursive, and therefore, it was identified.

Model Estimation

RML estimation revealed a converged and admissible solution for the hypothesized model, but the overall fit of the model was poor (see Table 1).

Table 1

Fit Statistics for Alternative Models

Model	d f	X^2	RSMEA	CFI	GFI	PGFI
1	237	1176.75***	0.09	0.89	0.77	0.6
2	212	912.21***	0.11	0.92	0.8	0.61

Note. Satorra-Bentler X^2 is presented.
*** p<0.001

Model Modification

Post hoc model modifications were performed in an attempt to develop a better fitting model. The final model, including significant coefficients in standardized form is illustrated in Figure 3. The re-specified model had moderate overall model fit, a better fit than the original model (see Table 1).
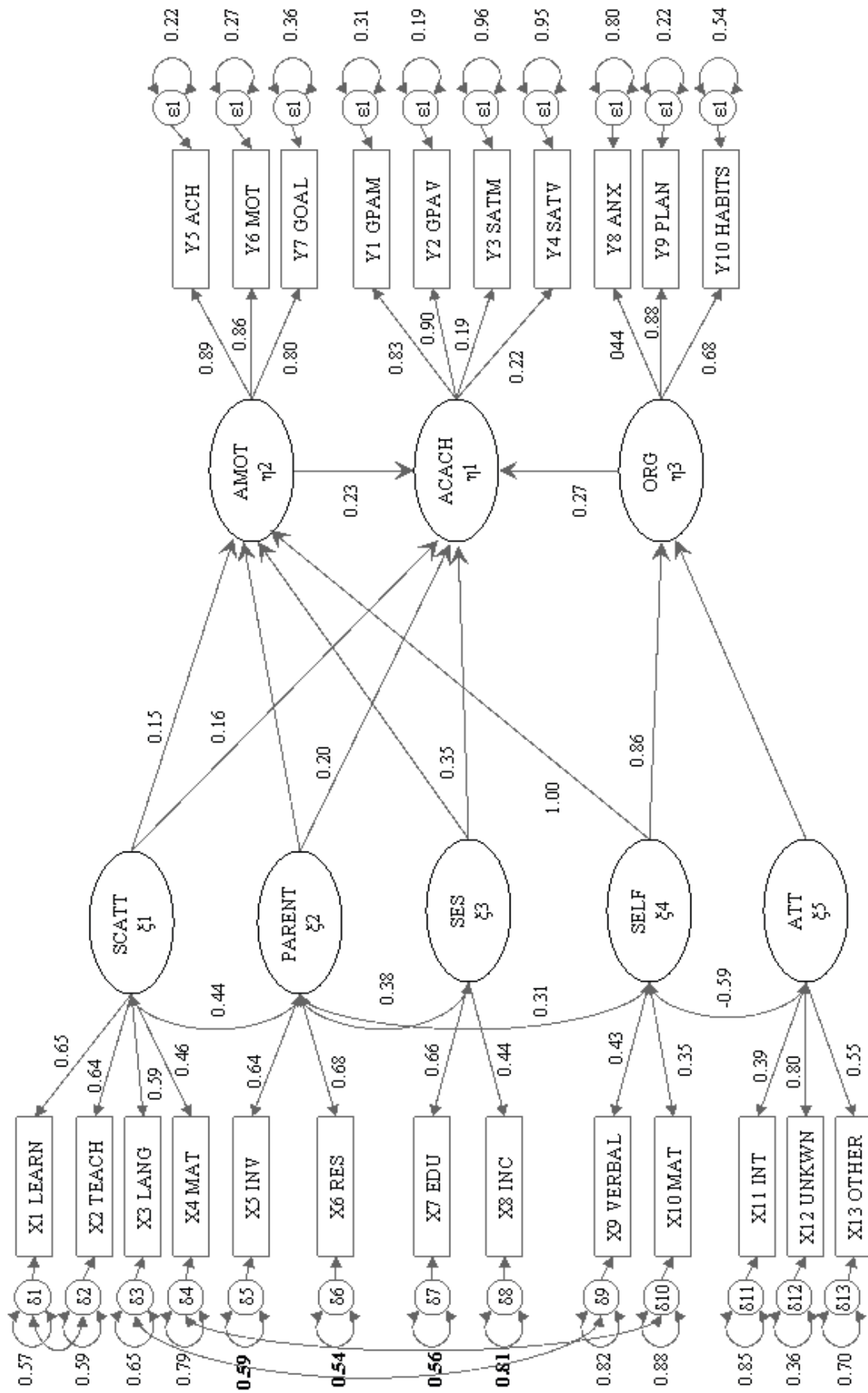
Note. Only significant standard estimates are reported.

Figure 3. Standardized coefficients for model 2 (final re-specified model).

Interpretation of Final Model

The final model was found to only have a moderate fit to the data. This suggests that changes to the measurements used in the model, or changes to the structure of the model (paths between latent variables) might result in a better fitting model. A review of the findings from the estimated parameters of the latent variables, and the indicators and error associated with each of these latent and observed variables leads to a clearer understanding of changes that might help to improve the model. The changes to the model that are suggested below were not made in this study because modifications had already been made and further modifications may have led to more error.

Students' attitudes toward school, as measured by their attitudes toward teachers, learning, language arts, and mathematics, was found to be significantly correlated to parenting style/involvement accounting for 19.4% of the variance. Students' attitudes toward school also had a small positive effect on both academic achievement (standardized coefficient=0.16) and achievement motivation (standardized coefficient=0.15).

Parenting style and involvement, as measured by parents involvement and responsiveness, had minimal positive effect on academic achievement (standardized coefficient=0.20), but did not have a significant effect on achievement motivation. Parenting style and involvement was also found to have significant relationships with socioeconomic status ($r=0.38$), attitudes toward school ($r=0.44$), and self-perception ($r=0.31$).

Socioeconomic (SES) status as measured by parents' annual income and level of education had a significant correlation ($r=0.38$) with parenting style and involvement. In addition, SES was found to have a moderate direct effect on academic achievement (standardized coefficient=0.35), and no significant effect on achievement motivation. Achievement motivation does not appear to be a mediating variable between SES and academic achievement.

Self-perception as measured by verbal and mathematics self-perception had the strongest effect on achievement motivation (standardized coefficient=1.00) and study/organizational skills (standardized coefficient=0.86). Caution is taken in interpreting these estimates due to the large amount of measurement error found in the indicator variables (Verbal $\delta=0.82$; Math $\delta=0.88$).

Students' attributional style, as measured by tendency to attribute success and failure to self, others or unknown causes, did not have a significant effect on study/organizational skills. Attributional style exhibits a strong negative correlation with self-perception ($r=-0.59$). This means that students who are more likely to attribute successes and failures to someone other than themselves are less likely to have a positive self-perception.

Achievement motivation, as measured by the students' follow through (i.e., achievement of specific goals), inner commitment to achieve, and clear goals and objectives, had a moderate direct effect on academic achievement (standardized coefficient=0.23). Study/organizational skills as measured by study anxiety, planning strategies/time management, and study habits were found to have a moderate effect on academic achievement (standardized coefficient=0.27).

The error associated with the latent academic achievement variable (standardized residual=0.73), and with the Stanford-9 math (standardized residual=0.96) and reading scores (standardized residual=0.95) indicates a large amount of error being measured in the latent achievement variable. The Stanford-9 indicator variables accounted for most of the error associated with the latent achievement variable. This suggests that the Stanford-9 test scores were not measuring the same achievement construct as the GPAs were. It appears that there were two separate achievement variables; school achievement (as measured by GPAs) and other academic achievement (as measured by standardized test scores).

Conclusions

The findings from this study provide support for several of the previous findings related to academic achievement, achievement motivation, study/organizational skills, attitude towards school, parental involvement and style, socioeconomic status, self-perceptions, attributional style, and gender, suggesting that all of the variables, except gender, in some way influence achievement. While a few gender differences were found on the indicator variables, none of these differences exhibited a meaningful effect, counter to previous research which found gender differences for attributional style, self-perception, and achievement (Dweck, Goetz & Strauss, 1980; Eccles et al., 1993; Marsh, 1989; Wigfield et al., 1991). The value of the new findings is in the interpretation of how these variables work together to influence achievement in a gifted population.

Previous studies have suggested that achievement motivation and study/organizational skills account for the most variance in achievement in gifted students (Baker, et al., 1998; Ford, 1992; McCoach & Siegle, 2001, 2003). In the model used in the current study, achievement motivation and study/organizational skills have strong relationships with academic achievement, but it appears that SES has the strongest relationship, followed by study/organizational skills, achievement motivation and parental style/involvement respectively. Also, attitude towards school appears to have a minimal direct influence on achievement, as well as an indirect effect through motivation. The model also suggests that self-perception indirectly affects achievement through a strong influence on motivation and study/organizational skills. Finally, it appears that attributional style has a very indirect relationship with achievement; it influences self-perception which in turn influences achievement motivation and study/organizational skills, which in turn influence achievement. The results of this study provide support for the following findings from previous research:

1. Students' attitude towards school impacts underachievement among gifted students (Colangelo et al., 1993; Emerick, 1992; Ford, 1992; McCoach & Siegle, 2001, 2003; Peterson & Colangelo, 1996; Supplee, 1990).
2. Parental style/involvement influences student achievement (Baker et al., 1998; Baum et al., 1995; Diaz, 1998; Emerick, 1992; Ford, 1992; Hébert, 2001; Paulson, 1994; Reis et al., 1995).
3. Parents with higher income and more education are more likely to be responsive to their children and more involved with their children's education (Hetherington & Clingempeel, 1992).
4. Students are more likely to have a positive attitude toward school and self-perception if their parents are more responsive and involved (Bandura, 1986; Marchant et al., 2001).
5. Students with more positive self-perceptions are much more likely to have high achievement motivation and strong study and organizational skills (Carr et al., 1991; Meece et al., 1990; Pintirch & DeGroot, 1990; Pintrich & Garcia, 1991).
6. Students' self-perceptions and attributional styles are related (Eccles et al., 1993; Eccles & Wigfield, 1993).
7. Gifted students are more likely to have high self-perceptions if they have internal attributional styles (Kanoy et al., 1980).
8. Gifted students with higher achievement motivation are more likely to achieve (as documented by grades and test scores) (Baker, et al., 1998; Baum et al., 1995; Diaz, 1998; Ford, 1992; Hébert, 2001; McCoach & Seigle, 2001; Reis et al., 1995).
9. Gifted students with better study/organizational skills are more likely to achieve (as documented by grades and test scores) (Baker et al., 1998; Baum et al., 1995; Colangelo et al., 1993; Hébert, 2001; McCoach & Siegle, 2001, 2003; Muir-Broaddus, 1995; Redding, 1990; Reis et al., 1995).

The findings from this study also suggest new relationships that have not been discussed in previous research. Students' attitudes toward school might be similar to their self-perception about school subjects, that is if you question students about their attitude toward mathematics you might also get an indication of their perceived ability in mathematics. Student's attributional style indirectly influences study/organizational skills through its influence on self-perception.

The results suggest that motivation does not serve as a mediating variable between parental style/involvement and achievement (Marchant, et al., 2001). The findings help to clarify findings related to SES, achievement and motivation (Borkowski & Thorpe, 1994; Meece, 1997; Stipek & Ryan, 1997), suggesting that SES relates to achievement more directly and does not influence motivation. Academic achievement also appears to be influenced by some relationship of parenting style/involvement and SES. The results also help to clarify findings that self-perception influences achievement in gifted students (Diaz, 1998; Emerick, 1992; Ford, 1992; Reis et al., Supplee, 1990)

suggesting that self-perception may have more of an indirect affect on achievement through its influence on motivation and study/organizational skills.

Implications

The findings from this model may help teachers and parents by providing them with a structure of which factors to consider in the prevention of underachievement or the identification of causes of underachievement. It seems that many students may be achieving at high levels as measured by grades, but not achieving if achievement test scores are considered (or vice versa). In light of these findings, teachers and others working with students should create a profile (standards based standardized test scores, norm referenced achievement test scores, grades, etc.) of any student who they believe is underachieving in order to determine the extent to which the student is achieving, and the extent to which the student is lacking motivation versus lacking knowledge or skills necessary to achieve. Students who are earning poor grades but are performing well on standardized tests are probably lacking motivation since they are still able to earn high scores on tests of their knowledge. Teachers and parents might respond to this by providing the student with work that is more challenging, or work that is aligned to the students interests and/or learning profile. Students who are earning poor grades and are not performing well on standardized tests might be lacking some of the knowledge or the study skills necessary to continue to learn the information. Students who are earning good grades but are not performing well on standardized achievement tests might be lacking some study/organizational skills related to test taking. Teachers should look at these profiles to determine how to intervene to help these students begin to achieve.

The model suggests that gifted students from lower SES might be at greater risk for underachievement; therefore teachers should pay special attention to the model variables in students with lower SES. This finding also has implications for identifying and retaining students with low SES in gifted programs suggesting that there is a need for methods to retain low SES gifted students ensuring their success in gifted programming. The current study suggests that students from lower SES levels may be as motivated to achieve, but they are still not performing at the same level as their cohort from higher SES levels. One might hypothesize that the school divisions had a gifted identification process which used a lower achievement criteria for students from lower SES leading to a strong relationship between achievement and SES. However, the school divisions in this study did not adhere to such practices; students from all SES levels were identified with the same criteria. Further research is needed to determine how the model variables function differently for students from different SES levels.

The relationships found among achievement, achievement motivation, study and organizational skills, self-perception, attitudes toward school, and attributional style can be used to guide teachers and parents in helping gifted underachievers. Teachers and parents seeking to prevent students from underachieving should focus on students' motivation and study/organizational skills. If a student appears to be losing motivation (i.e., stops turning in work, doesn't appear to be putting forth effort on assignments, etc.) this might be a strong indication of future underachievement.

1.	If a student does not have the necessary study or organizational skills, s/he may begin to underachieve.
2.	If a student shows a lack of motivation or lack of study/organizational skills the students' self-perception and/or attitudes toward school may be an underlying cause.
3.	If the student is found to have issues with self-perception one area of concern might be his/her attributional style.

Summary of Methodological Findings and Suggestions for Future Research

•	A few of the findings in this research have implications for future research on the achievement of gifted students.

•	Careful consideration must be taken when choosing the measure of achievement. The findings from this research suggest that school achievement, as represented by grades, is different from academic achievement, as represented by norm referenced achievement tests.

•	The self-perception and attitude towards school variables appear to be measures of similar constructs at least at the subject level (i.e., math and language arts). In the future researchers might want to combine these two variables or consider different measures for these variables.

There did not appear to be any gender differences in the indicator variables, but gender differences may exist in the interaction of the latent variables. SES had the strongest effect on achievement; therefore SES might have an effect on the interaction of all of the variables. With a large enough sample, multi-level SEM techniques should be employed to examine model differences in levels of SES. In structural equation modeling, models that are found to have model fit are not necessarily the only true model to represent the relationship among the variables. Cross-validation of this model with other samples of gifted students and tests of other models of achievement should be conducted to produce evidence in support of or against this model's tenability.

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CHAPTER 1: Introduction and Review of the Related Literature

Introduction and Overview

The National Commission on Excellence in Education (NCEE, 1984) estimated that 10% to 20% of high school dropouts are gifted, and approximately 50% of gifted students' achievement levels do not match their abilities. Based on studies of delinquent gifted students, Seeley (1984; 1987; 1993) estimated that 18% to 40% of identified gifted middle school students are at risk for school failure (i.e., dropping out of school) or academic underachievement (as measured by grades). The NCEE and Seeley only provide estimates of the percentage of gifted high school dropouts and gifted students at risk for underachievement; however these estimates suggest that there may be a larger population of gifted underachievers than may have been recognized in the past. The National Association for Gifted Children (NAGC) addresses the population of gifted underachievers in the Gifted Program Standards (NAGC, 1998). According to the NAGC standards, schools meeting the exemplary levels of these standards should be providing underachieving gifted learners with specific guidance and counseling services that address the issues and problems related to underachievement and should be providing specialized intervention services to gifted learners who do not demonstrate satisfactory performance in regular and/or gifted education classes. In order to meet these exemplary standards, educators must have a thorough understanding of the construct of gifted underachievement.

In an effort to explain gifted underachievement, this study combined research on gifted underachievement and motivation to formulate and test a model of achievement using a sample of gifted students. Through an examination of conceptions of giftedness, theory and research on gifted underachievement, and theory and research on motivation, a social-cognitive model of underachievement was derived. The model portrays the relationships among students' self-perceptions, value of a task, expectations for success, study and organizational skills, motivation, attributional style, gender, parental involvement and style, parental income and level of education, and student's academic performance or achievement.

Review of Related Literature

To understand the construct of gifted underachievement, it is necessary to examine conceptions of giftedness as well as theories and research on underachievement. In examining the literature on conceptions of giftedness, personality factors such as motivation are often seen as necessary for gifted students' achievement. Also, in theories of underachievement, it is suggested that underachievement is a complex construct which is influenced by many variables. Research on gifted underachievement includes simple studies of the relationship of single personality factors and underachievement and more complex studies which examine the relationship of several variables to underachievement. Researchers studying underachievement in gifted populations have mostly sought to determine whether a relationship exists between these variables and underachievement. To help understand the structure of this relationship, including the interrelationship among the variables, research on motivation and achievement should be examined. Findings from research on motivation contribute to the understanding of gifted underachievement because the relationships among several variables are studied with a focus on motivation and related personality factors, making these studies relevant to both conceptions of giftedness and theories on underachievement. Combining theories and findings from gifted underachievement and motivation research enables the development of a model of gifted underachievement which includes personality, cognitive and social factors.

Conceptions of Giftedness

Giftedness was once narrowly described as a person scoring in the top 1 - 1.5 percentile on a test of intellectual ability (Hollingworth, 1942; Terman, 1925). More recently, conceptions of giftedness have been transformed to reflect multifaceted, multicultural, and multidimensional perspectives that are not defined by static performance (Feldman, 1986; Gagné, 1985; Renzulli, 1978; Sternberg, 1986; Tannenbaum, 1983). Although many conceptions of giftedness exist, it is not in the purview of this paper to cover all. Conceptions of giftedness proposed by Renzulli, Gagné, Sternberg, Feldman, and Tannenbaum are reviewed because these conceptions of giftedness include specific ideas directly related to the study of underachievement. These authors speak either directly of underachievement, address the relationship of motivation to giftedness, or discuss the idea of potential giftedness. In his conceptual framework of giftedness, Renzulli (1978) discusses task commitment. Gagné (1985) , Sternberg (1986; 2001) and Feldman (1986; 1994) discuss motivation and/or personality factors, and Tannenbaum (1983) discusses supportive non-intellectual factors such as ambition and motivation.

