

RISK FACTORS THAT AFFECT TEST SCORES, SPECIFICALLY DEVIANT BEHAVIOR

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The following faculty members have examined the final copy of this thesis for form and content, and recommended that it be accepted in partial fulfillment of the requirement for the degree of Master of Arts with a major in Sociology.

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## ABSTRACT

This study attempts to identify the effect that deviance has on high school test scores. Using the Educational Longitudinal Survey, 2002, student role performance, family, peer, and school factors were examined to see the effect they had on test scores. After separating the sample by deviance, the same variables were examined to see if being deviant strengthened the effect the variables had on test scores. Deviance was found to lower test scores by -0.546 points using multiple regression analysis. Using a partitioning of variance, the student role performance factors (which included deviance) were found to explain the greatest amount of variance in test scores. While deviance did affect test scores, other factors such as socio-economic status were shown to have a greater effect than deviance. Future research might focus on when discrepancies start between groups in education in order to solve the problems at earlier ages.

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## 1. Introduction

Education has a direct relationship to an individual's economic success due to the value society places on credentials. These credentials are what give an individual access to jobs and career advancement. High school test scores serve as a gateway to college acceptance. Failure to achieve high test scores is prohibitive to admittance into college and the acquisition of credentials. Many risk factors can affect educational attainment during the high school years, especially deviance. Literature tells us that academic achievement and deviance have a reciprocal relationship. Controlling for demographics such as gender, ethnicity, and socioeconomic status, researchers found that a low grade point average was a significant factor linked to deviance (Jessor, Bos, Vanderryn, Costa, and al. 1995). A study performed by Liu, Kaplan, and Risser (1992) found that deviants tended to lack motivation to do well academically. This research supports the notion that deviance affects academic achievement and therefore the credentials that students need to gain entrance to college.

Literature portrays four broad topical areas that have been shown to affect test scores. Student role performance encompasses a student's demographic characteristics, the student's dedication to homework and being prepared for class and whether or not the student has a disability. Schools are the institutions in which student role performance is evaluated, and the different sizes of schools, availability of resources and teacher certifications have been shown to affect test scores. A student's family, household structure, and familial importance placed on education can also affect student role performance. The peers with whom a student associates can affect test scores through values such as the importance friends place on academic achievement. This research will take a holistic approach to the study of test scores by looking at

these four topical areas and the effects that they have on test scores using the Educational Longitudinal Study of 2002 (U.S Department of Education 2004).

## 2.0 Literature Review

### 2.1 Student Role Performance

Behavioral expectations are assessed at school through student role performance. Student role performance can be defined as the behavioral expectations that are established by institutional agents (e.g., teachers, administrators) defining appropriate classroom behavior. Teachers have different expectations of students based on demographic factors and school behaviors. In this study student role performance includes sex/gender, race/ethnicity, disability, classroom preparation, homework, remedial class enrollment, grade retention and deviance.

Many studies have been conducted to explain the difference in test scores and school achievement between girls and boys (e.g., Hutchison 2004; Nowell and Hedges 1998). However, the research contains many contradictions. Some studies found boys to outperform girls while others found girls to achieve higher grades. Hamilton (1998) explored gender performance on tests based on the content and format of the test questions and found that boys outperformed girls on spatial-ability tests. Duckworth and Seligman (2006) studied the variance that could be explained by looking at the differences in the amount of self-discipline that boys and girls have. His work showed that girls have more self-discipline which could indicate that they study more and therefore achieve greater academic success. Crosnoe, Riegle-Crumb, and Muller (2007) found that some of the gender difference could be explained because of the difference in the externalization and internalization of failure. Specifically, girls internalize failures which in turn lower their self-esteem. Downey and Yuan (2005) tried to explain some of the variance in test scores by looking at the extra-curricular activities that boys and girls participate in. The

researchers found that girls were less likely to participate in activities that would build math scores and were more likely to read outside of school than boys, explaining why girls' scores on standardized math tests were lower, even though their overall grade achievement was higher.

Studies have shown that there is a racial academic achievement gap, with white students outperforming Black students on tests (c.f., Moller, Stearns, Blau, and Land 2006; Orr 2003). Moller, Stearns, Blau, and Land (2006) studied the effects that race had on grade retention and academic trajectories. The research showed that low-scoring black students were more likely to pursue a college trajectory than low-scoring white students, and that the racial gap in test scores increased over time. Orr (2003) studied the impact that wealth had on the racial gap. Orr's study found that when wealth was entered into the model, the coefficient for race decreased by 15%. Orr's research illustrates that as the gap between wealth increases, so does the gap in test scores. There is less support for a difference in test scores between Latinos/Hispanics and whites (e.g., Battle and Pastrana 2007; Davalos, Chavez, and Guardiola 2005). In the study by Battle and Pastrana (2007), research showed that even though Hispanics scored lower on tests than white students, socioeconomic status was a much more powerful predictor of academic achievement than race. In the study by Davalos, Chavez, and Guardiola (2005), Hispanics and whites scored equally on a family closeness variable, yet whites outperformed Hispanics in test scores. In this study, race and ethnicity are studied as a minority status variable to see if being a member of a minority group will have an impact on test scores.