Each theory of giftedness leads to a different understanding of gifted underachievement. Some of the authors directly address underachievement in their theories of giftedness, while others simply discuss the role that motivation plays in giftedness, or discuss other factors that may hinder or help the development of giftedness or talent. At first glance, it may seem that some theories leave little if any room for gifted underachievers.

With the inclusion of task commitment as a necessary component of Renzullli's conception of giftedness, it seems that a gifted underachiever would not exist in his eyes. However, Renzulli (1986; 2002) argues that gifted underachievers can be included in his model as task commitment is seen as a characteristic that can be developed. In addition, a student may exhibit task commitment when completing a task in an area of interest, even if that child failed to display overall task commitment in other activities. Therefore, according to this theory reversing underachievement involves in-depth assessment of students' interests and abilities in order to involve them in enriching activities that will challenge them while piquing their interests (Baum, Renzulli, & Hébert, 1995).

In contrast to Renzulli's model, Gagné's model was developed specifically with gifted underachievers in mind. Gagné critiqued Renzulli's model for it's seemingly lack of inclusion of gifted underachievers. Although, motivation is not an essential component of the Differentiated Model of Giftedness and Talent (DMGT), it is an essential catalyst in order for a gifted student to develop into a talented individual who has mastered his/her abilities to perform in a specific field (Gagné, 1993;1995). Gagné (1993) suggests that there is no such thing as a potentially gifted person; if you have the ability then you are gifted whether or not you are able to or chose to do anything with this ability. Therefore, in this model one might argue that a gifted underachiever is really just a gifted individual who does not have the appropriate catalysts to develop into a talented individual.

Sternberg's triarchic theory of giftedness focuses more on information processing skills, than on personal factors such as motivation. However, in his discussion of giftedness as developing expertise, motivation is a fundamental element in the process (Sternberg, 2001). Since motivation is the force that drives a gifted person to develop into an expert in a domain, a person without motivation may never become an expert students may not be identified as gifted using this model if they lack the motivation to become an expert test taker, because expertise is measured by test performance at the school aged level. These children may be seen as an underachiever in the eyes of their teacher or parents.

Feldman (1986) chooses not to use the term underachievement because he believes the typical measure of underachievement, students falling below their mark on a standardized test, is too confining. A person aligned with Feldman's conception of giftedness might argue that, since giftedness is domain specific, children could be mistakenly classified as underachievers because they are talented in domains that are not encouraged or developed in the school system. However, these students may grow into gifted or creative adults if the right variables are available to allow the development of expertise in a domain. Labeling a child as an underachiever might prevent some of the availability of necessary variables such as parent and teacher support, and therefore, hinder the development of giftedness or creativity in that child.

Tannenbaum (1983; 1986; 1997) excludes from his definition of giftedness those who do not produce or perform. With the exception of prodigious children, children are considered only as potentially gifted since a person's performance or production cannot

be evaluated until adulthood. Therefore, according to this definition it is futile to label children as underachieving since they are only exhibiting a potential to become a producer or performer. However, a child who has been identified as having superior general ability and distinctive special aptitudes (i.e., potential to be gifted) may not perform well in school because s/he does not have essential non-intellective factors such as motivation. In a case such as this, parents or teachers may try to develop achievement motivation to eliminate roadblocks in that child's path of development into a producer or performer.

Although each of the conceptions of giftedness is different, they all share some common aspects. The definitions of giftedness presented above contain many of the same components (i.e., general ability, motivation). The differences among the definitions are in what role each component plays in defining giftedness, how much of each component is necessary, and how each component is measured. Depending on the definition of gifted, a component can act as an essential component, or it may only be a "catalyst" needed in the process, but not included in the actual definition. Each of the conceptions suggest that giftedness is a multi-faceted construct, and that certain components or catalysts are necessary for a gifted individual to achieve, produce, or reach his/her potential. Theories of underachievement allude to a much narrower conception of giftedness, describing gifted children as children who have high IQ's or high scores on achievement tests (e.g., Mandel & Marcus, 1995; Rimm, 1995). However, underachievement is viewed as a multi-faceted construct.

Theories of Underachievement

Theories of underachievement are based on clinical and counseling work with underachieving students which attempted to reverse the patterns of underachievement (Mandel & Marcus, 1988; Rimm, 1995). Even though there is foundation for these theories, systematic supporting evidence has not been collected. Although theories of underachievement address giftedness, and even suggest that gifted students are at a greater risk of underachieving, they do not concentrate on only gifted students. Two theories on underachievement, the theories of Mandel and Marcus (1988; 1995) and Rimm (1995), discuss the construct of underachievement by categorizing types of underachievers and outlining strategies for addressing underachievement.

Types of underachievers. Underachievers, defined as children who are not living up to their expected capabilities, may have varying characteristics, backgrounds, interests, and educational experiences (Mandel & Marcus, 1988; 1995; Rimm, 1995). In response to this multifaceted view of underachievement, Mandel and Marcus (1988) and Rimm (1995) have generated prototypical categories that they believe fit most underachievers. Rimm (1995) introduced 16 types of underachievement based on how the child falls on two continua: conformity to nonconformity and dependence to dominant. Thus, the 16 types (Perfectionist Pearl, Poor Sally, Passive Paul, Social Sally, Jock Jack, Academic Alice, Dramatic Dick, Sick Sam, Taunted Terrance, Depressed Donna, Torn Tommy, Hyper Harry, Creative Chris, Manipulative Mary, Rebellious

Rebecca, and Bully Bob) fall into four categories of dependent conformer, dominant conformer, dependent non-conformer, and dominant non-conformer.

Mandel and Marcus (1995) introduced six categories of underachievers (coasting, defiant, anxious, sad/depressed, identity search, and wheeler dealer) which were developed from their clinical work with underachievers and based on personality types found in the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition-Revised* (DSMIII-R). Mandel and Marcus (1988) clearly state that they are not suggesting that underachievers have psychological disorders. By referencing the DSMIII-R they were simply trying to capture various characteristics associated with a personality style.

Mandel and Marcus' and Rimm's categories are not mutually exclusive, as an underachiever most likely has characteristics that fall into more than one category. The categories are presented with a brief description of characteristics of each type of underachiever in Table 1. From this table it becomes evident that the types of underachievement described by Rimm overlap with those of Mandel and Marcus.

What can be done about underachievement? The titles of the books, Why Bright Kids Get Poor Grades, and What You Can Do About it (Rimm, 1995), and Could Do Better; Why Children Underachieve and What to Do About it (Mandel & Marcus, 1995) present the authors' beliefs that underachievement is a learned behavior and therefore something can be done about it. Based on their profiles of underachievers, the authors offer methods for reversing underachievement.

Rimm (1995) presents the Trifocal Model, which focuses on the child, the parents and the school. The model consists of six steps for reversing underachievement: assessment, communication, changing expectations, identification, correction of deficiencies, and modifications at home and school (depending on the type of underachiever). According to the Trifocal Model, gifted children are at a greater risk for developing the underachievement syndrome because they are often given too much attention and power in their early years of schooling (Rimm, 1995). Gifted children also more likely to experience boredom in school due to the ease of the assignments, and the realization that they only have to exert minimal effort to succeed in school. This may become a problem if students lack the necessary study skills to do well when they first face a more challenging classroom experience. These students may give up rather than put forth more effort in order to succeed in the class. Other than having a greater risk of experiencing boredom, gifted children fall into the same patterns of underachievement as other children, and therefore the Trifocal Model is appropriate for all underachieving students, including gifted students (Rimm, 1995).

Table 1

Types of Underachievers Presented by Mandel & Marcus and Rimm

Types of Underachievers	Categories		
Mandel and Marcus (1988; 1995)	*Rimm (1995; 1997)*	*Rimm (1995; 1997)*	Description
Anxious	Perfectionist Pearl	Dependent Conformer	Avoid work because they fear they will not be able to do it well enough.
Anxious	Sick Sam	Dependent Non-Conformer	Become so anxious about work, they make themselves physically ill or are afraid of attending school
Coasting	Passive Paul	Dependent Conformer	Procrastinate and are unmoved or lack concern about achievement.
	Poor Sally	Dependent Conformer	Do not accept responsibility and are very dependent on adults.
	Taunted Terrance	Dependent Non-Conformer	Do not fit in with the other kids at school.
Sad or Depressed	Depressed Donna	Dependent Non-Conformer	Feel hopeless and have symptoms of depression.
	Torn Tommy	Dependent/Dominant Non-Conformer	Experience turmoil at home such as divorce, therefore do not know whose rules to follow.
	Jock Jack	Dominant Conformer	Only sign up for classes or activities at which they know they will succeed.
	Social Sally		
	Dramatic Dick		
	Academic Alice	Dominant Conformer	Were very successful high school students but are having trouble in college now that the bar has been raised.
Wheeler Dealer	Manipulative Mary	Dominant Non-Conformer	Manipulate teachers and parents sometimes pitting them against each other; are impulsive and want instant gratification.
Identity Search	Creative Chris	Dominant Non-Conformer	Do not see the point in school activities; are unable to see how this will help with future plans.
Defiant	Rebellious Rebecca	Dominant Non-Conformer	Lose temper easily; defy and argue with authority; can be disruptive and vindictive.
Defiant	Bully Bob	Dominant Non-Conformer	
	Hyperactive Harry	Dependent/Dominant Non-Conformer	Have high energy and are disorganized and sloppy.

Mandel and Marcus address parents and clinicians separately in their work on reversing underachievement. Clinicians are encouraged to use a diagnostic interview to identify and then offer treatment to an underachiever. This interview focuses on the following five areas (Mandel & Marcus, 1988, p. 96-97):

1. The nature of school performance and related issues, especially if they are problem areas

2.   The nature of family relationships
3.   The nature of social relationships (peers, the opposite sex, etc.)
4.   The nature of the student's self-perceptions and affect
5.   The student's perceptions and plans for the future

From background information and the interview, the child can first be diagnosed as an underachiever, and then further placed in a particular category of underachiever (i.e., anxious). The treatment is determined based on the type of underachiever the child is and the context of the child's environment. Mandel and Marcus (1995) present parents with descriptions of what can be done to help reverse the pattern of underachievement in each of the types of underachievers. Mandel and Marcus (1988) note their beliefs about the complexity of underachievement, stating:

> The point at which a certain level of accomplishment changes from being called achievement to underachievement varies from one grade to another, one school system to another, one teacher to another, and even one student to another, and will not be a matter of widely accepted definition, but will generally be influenced by the particulars of setting, individuals and situation. (p. 2)

Gifted underachievers are less of a focus in Mandel and Marcus's (1988,1995) theory. In their theory, intelligence is only one of many factors that contribute to achievement, therefore a person with a high intelligence should not be automatically expected to achieve, nor treated differently than any other underachieving student (Mandel & Marcus, 1995). However, they do provide reasons, similar to those discussed in Rimm's (1995) work, as to why a gifted child may underachieve. According to Mandel and Marcus (1995) gifted children may underachieve if they become bored in school, their maturity level does not match their IQ, they lack basic academic skills, or they have poor work habits.

Mandel and Marcus's and Rimm's theories have been formulated based on clinical work with underachieving students. Many of the students involved in the clinical work were brought in by their parents. These students had parents who were responsive enough to seek help when their child was in need. This is probably not the case with all gifted underachievers, which limits the generalizability and usability of their findings. Mandel and Marcus and Rimm have helped to illustrate the complexity of gifted underachievement by addressing the personal, cognitive and social factors involved in underachievement.

Summary. Conceptions of giftedness and theories of underachievement suggest that gifted underachievement may be influenced by several social, personal and cognitive factors. In particular personality factors such as motivation, self-esteem and ambition, environmental factors such as language, parental influence and peer relationships, and cognitive factors such as study skills, organizational skills and monitoring problem solving have all been discussed as important components in the achievement of gifted individuals. Research on gifted underachievement has examined how several of these variables influence underachievement.

Research on Gifted Underachievement

In 1982, a review of the research related to gifted underachievement suggested that underachievers were more likely to have family interaction problems, to exhibit negative attitudes toward school, to experience cultural or peer identification issues, to report problematic teacher and counselor interactions, and to lack the skills or creativity necessary to complete tasks (Dowdall & Colangelo, 1982). Common characteristics of gifted underachievers were social immaturity, incidence of emotional problems, antisocial behavior, and low self-esteem. Gifted underachievers were more likely to come from unstable families, single parent homes, and low income families. The review also revealed that gifted males were more likely to underachieve than gifted females. Unfortunately, in the past two decades of research on underachieving gifted students, not much more has been revealed. More recent studies suggest a relationship between underachievement and a single personal and cognitive factor, or that underachievement is influenced by a variety of personal, cognitive and social factors.

Most of the research on underachieving gifted students has answered the question "What variables are related to underachievement?" Generally researchers have sought to answer this question by comparing gifted underachievers to gifted achievers on a set of personal, cognitive, family, peer, and/or school-related factors. Researchers have also analyzed perceptions of underachieving students and their parents and teachers as related to underachievement. Some researchers have examined variables related to underachievement by evaluating interventions or determining what factors contribute to the reversal of underachievement in students who were no longer underachieving. This research has lead to a limited understanding of gifted underachievement as it provides a long list of variables that appear to be related to underachievement thus limiting understanding as to how these variables interact in relation to underachievement.

Personal and cognitive factors. Several studies have examined personal or cognitive factors as they relate to gifted underachievement by focusing on single factors such as locus of control, learning preferences and skill for auditory versus holistic tasks, auditory processes, and strategic functioning in underachieving students (e.g., Arehole & Rigo, 1999; McClelland, Yewchuk, & Mulcahy, 1991; Muir-Broadus, 1995; Redding, 1990; Rigo, Arehole, & Hayes, 1998). These researchers suggest that gifted underachievers may have inherently different personalities, preferences, or cognitive functioning than gifted achievers.

Locus of control. A possible relationship between gifted underachievement and students' locus of control has been revealed, yet the nature of this relationship is not completely understood as different results have been found in studies of locus of control. McClelland, Yewchuck, and Mulcahy (1991) compared gifted middle school achievers' and underachievers' locus of control as measured by Crandall's Intellectual Achievement Responsibility Questionnaire (Crandall, Katkovsky, & Crandall, 1965). This questionnaire results in three internal locus of control scores: positive (acceptance of success), negative (acceptance of failure), and total. Students were identified as gifted using the Canadian Lorge-Thorndike Intelligence Test. Gifted students were students

scoring 130 or above on either the verbal or non-verbal scale and 120 or above on the full scale, or 115 or above on the verbal, non-verbal and full scale. Underachievement and achievement was determined by comparing actual to predicted scores on the Canada Test of Basic Skills. Predicted scores were computed using a multiple regression procedure incorporating IQ scores (Full scale Canadian Lorge-Thorndike), age and gender factors. Students whose discrepancy score (actual score minus predicted score) was at least 1.5 standard deviations above the mean of the gifted group were labeled as achievers. Underachievers were those students whose discrepancy score was at least 1.5 standard deviations below the mean. The study found no significant differences between achieving and underachieving gifted students on positive, negative nor total locus of control scores.

Conversely, other researchers (Davis & Connell, 1985) using different measures of locus of control and different samples, found a relationship between gifted underachievement and locus of control. Underachieving gifted students, grades 4-6, were found to have a higher internal locus of control than gifted achievers in a study that determined achievement level by regressing achievement on aptitude. In this study, locus of control was measured using the Multidimensional Measure of Children's Perceptions of Control. Another study using a similar method to determine achievement levels reported that gifted achievers in fourth grade had a higher internal locus of control than gifted underachievers (Kanoy, Johnson, & Kanoy, 1980). This study used the Intellectual Achievement Responsibility Questionnaire to measure internal and external locus of control.

These studies of the relationship between locus of control and underachievement in gifted students all used similar methods to determine the level of achievement of the students (regression using standardized achievement and aptitude instruments). This suggests that the differing results may have been due to the three different measures of locus of control or differences in the samples. Further research is needed to better understand the nature of the relationship between underachievement and locus of control.

Learning preferences and skill patterns. Students' different preferences for tasks or cognitive functioning may also be related to underachievement. For example, gifted underachieving students may prefer tasks which require certain processes, or they may lack the necessary skills to complete certain types of tasks. One study sought to answer whether gifted underachievers performed worse than gifted achievers on tasks which required analytic information processing, and whether differences, if they existed, were due to learning preferences or skill patterns in gifted underachievers (Redding, 1990). This study included junior high school students who had been identified as gifted by their school district, as evidenced by a score of 130 or greater on the Wechsler Intelligence Scale for Children-Revised (WISC-R) and favorable teacher recommendations. Underachievement was defined as a discrepancy of one standard error of measurement (SEM) higher on predicted GPA than on actual GPA, determined by a regression procedure which predicted GPA based on the full scale WISC-R score. The author did not describe how achievers were identified.

Analytic and holistic tasks were measured using the Comprehensive Assessment Program of the Scott-Foresman Achievement Test Series (Foresman, 1980). The mathematics computation, capitalization and punctuation, and spelling subtests were used as measures of analytic tasks, and the mathematics concepts, reading comprehension, and vocabulary subtests were used as measures of holistic tasks. Underachievers' scores on all the holistic subtests were higher than their scores on the analytic subtests; this pattern was not found for achieving students. An analysis of variance (ANOVA) revealed a significant interaction effect between achievement level and verbal superiority on differential subtest performance. The ANOVA did not reveal a significant difference between verbal and performance IQ as related to differential subtest performance, suggesting that the deficit underachievers exhibited on analytic subtests was not a function of a underlying cognitive inferiority in analytical or convergent problem solving. These underachieving gifted students performed better on holistic tasks even though they had the skills necessary to perform well on both the holistic and analytic tasks. These findings suggest that gifted underachieving students may prefer holistic type tasks over analytic tasks.

Strategic functioning. Although differences between achievers' and underachievers' performance on holistic and analytic tasks were not attributable to cognitive processes (Redding, 1990), differences between achievers' and underachievers' performance on auditory processing tasks, as well as differences in their strategic functioning have been found (Arehole & Rigo, 1999; Muir-Broaddus, 1995; Rigo, Arehole, & Hayes, 1998). Low-achieving gifted students when compared to gifted achievers were found to have deficits in central auditory processes, and consequently, performed less well on auditory processing tasks (Arehole & Rigo, 1999; Rigo, Arehole, & Hayes, 1998). In these studies, students were identified as gifted by their school districts. Low-achieving students were described as students who demonstrated a discrepancy between intellectual ability and academic performance. Students were determined to be low-achieving or achieving based on evaluations from their teachers, grades, reports from previous teachers, and reports from related professionals.

Muir-Broaddus (1995) also examined cognitive processes as they related to gifted underachievement finding that gifted underachievers and achievers have different strategic functioning; that is achievers exceeded underachievers in spontaneous strategy implementation, acquisition, and generalization when solving figural analogies. Students were identified as gifted by their school district and classified as achieving if their grade point average was between 3.5 and 4.0. Students were classified as underachievers based on their GPA, performance on the math and total language subtests of the Iowa Test of Basic Skills (ITBS) or Stanford Achievement Test (SAT-9), and teacher or counselor opinions.

These studies (Arehole & Rigo, 1999; Muir-Broaddus, 1995, Redding, 1990; Rigo, Arehole, & Hayes, 1995) on cognitive processes suggest that underachieving gifted students prefer different types of tasks and have different levels of cognitive processes than gifted achieving students. Studies on locus of control and cognitive processes focus only on personal or cognitive factors, suggesting that a person has certain traits or

characteristics that make him/her more prone to underachieve. However, there may be many environmental or social factors that contribute to the onset of underachievement.

Multiple factor studies. A three-year case study of achieving and underachieving talented students in an urban high school addressed the multifaceted nature of gifted underachievement by examining how several school, family, community, and personal factors related to gifted underachievement (Reis, Hébert, Diaz, Maxfield, & Ratley,1995). Underachieving students were defined as students with high potential who were not achieving at the level expected. High potential was defined as scoring at or above the 85th percentile, using local norms, on an academic achievement or intelligence test. The students were labeled as underachievers if they met four of the following five criteria:

1. The student had been enrolled in a gifted program and had previously been achieving at a superior level academically as evidenced by grades, teacher observations, awards, honors, etc.
2. The student had previously displayed consistent strong academic performance with grades of B or better in an elementary and/or junior high school.
3. The student was presently maintaining a GPA of 2.0 or below.
4. The student was consistently enrolled in non-college or general classes.
5. The student was no longer in school, having dropped out or become truant.

The researchers sought to answer two research questions: (1) What are the characteristics of the young people in urban high schools who have high abilities but fail to demonstrate them in their school settings? and (2) How and why do some young people achieve in urban schools, while many others who have high intellectual potential do not experience academic success? Through interviews and participant observation, they found that achievement levels in gifted students were influenced by school, family, community, and personal factors. Specific factors related to gifted underachievement are presented in Table 2.

Two studies investigated sub-samples of the Reis et al. (1995) study. One study focused on students of Puerto Rican descent, as this population of students may be at a higher risk for underachievement than other populations (Diaz, 1998). Using the same definition of underachievement as the larger Reis et al. study, the researcher studied six students of Puerto Rican descent to answer the question: What family, classroom or school, community or social, and personal characteristics do talented Puerto Rican underachievers perceive as factors contributing to underachievement? To answer the question the researcher was involved in 45 days of observation within the school setting, the students' immediate community and students' homes. The researcher also conducted several interviews and examined personal documents such as grade reports, test results, and students' written work. All participants were interviewed five to eight times, and their families were interviewed once. In addition, teachers, administrators, guidance counselors and other school personnel were interviewed. The results of this study were similar to the larger study, although Diaz (1998) modeled how the variables that relate to gifted underachievement seemed to be interrelated. The model, presented in Figure 1,

shows that the absence of early appropriate academic experiences was the most critical factor influencing underachievement.

Table 2

Factors Found to Influence Underachievement (Reis, et al., 1995)

Factor	Examples
School	*Inappropriate early curricular experiences, absence of opportunities to develop appropriate school work habits, absence of challenge in high school, negative interactions with teachers, and questionable counseling experiences*
Family	*Family dysfunction, strained relations with family members, problems with siblings and sibling rivalry, inconsistent role models and family value systems, and minimal parental academic monitoring, guidance, and expectations*
Community	*Negative school environment, hostile urban environment, inappropriate peer groups*
Personal	*Behavioral problems, problems with unstructured time, unrealistic aspirations, insufficient perseverance and low self-efficacy, and inappropriate coping strategies*

Family

- Strained relationship with family member
- Unhappy home climate
- Minimal parental academic
- Guidance
- Inconsistent parental monitoring of student's achievement oriented activities at home
- Inappropriate parental expectations

School

- Absence of opportunities to develop or improve a school work discipline
- Negative interactions with teachers
- Unrewarding curriculum
- Questionable counseling experiences

Inappropriate Early Curricular Experiences

Personal

- Insufficient perseverance
- Low sense of efficacy
- Inappropriate coping strategies

Community

- Hostile environment

Underachievement

Figure 1. Model of academic underachievement taken from Diaz 1988).

Hébert (2001) studied six male students from the Reis et al. (1995) study, as some studies have suggested that males are more likely than females to underachieve (Dowdall & Colangelo, 1982). Using the same criteria for identifying underachieving students as Reis et al. (1995), the author used a combination of observation, interviews, and document review to examine the perceptions of high-ability high school males to determine how urban life experiences influenced their underachievement. This study revealed a set of variables related to gifted underachievement similar to the variables found in the Reis et al. study and the Puerto Rican sub-sample studied by Diaz. Hébert (2001) found that inappropriate curricular experiences, questionable counseling experiences and a series of family issues were the major factors influencing underachievement. In addition, these students faced peer group issues, behavioral problems and disciplinary issues, problems with unstructured time, and confused or unrealistic aspirations. All of these variables were discussed in the larger study, however,

Hébert identified two new variables that were not found in the Reis et al. research. Hébert reported that underachieving males had deficits in their organizational and self-regulation strategies, and they were frustrated with the mismatch in their courses and their learning style.

Although these studies reveal several factors that influence underachievement, they are limited as the findings cannot be generalized to all underachievers. All of these studies note that underachievement is complex and may be influenced by a combination of several factors. A strong point of the Diaz (1998) study is the model that was developed to discuss the interrelationships among the variables.

The complexity of gifted underachievement is a theme in other studies of gifted underachievers which examine how several variables relate to gifted underachievement through the use of quantitative methods. Colangelo, Kerr, Christensen, & Maxey (1993) compared gifted achievers' and underachievers' scores on the American College Test (ACT) and their responses on the student profile section. This study consisted of a national sample of 30,604 high school juniors and seniors labeled as gifted, as determined by their score of 95th percentile or higher on the ACT. The sample consisted of 257 gifted underachievers and 30,347 gifted achievers. Students were classified as underachieving if they had an overall high school GPA≤2.25, and achieving if they had a GPA≥3.75.

Chi-square analyses revealed that gifted underachievers and achievers differed significantly on several factors. Gifted underachievers were more likely than gifted achievers to be male, come from larger sized communities, and choose careers such as fine and applied arts and social sciences rather than engineering and health professions. In addition, gifted underachievers were less satisfied with their high school instruction, overall guidance services, and overall adequacy of their high school education. Underachievers also indicated that they had less interest in freshman honors courses and independent studies and less of a need for help with educational plans. Underachievers also claimed more need for help with personal concerns and a need to improve study skills. T-test analyses revealed that underachievers had lower composite ACT scores, as well as lower English and mathematics scores. However, underachievers scored higher than achievers on the natural science section of the ACT.

This research suggests that gifted underachievers had a more negative attitude toward school than gifted achievers. It also suggests that gifted underachievers have some awareness of their need for help with study skills and personal concerns, while they may not perceive a need for help with educational plans. The differences between achievers and underachievers in ACT scores may suggest that students' underachievement in school has affected other areas of students' academic performance or that underachieving students did not put forth as much effort when taking the ACT. However, there is no obvious explanation for why the underachievers scored higher on the natural science section of the ACT.

A similar study focused on variables related to gifted underachievement that could be obtained through school files, including ACT scores (Peterson & Colangelo, 1996). The sample consisted of 153 students in grades 10-12. Students were classified as gifted if they met two of the following four criteria.

1. WISC score at or above 130 ± 6 (98th percentile)
2. Composite OLSAT score at or above 132 (98th percentile)
3. Composite score on the Stanford Achievement test at or above the 95th percentile
4. At least one subset score on the Stanford Achievement Test at or above the 98th percentile in the areas of vocabulary, reading, concepts of numbers, science, social studies, or language.

The researchers classified students into four achievement categories: high achievers maintained (GPA≥3.75), moderate achievers (3.35≥GPA≤3.74), moderate underachievers (2.75≥GPA≤3.34), and extreme underachievers (GPA < 2.75). Underachievers were further classified into the categories of chronic (9-12 semesters of underachievement), sustained (5-8 semesters of underachievement), and episodic (1-4 semesters of underachievement) underachievement. The researchers believed it was important to classify students into chronic, sustained and episodic underachievement, because each of these might be brought on by different variables. For example, a student whose parents were just divorced might experience episodic underachievement, while a student with low motivation might experience chronic underachievement. This study sought to answer seven questions by comparing patterns found in school files for gifted achievers and gifted underachievers. The seven research questions were:

1. Among gifted underachievers, which type of underachievement is most prevalent?
2. Do gifted achievers experience semesters of underachievement?
3. Are there patterns regarding onset and improvement of underachievement?
4. Are there patterns regarding areas where achievement is maintained during periods of underachievement?
5. Are there differences between gifted achievers and underachievers regarding attendance and tardiness?
6. Are there differences between gifted achievers and underachievers regarding their selection of demanding and undemanding courses?
7. Are there differences between gifted achievers and underachievers regarding performance on a standard achievement test used for college entrance?

Comparisons using t-test analyses revealed that there were significantly more male than female chronic underachievers, but more females experienced episodic underachievement. Additionally, gifted underachievers were tardy and absent more often, chose less demanding classes, and scored lower on the composite ACT than achievers. For the remaining factors, no significant differences were found. It is not surprising to learn that gifted underachievers were tardy and absent more often, or that

they had lower ACT scores and chose less demanding classes. This information suggests that underachievers may not be motivated to go to class or to sign up for challenging classes, and that missing out on these classes may to some extent affect their scores on standardized tests such as the ACT.

The works of Reis et al (1995), Diaz (1998), Hébert (2001), Colangelo et al. (1993), and Peterson & Colangelo (1996) suggest that there are many factors that may influence or be related to underachievement. But, does this information provide the knowledge needed to attempt to prevent or reverse the underachievement pattern? Rather than looking at the onset of underachievement some researchers chose to determine if underachievement can be reversed, and/or what factors lead to the reversal of underachievement.

Reversing underachievement. A study involving interviews of 10 students, aged 14 to 20, who had reversed the underachievement pattern uncovered six factors that students perceived to influence reversal (Emerick, 1992). These students were achieving but had underachieved for two years or longer, as evidenced by average or below average academic performance based on test scores, grades, and observations. The students believed that their involvement in out-of-school activities, their parents' approval and support of these interests and their parents' positive attitude towards them during their underachievement helped them to reverse the pattern. In addition, the classes these students were in provided opportunities for intellectual challenge, independent studies, student discussion, assignments that were relevant, and focused on the process of learning. These students had teachers who cared for and liked the students, communicated with the students as peers, were enthusiastic and knowledgeable, and had high but realistic expectations for the students. The students developed goals that were personally motivating and directly related to academic success, developed more self-confidence, began to see school success as a personal satisfaction, and believed that they had gained the ability to reflect on and understand factors that contributed to underachievement. Emerick's (1992) research provides indicators of variables that are potentially related to the reversal of underachievement patterns; however, a follow up to this study is needed to determine if these findings can be generalized.

A more controlled method of studying the reversal of underachievement is to involve an intervention and determine to what extent the intervention helped to reverse underachievement in a population of gifted underachieving students. One such study examined the effect of Type III enrichment activities on the reversal of underachievement patterns among high academic potential students, grades three through nine (Baum, Renzulli, & Hébert, 1995). The students were identified as having high academic potential if they qualified for participation in the gifted program in their school districts. Students were identified as underachievers based on evaluations from special programs and classroom teachers, their scores on ability and achievement tests, grades, classroom records, work samples, and anecdotal information provided by teachers and obtained from permanent records.

Through interviews and observations the researchers concluded that four factors contributed to underachievement among the 17 case studies of underachieving gifted students. These factors were emotional issues, social and behavioral issues, lack of an appropriate curriculum, and learning disabilities/poor self-regulation. Emotional issues included dysfunctional families, students' need for attention, perfectionism and depression. Social and behavioral issues included influence of an inappropriate peer group, questioning of social values, and lack of behavioral controls or social skills. The students were not motivated by the curriculum and did not apply appropriate learning strategies, were disorganized and forgetful, lacked time management skills, and failed to turn in assignments.

Based on these interviews and observations, the study also found that five teacher behaviors were important to help a student reverse the patterns of underachievement. These factors were taking time to get to know the student, focusing on positive traits of the student, understanding the role of facilitator, applying the role of teacher as researcher, and conveying a belief in the students' abilities. Through the use of Type III enrichment activities as an intervention, 82% of the students were reported as making positive gains during the year of the intervention and the year following, as evidenced by grades, teacher comments, achievement test scores, and parental and teacher interviews. Teacher and parental interviews revealed that students had improved their effort in school, attitude toward school, self-regulated behavior, and classroom behavior.

Supplee (1990) also implemented an intervention program designed to improve underachieving students' self-esteem, attitude towards school, school behaviors, and academic achievement. Students were identified as gifted if they had an IQ or achievement test score at the eighth or ninth stanine. Underachievement was determined by teacher ratings, grades, or a score on an achievement test that was two or more stanines below their score on an IQ test. The 16 underachieving students were provided with curriculum that was differentiated to address both cognitive and affective needs. Acceleration, enrichment, and remediation were also used to provide additional services. Additionally, the classroom environment was changed to make the room look more homelike, teachers were provided with different classroom management techniques, and schedule adjustments were made.

A multi-case design was used to help determine the effect of the intervention, to identify the most important differences in the students and to determine the factors in the adaptive classroom that helped reverse underachievement. The researcher looked at individual cases as well as cross case analyses. The case studies consisted of interviews, questionnaires, and review of school records and anecdotal records kept by the classroom teachers. Students' self-perceptions, value the students placed on their intelligence, sense of control over their lives, identifying learning disabilities, and learning style were found to be the most important factors in reversing underachievement. The author found that at least four of the students were learning disabled. Generally, learning disabilities in gifted students are studied separately from underachievement (e.g., Baum, Olenchak, & Owens, 1998; Moon, 2001; Reis & McCoach, 2000). However, most of the researchers of gifted

underachievement did not assure that their sample excluded gifted students with learning disabilities.

From all of the previous research a large list of variables that are related to underachievement can be compiled (see Table 3). However, not all underachievers exhibit these characteristics, and some achievers may possess a number of these characteristics. Also, many of these variables seem to be interrelated. To address these interrelationships some researchers examined how social, cognitive and personal factors work together to explain or predict underachievement.

Combining variables related to gifted underachievement. Ford (1992) examined a combination of psychological, social, and cultural factors in the underachievement of gifted, above-average and average Black sixth-grade students. Students were classified as achievers or underachievers based on GPA, self report of effort, and students' report of teacher feedback regarding their effort. Students completed survey instruments regarding their perceptions of psychological factors (anxiety, locus of control, isolation, self-efficacy on student achievement, motivation and desire to achieve), social factors (aspirations of students and importance of schooling given discrimination, racism, and other barriers to social mobility), and cultural factors (parents' beliefs and values about school, achievement, and success). Multiple regression analyses revealed that a combination of these three factors accounted for 26% of the variance in underachievement in this sample. The psychological factors accounted for seven percent of the variance and further analysis revealed that this was the only factor that revealed a significant correlation to underachievement (r=.50, p < .01). This suggests that, in this sample, psychological factors such as motivation and self-efficacy may have more influence on underachievement than social or cultural factors.

Baker, Bridger, & Evans (1998) examined similar factors as Ford by testing four models of underachievement. The four models examined were:

1. Individual etiology model (behavior/emotional problems, poor personal/social adjustment, and lack of organizational/study skills)
2. Family etiology model (poor emotional climate, poor control within the family, and poor parenting skills)
3. School etiology model (poor academic quality, poor student/teacher relationship, and poor peer relationships)
4. Combined model (lack of organizational/study skills, poor parenting skills, and poor academic quality)

Table 3

<u>Variables Related to Gifted Underachievement</u>

Family Factors	School Factors	Personal Factors
• Family interaction problems • Family instability • Undesirable home environment • Family dysfunction • Strained relations with family members • Problems with siblings and sibling rivalry • Inconsistent role models and value systems in the family • Minimal parental academic monitoring • Minimal parental guidance • Low parental expectations • Unhappy home climate • Inappropriate parental expectations • Parents' attitude toward work, education and gender roles	• Problematic or negative interactions with teachers or counselors • Absence of opportunities to develop appropriate school work habits • Absence of challenge in high school • Inappropriate early curricular experiences • Participation in special programs • Low satisfaction with high school classroom instruction • Low satisfaction with overall guidance services • Low satisfaction with high school education • Enrollment in less demanding classes • Absence of opportunities to develop or improve a school work discipline. • Unrewarding curriculum • Inappropriate peer group • Instruction not addressing their learning style	• Negative attitudes toward school • Immature social behaviors • Problems emotionally • Low self-esteem • Lack of skills necessary to complete tasks • Learning preferences for holistic tasks • Deficits in auditory processing • Deficits in strategic functioning • Inappropriate use of learning strategies • Behavioral problems • Problems with unstructured time • Unrealistic aspirations • Insufficient perseverance • Low self-efficacy • Inappropriate coping strategies • Strong belief in self • Low motivation • Desire for help with educational plans • Desire for help with personal concerns • Desire for help with study skills • Gender • Locus of control • Tendency towards perfectionism • Depression

From Arehole & Rigo, 1999; Baum, Renzulli, & Hébert, 1995; Colangelo, Kerr, Christensen, & Maxey 1993; Diaz, 1998; Dowdall & Colangelo 1982; Emerick, 1992; Hébert, 2001; Muir-Broadus, 1995; Peterson & Colangelo, 1996; Redding, 1990; Reis et al., 1995; Rigo, Arehole, & Hayes, 1998; Supplee, 1990

Students and one of their parents completed a battery of instruments designed to measure variables in each model. Only the personality scale completed was by the students. Students were fourth to eighth graders identified as gifted by their school districts. Underachieving students were those students who were at risk of being removed from the gifted program due to poor academic performance. Assessing each model separately using regression the researchers found that each of the models was a significant predictor of underachievement, the individual and family model correctly classified 78% of the cases, while the school model classified 73% of the cases. However, lack of study/organizational skills was the only factor contributing significantly to the individual model after controlling for age, suggesting that this factor accounted for most of the variance explained by the model. None of the independent variables obtained significance in the family or school model. The combined model consisted of variables that were significant or approached significance (p=.06-.09) from each of the individual, family and school models. All of the predictors in the combined model (organizational/study skills, parenting skills, and academic quality) were significant after controlling for age. The combined model correctly classified 73% of the cases. These findings suggest that individual factors may be the most influential in underachievement; however, family and social factors may also contribute to underachievement.