Studies have shown that disabled students do not achieve the same level of academic achievement as non-disabled students do (e.g., Hollar 2005; Jenkins, Dale, Mills, Cole, Pious, and Ronk 2006; Sireci 2005). Not only do disabled students not achieve as much academically, but also there are more instances of suspension and juvenile correctional institute placements

among disabled students. In a study on hyperactive children, Barkley, Fischer, Smallish and Fletcher (2006) found that hyperactive students not only received lower grades than the non-disabled students, but that the disabled were often retained, suspended or failed to graduate from school at all. The researcher's control group and hyperactive group showed no significant difference in the rate of expulsion. The disabled students obtained fewer years of education and ranked lower in their high school classes. Baltodano, Harris and Rutherford (2005) found that youth with disabilities were over-represented in juvenile correctional facilities (12.7% of the population outside of corrections, while 34% of the population within corrections) and were further behind in academics than the non-disabled juveniles. Disabled youth read 30 words less per minute than the non-disabled youth; however the disabled youth were only one standard deviation from the mean reading speed of students. The over-representation of student within corrections is also seen in the suspension rates from school. Cooley (1995) found that students with disabilities comprised 24% of the students suspended, but only 11% of the student population in Kansas when he performed his study. The studies cited here show that students with disabilities are at a disadvantage when it comes to school achievement and school success.

Grade retention has been studied in order to see if students who are kept back a grade, or multiple grades, actually have lower test scores than those students who have not been held back. Grade retention is an intervention that some believe is growing more acceptable in our educational system. Alexander, Entwisle and Kabbani (1999) estimate that as many as 30% to 50% of students will receive this form of intervention during their academic career. Stearns, Moller, Blau, and Potochnick (2007) found that students who had been retained were more likely to drop out of school than non-retained students. The research also showed that ethnicity played a factor in dropout age, with whites and Latinos who had been retained dropping out earlier than

Black students who had been retained. Data also showed that students who had been retained were poorer than their promoted counterparts and fewer retained students were from two-parent households. Retained students were found to have lower test scores, a more pessimistic view of their educational futures and have more disciplinary problems. Among white retained students the mean test score was 45.21 ( $\sigma=7.70$ ) whereas the white promoted students had a mean test score of 54.20 ( $\sigma =9.50$ ). Moller, Stearns, Blau, and Land (2006) studied the effect of retention in lower grades and found that students who were retained prior to eighth grade have initial achievement scores 5.09 points lower than the students who were normally promoted. An issue that Moller et al. brought up is the fact that making the decision to retain a student is generally done at the school level, and there is not a standardized process for retention. This process, or lack there of, allows for teacher discretion and therefore teacher discrimination to come into play. Jimerson and Ferguson (2007) found that 10<sup>th</sup> grade students' grade point averages (GPA) were affected by retention, with non-retained students performing significantly better than retained students. Jimerson (2001) reviewed 20 studies of retention done in the past to see their overall effects. Jimerson looked at 175 different cases and statistical tests, finding that 82 favored the promoted group of student academically over the retained group of students. The retained group of students scored .39 standard deviations below the comparison promoted group. Overall, these studies show that being retained has an effect on educational achievement for students.

Whether or not a student received remedial education and training is another intervention that can affect academic achievement and test scores. Many different types of these remedial programs exist, some of which are run as after school programs, summer programs, or during special remedial classes. Any students who need help in subject areas can obtain remedial help; the term does not refer to disabled or special education classes. Raivetz and Bosquet (1987)

performed a study where a group of students participated in a summer school program to increase their math and reading scores. The data showed that students who participated in the summer school learning achieved higher scores than those who did not participate. The summer study group received a reading score mean of 67.6, compared to the comparison groups mean reading score of 47.6. In the math tests, students who had participated in the summer training received a mean score of 58.1 while the comparison group received only a 36.2. Finally in the writing test, the remedially trained group received a mean score of 65.4 in comparison to the score of 43.3 that the comparison group received ( $p < 0.001$ ). Biesinger and Crippen (2008) performed a similar study about the usefulness of a remedial online website to help students receive higher scores on the Nevada High School Proficiency Examination in Mathematics. Of the remedially trained group, 44.13% passed the examination, while only 40.01% of the control group passed the exam. Lauer, Akiba, Wilkerson, Apthorp, Snow, and Martin-Glenn (2006) studied out-of-school time (OST) programs and options to see if the students within these programs achieved higher scores and grades than their non-OST enrolled counterparts. The research showed that certain programs had a higher impact on grades such as Title I and summer reading programs, and that any extra learning helped scores in a positive way.

Homework is a constant battle for students of all ages, and there has been some debate as to whether or not homework actually helps students achieve better test scores and grades. It is important to note that teachers assign homework for different reasons, such as practicing skills learned in class, encouraging independent reading, and preparing for exams (Brock, Lapp, Flood, Fisher, and Han 2007). Cooper, Lindsay, Nye, and Greathouse (1998) performed a study of students and the effect that time spent on homework had on their class grades and standardized test scores. The research showed a significantly positive relation between the amount of

homework completed and class grades ( $p < 0.001$ ). McGrath's 1992 study (as cited in Cooper, Robinson, and Patall 2006) of students who completed homework in comparison to those who did not, showed that the homework completion group did significantly better on the given posttest ( $d = 0.39$ ). These studies show that the amount of time spent on homework as well as the amount of homework completion has impact on students' test scores, academic achievement, and grades.