McCoach & Siegle (2001) examined similar factors using student's responses to the School Attitude Assessment Survey-R (McCoach, 2000). Regression procedures were used to examine the relationship among gifted underachievement and academic self-perceptions, attitudes towards teachers, attitudes towards school, goal valuation, and motivation/self-regulation. The study also examined differences between gifted achieving and underachieving students, grades 9-12, on these five factors. Again, using a standardized achievement test/grade discrepancy as a measure of underachievement, a gifted student was defined as a student who scored at or above the 92nd percentile on a norm-referenced test of achievement within the last four years. Students were classified as underachievers if they had a GPA at or below 2.5 or they ranked in the bottom half of their class. Students were classified as achievers if they had a GPA at or above 3.75 or ranked in the top 10% of their class. The study found that gifted underachievers had significantly lower means on all of the factors except academic self-perceptions. However, logistic regression analysis revealed that only goal valuation and motivation/self-regulation were significant predictors of underachievement, suggesting that the direct effect of other factors may not be as strong.

Summary. Through these regression analyses it has been suggested that some variables, particularly psychological variables, such as motivation, are more important than others in explaining underachievement (Baker, Bridger, & Evans, 1998; Ford, 1992; McCoach & Siegle, 2001). The interrelationships among the variables tested have not been examined, although motivation research, and theories of giftedness and underachievement have suggested a relationship among these variables (Feldman, 1986; Gagné, 1985; Mandel & Marcus, 1995; Meece, Wigfield, & Eccles, 1990; Pintrich & DeGroot, 1990; Renzulli, 1978; Rimm, 1995; Sternberg, 1986; Tannenbaum, 1983). Theories of giftedness identify motivation as one of the key catalysts or components in the expression of giftedness (Gagné, 1985; Renzulli, 1978; Sternberg, 1986;

Tannenbaum, 1983). To tie the research on gifted underachievement back to the definitions of giftedness and to incorporate the findings from research on underachievement, one might begin to examine the interrelationship of variables related to gifted underachievement by focusing on achievement motivation.

Researchers studying achievement motivation have examined the interrelationship of many of the variables described above, as well their relationship to achievement motivation and achievement, using more sophisticated statistical techniques (e.g., Carr, Borkowski, & Maxwell, 1991; Eccles, Wigfield, Harold, & Blumenfield, 1993; Pintrich & Garcia, 1991). Examining research on achievement motivation contributes to the development and testing of a model of gifted underachievement and increases understanding of the construct of underachievement. This increased understanding may help to identify students at risk for underachievement, as well as determine more appropriate interventions for students who are currently underachieving. To begin to develop an understanding of the interrelationships of the variables found to be related o gifted underachievement theories of motivation and research on motivation will now be examined.

Theories of Motivation

Theories of motivation include expectancy-value theories, attribution theories and social cognitive theories. Although components of these theories overlap they each focus on different key ideas. Expectancy-value theories focus on how well a person expects to do on a task as well as how much they value the task. Attribution theories focus on the factors to which people attribute their successes and failures. Social cognitive theories focus on personal, social, and contextual factors.

Expectancy-value theory. In an expectancy-value theory, motivation consists of both the expectancy and the value component. Expectancy is how well a person expects to do on the task. Value is how important the task is to a person. One of the first expectancy-value theories of motivation combined motives, probability for success, and incentive value (Atkinson, 1964). In this theory a person has the motive to either seek success or to avoid failure. Whether a person expects to succeed is based on the person's beliefs about his or her ability as well as the difficulty of the task at hand. The probability of success is said to be inversely related to the difficulty of the task. The incentive value component is described as the amount of pride a person takes in accomplishing the task. The person's pride can be related to the difficulty of the task or the degree of interest in the task.

Stemming from Atkinson's model, Covington (1992) conceptualized motive to approach success or motive to avoid failure in a quadripolar model of need for achievement (see Table 4). In this model, a student's behaviors are dependent on the combination of the level of motive to approach success and the level of motive to avoid failure. Students with a high motive to avoid failure but a low motive to approach success are labeled as failure avoiders. A failure avoider would choose a very easy or a very difficult task. The choice of a very easy task would inhibit their fear of failure

because they would be more likely to succeed. By choosing a very difficult task this student would be able to justify his/her failure by reasoning that not very many people had been able to accomplish the task due to the level of difficulty. Combining Covington and Atkinson's explanations, a student's choice of task and persistence in a task are dependent on the expectancy of success, the pride a student takes in accomplishing a task and a combination of the student's level of motive to either seek success or to avoid failure.

Table 4

Covington's Quadripolar Model of Need for Achievement Taken From Pintrich & Schunk (2002)

| | | Motive to Approach Success | |
		Low	High
Motive to Avoid Failure	Low	Failure Acceptors	Success Oriented
	High	Failure Avoiders	Over strivers

Attribution theory of motivation. Attribution theories of motivation focus on the factors that a person perceives are responsible for successes and failures. The general attributional model states that environmental and personal factors influence the person's perceived cause of an event (Weiner, 1986). These perceived causes are categorized into three causal dimensions: stability, locus, and control. Stability describes how constant versus unstable the cause is. For example, ability is stable, but task difficulty will change from task to task. Locus is how external or internal the cause is. For example, ability is an internal cause while luck is an external cause. Control is how much a person can regulate the cause. For example, students have little control over their ability but have control over the amount of effort they exert. These causal dimensions influence whether a person expects to succeed on future tasks. For example, if a person attributes success to ability, which is internal and stable, the person will be more likely to expect to succeed in the future. However, if a person attributes success to luck, an external and unstable task, the person will be less likely to expect to succeed on a future task. Whether a person expects to succeed or fail at a task is related to whether or not the person is motivated to approach the task.

Social cognitive models. Social cognitive models of motivation discuss the interaction of personal and social or contextual factors. Bandura (1986) presents a model of triadic reciprocity in which behavior, cognitive/personal factors, and environmental events are all determinants of one another. A more complex model is presented to explain motivation in the classroom by Pintrich and Schrauben (1992). In this model, (see Figure 2), task characteristics and instructional processes influence each other as well as motivation components (expectancy, value, etc.) and cognitive components (learning strategies such as mnemonics). The motivation and cognitive components

directly influence student involvement in learning and academic achievement. Student involvement in learning also directly influences academic achievement. Finally, students' characteristics, including personal beliefs and demographic characteristics, are influential at every stage of the model. That is, these characteristics directly influence task characteristics, instructional processes, motivation components, cognitive components, and academic achievement. This model incorporates the expectancy-value theory suggesting that academic achievement is influenced by an interaction of motivation and several other contextual variables.
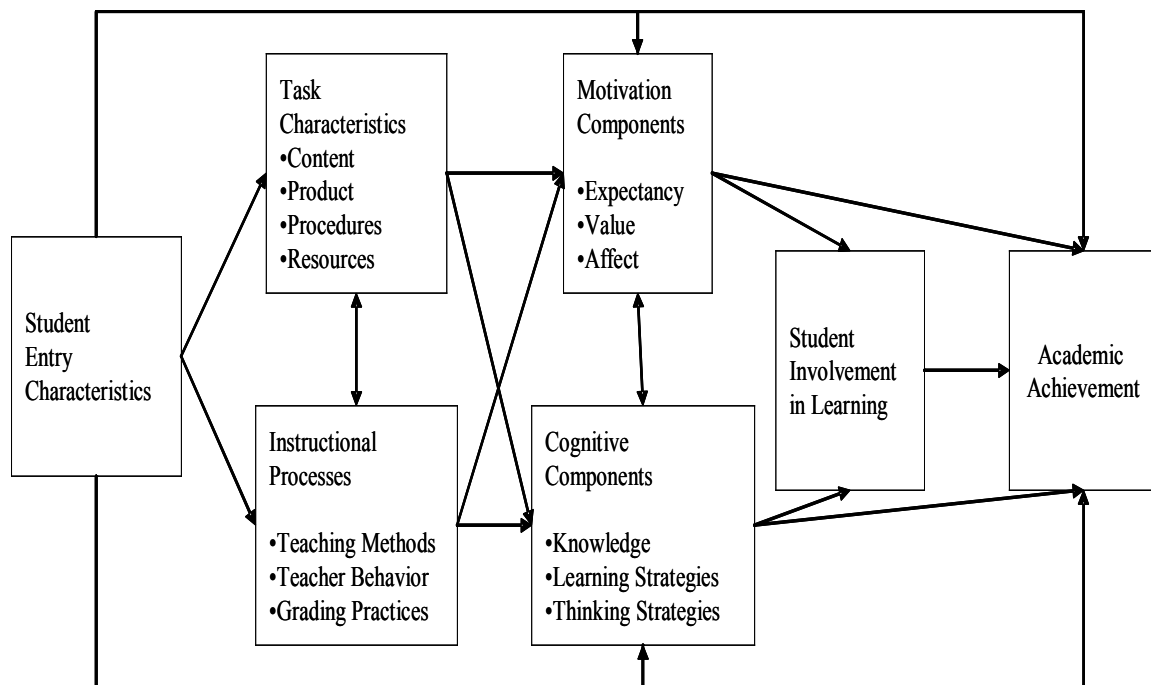
Figure 2. Social cognitive model of motivation taken from Pintrich & Schrauben (1992).

*A combined mode*l. The model that has generated the most theory and research on academic achievement in the classroom has components from expectancy-value, attributional, and social cognitive models (Pintrich & Schunk, 2002). This most recent version of this model, derived by Wigfield & Eccles (2000) is a complex combination of cultural beliefs, socializer's beliefs and student variables (see Figure 3). The socializer can be the parents, teachers or other important adults in the student's life. Student variables include aptitude, previous achievement related experiences, perceptions of socializers' beliefs, gender roles, etc., interpretations of their experiences, short-term and long-term achievement goals, affective memories, expectation of success, and subjective task value.
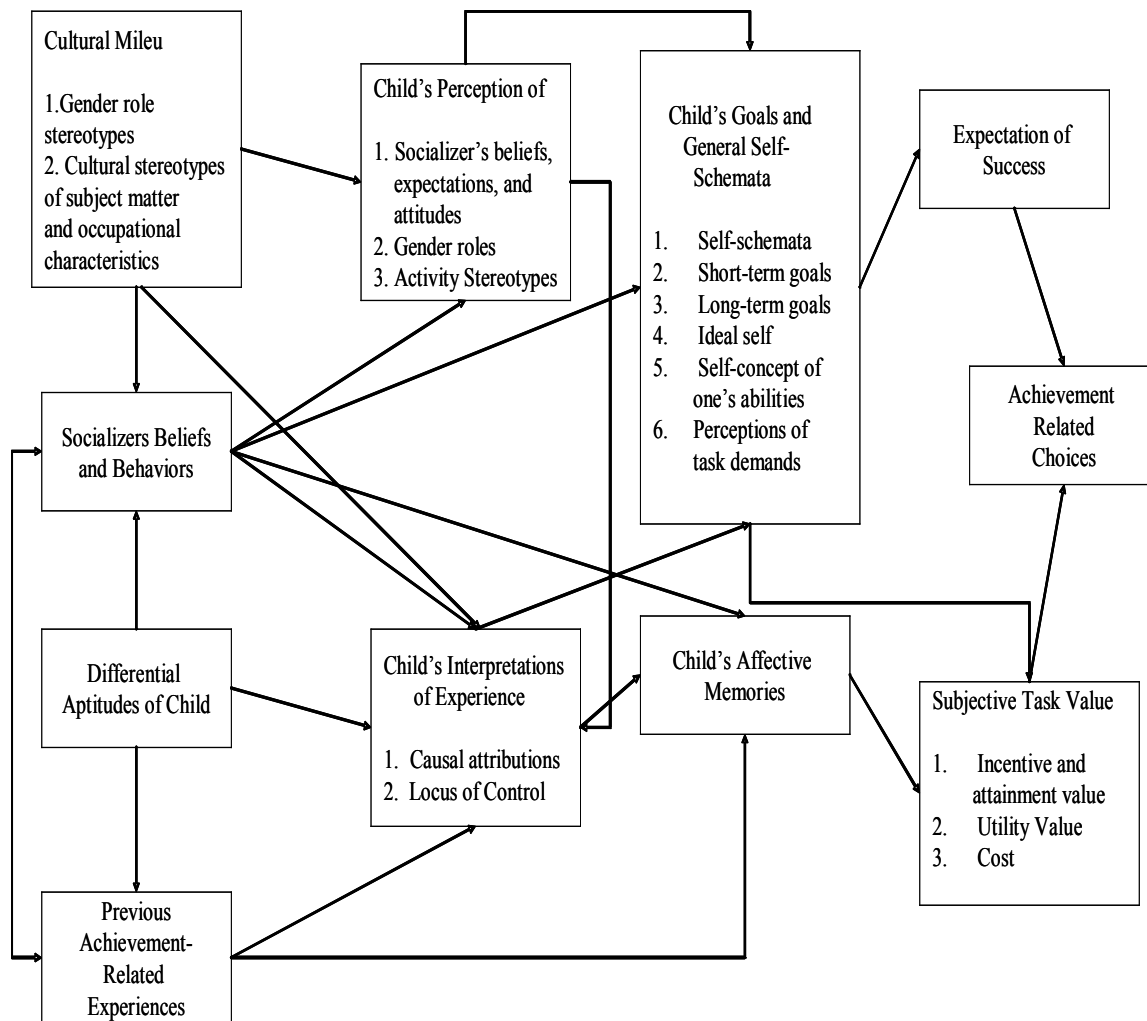
Figure 3. Model of achievement taken from Wigfield & Eccles (2000).

Research on Motivation

Through the use of longitudinal studies, aspects of the Wigfield & Eccles model of motivation have been tested. Confirmatory factor analysis revealed that ability beliefs and expectancy for success consistently loaded together as one factor; however, ability beliefs formed distinct factors within each academic domain (Eccles et al., 1993; Eccles & Wigfield, 1993). Additionally, children's ability beliefs and value of tasks formed distinct factors (Eccles et al., 1993). In other words, children's beliefs about their abilities influence whether they expect to succeed, but do not necessarily influence whether they value the task. Eccles et al. (1993) focused on children age 7-10, while Eccles & Wigfield (1993) studied adolescents grades 5-12.

Although children's beliefs about ability do not influence their values (Eccles et al., 1993), their actual ability has been shown to predict how much they value the task

(Meece, Wigfield, & Eccles, 1990). These researchers used structural equation modeling to analyze how seventh, eighth and ninth graders' achievement beliefs and performance in math one year predicted their achievement beliefs and performance in math the next year. The achievement beliefs included expectancies for success, perceived importance of math, math anxiety, and intentions to continue taking math and were measured using the Student Attitude Questionnaire (SAQ). The results of the study indicated that year two expectancies for success and perceived importance of math were predicted directly and positively from ability in math the first year. Also, ability in year one negatively predicted math anxiety in year two. In addition, intentions to continue math were predicted more strongly by year two math importance ratings than by expectancies for success. However, year one expectancies for success predicted year two performance in math more strongly than year one ratings of importance of math. These findings suggest that student's expectations of success influence the student's performance.

A student's expectation of success helps to predict whether that student will succeed or fail (Meece, Wigfield, & Eccles, 1990). But to what factors does this child attribute his successes and failures? Do these attributional styles influence future performance? Using the attribution theory of motivation as a framework, one study attempted to discriminate third, fourth and fifth grade underachieving students from achieving students on the basis of ability, attributions, self-esteem, and reading awareness (Carr, Borkowski, & Maxwell, 1991). Using structural equation modeling the researchers tested the goodness of fit of a hypothesized model (see Figure 4) and whether underachievers differed from achieving students in the relationship between ability and attributional style. In the model, reading awareness was measured on four scales which assessed the students' ability to evaluate components of reading tasks and one's own skills, planning, ability to regulate reading according to task and comprehension demands, and knowledge about the usefulness of specific strategies for particular problems. The researchers left the path between ability and attributions unconstrained in order to test whether underachievers and achievers differed in their tendency to associate ability with effort.
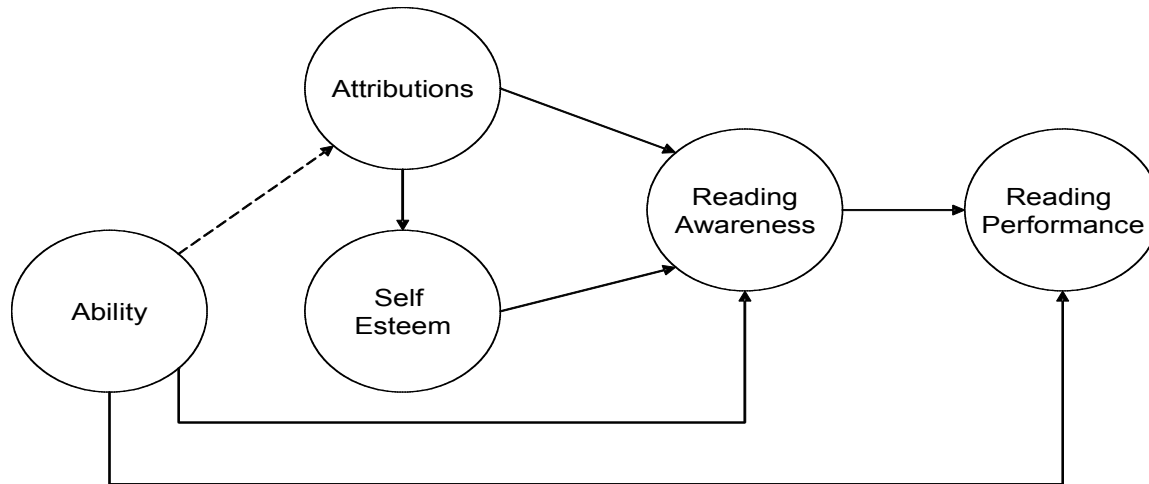
Figure 4. Hypothesized model from Carr, Borkowski, & Maxwell (1991).

The analysis revealed a good correspondence between the hypothesized model and the data for both underachievers and achievers. The analysis found that the path between ability and attributions was only significant for achievers, not for underachievers (see Figure 5 and Figure 6). This suggests that factors to which underachievers attribute their success and failures are not influenced by their ability, whereas achievers' attributions are influenced by their ability. In addition, performance for both groups was predicted directly by reading awareness and ability, and indirectly by attributions and self-esteem. Based on the instrument used to measure reading awareness, a student's ability to evaluate, regulate, plan, and use specific strategies directly influenced the student's performance. The students' reading awareness was in turn influenced by a student's self-esteem.

*p<.05
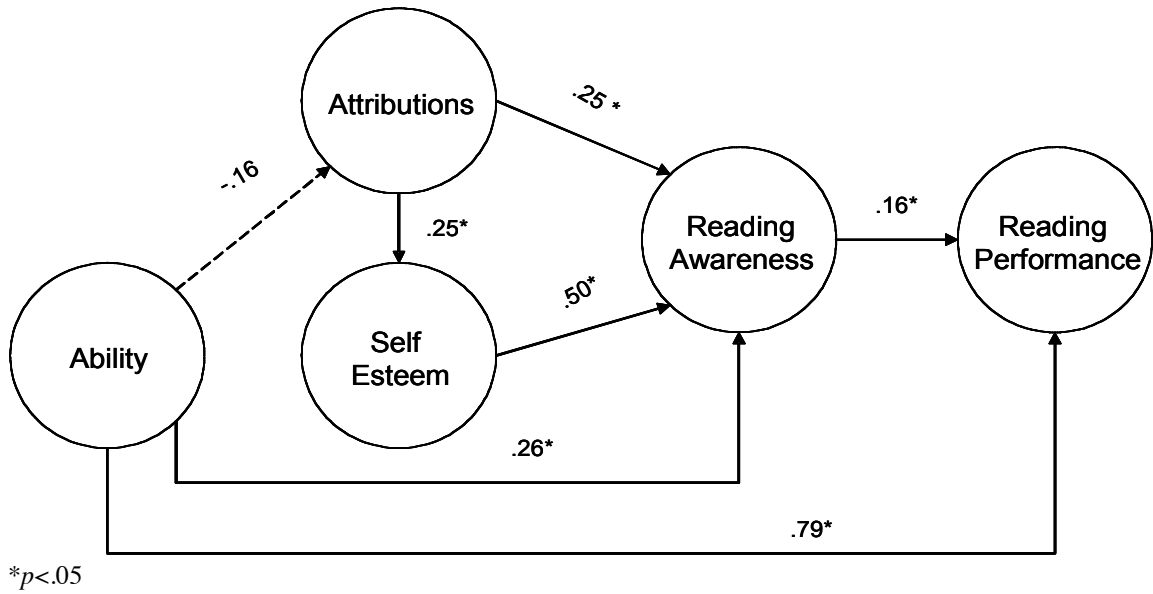
Figure 5. Resulting path coefficients of model tested on underachievers (from Carr, et al., 1991).

*p<.05
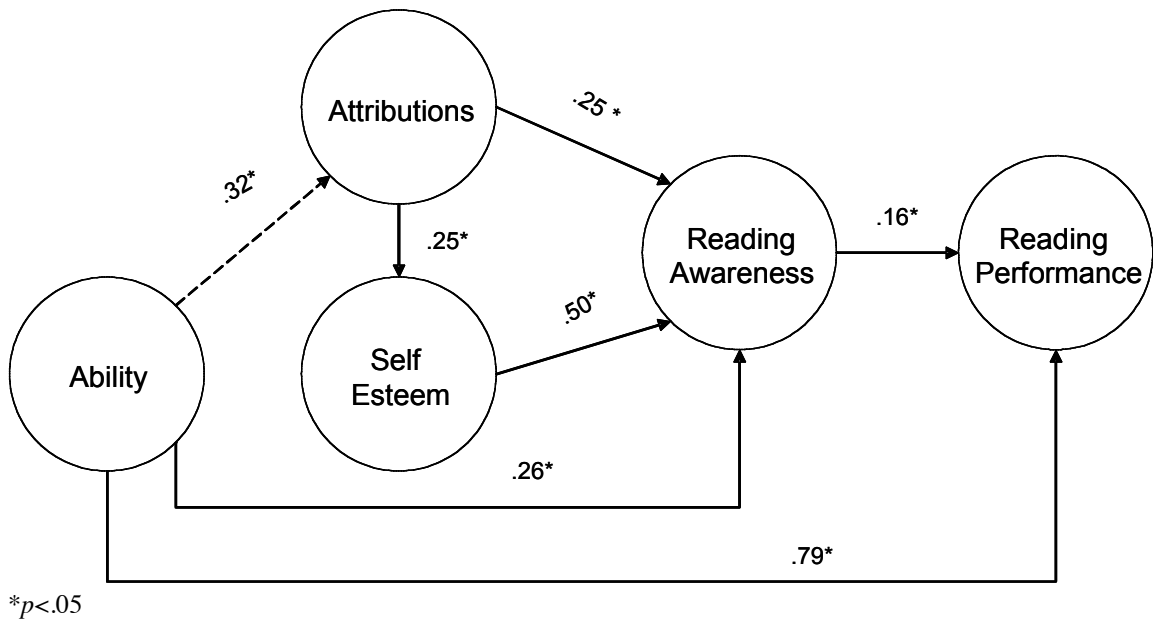
Figure 6. Resulting path coefficients of model tested on achievers (from Carr et al., 1991).

Other studies have also found a relationship among performance, cognitive and self-regulatory strategies, and self-esteem (or self-efficacy). Pintrich and DeGroot (1990) measured how self-efficacy, intrinsic value, test anxiety, self-regulation (control of metacognitive and effort management activities), and cognitive strategies (rehearsing, organizing, and elaborating) related to seventh graders classroom performance. Students completed the Motivated Strategies for Learning Questionnaire (MSLQ). Regression analysis revealed that performance was influenced by self-regulatory strategies, self-efficacy, and test anxiety, but not influenced directly by intrinsic value. Intrinsic value was strongly related to self-regulation and cognitive strategy use. Multivariate Analysis of Covariance (ANCOVA) revealed that students who exhibited high self-efficacy were significantly more likely to report use of cognitive and self-regulatory strategies.

Using the MSLQ in a study on college students' cognitive and self-regulatory strategy usage, a similar relationship was found among self-efficacy, cognitive strategies and self-regulatory strategies (Pintrich & Garcia, 1991). Examination of zero order correlations found significant positive correlations between self-efficacy and use of rehearsal, elaboration, and organizational strategies. Self-efficacy was also significantly positively related to self-regulatory strategies, management of study environment and management of study time. This study helps to confirm the findings that performance is influenced directly by cognitive and self-regulatory strategies, and that self-efficacy indirectly influences performance by affecting self-regulatory and cognitive strategies.

These findings suggest a complex relationship among students' ability, self-perceptions, value of a task, expectations for success, cognitive and self-regulatory strategies, motivation, success and failure attributions, and performance or achievement. Comparing these findings with Wigfield and Eccles' (2000) model of motivation, the cultural milieu, a child's perception of cultural milieu, socializers' beliefs and behaviors, previous achievement related experiences, and a child's affective memories have yet to be examined. All of these variables pose various measurement issues. However, one can begin to assess the socializers' beliefs and behaviors by examining students' perceptions of parenting style and involvement. In addition steps can be taken to begin to study the affects of cultural milieu. One aspect of the cultural milieu is gender role stereotypes. Although, it is difficult to measure the influence of stereotypes, the relationship between gender and motivation can be observed.

Parental influences. Parenting style and parental involvement can both be influential in a child's achievement. In research on parenting, parental involvement has included many different variables such as parents having high-expectations for their children, parental values about achievement and parental involvement in school functions, all of which have been shown to positively effect children's achievement (Seginer, 1983; Steinberg, Lamborn, Dornbusch, & Darling, 1992; Stevenson & Baker, 1987).

In more recent studies, effects of combinations of parent involvement and parenting styles on achievement have been examined (Marchant, Paulson, & Rothlisberg, 2001; Paulson, 1994). One study of this combination examined ninth graders'

perceptions of parental involvement and style using the Parenting Style and Parenting Involvement scale (Paulson, 1994). Hierarchical multiple regression analysis revealed that mother and father demandingness, responsiveness, values toward achievement, interest in their children's schoolwork, and involvement in school functions were all positively related to achievement. Similar relationships were found by Marchant et al. (2001) in a study of fifth- and sixth-grade students, testing a model of achievement in which student achievement was predicted by students' perceived motivation and perceived school competence. Perceived motivation and perceived school competence were predicted by family context (parental demandingness, responsiveness, values toward achievement, values, interest in school functions) and school context (teacher responsiveness, teacher control, school responsiveness, supportive social environment). The analyses revealed that all of the paths were significant (see Figure 7). However, family and school factors did not predict any variability in school achievement beyond motivation and competence.
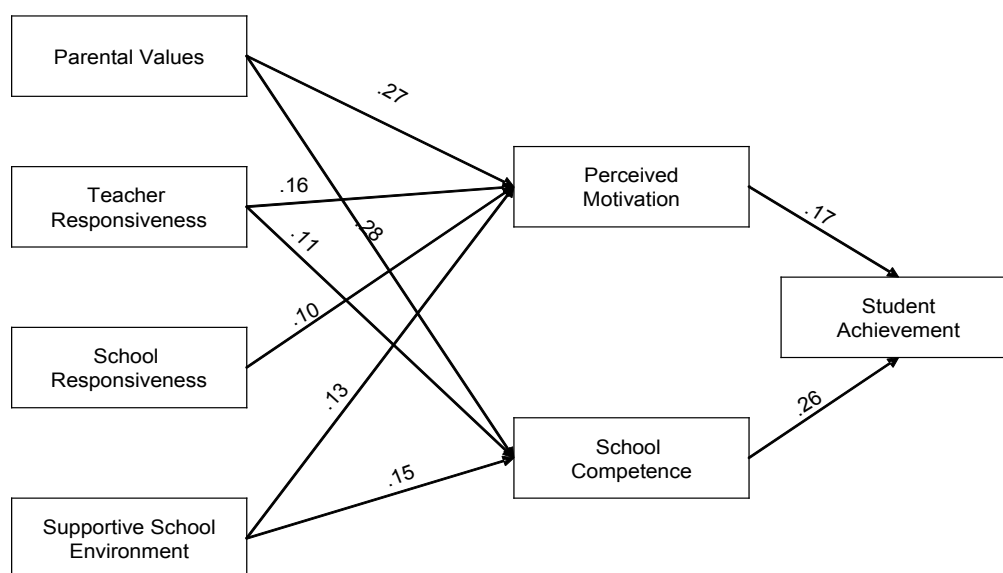
Figure 7. Marchant, Paulson, & Rothlisberg model of student achievement.

The findings from the Marchant et al. study suggest that students' perceived competence is a mediator between parents' styles/involvement and academic achievement as parental values were indirectly related to student achievement but directly related to perceived school competence which was directly related to student achievement. Parents may also influence children's attitudes or value of schools as they serve as one model in the children's environment (Bandura, 1986). In addition, parents' style is related to the parents' level of education, income, and marital status (Hetherington & Clingempeel, 1992). It has also been suggested that socioeconomic status influences motivation and achievement (Borkowski & Thorpe, 1994; Meece, 1997; Stipek & Ryan, 1997).

Gender differences. Several researchers have examined the relationship between gender and self-perceptions and gender and attributions of success and failure finding that boys tend to show higher self-perceptions of math ability, ability in sports, ratings of physical appearance, physical ability, general competence, general self-esteem, while girls show higher self-perceptions of ability in reading and English, and social activities (Marsh, 1989; Eccles et al., 1993; Wigfield, Eccles, MacIver, Reuman, & Midgley, 1991). The relationship between gender and attributions is not as clear, as the different measures of attributions used lead to many different findings (Eccles et al., 1993).

An experimental study involving fifth-grade students examined whether boys have more external attributional styles than girls (Dweck, Goetz, & Strauss, 1980). The students participated in five trials in which a new task, new evaluator, or both a new task and new evaluator were introduced, and a fifth trial in which no change was made. The students gave statements before each trial regarding whether they expected to succeed or fail. ANOVA revealed that overall expectancies for success were higher for boys than girls. In addition, boys' expectancies for success rose when the evaluator changed but the task remained the same, while girls' expectancies declined. This suggests that boys are more likely than girls to attribute their success/failures to an external cause (the evaluator) rather than an internal cause (ability). Nurmi, Onatsu, & Haavisto (1995) completed two studies comparing underachieving and achieving students' attributional styles. One study included 13 to 14 year-old students, while the other included students aged 14 to 19. Both studies found that gender did not affect attributional patterns.

Conclusion

The findings from motivation and gifted underachievement research suggest a complex relationship among students' ability, self-perceptions, value of a task, expectations for success, cognitive and self-regulatory strategies, motivation, success and failure attributions, gender, parental involvement and style, parental socioeconomic status (income, level of education and marital status), and students' performance or achievement. Focusing on gifted children limits the variability in students' ability, making this variable less of a concern. The relationship among the remaining variables, with the exception of gender, is presented in a model shown in Figure 8. Gender was excluded from the model due to lack of support as to which variables gender influenced. However since research has suggested some relationship between gender and achievement (Dweck, Goetz, & Strauss, 1980; Eccles et al., 1993; Marsh, 1989; Wigfield et al., 1991), gender will be reviewed as related to all the variables in the model.

In the model straight arrows represent a direct effect while curved arrows represent a bi-directional relationship. The arrows are labeled according to the relationship/effect that they represent. The model (see Figure 8) suggests that achievement level is directly influenced by (1) achievement motivation and (2) study/organizational skills (Baker et al. 1998; Carr et al., 1991, Ford, 1992; McCoach & Siegle, 2001). Achievement motivation is affected by how much a student values the task, which in this case is measured by (3) attitude toward school, as school is the task at hand (Meece et al., 1990). Parents' involvement/style is related to the (4) students' self-

perception (5) students' attitude toward school, and the (6) parents socioeconomic status, which all affect (3,8,9,10) achievement motivation (Bandura, 1986; Borkowski & Thorpe, 1994; Hetherington & Clingempeel, 1992; Marchant et al., 2001; Meece, 1997; Meece et al., 1990; Paulson, 1994; Stipek & Ryan, 1997). Students' self-perceptions are related to their (11) attributional style, which both affect (12,13) study/organizational skills (Carr et al., 1991; Pintrich & DeGroot, 1990). The model also contains direct relationships between (14) attitude toward school and achievement (Meece et al., 1990), (15) parental involvement and achievement (Paulson, 1994), and (16) socioeconomic status and achievement (Borkowski & Thorpe, 1994; Stipek & Ryan, 1997) in order to determine the extent to which achievement motivation is a mediator for these variables and achievement in a gifted population.

Figure 8. A social cognitive model of achievement.

Examining this model with a gifted population in order to test the fit of the model as well as the strengths of the paths will bring further insight into the understanding of gifted underachievement. It will also contribute to further examination of models of motivation, particularly as these models relate to gifted underachievers.

CHAPTER 2: Methodology and Procedures

Population and Sample

A non-probability sample of 369 students was drawn from six school districts located in Arkansas, Utah, and Virginia. Students were sixth through ninth graders who had been identified as intellectually gifted by their school district, excluding students identified as learning disabled. The school districts involved in the study identified students for gifted services through a screening process using ability tests administered in primary grades, and/or achievement tests administered in later grades. Students could also be identified through nominations in most of the school districts. The final sample after missing cases were deleted was distributed across grade levels as follows: 71 sixth graders, 11 seventh graders, 7 eighth graders, and 253 ninth graders. The final sample of 342 consisted of 178 males and 164 females.

Design

A model was developed (Figure 9) in order to address the research question: To what extent do parenting style and involvement, socioeconomic status, students' attitudes toward school, students' self-perception, students' study/organizational skills, students' attributional style and students' achievement motivation affect achievement in gifted students? The structural model consisted of eight latent variables: academic achievement (ACACH), achievement motivation (AMOT), study/organizational skills (ORG), parental style/involvement (PARENT), self-perception (SELF), attitudes toward school (SCATT), attributional style (ATT), and socioeconomic status (SES). Latent variables are variables which cannot be directly measured and are therefore indirectly measured by a specified indicator. Although, the latent variables cannot be directly measured, structural equation modeling (SEM) techniques allow for the analysis of the paths between the latent variables.

Instrumentation

In this study, survey instruments were used to gather data on parents' income and level of education, as well as students' self-perception, attitudes toward school, achievement motivation, attributional style, study/organizational skills, and students' perceptions of parents' involvement and parenting style.

Figure 9. Structural model.

Achievement Motivation Profile (AMP)

The AMP (Mandel, Friedland, & Marcus, 1996), designed to assess students' motivation to achieve, consists of five scales: (1) response style, (2) motivation for achievement, (3) inner resources, (4) interpersonal strengths, (5) work habits, with 18 subscales: (1) inconsistent responding, (2) self-enhancing, (3) self-critical, (4) achiever, (5) motivation, (6) competitiveness, (7) goal orientation, (8) relaxed style, (9) happiness, (10) patience, (11) self-confidence, (12) assertiveness, (13) personal diplomacy, (14) extroversion, (15) cooperativeness, (16) planning and organization, (17) initiative, and (18) team player. Of particular interest to this study are the achiever, motivation, goal orientation, and planning and organization subscales.

Reliability. The AMP was developed based on factors revealed in analysis of results from research on underachievers. The scales have Cronbach alpha coefficients ranging from 0.58 to 0.84, with a median of 0.75. The test-retest estimates ranged from 0.61 to 0.89. The internal consistency estimates and two month test-retest reliabilities for these scales are presented in Table 5 (Mandel, Friedland, & Marcus, 1996).

Table 5

AMP Reliability Estimates for Subscales Used in Current Study

	Internal Consistency	Test-Retest
Achiever (ACH)	0.84	0.84
Motivation (MOT)	0.74	0.85
Goal orientation (GOAL)	0.74	0.85
Planning & organization (PLAN)	0.72	0.85

Validity. Concurrent validity was examined through the correlation of teacher ratings and AMP scores and GPAs and AMP scores. The motivation, achievement, goal orientation and planning and organization scales correlated significantly with GPAs and teacher ratings. To provide evidence of construct validity, convergent and discriminant validity were examined. The findings suggested adequate construct validity since higher correlations between AMP scales and scales used to measure similar characteristics were found and lower correlations between AMP scales and scales used to measure dissimilar characteristics.

Self-Description Questionnaire (SDQ-II)

The SDQ-II (Marsh, 1990) assesses academic, non-academic, and general self-concept. The instrument consists of 11 scales. The scales are academic (mathematics, verbal, general-school); non-academic (physical abilities, physical appearance, same sex peer relations, opposite sex peer relations, emotional stability, honesty-trustworthiness); global (general-self, total-self). Of particular interest in this study are the math, verbal, general school and general self scales.

Reliability. The scales have Cronbach alpha coefficients ranging from the 0.83 to 0.91. In addition, many stability estimates range from 0.72 to 0.88. High estimates of reliability were found when the SDQ II was administered to a group of gifted students (Plucker, Taylor, Callahan, & Tomchin, 1997). The reliability estimates for the scales to be used in this study are presented in Table 6.

Table 6

Reliability Estimates for the SDQ II

Scale	Internal Consistency
Math	0.90
Verbal	0.86
General school	0.87
General self	0.88

Validity. In order to ensure content validity the questionnaire was developed using the Shavelson, Hubner, & Stanton (1976) multifaceted, hierarchical model of self-concept. Construct validity evidence was derived from confirmatory and exploratory factor analysis, resulting in target loadings ranging from 0.48 to 0.80 (Marsh, 1990), suggesting that the items accurately measure the variables within each scale.