Whether or not a student is considered to be a deviant also has an impact on academic achievement. For the purpose of this study a deviant student is defined as one who "got in trouble" at least once. This includes students who were found fighting, cutting class, and students who were given suspension for various reasons. The relationship between deviance and academic achievement is a reciprocal one. Research is still being done to see which comes first, the deviant behavior or the low grades. Jessor et al. (1995) performed a study looking at the risk factors that can affect deviant behavior. When controlling for the demographics of gender, ethnicity, socioeconomic status and grade cohort, they found that low GPA is a significant factor linked to deviance ( $p < 0.01$ ). In their study of the pathways between self-esteem and academic performance, Liu, Kaplan, and Risser (1992) found that self-esteem had a significant negative impact on deviance. Deviance had an inverse direct effect on motivation, which is directly tied to academic performance ( $p < 0.05$ ). This study shows that deviance can affect test scores and academic performance through the lack of self-esteem and lack of motivation to do well academically. Kasen, Cohen, and Brook (1998) found that antisocial behavior, the risk of dropping out, and committing a crime all decline with higher academic achievement. This shows that students who are deviant do not tend to attain test scores as high as those of students who are

non-deviant. The research also showed that that within high conflict school settings there is a high proportion of deviant youth ( $p < 0.001$ ).

## 2.2 Schools

Schools are the institutional environment in which student role performance is evaluated. School factors should be investigated for their effect on student achievement such as school size, classroom size, available resources, location, economic level, and course selection. School size, specifically the student/teacher ratio, has been found to have an impact on students' academic achievement (e.g., Lee and Smith 1997). Nye, Hedges, and Konstantopoulos (2000) found that the average effect of small class size is positive and statistically significant in relation to grades and achievement, specifically reading and math, at every grade level ( $p < 0.05$ ). The analysis of the data also showed that the effect is cumulative, so the more years that a student is in a small class, the better that student's grades. Finn, Gerber, and Boyd-Zaharias (2005) performed a similar study in which they tried to see how many years of being in a small class had the most benefit to a student. Students who spent four years in a small class had a graduating percentage of 87.8% versus full-class size students 76.3%. The analysis showed that class size did have an effect on the test scores of students after spending four years in a small class. A study was conducted by the NICHD to look at the many different aspects of a classroom, teaching styles, and behavior development that are impacted by class size. The data showed that with a class size of 26 the ratings showed a lower quality of instructional support ( $p < 0.05$ ) and more teacher-directed group activities ( $p < 0.01$ ) than in smaller classes. The researchers also found that as class size grew, the amount of time that was spent on academic activities decreased (Allhusen, Belsky, Booth-LaForce, Bradley, Brownwell, Burchinal, Campbell, Clarke-Stewart, Cox, Friedman, Hirsh-Pasek, Houts, Huston, Jaeger, Johnson, Kelly, Knoke, Marshall, McCartney, Morrison,

O'Brien, Owen, Payne, Phillips, Pianta, Randolph, Robeson, Spieker, Vandell, and Weinraub 2004).

Some studies have shown that academic differences are affected by the location of a school, whether urban or suburban (e.g., Battle and Coates 2004). One study conducted showed that there was no statistical difference in rural students in either school adjustment or performance (Stanley, Comello, Edwards, and Marquart 2008). Finn, Gerber, and Boyd-Zaharias (2005) performed a study where they found that graduation rates were significantly higher in suburban and rural schools than in inner-city schools. Rosenfeld, Richman, Bowen, and Wynns (2006) found that without social support both perceived neighborhood danger and personal neighborhood danger accounted for 5.2% of the variance in grades. In a multiple regression, social support and personal neighborhood danger explained 8.5% of the variance in grades.

Along with school location, the actual type of school can be a factor in student achievement. Lubienski and Lubienski (2006) studied the differences between public and private schools, and the many different denominations of religious schools. The data for 4<sup>th</sup> grade students showed that without controlling for demographics, Catholic school students scored 10 points higher, Lutheran students scored 11 points higher, Conservative Christian students scored 4 points higher and charter school students scored 6 points lower in math. Once demographics were controlled for in this data these relationships were all found to be negatively significant in 4<sup>th</sup> grade; however in 8<sup>th</sup> grade the Lutheran students still outperformed the others. Shanahan and Walberg (2001) found that private schools did not outperform public school performance, contrary to the popular private school-superiority complex. This research will also attempt to test this superiority complex.

The economic level of a school can also affect a student's academic achievement. Malecki and Demaray (2006) studied the effect free lunch programs have on academic achievement. Most schools located in a lower socioeconomic sector have free lunch programs to help feed their students. Malecki and Demaray found that students who receive free lunches have lower GPAs than student who were not receiving free lunches. Those schools which offered a free lunch program, usually inner-city schools, showed a lower graduation rate (70.2%) compared to those schools with no free lunch program which graduated 83.7% of students, according to Finn, Gerber, and Boyd-Zaharias (2005). Leventhal and Brooks-Gunn (2004) found that there were significant program effects for low-poverty voucher males. The students who used these vouchers to move to a better, safer school were found to have higher grades than those who did not move using these vouchers. The average scores of students who did not move ( $\sigma = .21$ ) were found to be lower than those who did move using the vouchers ( $\sigma = .56$ ). The only mediating effect on tests was school safety as reported by parents. Alexander, Entwisle, and Olson (2001) found that by the 6<sup>th</sup> grade students with low socioeconomic status had lower achievement scores by a standard deviation of 0.9. Research into the socioeconomic status (SES) of families found that SES is significantly and positively related to 10<sup>th</sup> graders GPA ( $\sigma = 0.06$ ,  $p < 0.05$ ) (Stewart 2008).