Parenting Style and Parent Involvement (PSPI)

The PSPI (Paulson, 1991) consists of three scales: (1) demandingness, (2) responsiveness, and (3) involvement. The involvement scale has three subscales: (1) achievement values, (2) interest in schoolwork, and (3) involvement in school functions. The author of the instrument suggests having students complete the instrument twice, once for each parent, and then having each parent complete the instrument.

Reliability. Reliability estimates for students ratings of parental demandingness, responsiveness, and involvement ranged from 0.78 to 0.87. The alphas range from 0.71 to 0.79 on the involvement subscales (Paulson, 1991).

Validity. Principal component analysis was used to provide evidence of construct validity. In addition, scales were correlated with Children's Report of Parental Behavior Inventory (Schaefer, 1965) and the Family Environment Scale (Moos & Moos, 1981). This yielded coefficients ranging from 0.45 to 0.84.

Student Attitudes and Methods Survey Revised (SAMS-R)

The SAMS-R (Michael, Michael, & Zimmerman 1972) was developed to identify students performing poorly at school due to ineffective study skills or a negative attitude towards school. The SAMS-R contains six scales: (1) academic interest, (2) academic drive, (3) study methods, (4) study anxiety, (5) manipulation, and (6) alienation toward authority.

Reliability. Reliability estimates were calculated for a sample of 558 suburban tenth grade students, a sample of 337 suburban tenth and eleventh grade suburban students, and a sample of 146 rural tenth and eleventh grade students. The scales have Cronbach alpha coefficients ranging from 0.76 to 0.89. The reliability estimates for the scales to be used in this study are presented in Table 7.

Table 7

Reliability Estimates for the SAMS (Michael, Michael, & Zimmerman, 1972)

	Internal Consistency		
	Tenth Grade Suburban	Tenth & Eleventh Grade Suburban	Tenth & Eleventh Grade Urban
Study Methods	0.84	0.86	0.83
Study Anxiety	0.81	0.76	0.85

Validity. Items were developed based on a review of the literature on study methods and motivation and analysis of student responses to interviews and written open-ended questions. To help provide evidence of construct validity the SAMS was correlated with the Career Orientation Placement and Evaluation Survey (COPES) (Knapp & Knapp, 1977), the D-F Opinion Survey (Guilford, Christensen, & Bond, 1956), and the School Environment Preference Survey (SEPS) (Gordon, 1978). Strong and significant correlations were found between study methods and the investigative and practical scales of the COPES and the self-reliance scale of the DF Opinion Survey. Also, strong correlations were found between the study anxiety and orderliness and practical scales of the COPES, the need for attention and the need for freedom scales of the DF Opinion Survey and the traditionalism, self-subordination, and structured rule orientation scales of the SEPS. These correlations suggest that the study methods and study anxiety scales are measuring two separate factors. In addition, principal component analyses were done on two cross validation studies to provide evidence of construct validity. Factor loadings on the study methods and study anxiety scales ranged from 0.63 to 0.72 (Michael, Michael, & Zimmerman, 1972), suggesting that the items within these scales accurately measure the defined variables.

Arlin-Hills Attitude Surveys

The Arlin-Hills Attitude Surveys (Arlin, 1976) consists of four attitude scales: (1) attitude toward teachers, (2) attitude toward language arts, (3) attitude toward mathematics, and (4) attitude toward learning processes.

Reliability. The scales have Cronbach alphas ranging from 0.73 to 0.95. The standard error of measurement for all three scales is 3.4, with the scores ranging from 0 to 45.

Validity. A multitrait-multimethod study was conducted with 402 students, grades 2 through 6, to examine convergent and discriminant validity. The students took both the cartoon format and the non-cartoon format of the instrument. Validity coefficients ranged from 0.75 to 0.85 on the cartoon method and from 0.73 to 0.85 on the non-cartoon method. Heterotrait-monomethod coefficients ranged from 0.49 to 0.57 for the cartoon method, suggesting that the different traits being measured are similar but the correlations are not high enough to suggest that the traits are the same trait. Monotrait-heteromethod coefficients ranged from 0.75 to 0.80 (Arlin, 1976), suggesting satisfactory construct validity since the correlations between the same traits using different methods were higher than the correlations between different traits using the same methods.

The New Multidimensional Measure of Children's Perception of Control

The New Multidimensional Measure of Children's Perception of Control (Connell, 1985) was designed to measure upper elementary and junior high school students' beliefs about their reason for successes and failures. The instrument determines the degree to which students attribute successes and failures to an unknown cause (unknown control), themselves (internal control), or others (powerful others control). The instrument assesses the cognitive domain, social domain, physical domain and general domain. Psychometric data were based on responses from 1,300 children ranging from 8 to 14 years of age.

Reliability. Reliability estimates ranged from 0.39 to 0.71 (Connell, 1985). Reliability estimates of the scales to be used in this study are presented in Table 8.

Table 8

Reliability Estimates of the New Multidimensional Measure of Children's Perception of Control

		Internal Consistency	
		Third - Sixth Graders	Junior High Students
Cognitive Domain	Unknown Control	0.67	0.68
	Powerful Other Control	0.59	0.65
	Internal Control	0.56	0.62

Validity. Principal axis factor analysis was conducted to provide evidence of construct validity, resulting in high factor loadings within the cognitive and general domain (0.49 to 0.86) and slightly lower loadings in the social and physical domain (0.37 to 0.88). In addition, the authors examined the subscale intercorrelations and the instrument's correlation with Harter (1978) assessments of perceived competence, mastery motivation and autonomous judgment. Intercorrelations of the cognitive domain and general domain scales ranged from 0.43 to 0.60. Significant correlations were found between the cognitive domain scale for internal control and mastery motivation. Significant negative correlations were found between the cognitive domain unknown control and perceived competence, mastery motivation and autonomous judgment. The findings suggest acceptable construct validity as the target factor loadings are substantial, the correlations among the scales suggested some relationship, and the scales had significant correlations with other measures of similar constructs.

Data Collection

Instruments were sent to the gifted coordinator in each school district. The gifted coordinator then distributed the instruments to the gifted resource teachers for administration. In one case the gifted coordinator administered some of the instruments. In another case, the researcher administered the instruments at one school. Each gifted resource teacher was provided with a set of standard administration instructions. On average, the instruments took one hour to complete. The instruments were returned to the researcher with the students' unique identification number labeled on the packet (no other identifying information was placed on the instruments). Parental income and level of education were collected in a short questionnaire that was mailed to the parents and returned to the researcher. Students' gender, grade point average (GPA) in math and language arts courses, and Stanford 9 Language Arts and Math exam scaled scores were collected from each district. One school district sent the student and parent surveys home with the students. The students returned the completed packet to their teacher and the students' achievement information was added to the packet. The complete packet was then mailed back to the researcher with only a unique identification number labeled on the packet. To maintain confidentiality, students were assigned a unique identification number and files with students' names were destroyed.

Measurement Model

The instruments reviewed above were used to measure the latent variables presented in the model in Figure 9. The following scales were used as indicators of the latent variables.

1. Academic Motivation (AMOT)
   - Achiever scale of AMP (ACH)
   - Motivation scale of AMP (MOT)
   - Goal orientation of AMP (GOAL)

2.   Organization/Study Skills (ORG)
- Planning & Organization scale of AMP (PLAN)
- Study habits scale of SAMS (HABITS)
- Study anxiety scale of SAMS (ANX)

3.   Self-perception (SELF)
- Verbal scale of SDQ II (VERBAL)
- Math scale of SDQ II (MATH)
- General school scale of SDQ II (SCH)
- General self scale of SDQ II (GEN)

4.   Attitude Toward School (SCATT)
- Arlin-Hills Attitude Toward Teacher (TEACH)
- Arlin-Hills Attitude Toward Learning (LEARN)
- Arlin-Hills Attitude Toward Math (ATMAT)
- Arlin-Hills Attitude Toward Language (ATLANG)

5.   Parental Influence (PARENT)
- Students' reports on involvement scale of PSPI (INV)
- Students' reports on demandingness scale of PSPI (DEM)
- Students' reports on responsiveness scale of PSPI (RES)

6.   Attributional Style (ATT)
- Cognitive domain scale (unknown control) of the New Multidimensional Measure of Children's Perception of Control (UNCONT)
- Cognitive domain scale (powerful others control) of the New Multidimensional Measure of Children's Perception of Control (OTCONT)
- Cognitive domain scale (internal control) of the New Multidimensional Measure of Children's Perception of Control (INTERN)

Academic achievement (ACACH) was measured using students' average GPA in math (GPAM) and language arts (GPAV) courses over the past three semesters, as well as their previous grade scores on the Stanford-9 tests for math and language (STANM, STANV). Socioeconomic Status (SES) was measured by the parent/guardian level of education (EDU) and the parent/guardian annual income (INC). A visual representation of the measurement model is presented in Figure 10.

Analysis

Through the use of SEM, a set of relationships among independent variables (IVs) and dependent variables (DVs) can be examined. SEM allows for the examination of the latent structure underlying a set of observed variables (Byrne, 1998). In addition, relationships among the observed and latent variables can be examined. SEM is the method most appropriate for determining the relationship among the variables proposed in the model of achievement by testing the fit of the model and examining the path coefficients within the model.
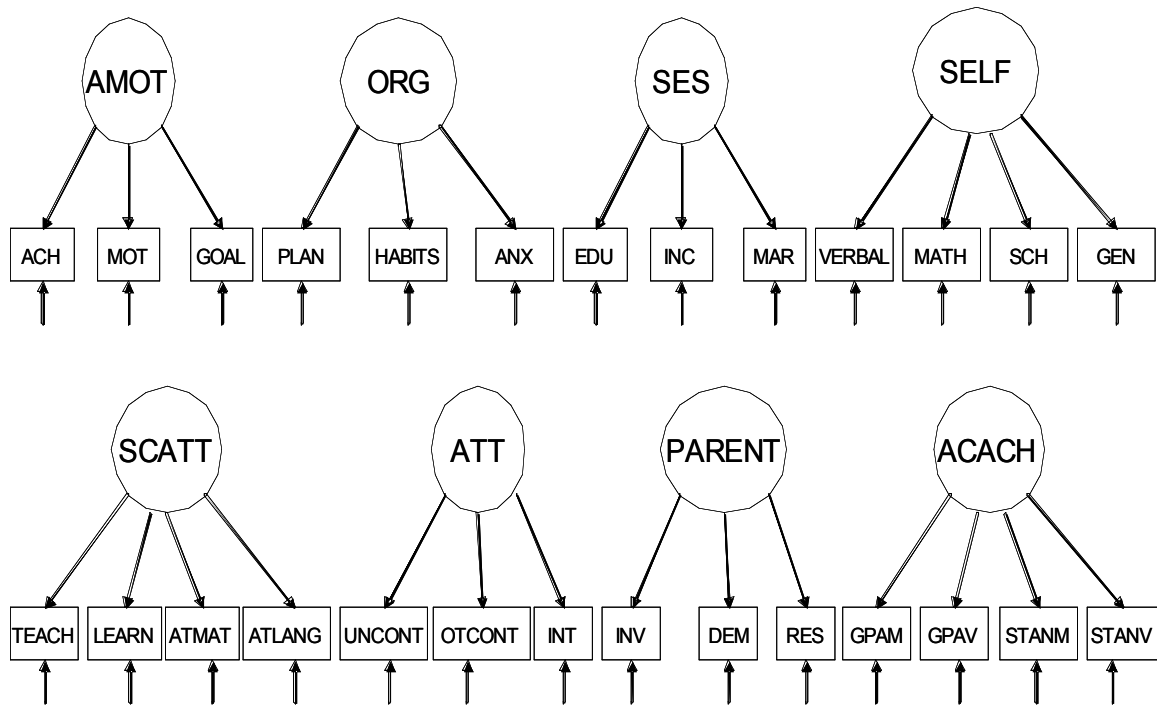
Figure 10. Measurement model (this model is not hierarchical).

The proposed model was determined to be over-identified due to 378 data points and 60 parameters estimated. Since this was a large model, the number of data points was determined using the equation $p(p+1)/2$, where p is the number of observed variables (Tabachnick & Fidell, 1996).

The Bentler-Weeks method (Bentler & Weeks, 1980) was used as the method of model specification. Maximum likelihood was used as the estimation method. Once the model was tested, the path coefficients were examined, and several goodness of fit indices (χ^2, Goodness of Fit Index (GFI), Parsimonious Goodness of Fit Index (PGFI), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI)) were examined to determine the degree to which the model fit the data. Modification indices were examined for potential model modification. Listwise deletion was used to eliminate missing data. LISREL statistical software was used to specify, estimate and test the model. SPSS statistical software was used to run descriptive statistics. PRELIS was used to determine the covariance matrix and the asymptotic covariance matrix which were used in the LISREL analysis. SPSS and PRELIS were also used to examine skewness and kurtosis of the measured variables in order to examine multivariate normality.

Descriptive Statistics and Multivariate Normality

Prior to analysis, the 26 indicator variables (see Table 9) were examined through various SPSS and PRELIS programs for fit between their distributions and the

assumptions of multivariate analysis. All cases with missing values on any one variable were excluded from the sample. This resulted in the deletion of 27 cases, thus the final sample size was 342 students.

Scaled scores from the Stanford-9 achievement test were measured on a scale that was quite different from the other variable scales (see Table 10). Differences in the scales resulted in covariances of vastly different sizes, therefore the Stanford-9 scores were rescaled to better match the scales of other variables, using the rescaling method suggested by Tabachnick and Fidell (1996). Each Stanford-9 reading and math score was multiplied by 0.1. The rescaled math scores on the Stanford-9 had a range of 21.4, a minimum of 61.2 and a maximum of 82.6. The rescaled Stanford-9 reading scores had a range of 40.6, a minimum of 43.3 and a maximum of 83.9.

Table 9

Indicator Variables Used to Measure Latent Variables

	Indicator Variable		Indicator Variable
1	Math GPA over three semesters (GPAM)	16	Arlin-Hills Attitude Toward Learning (LEARN)
2	English GPA over three semesters (GPAV)	17	Arlin-Hills Attitude Toward Math (ATMAT)
3.	Stanford 9 Math Score (STANM)	18	Arlin-Hills Attitude Toward Language (ATLANG)
4	Stanford 9 Reading Score (STANV)	19	Student's Report on involvement scale of PSPI for reported primary caregiver (INV)
5	Achiever Scale of AMP (ACH)	20	Student's Report on demandingness scale of PSPI for reported primary caregiver (DEM)
6.	Motivation scale of AMP (MOT)	21	Student's Report on responsiveness scale of PSPI for reported primary caregiver (RES)
7	Goal Orientation of AMP (GOAL)		Cognitive domain scale (unknown control) of the New Multidimensional Measure of Children's Perception of Control (UNCONT)
8	Planning & Organization scale of AMP (PLAN)	22	
9	Study Habits scale of SAMS (HABITS)		Cognitive domain scale (powerful others control) of the New Multidimensional Measure of Children's Perception of Control (OTCONT)
10	Study Anxiety Scale of SAMS (ANX)	23	
11	Math Scale of SDQ II (VERBAL)		Cognitive domain scale (internal control) of the New Multidimensional Measure of Children's Perception of Control (INTERN)
12	Math scale of SDQ II (MATH)	24	
13	General School scale of SDQ II (SCH)	25	Parent's annual household income (INC)
14	General self scale of SDQ II (GEN)		
15	Arlin-Hills Attitude Toward Teacher (TEACH)	26	Parent's level of education (EDU)

Table 10

Ranges of Indicator Variables

Variable	M	SD	Range	Minimum	Maximum
GPAM	3.57	0.54	2.83	1.17	4.00
GPAV	3.65	0.50	3.11	0.89	4.00
STANM	713.60	35.60	214	612	826
STANV	718.20	35.90	406	433	839
ACH	51.9	6.95	36	29	65
MOT	39.37	5.64	36	19	55
GOAL	30.37	5.64	24	16	40
ANX	33.06	7.36	38	7	45
PLAN	25.25	4.09	22	13	35
HABITS	18.48	8.32	43	0	43
LEARN	19.43	9.06	44	0	44
TEACH	31.35	7.99	40	5	45
ATLANG	29.72	7.83	44	1	45
ATMAT	27.19	9.29	45	0	45
INV	91.30	9.76	57	53	110
RES	56.97	9.10	46	29	75
DEM	39.66	9.41	49	17	66
EDU	5.57	1.69	8	1	9
INC	7.16	2.61	10	1	11
VERBAL	46.71	8.46	50	10	60
MATH	43.61	8.46	50	10	60
SCH	52.25	6.71	42	18	60
GEN	52.94	6.45	44	16	60
INTERN	13.57	1.72	10	12	22
UNCONT	6.61	2.42	11	5	15
OTCONT	7.92	2.62	12	4	16

Multivariate and Univariate Normality

Multivariate and univariate skewness and kurtosis were analyzed in order to determine multivariate normality. This analysis yielded evidence of multivariate non-normality, as several variables were significantly skewed and/or kurtotic (see Table 11). Many of the variables did not follow a normal distribution, and a few variables had significant outliers. Non-normal distributions were expected with certain variables, such as achievement and self-perception, due to the restricted sample of gifted students. The variables showing the most kurtosis and skewness were the achievement variables, and the school and general self-perception variables. The school and general self-perception variables were excluded from the model due to their extreme skewness and kurtosis. A table of the excluded variables is presented in Appendix A.

Due to the non-normal distribution of the remaining variables robust maximum likelihood (RML) estimation techniques were used to examine the hypothesized model. RML gives standard errors with unspecified distributional assumptions, yielding the least biased standard errors when multivariate normality assumptions are false (Bentler & Dijkstra, 1985; Chou & Bentler, 1995). In addition, RML estimation provides a scaled χ^2 statistic (Satorra-Bentler test statistic (Satorra & Bentler, 1994) which adjusts the standard test statistic to reflect the observed kurtosis (Kline, 2005). The Satorra-Bentler test statistic performed better in robustness studies than the standard maximum likelihood (ML) estimator, and the Asymptotically Distribution Free (ADF) estimator (Chou, Bentler, & Satorra, 1991; Curran, West, & Finch, 1996; Hu, Bentler, & Kano, 1992). The outliers causing the skewness and kurtosis in the achievement variables were cases of significant interest, therefore all of the achievement indicator variables were kept. Additionally, the remaining skewed and kurtotic variables were kept and no transformations were made.

Limitations

When using SEM techniques several considerations must be made. SEM requires large sample sizes and limited amounts of missing data. In addition, the techniques in SEM examine only a linear relationship among variables and assume multivariate normality. Factorability of the covariance matrix and multi-collinearity must be considered to examine the magnitude of the relationships among variables.