The programs and resources of a school can affect a student's academic achievement. Fredericks and Eccles (2006) found that children who participated in school clubs in the 8<sup>th</sup> grade had higher 11<sup>th</sup> grade GPAs ( $p < 0.001$ ) and higher educational expectations for themselves ( $p < 0.001$ ). The research showed that participation in sports in 8<sup>th</sup> grade correlated to higher GPAs in 11<sup>th</sup> grade. In a study of college preparatory classes and the effect enrollment in these classes can have on deviance, those students in non-college preparatory classes had higher

instances of delinquency (Crosnoe 2002). The research also showed that those students within the college preparatory track scored higher on tests. Noble and McNabb (1989) found that being in a college preparatory class appeared to have more of an impact on female students than male students for increasing ACT test scores. On the opposite end of the spectrum from college preparatory classes are the programs schools have for drop-out prevention. Somers and Piliawsky (2004) found no significant difference in GPA between a control group and a treatment group of high school students in a drop-out prevention treatment program. However, research showed that the school that utilized the program had a lower retention rate (7.7%) than the current district standard (15%). Research in another program for dropout prevention showed that the treatment group had lower final GPAs that approached significance ( $F=2.23$ ) (Catterall 1987). The difference in results supports the need for more research into the area of drop-out prevention and the different treatment programs that might help to increase retention rates.

Course selection and course availability can impact a student's grades and test scores. Noble and McNabb (1989) found that the number of English, science and math courses that a student enrolls in has a direct effect on the ACT test scores. On average, students take one additional math and English course than is required for graduation. Noble and McNabb's study found that for each additional English course taken there was an increase of 1.5 units for juniors and over 2.0 units in seniors. For additional math courses there was an increase of 2.0 units and for additional science classes there was a gain of 1 unit. Peterson and Colangelo (1996) found that the choice of electives could change students' mean test scores ( $p<0.001$ ). Research showed that the number of undemanding electives taken were significantly higher for underachievers (2.31) than the number of undemanding electives chosen by all other achievers (1.19). Chaney, Burgdorf, and Atash (1997) conducted a study to see if the graduation requirements of schools

vary and how the variances between schools affect student achievement levels. The research showed that even if students attempt a harder course and fail, they are still working and learning and therefore even failing a class is an achievement because they attempted it.

### 2.3 Family

During the adolescent years, the family is the primary socialization agent of a child. Family is where students learn values, goals, and the position they occupy within the family structure. Family factors such as household structure, socio-economic status, parental involvement in school activities, and parental expectations can all affect student behavior and student role performance. High socio-economic status gives students access to better resources and better schools, which leads to higher academic achievement. A study of high school failure showed that the higher family socioeconomic status was positively related to academic competence (Newcomb, Abbott, Catalano, Hawkins, Battin-Pearson, and Hill 2002). Adams and Singh (1998) found that socio-economic status was a significant predictor of academic achievement for African American tenth graders. Research has shown that socio-economic status is the largest predictor of academic achievement (Lee, Daniels, Puig, Newgent, and Nam 2008) and this research intends to replicate these past results.

Zimiles and Lee (1991) found that the mean achievement scores of students who were living in either a single-parent home or a home with a step-parent were lower than students living in intact families. In a study of urban African American students, Battle and Coates (2004) found that 12<sup>th</sup> grade females in single-parent homes with their mothers outperformed the females who lived with only their fathers. As a student's SES increased the returns were found to be higher for females who lived with only their mothers. Battle and Coates also found that the larger the families' size the worse the students' scores. Heard (2007) found that students are negatively

affected by not living in the traditional two-parent home. Students' GPAs dropped approximately one-tenth of a point every time there was a change within a family structure. Generally all types of family structures have some impact on student academic achievement. Jeynes (2000) found the lowest level of academic achievement came from a student of a never-married single parent ( $p < 0.0001$ ) and widowed parents who had remarried ( $p < 0.0001$ ). There was also a significant negative impact of cohabitation relationships on a student's academic achievement ( $p < 0.0001$ ).

A parent can be involved in many parts of a student's academic achievement and experience through parent-teacher organizations, checking the student's homework, and allowing the student to use a computer for schoolwork. Jeynes (2007) performed a meta-analysis that indicates parental involvement is associated with higher achievement outcomes and the effect of parental expectations was also significant ( $p < 0.0001$ ). Jeynes defined parental expectations as the level of achievement that parents expected that students had the ability to achieve.

#### 2.4 Peer Relationships

A student's social network is made up of the peers and friends with whom the student associates on a regular basis. Peer groups, or reference groups, are the secondary socialization agent for children. Peer factors such as the importance of academics within a peer group, delinquency of peers, and the number of friends who have dropped out can affect student role performance. Haynie (2001) found that for each unit increase of a friend's delinquency there was a 4% increase of the respondent's own delinquency. Depending on the density of the social network, delinquency is shown to be tied to a student's peers. Weerman and Bijlleveld (2007) performed an ANOVA of variance on the effects of delinquent peers ( $p < 0.01$ ) and the effects of delinquent best friends ( $p < 0.01$ ) on non-delinquents and found the effects to be significant. This research showed that students follow their peers. In working with the social bond theory,

Huebner and Betts (2002) found that the 4 attachment variables (time in family, adult bond, friend bond, parent quality) were inversely and significantly related to delinquency in females. Santor, Messervey, and Kusumaker (2000) performed a study of peers which showed that peer conformity is the strongest bond, followed by peer pressure and then peer popularity. Crosnoe (2002) found that students choose to take the same classes as their friends, and those students who report lower popularity are more vulnerable to their friends' choices. From the self-reported surveys, students said that 31% of their friends were in all the same classes as themselves, 76% of their friends were in most of their classes, and only 6% of their friends were in none of the same classes.

## 2.5 Composite Model

The composite model for this research incorporates all the preceding elements into a holistic model to explain variance within test scores. Student role performance is the behavioral expectations and rules that are established by institutional agents. For instance, a student who is handicapped will have lower test scores than a non-handicapped student. Student role performance has a direct effect on test scores.