This study used a sample of students who had been identified as gifted by their school districts. The use of this sample poses a few limitations. Different districts may have varying definitions of giftedness and therefore may use different processes and measures to identify students for gifted programming. This could result in the inclusion of students in the study who differ in terms of giftedness. This was controlled as much as possible by including school districts that had similar definitions of giftedness, and also similar gifted identification processes. However, the school districts did use varying measures of aptitude and achievement and had set different cut scores on these measures for use in screening.

Table 11

Skewness and Kurtosis of Indicator Variables

	Skewness		Kurtosis		Skewness & Kurtosis	
Variable	Z-Score	P-Value	Z-Score	P-Value	X^2	P-Value
GPAM	-8.96	0.00	4.89	0.00	104.197	0.00
GPAV	-10.684	0.00	7.038	0.00	163.675	0.00
STANM	1.116	0.264	0.184	0.854	1.28	0.527
STANV	-7.212	0.00	8.71	0.00	127.876	0.00
ACH	-3.835	0.00	0.936	0.349	15.581	0.00
MOT	-0.931	0.352	0.767	0.443	1.456	0.483
GOAL	-1.674	0.094	-1.285	0.199	4.453	0.108
ANX	4.407	0.00	-0.351	0.726	19.541	0.00
PLAN	-1.73	0.084	-1.452	0.147	5.10	0.078
HABITS	1.471	0.141	-1.469	0.142	4.323	0.115
LEARN	3.343	0.001	-0.996	0.319	12.166	0.002
TEACH	-4.463	0.00	0.778	0.436	20.524	0.00
ATLANG	-3.53	0.00	0.332	0.74	12.57	0.002
ATMAT	-3.30	0.001	-1.125	0.261	12.153	0.002
INV	-5.127	0.00	2.598	0.009	33.031	0.00
RES	-4.251	0.00	-0.187	0.851	18.103	0.00
DEM	-0.106	0.916	-0.973	0.331	0.958	0.619
EDU	-3.592	0.00	-0.368	0.713	13.041	0.001
INC	-1.084	0.279	-4.614	0.00	22.459	0.00
VERBAL	-5.612	0.00	2.541	0.011	37.95	0.00
MATH	-6.974	0.00	3.623	0.00	61.765	0.00
INTERN	-7.896	0.00	4.531	0.00	82.877	0.00
UNCONT	5.663	0.00	1.105	0.269	33.286	0.00
OTCONT	2.767	0.006	-0.898	0.369	8.46	0.015
SCHOOL	-9.617	0.00	6.451	0.00	134.108	0.00
GENERAL	-10.172	0.00	6.977	0.00	152.155	0.00
*MULTIVARIATE**	20.93	0.00	12.41	0.00	592.00	0.00

*Multivariate results do not include school and general variables.

CHAPTER 3: Results and Discussion

Model Analysis

Before analyzing the model, one-way analysis of variance (ANOVA) were used to determine the effects of gender on the indicator variables. The one-way ANOVAs revealed several significant gender differences, after alpha was corrected for Type I error (see Table 12). Cohen (1988) defined effect sizes as small if d≤0.20. All of the effects exhibited trivial effect sizes, much smaller than 0.2. Since gender was not found to have any meaningful effects on the variables in the model it was not analyzed further in relation to the hypothesized model.

Table 12

Means, Standard Deviations, and One-way ANOVAs for Effects of Gender

	Female Mean		Male Mean		ANOVA		
Variable	M	SD	M	SD	$F (338)$	p	d
RES	58.56	9.21	55.48	8.67	10.032**	0.002	0.029
ATLANG	31.39	7.18	28.11	8.09	15.478***	0.000	0.044
VERBAL	48.45	7.80	44.97	8.72	14.878***	0.000	0.042
PLAN	25.98	4.11	24.50	3.94	11.476**	0.001	0.033
HABITS	19.77	8.26	17.07	8.04	9.330**	0.002	0.027

Note. d=effect size from one way ANOVAs

Model Identification

In order for a model to be identified it must be possible to derive a unique estimate for each parameter. This means that there must be more observations than parameters (Kline, 2005). Also, recursive path models are always identified (Bollen, 1989). The measurement model was determined to be identified since there were more observations than parameters, at least two indicators for each latent variable, and the structural model was recursive. The hypothesized model (see Figure 11) had 63 parameters, including 24 variances of measurement error, 24 factor loadings, 11 factor correlations, and 4 factor covariances. There were 24 indicators; resulting in 300 observations and 237 degrees of freedom.

Model Estimation

RML estimation was employed to estimate all models using the covariance matrix presented in Figure 11. The correlation matrix is presented in Appendix B. RML estimation revealed a converged and admissible solution for the hypothesized model, but the overall fit of the model was poor (see Table 13).
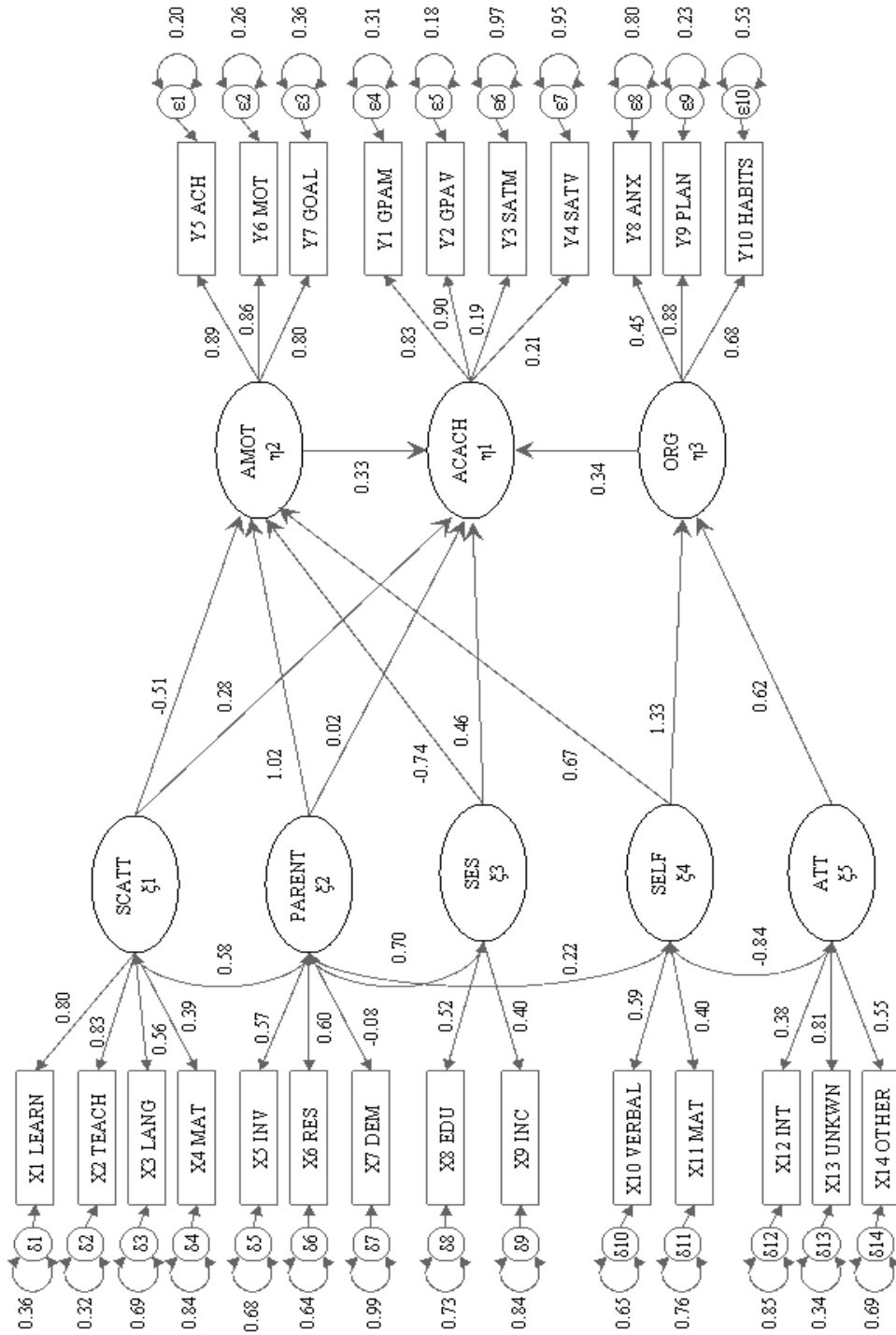
Figure 11. Standardized coefficients for model 1 (original hypothesized model).

Table 13

Covariance Matrix for Indicator Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 GPAM	0.29																							
2 GPAV	0.20	0.25																						
3 STANM	0.43	0.23	12.65																					
4 STANV	0.38	0.32	5.05	12.90																				
5 ACH	1.71	1.58	3.24	5.30	48.37																			
6 MOT	1.06	1.03	0.47	0.57	30.09	31.79																		
7 GOAL	0.71	0.60	-0.17	1.28	23.23	19.19	18.88																	
8 ANX	0.69	0.55	2.35	5.10	23.55	18.92	15.00	54.23																
9 PLAN	0.80	0.88	1.21	1.18	22.83	18.17	11.53	10.43	16.75															
10 HABITS	1.15	1.21	2.30	1.85	34.31	29.93	19.23	17.05	22.96	69.26														
11 LEARN	0.76	0.79	-5.99	-3.34	17.64	19.06	13.06	17.01	9.66	29.13	82.15													
12 TEACH	0.97	0.89	-3.83	0.18	23.12	20.30	13.72	13.35	12.82	26.81	48.76	63.78												
13 ATLANG	0.74	0.90	-1.22	4.78	26.80	19.28	13.65	22.07	14.01	32.42	31.03	27.88	61.35											
14 ATMAT	0.91	0.24	6.62	0.98	28.91	21.27	13.69	20.81	13.73	31.26	25.90	22.67	21.58	86.37										
15 INV	1.35	1.47	-0.13	1.30	26.58	22.14	16.37	19.40	13.35	27.42	19.58	19.32	17.93	20.86	95.33									
16 RES	0.89	1.06	-0.08	3.84	24.88	23.15	16.09	23.00	13.64	27.66	27.50	25.66	25.85	13.71	40.63	82.80								
17 DEM	-0.64	-0.70	2.52	2.16	-3.13	-5.11	-2.21	-3.54	-3.19	-5.95	-8.11	-2.83	-5.92	-1.45	-18.50	8.24	88.56							
18 EDU	0.20	0.22	0.82	0.98	1.22	1.20	0.55	1.56	0.84	1.86	0.07	-0.42	0.92	-0.05	2.87	2.62	0.90	2.86						
19 INC	0.19	0.24	0.64	0.70	0.27	0.03	0.55	0.72	-0.41	-0.32	-0.04	0.52	-0.75	-1.28	4.07	1.41	-1.23	1.25	6.86					
20 VERBAL	0.73	0.94	2.17	8.12	32.30	23.28	17.16	33.48	15.33	29.20	17.59	20.47	47.97	15.37	26.07	30.42	-2.20	2.50	-1.43	71.52				
21 MATH	1.24	0.44	5.86	3.00	23.32	13.38	11.53	15.41	9.46	17.93	7.05	9.82	7.06	40.27	11.29	9.62	2.47	0.49	-0.77	12.33	39.87			
22 INT	-0.17	-0.13	-0.02	-0.16	-3.39	-2.59	-2.26	-2.11	-1.76	-3.50	-3.24	-3.63	-2.86	-2.39	-3.40	-2.08	1.38	-0.05	-0.14	-2.33	-2.09	2.95		
23 UNCONT	-0.32	-0.27	-0.38	-1.76	-8.54	-6.23	-5.00	-8.12	-3.84	-7.46	-5.46	-6.96	-6.23	-7.27	-6.80	-6.72	1.45	-0.28	-0.13	-9.10	-5.20	1.36	5.87	
24 OTCONT	-0.32	-0.23	0.16	-0.89	-6.77	-4.91	-3.84	-6.29	-3.15	-6.12	-8.21	-7.92	-6.37	-5.87	-4.08	-4.67	1.40	-0.03	0.02	-7.69	-3.17	0.66	2.85	6.48

Table 14

Fit Statistics for Alternative Models

Model	d f	X^2	RSMEA	CFI	GFI	PGFI
1	237	1176.75***	0.09	0.89	0.77	0.6
2	212	912.21***	0.11	0.92	0.8	0.61

Note. Satorra-Bentler X^2 is presented.
*** $p<0.001$

Model Modification

Post hoc model modifications were performed in an attempt to develop a better fitting model. When examining models for modification, indicator loadings should be examined as well as measurement error correlations (Kline, 2005). Small indicator loadings (e.g., standardized loading≤0.20) should be examined and potentially removed or switched to loading on a different latent variable (Kline, 2005). LISREL supplies univariate Lagrange Multiplier Tests as modification indices and expected changes for each fixed parameter. MI and expected changes should be examined to consider freeing or adding paths (Tabachnick & Fidell, 1996).

Examination of the standardized RML solution (presented in Figure 12) indicated a low factor loading and a few correlations between the measurement error associated with variables (residuals). The loading of the demandingness variable (DEM) on the parent factor was low (-0.08) and had a high proportion of unique variance (0.99). There was no indication that the demandingness variable was an indicator of another variable, or that the variable's residuals were correlated with other residuals. The Stanford-9 achievement indicators, STANM and STANV, also had small factor loadings (STANM=0.19; STANV=0.21). These indicators were not removed since they were the only standardized achievement measure.

Large modification indices and/or expected changes were reported for relationships among three sets of residuals:

(1)　LEARN (δ_1) to TEACH (δ_2) - MI=36.28; Expected Change=66.95
(2)　ATLANG ($\delta3$) to VERBAL ($\delta10$) - MI=123.04; Expected Change=28.17
(3)　ATMAT ($\delta4$) to MATH ($\delta11$) - MI=118.06; Expected Change=28.33
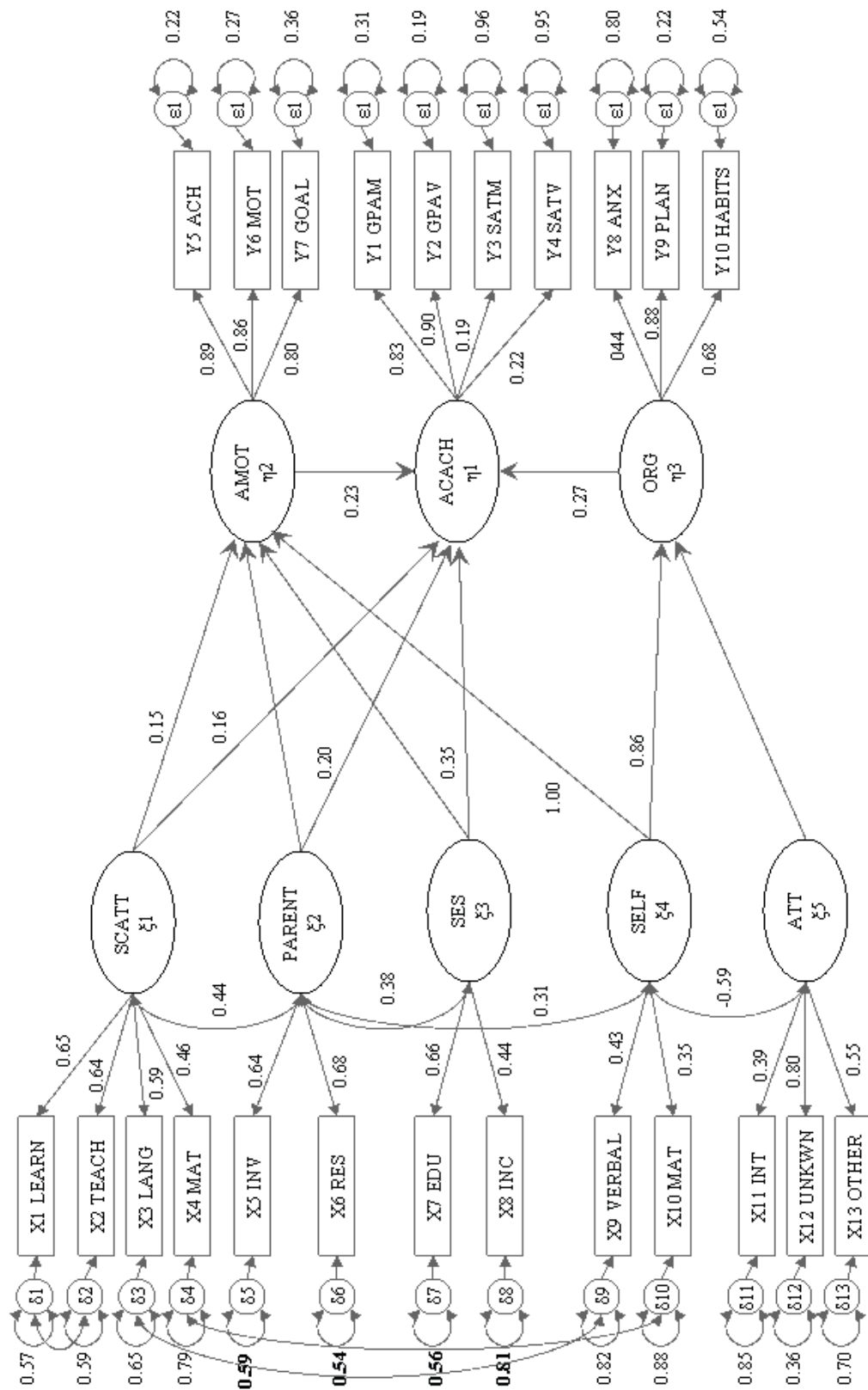
Note: Only significant standard estimates are reported.

Figure 12. Standardized coefficients for model 2 (final re-specified model)

The ATLANG and VERBAL indicators measured attitudes toward language arts and self-perception of language arts, respectively. The ATMAT and MATH indicators measured attitudes toward math and self-perception of math respectively. Examination of the surveys used to measure attitudes and self-perceptions revealed resemblance in wording among the math items and among the language arts items. The similarity of the items might have contributed to common method variance, explaining the measurement error correlations between these residuals (Kline, 2005).

Based on these results, the original model was re-specified so that (1) the demandingness indicator was excluded from the model, (2) the LEARN and TEACH measurement errors were allowed to covary, (3) the ATLANG and VERBAL measurement errors were allowed to covary, and (4) the ATMAT and MATH measurement errors were allowed to covary. The final model, including significant coefficients in standardized form is illustrated in Figure 15. The re-specified model had moderate overall model fit, a better fit than the original model (see Table 13).

The re-specified model could have been modified further based on small factor loadings as well as indicators with large measurement error. Over fitting the model (including additional parameters after the model has been determined to be adequately fit) can lead to the inclusion of parameters that do not have replicable effects, and the inflation of errors (Byrne, 1998). Model modification indices may be particular to the sample on which the model was tested, therefore when modifications are made there is the increased risk of making Type I and Type II errors (Byrne, 1998). Further modifications were not employed since there was no cross validation sample and to avoid over fitting the model.