Schools are the institutions in which student role performance is assessed. Teacher-student ratio, location, and financial resources have an effect on every student, and therefore have a direct effect on student role performance and an indirect effect on test scores. For instance, small class size has been shown to increase standardized test scores. Whether or not the school offers remedial classes and the percentage of the school that takes advantage of a free-lunch program have a direct effect on the students who are involved with the program. School factors have a direct impact on these specific students student role performance and an indirect effect on the test scores.

Families are the primary socialization agent for students and can have an impact on student role performance. The rules a family sets, the importance they place on homework, and the structure of a traditional or non-traditional family can all affect student role performance. For example, students from two-parent households achieve higher test scores than children from single-parent homes. Family factors show a direct impact on student role performance and an indirect effect on test scores.

Peers are the secondary socialization group in a student's life. Peers can have an impact on the choices a student makes regarding classes and how much effort to put into scholastic endeavors. For example, if a student participates in a peer group that emphasizes academic achievement, the student will be likely to have higher test scores. Peers can have a direct effect on student role performance and an indirect effect on test scores.

## 2.6 Hypotheses

### Student Role Performance Model

1. Net of other factors, deviant students will have lower test scores than non-deviant students.
2. Net of other factors, minority students will have lower test scores than non-minority students.

### School Model

3. Net of other factors, students in private schools will have higher test scores than students in public schools.
4. Net of other factors, students in schools with larger percentages of participation in a free lunch program will have lower test scores than students in schools with lower percentages of participation in the free lunch program.

## Family Model

5. Net of other factors, students from two-parent family structures will score higher than students from single-parent family structures.
6. Net of other factors, as socio-economic status increases, so do test scores.

## Peer Model

7. Net of other factors, students whose friends believe in the importance of grades will outperform students with friends who put little importance on grades.
8. Net of other factors, students who have a lot of friends who have dropped out will have lower test scores than others.

## 3.0 Data and Methodology

### 3.1 Data

Data was taken from the Education Longitudinal Study of 2002 (U.S Department of Education 2004). The ELS was designed by the National Center for Educational Statistics to follow 10<sup>th</sup> grade students through high school and beyond, with follow-up studies done every two years from 2002-2006. The data was obtained based on completed questionnaires from students, teachers, parents and administrators. Along with these questionnaires data was obtained from school records, a school facilities checklist and a media center/library questionnaire.

The sample size of schools was 750, with 17,000 randomly chosen tenth graders within these schools. In the original dataset there was an oversampling of Asian and Hispanic students, as well as private institutions. From the overall sample, only students with a completed student questionnaire, school administrator questionnaire, parent questionnaire, and a composite test score were used. This limited the sample to 15,222 eligible students.

Weights are used in order to resolve the oversampling that occurs, so that a researcher may extrapolate data to a wider target audience. Many datasets include weights which can increase the sample size. This sample size increase can lead to a false positive or type 1 error. In this study a relative weight was created by taking the weight and dividing it by the mean of the weight. This relative weight allows the sample to remain the same size at the original, but have the distribution of the target universe.

### 3.2 Dependent Variable

The dependent variable in this study was the composite score on the student's math and reading assessment. The test questions were derived from previous assessments and field-tested a year before the ELS 2002 to show reliability and validity. The tenth graders received the tests in two stages. There was a 15 question math section followed by a section of 14 reading questions. After scoring, the administrators of the test would assign the student to either a low, medium or high level of difficulty that affected the second stage of testing. The second stage of testing consisted of a free response and multiple choice question section in both math and reading. In this study the composite score was chosen as the dependent variable to allow comparison of achievement between groups. The composite score is an interval level variable with a low score of 20.91, a high score of 81.04, and follows a normal curve of distribution. The composite scores were arranged into quintiles and centiles to allow for descriptive analysis.

### 3.3 Independent Variables

The Student Role Performance model includes the variables of female, minority, handicap, whether or not a student was held back, if the student was prepared for class, the hours a student spends on other activities, and if there was ever any contact between the school and parents due to behavior issues.

The deviance variable was coded into a binary with 1 being that a student has gotten in trouble at school at least once. This low threshold was chosen in order to look at general deviance across the dataset without testing each individual deviant variable. The sex variable was coded as a binary, 0 being male and 1 being female, and labeled female to be able to use the variable in bivariate/multivariate analysis. Different ethnic groups were divided into two groups to create a minority binary. In order to classify ethnic groups of minority or non-minority status, a means procedure was performed. The mean test scores of Asian, Hawaii/ Pacific Islander, non-Hispanics and White, non-Hispanics were similar enough that the two groups were combined into the non-minority group. The minority group is comprised of Black or African American non-Hispanics, Hispanics, Multiracial non-Hispanics and American Indian/Alaska Native, non-Hispanics. A binary was created with 0 signifying non-minority and 1 signifying minority.

To show whether or not a student was ever held back a grade, a binary was created with 1 being yes and 0 being no. The disability variables were combined to form a binary and included disabilities such as hearing, visual, speech, learning, emotional disturbance, mental retardation, orthopedic impairments, and other physical impairments. This binary was labeled as 0 being no disability and 1 being a student who has one or more disabilities.

A binary was created for students who come to class unprepared, with 1 being students who have come to unprepared for class at least one time. The number of hours spent per week on homework, combined homework done in-school, out-of-school, and on weekends to form an index. An index was made of the number of hours spent per day on the computer, watching television or playing video games was a scale made of three separate variables: hours spent on computer, hours spent watching television, and hours spent playing videogames. An index was created from the variables involving school contact with parents regarding performance,

behavior, or attendance. From this index, a binary was created to use in bivariate/multivariate analysis, with 1 being school has contacted the parents and 0 being no contact. The number of hours spent on extra-curricular activities included being in the school band, being in a play/musical, participating in student government, being a member of an honor society, working on the yearbook or newspaper, and participating in any academic/vocational/school service clubs.