Interpretation of Final Model

The final model was found to only have a moderate fit to the data. This suggests that changes to the measurements used in the model, or changes to the structure of the model (paths between latent variables) might result in a better fitted model. A review of the findings from the estimated parameters of the latent variables, and the indicators and error associated with each of these latent and observed variables leads to a clearer understanding of changes that might help to improve the model. The changes to the model that are suggested below were not made in this study because modifications had already been made and further modifications may have led to more error.

Students' attitudes toward school, as measured by their attitudes toward teachers, learning, language arts, and mathematics, was found to be significantly correlated to parenting style/involvement accounting for 19.4% of the variance. Students' attitudes toward school also had a small positive effect on both academic achievement (standardized coefficient=0.16) and achievement motivation (standardized coefficient=0.15). These small effects might be related to the measurement errors associated with attitudes toward math and attitudes toward language, which were found to covary with math and verbal self-perception. The error covariance suggests that the

surveys used to measure attitudes toward school and self-perception may have been measuring similar constructs, at least at the subject level (i.e., language arts and mathematics). Self-perception had a much stronger effect on achievement motivation. Using different measures of self-perception and attitude towards school which appeared to be more distinct, or combining the variables into a latent variable which had both self-perceptions and attitudes indicators might result in larger effects that have more substantive meaning.

Parenting style and involvement, as measured by parents' involvement and responsiveness, had minimal positive effect on academic achievement (standardized coefficient=0.20), but did not have a significant effect on achievement motivation. Parenting style and involvement was also found to have significant relationships with socioeconomic status (r=0.38), attitudes toward school (r=0.44), and self-perception (r=0.31).

Socioeconomic (SES) status as measured by parents' annual income and level of education had a significant correlation (r=0.38) with parenting style and involvement. In addition, SES was found to have a moderate direct effect on academic achievement (standardized coefficient=0.35) but no significant effect on achievement motivation. Achievement motivation does not appear to be a mediating variable between SES and academic achievement.

Self-perception as measured by verbal and mathematics self-perception had the strongest effect on achievement motivation (standardized coefficient=1.00) and study/organizational skills (standardized coefficient=0.86). Caution is taken in interpreting these estimates due to the large amount of measurement error found in the indicator variables (Verbal δ=0.82; Math δ=0.88).

Students' attributional style, as measured by tendency to attribute success and failure to self, others or unknown causes, did not have a significant effect on study/organizational skills. Attributional style exhibits a strong negative correlation with self-perception (r=-0.59). This means that students who are more likely to attribute successes and failures to someone other than themselves are less likely to have a positive self-perception.

Achievement motivation, as measured by the students' follow through (i.e., achievement of specific goals), inner commitment to achieve, and clear goals and objectives, had a moderate direct effect on academic achievement (standardized coefficient=0.23). Study/organizational skills as measured by study anxiety, planning strategies/time management, and study habits were found to have a moderate effect on academic achievement (standardized coefficient=0.27). The large measurement error on the anxiety indicator (0.80) suggests that the anxiety indicator was measuring something different from planning strategies/time management and study habits indicators. The exclusion of the anxiety indicator may have resulted in stronger parameter estimates in relation to the study/organizational variable. Overall, the study/organizational skills

latent variable exhibited a small error measurement (standardized residual=0.15), suggesting a reliable measurement of study/organizational skills.

Academic achievement was measured by student's English GPA and math GPA over three semesters, as well as their scaled scores on the Stanford-9 reading and mathematics subtest. The error associated with the latent academic achievement variable (standardized residual=0.73) and with the Stanford-9 math (standardized residual=0.96) and reading scores (standardized residual=0.95) indicates a large amount of error being measured in the latent achievement variable. The Stanford-9 indicator variables accounted for most of the error associated with the latent achievement variable. This suggests that the Stanford-9 test scores were not measuring the same achievement construct as the GPAs were. It appears that there were two separate achievement variables: school achievement (as measured by GPAs) and other academic achievement (as measured by standardized test scores). Further examination of the relationship of GPA with Stanford-9 scores revealed that the student with the lowest Stanford-9 reading score (433) had a 3.11 English GPA; incidentally the student with the highest Stanford-9 reading score (839) had one of the lowest English GPAs (1.78). Similarly, the student with the lowest Stanford-9 math score (612) had a 3.89 math GPA, while a student in the top eight scores on the Stanford-9 (767) had a 2.56 GPA. Students who had a 4.00 English GP A had Stanford-9 English scores ranging from 664 to 816. Students who had a 4.00 math GPA had Stanford-9 Math scores ranging from 641 to 803. Additionally, the math Stanford-9 scores and math GPA had a small correlation (r=0.225; p=0.00). The Stanford-9 reading scores and English GPA also had an even smaller correlation (r=0.177; P=0.00 I). These findings have both methodological and practical implications. In light of these findings researchers may want to consider teacher-based judgments of achievement as one latent variable and standardized test scores as another, rather than using these variables together as indicators of one type of achievement.

CHAPTER 4: General Discussions and Implications

Conclusions

The purpose of this study was to examine the relationships among academic achievement, achievement motivation, study/organizational skills, attitude towards school, parental involvement and style, socioeconomic status, self-perceptions, attributional style, and gender within a sample of gifted middle school students. These relationships were examined through the test of a model which was developed based on findings from previous research on motivation in all students and gifted students' achievement. Results from this study support some findings from previous studies and also indicate ways some variables function differently in a sample of gifted students.

The findings from this study provide support for several of the previous findings related to academic achievement, achievement motivation, study/organizational skills, attitude towards school, parental involvement and style, socioeconomic status, self-perceptions, attributional style, and gender, suggesting that all of the variables, except gender, in some way influence achievement. While a few gender differences were found on the indicator variables, none of these differences exhibited a meaningful effect, counter to previous research which found gender differences for attributional style, self-perception, and achievement (Dweck, Goetz, & Strauss, 1980; Eccles et al., 1993; Marsh, 1989; Wigfield et al., 1991). The value of the new findings is in the interpretation of how these variables work together to influence achievement in a gifted population.

Previous studies have suggested that achievement motivation and study/organizational skills account for the most variance in achievement in gifted students (Baker, et al., 1998; Ford, 1992; McCoach & Siegle, 2001, 2003). In the model used in the current study, achievement motivation and study/organizational skills have strong relationships with academic achievement, but it appears that SES has the strongest relationship, followed by study/organizational skills, achievement motivation and parental style/involvement respectively. Also, attitude towards school appears to have a minimal direct influence on achievement, and indirect effect through motivation. The model also suggests that self-perception indirectly affects achievement through a strong influence on motivation and study/organizational skills. Finally, it appears that attributional style has a very indirect relationship with achievement; it influences self-perception which in turn influences achievement motivation and study/organizational skills, which in turn influence achievement. The results of this study provide support for the following findings from previous research:

1. Students' attitude towards school impacts underachievement among gifted students (Colangelo et al., 1993; Emerick, 1992; Ford, 1992; McCoach & Siegle, 2001, 2003; Peterson & Colangelo, 1996; Supplee, 1990).
2. Parental style/involvement influences student achievement (Baker et al., 1998; Baum et al., 1995; Diaz, 1998; Emerick, 1992; Ford, 1992; Hébert, 2001; Paulson, 1994; Reis et al., 1995).

3. Parents with higher income and more education are more likely to be responsive to their children and more involved with their children's education (Hetherington & Clingempeel, 1992).

4. Students are more likely to have a positive attitude toward school and self-perception if their parents are more responsive and involved (Bandura, 1986; Marchant et al., 2001).

5. Students with more positive self-perceptions are much more likely to have high achievement motivation and strong study and organizational skills (Carr et al., 1991; Meece et al., 1990; Pintirch & DeGroot, 1990; Pintrich & Garcia, 1991).

6. Students' self-perceptions and attributional styles are related (Eccles et al., 1993; Eccles & Wigfield, 1993).

7. Gifted students are more likely to have high self-perceptions if they have internal attributional styles (Kanoy et al., 1980).

8. Gifted students with higher achievement motivation are more likely to achieve (as documented by grades and test scores) (Baker, et al., 1998; Baum et al., 1995; Diaz, 1998; Ford, 1992; Hébert, 2001; McCoach & Seigle, 2001; Reis et al., 1995).

9. Gifted students with better study/organizational skills are more likely to achieve (as documented by grades and test scores) (Baker et al., 1998; Baum et al., 1995; Colangelo et al., 1993; Hébert, 2001; McCoach & Siegle, 2001, 2003; Muir-Broaddus, 1995; Redding, 1990; Reis et al., 1995).

The findings from this study also suggest new relationships that have not been discussed in previous research. Students' attitudes toward school might be similar to their self-perception about school subjects. That is, if you question students about their attitude toward mathematics you might also get an indication of their perceived ability in mathematics. Students' attitudes toward school have an effect directly on achievement motivation and academic achievement. Therefore attitude toward school not only influences achievement directly, it also indirectly influences achievement through its influence on motivation. Also, self-perception appears to be a mediating variable between attributional style and study/organizational skills. This means that a student's attributional style indirectly influences study/organizational skills through its influence on self-perception.

Finally, the findings help to clarify some of the previous findings about relationships among the variables in the model. The results suggest that motivation does not serve as a mediating variable between parental style/involvement and achievement (Marchant, et al., 2001). The findings help to clarify findings related to SES, achievement and motivation (Borkowski & Thorpe, 1994; Meece, 1997; Stipek & Ryan, 1997), suggesting that SES relates to achievement more directly and does not influence motivation. Academic achievement also appears to be influenced by some relationship of parenting style/involvement and SES because parenting style/involvement and SES are correlated and both influence academic achievement. The results also help to clarify findings that self-perception influences achievement in gifted students (Diaz, 1998;

Emerick, 1992; Ford, 1992; Reis et al., Supplee, 1990) suggesting that self-perception may have more of an indirect affect on achievement through its influence on motivation and study/organizational skills.

Implications

The findings from this model may help teachers and parents by providing them with a structure suggesting factors to consider in the prevention of underachievement or the identification of causes of underachievement. It seems that many students may be achieving at high levels as measured by grades, but not achieving if achievement test scores are considered (or vice versa). If grades are based more on effort than on ability, students who are not putting forth the effort will receive poor grades. If underachievement is defined as not putting forth the effort needed to achieve, then the use of grades as an indicator of achievement is more appropriate than the use of standardized achievement measures. In light of these findings, teachers and others working with students should create a profile (standards based standardized test scores, norm referenced achievement test scores, grades, etc.) of any student who they believe is underachieving in order to determine the extent to which the student is achieving and the extent to which the student is lacking motivation versus lacking knowledge or skills necessary to achieve. Students who are earning poor grades but are performing well on standardized tests are probably lacking motivation since they are still able to earn high scores on tests of their knowledge. Teachers and parents might respond to this by providing the student with work that is more challenging, or work that is aligned to the students interests and/or learning profile. Students who are earning poor grades and are not performing well on standardized tests might be lacking some of the knowledge or the study skills necessary to continue to learn the information. Students who are earning good grades but are not performing well on standardized achievement tests might be lacking some study/organizational skills related to test taking. Teachers should look at these profiles to determine how to intervene to help these students begin to achieve.

The model suggests that gifted students from lower SES might be at greater risk for underachievement; therefore teachers should pay special attention to the model variables in students with lower SES. This finding also has implications for identifying and retaining students with low SES in gifted programs. Students from low SES families are less likely to be identified as gifted. One finding suggests that as few as 9% of students in gifted programs are in the bottom quartile of family income, while 47% are in the top quartile (Ross, 1993). Findings from the current study suggest that in addition to increasing the number of low SES students identified as gifted, there is a need for methods to retain these students ensuring their success in the programs. The current study suggests that students from lower SES levels may be as motivated to achieve, but they are still not performing at the same level as their cohort from higher SES levels. One might hypothesize that the school divisions had a gifted identification process which used a lower achievement criteria for students from lower SES leading to a strong relationship between achievement and SES. However, the school divisions in this study did not adhere to such practices. Students from all SES levels were identified with the

same criteria. Further research is needed to determine how the model variables function differently for students from different SES levels.

The relationships found among achievement, achievement motivation, study and organizational skills, self-perception, attitudes toward school, and attributional style can be used to guide teachers and parents in helping gifted underachievers. Teachers and parents seeking to prevent students from underachieving should focus on students' motivation and study/organizational skills. If a student appears to be losing motivation (i.e., stops turning in work, doesn't appear to be putting forth effort on assignments, etc.) this might be a strong indication of future underachievement. Likewise, if a student does not have the necessary study or organizational skills, s/he may begin to underachieve. In turn, students' self-perception and/or attitudes toward school may be an underlying cause for their lack of motivation or lack of study/organizational skills. Therefore, self-perception and attitudes toward school should be addressed for students who begin to lose motivation or who appear to lacking the necessary study and organizational skills. Finally, if the student is found to have issues with self-perception one area of concern might be his/her attributional style. That is the student may be attributing all of his/her successes and failures to others. If a student attributes successes to external and unstable tasks, the student will be less likely to expect to succeed on a future task. If the student does not expect to succeed, the student has a lower self-perception and will be less likely to try new tasks because s/he feels that failure will result.

Summary of Methodological Findings and Suggestions for Future Research

A few of the findings in this research have implications for future research on the achievement of gifted students. First, careful consideration must be taken when choosing the measure of achievement. The findings from this research suggest that school achievement, as represented by grades, is different from academic achievement, as represented by norm referenced achievement tests. Small correlations were found between grades and norm referenced achievement test scores, and large amounts of error were associated with the measurement of achievement using norm referenced test scores. Grades did not have a large amount of error associated with their measurement of achievement. However, grades should not be used alone as an indicator of achievement because they can be biased and do not represent a standardized measure of achievement. Researchers may want to consider including two latent achievement variables in future models, one school based and one for standardized achievement tests.

Second, the self-perception and attitude towards school variables appear to be measures of similar constructs at least at the subject level (i.e., math and language arts). In the future researchers might want to combine these two variables in order to alleviate some of the error in the measurement and to avoid confusion in interpreting the findings. Other measures of self-perception and attitude towards school might not present the same problems, therefore consideration of different measures for these variables is also recommended. Third, there did not appear to be any gender differences in the indicator

variables, but gender differences may exist in the interaction of the latent variables. Therefore, it is recommended that with a large enough sample, multi-sample SEM techniques should be employed to test differences in models for gender. Fourth, SES had the strongest effect on achievement; therefore SES might have an effect on the interaction of all of the variables. With a large enough sample, multi-level SEM techniques should be employed to examine model differences in levels of SES. Finally, in structural equation modeling, models that are found to have model fit are not necessarily the only true model to represent the relationship among the variables. Cross-validation of this model with other samples of gifted students, and tests of other models of achievement should be conducted to produce evidence in support of or against this model's tenability.

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APPENDIX A:

Variables Excluded from the Model

Variables Excluded from the Model

Variable	Reason for Deletion
Gender	No meaningful effects found for indicator variables
General Self-perception	Extremely skewed and kurtotic
School Self-perception	Extremely skewed and kurtotic

APPENDIX B:

Correlation Matrix of Indicator Variables

Correlation Matrix for Indicator Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 GPAM	1																							
2 GPAV	0.75	1																						
3 STANM	0.23	0.13	1																					
4 STANV	0.20	0.18	0.40	1																				
5 ACH	0.46	0.45	0.13	0.21	1																			
6 MOT	0.35	0.36	0.02	0.03	0.77	1																		
7 GOAL	0.30	0.28	-0.01	0.08	0.77	0.78	1																	
8 ANX	0.17	0.15	0.09	0.19	0.46	0.46	0.47	1																
9 PLAN	0.36	0.43	0.08	0.08	0.80	0.79	0.65	0.35	1															
10 HABITS	0.26	0.29	0.08	0.06	0.59	0.64	0.53	0.28	0.67	1														
11 LEARN	0.15	0.17	-0.19	-0.10	0.28	0.37	0.33	0.25	0.26	0.39	1													
12 TEACH	0.23	0.22	-0.13	0.01	0.42	0.45	0.40	0.23	0.39	0.40	0.67	1												
13 ATLANG	0.18	0.23	-0.04	0.17	0.49	0.44	0.40	0.38	0.44	0.50	0.44	0.45	1											
14 ATMAT	0.18	0.05	0.20	0.03	0.45	0.41	0.34	0.30	0.36	0.40	0.31	0.31	0.30	1										
15 NV	0.26	0.30	0.00	0.04	0.39	0.40	0.39	0.27	0.33	0.34	0.22	0.25	0.23	0.23	1									
16 RES	0.18	0.23	0.00	0.12	0.39	0.45	0.41	0.34	0.37	0.37	0.33	0.35	0.36	0.16	0.46	1								
17 DEM	-0.13	-0.15	0.07	0.06	-0.05	-0.10	-0.05	-0.05	-0.08	-0.07	-0.10	-0.04	-0.08	-0.02	-0.20	0.10	1							
18 EDU	0.22	0.25	0.14	0.16	0.10	0.13	0.08	0.13	0.12	0.13	0.00	-0.03	0.07	0.00	0.17	0.17	0.06	1						
19 NC	0.14	0.18	0.07	0.07	0.01	0.00	0.05	0.04	-0.04	-0.01	0.00	0.02	-0.04	-0.05	0.16	0.06	-0.05	0.28	1					
20 VERBAL	0.16	0.22	0.07	0.27	0.55	0.49	0.47	0.54	0.44	0.41	0.23	0.30	0.72	0.20	0.32	0.40	-0.03	0.17	-0.06	1				
21 MATH	0.36	0.14	0.26	0.13	0.53	0.38	0.42	0.33	0.37	0.34	0.12	0.19	0.14	0.69	0.18	0.17	0.04	0.05	-0.05	0.23	1			
22 NT	-0.18	-0.15	0.00	-0.03	-0.28	-0.27	-0.30	-0.17	-0.25	-0.24	-0.21	-0.26	-0.21	-0.15	-0.20	-0.13	0.08	-0.02	-0.03	-0.16	-0.19	1		
23 UNCONT	-0.24	-0.22	-0.04	-0.20	-0.51	-0.46	-0.48	-0.46	-0.39	-0.38	-0.25	-0.36	-0.33	-0.32	-0.29	-0.30	0.06	-0.07	-0.02	-0.44	-0.34	0.33	1	
24 OTCONT	-0.22	-0.17	0.02	-0.10	-0.37	-0.33	-0.34	-0.33	-0.29	-0.28	-0.35	-0.38	-0.31	-0.24	-0.16	-0.20	0.06	-0.01	0.00	-0.35	-0.19	0.15	0.45	1

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