The school variables included whether or not the school was a private school, the size of the school, what percentage of students were enrolled in the free lunch program, whether or not students feel safe at the school and how many students participate in an advanced placement (AP) program. A binary was created to represent whether or not the school was private or public, with 1 being private school. According to previous research, there should be no difference in test scores based on public or private schools (Shanahan and Walberg 2001). The school size variable was coded as midpoints. A variable of free lunch was created for percentage of the student body who participated in the free lunch program. The amount of participation in a free lunch program is influenced by the socio-economic status of the surrounding neighborhoods. In this way, a school with a higher percentage of participation in a free lunch program will have fewer resources for the students (Malecki and Demaray 2006). A binary was created for whether or not students felt safe at the school, with 1 being that they do feel safe. Finally, a binary was created for whether or not a school has an AP program, with 1 being yes.

The family variables included SES, whether or not the child was from a traditional two-parent family and the number of available household resources. SES was calculated using occupational prestige, parent education, and family income. A centile was created for the socio-economic status, ranging from 0-100. A binary was created for the two-parent family variable,

with 1 being student comes from a two-parent family. A variable for household resources was created by combining variables of whether the student's family receives a daily newspaper, gets magazines, has a computer, has access to the internet, has a DVD player, has an electric dishwasher, owns a clothes dryer, has more than 50 books in the home, whether or not the child has his/her own room, and whether or not the family has a fax machine.

The peer variables included hanging out with friends, having friends who have dropped out, and whether or not academic behavior is important to students' peers. A binary was created to show if students hang out with their friends more than once per week, with 1 being yes. A binary was created to show if a student has had a close friend that has dropped out of school, with 1 being yes. A binary variable was created to show if academic behavior was important to a student's peers, with 1 being yes.

### 3.4 Methodology

This study uses SPSS to examine the relationships that exist between student role performance, school, family, and peer factors and how these factors affect a student's test scores. Three types of analyses were performed in order to establish these relationships: univariate, bivariate, and multivariate. At the univariate level, the following measures of central tendency were calculated: frequencies, means, medians, and standard deviations. This univariate analysis showed the means and standard deviations of the full sample, so that bivariate analysis could then be performed.

A bivariate analysis consisted of a t-test, which shows the statistical differences between two sub-groups, such as deviant and non-deviant students. For this study alpha levels below 0.05 were considered to be statistically different. Following identification of statistically different

variables, a Cohen's  $d$  was performed to decipher whether this difference was meaningful. This calculation of effect size is meaningful at the 0.20 level and above.

A multivariate analysis was carried out by running an ordinary least squares regression (OLS). This statistical procedure examines each variable's independent effect on the dependent variable, in this study test scores. The OLS procedure produces unstandardized and standardized coefficients or betas. Therefore the numbers given are in the same metric of the dependent variables, in this case points. These unstandardized betas can only be compared across groups, such as deviant and non-deviant. The standardized betas are the slope coefficients and range from 0 to 1. The standardized betas can be compared within each group, but not across groups. Standardized betas are expressed as a standard deviation, so that with every one standard deviation of a test score, there is a certain amount of variance with the independent variable.

A modified chow test was performed to establish if any of the independent variables affect both sub-groups at a statistically significant level. If the difference is found to be significant, the two groups show significant differences in those specific independent variables. Significance was determined using  $z$ -scores, which convert differences into the same metric, in which a difference is significant if the  $z$ -score is above 1.96.

A partitioning of variance shows the testing of different theoretical models, such as student role performance, school, family and peer. This test shows the effect on variance of each model segment. Therefore, analyzing which model segment is the most important in explaining the variance of test scores. After looking at the full sample in the partitioning of variance, partitioning of unique variance provides more detailed analysis of the effects of the different model segments. Unique variance is how much of the explained variance can be attributed to a model segment, and ignoring the shared and unexplained variance that occurs.

## 4.0 Results

### 4.1 Univariate and Bivariate Results

Table 1 shows the univariate and bivariate analysis comparing deviant and non-deviant groups. The dependent variable, test score, is shown with a mean of 52.25 for non-deviants and 49.54 for deviants. This is a statistical, meaningful difference at 0.001.

Starting with the student role performance variables, deviant students are less likely to be female (39.5% vs. 59.2%), more likely to be a minority (35.1% vs. 29.7%), more likely to be held back a grade (15.1% vs. 10.5%), and more likely to have a handicap (14.9% vs. 9.7%). Deviant students are more likely to be unprepared for class (45.0% vs. 24.5%), to spend fewer hours per week on homework (4.79 vs. 5.63) and spend fewer hours on extra-curricular activities (4.23 vs. 5.21). Deviant students spend more hours per day on the computer, watching television, and playing video games (8.56 vs. 8.04), and deviant students' parents have been contacted about performance, behavior or attendance (52.4% vs. 26.9%). All of the student role performance variables showed significant statistical difference at the 0.001 level.

In the school variables, deviant students are more likely to attend private school (10.5% vs. 6.4%). Deviant students are less likely to feel safe at their school (85.1% vs. 89.6%) and are less likely to have the opportunity to participate in AP programs (16.3% vs. 19.5%). These differences are shown at a statistically significant level of 0.001.

Within the family model, deviant students have a lower family SES score (48.84 vs. 51.93) and are less likely to come from two-parent families (73.4% vs. 78.8%). These variables are statistically significant at the 0.001 level. Deviant students have less availability of household resources (6.88 vs. 7.02), and this difference is significant at the 0.01 level.

The peer variables show that deviant students are more likely to hang out with friends more than once per week (83.9% vs. 74%), more likely to have a close friend who has dropped out of school (50.2% vs. 37.9%), and less likely to have friends who think that academic behavior is important (97.6% vs. 98.7%). These differences are all measured at the 0.001 level of statistical significance.

#### 4.2 Multivariate Analysis

Table 2 shows an Ordinary Least Squares regression (OLS) analysis regressing students test scores onto the predictors. Although only eight variables were specifically covered by a hypothesis, all variables with a significant difference will be discussed. The adjusted  $r^2$  for the full sample is 0.527 which shows that the saturated model explains 52.7% of the variance within test scores. Looking at the full sample, the student role performance factors show that deviant students will score -0.546 points less on their test scores than non-deviant students and has a significance level of 0.001. This supports hypothesis number one, which stated that net of other factors, deviant students would have lower test scores than non-deviant students.

Being female lowered test scores by -1.555 in the full sample and a meaningful difference was found between non-deviant females -0.096 and deviant females of -0.064. Hypothesis two stated that minority students would score lower than non-minority students, and support was found for this hypothesis; minority students score 4.067 points less than non-minority students ( $p < 0.001$ ). There was a meaningful difference in test scores found between non-deviant minority students (-0.216) and deviant minority students (-0.183). Being held back a grade shows a negative effect of -4.214 on test scores and a meaningful difference between non-deviant (-0.153) and deviant students (-0.143) who were held back a grade. Having a handicap had the most negative effect on test scores of all the predictors (-5.722). A student who has come

to class unprepared will have lower test scores (-0.871). Coming to class unprepared showed a meaningful difference between non-deviant (-0.054) and deviant students (-0.028).

Two student role performance factors had a positive effect on test scores: number of hours per week spent on homework (0.158) and number of hours spent on extracurricular activities (0.056). The last two student role performance variables were both found to have a negative impact on test scores, with the hours per day spent on television/pc/videogames lowering scores by -0.160 and if the parent had ever been contacted regarding behavior lowering scores by -2.042.

Hypothesis number three stated that private schools will have higher test scores than public schools, which was supported with a positive effect of 0.881. Continuing to look at the full sample the only school factor which showed a negative effect on test scores was having a higher percentage of students enrolled in the free lunch program, which lowered test scores by -0.031. This shows slight support for hypothesis number four which states that net of other factors, schools with larger percentages of participation in a free lunch program will have lower test scores than others. The school variable of school size showed no effect on test scores and students feeling safe at school and having the opportunity to participate in an AP program both had a positive effect on test scores of 2.462 and 3.673 respectively.

Hypothesis number five stated that students from two-parent families will score higher than those students from other family structures and this hypothesis was not supported as the difference was not statistically significant. Hypothesis number six was supported, showing that as socio-economic status increases so do test scores (0.128). The full sample also shows that the family factor of number of household resources also has a positive effect on test scores of 0.274.

Within the peer factors, hanging out with friends more than once per week has a negative effect on test scores of -0.874. There was no support for hypothesis number seven, which stated that the importance placed on academic behavior would increase test scores. Hypothesis number eight was supported with a negative effect on test scores by the variable of having had a close friend who dropped out of high school.

Figure 2 illustrates a partitioning of variance of the full sample and the sample divided into the deviant and non-deviant groups. The full sample model shows that 56.3% of the variance within test scores can be explained by student role performance, with only 16.8% for school factors, 3.7% for peers, and 23.2% for family. Once the two groups of students were separated into deviant and non-deviant groups, the data shows that student role performance is almost equally important to both groups, with 55.8% variance explained for non-deviants and 57.6% explained for deviants. Socio-economic status is also relatively similar in both non-deviant and deviant groups, 21.1% versus 21.8% respectively. Peers are not seen to have any more of an influence over one group or another. The areas where differences are seen are school factors and family predictors. School factors explain 18.6% of the variance for non-deviants versus 14.6% for deviants. Family factors explain 21.8% of the variance in non-deviants versus 24.6% for deviants. Data shows that school factors are more of an important predictor of test scores for non-deviants and family factors are more important for deviants.

## 5.0 Conclusion

### 5.1 Summary of Results and Hypothesis Comparisons

Among the student role performance hypotheses, hypothesis #1, stated that net of other factors, deviant students will score lower on test scores than non-deviant students. This hypothesis was supported and is aligned with previous research (Liu, Kaplan, and Risser 1992).

As predicted in hypothesis #2, net of other factors, minority students do score lower than non-minority students on tests. This finding is aligned with previous research, which showed that minority students score lower than non-minority students on standardized test scores (Battle and Pastrana 2007; Connor, Poyrazli, Ferrer-Wreder, and Grahame 2004). Among the school factors, hypothesis #3 predicted that net of other factors, private school students will achieve higher test scores than public school students. This hypothesis was supported and is aligned with previous research (Lubienski and Lubienski 2006). Hypothesis #4 predicted that net of other factors, schools with larger percentages of participation in a free lunch program will have lower test scores than other schools. This hypothesis was supported and in line with studies performed by Malecki and Demaray (2006). Within the family model, there was no support found for hypothesis #5. Hypothesis #6 stated that net of other factors, as socio-economic status increases, so do test scores, and this was supported within this research. This is aligned with previous research that states that socio-economic status gives students access to better schools and more resources, which increases test scores (Adams and Singh 1998). In fact, socio-economic status was the largest predictor of variance within test scores. Only one peer model hypothesis was supported, #8, which predicted that net of other factors, students who have a lot of friends who have dropped out will have lower test scores than others. This is aligned with previous research done by Weerman and Bijileveld (2007). There was no support for hypothesis #7.

## 5.2 Limitations

One major limitation of this study is that it uses cross-sectional data which does not allow for the interpretation of recent events. For example, if a student has been through severe family disruption or a recent divorce, the test scores for that student may not have been affected even though the event may have affected the student's role performance categorization in the

database. This limits the actual use of the data because there are many other predictors that could have been a factor in the student's life that were not studied.

Within the variable of handicap were eight different classifications including learning disabilities and various physical disabilities. The fact that these disabilities were not separated out limits the ability to generalize the handicap effect on test scores. For example, it might be that a student who has a learning disability will have lower test scores, but a person who has an orthopedic impairment may have very high test scores.

The dependent variable of test scores is a measure of student ability on math and reading scores, however within this research; the dependent variable was used as a measure of teacher expectations and evaluations. While this does present a limitation to this study, student ability is undoubtedly impacted by past experiences of differential treatment by teachers.

Another limitation of the study is the fact that the variable of deviance was not exhaustively defined. The variable for deviance was described as the student ever getting into trouble at school, however just because a student got into trouble once does not necessarily make him/her a deviant for their entire schooling career. Also, there was no definition of the level of deviance within this study. It is possible that a good student who got into trouble once for running down the halls is coded as a deviant along with the student who was caught stealing from the chemistry teacher. These levels of deviance most likely have an impact on the test scores and were not defined in this study.

### 5.3 Future Research Direction and Policy Implications

This study could influence educational policy in studying what factors contribute to discrepancies within the test scores. If educational credentials are a gateway into college, then there would be some reasonable assumption of the tests being able to predict college

achievement. According to this study, females and minorities already start at a disadvantage in their test scores, yet both females and minorities are represented at the college level. Future research should be done to examine how this discrepancy begins, when it starts, and which factors continue to contribute to it. There may be outreach programs or additional training for teachers that could help to resolve these issues. For example, if it is found that teacher expectations are set lower for females, teacher development and training should include courses and statistics on how expectations should be equal.

Another area for policy implication is in the deviance itself. In this national study there were many types of deviance discussed, and the end effect on test scores was not tremendously high. Further research might continue to show that being deviant does not necessarily mean that a child will score lower on a test. By changing the social perception of deviant students, researchers might find other areas that effect test scores which need development. Further research into these areas is ongoing and will continue to influence educational policy.

Deviance is a factor in predicting low student achievement and government and school officials should be concerned with lowering deviance at schools. Once studies have been done to identify the specific acts of deviance that affect test scores school can put prevention programs into place in order to lower the occurrence of these deviant acts. By lowering deviance at schools there may be many positive effects, such as safer schools, more positive peer influences, and higher achieving students. As a society which places importance on credentials, having higher achieving students will have a large impact on us. By lowering deviance, test scores will increase, more students will acquire credentials, and we will have a more educated society.

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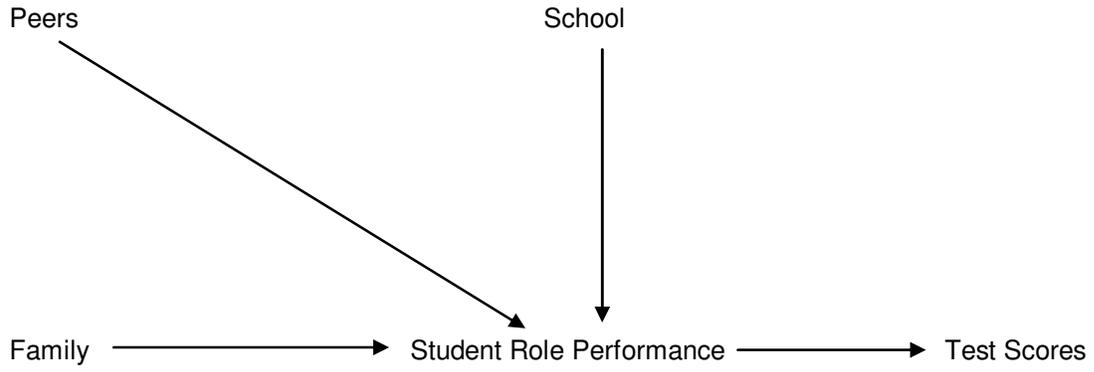
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## APPENDIX

**Figure 1  
Conceptual Model**



(Adapted from Wright, 2008)

**Table 1A**  
**Univariate and Bivariate Analysis**

Variables:	Full Sample	Non-Deviant	1	2	Deviant
<b>Dependent Variable</b>					
Test Scores (mean):	51.12	52.25	***	^	49.54
Test Scores (median):	51.4	52.78			49.6
Test Scores (centile):	51%	54%			46%
(stddev):	(9.46)	(9.36)			(9.37)
<b>Independent Variables:</b>					
<b><i>Student Role Performance:</i></b>					
% Female (0,1)	50.9%	59.2%	***	^	39.5%
	(0.50)	(0.49)			(0.49)
% Minority (0,1)	32.0%	29.7%	***		35.1%
	(0.47)	(0.46)			(0.48)
% Held back a grade (0,1)	12.4%	10.5%	***		15.1%
	(0.33)	(0.31)			(0.36)
% Handicap (0,1)	11.8%	9.7%	***		14.9%
	(0.32)	(0.30)			(0.36)
% Comes to class unprepared (0,1)	33.0%	24.5%	***	^	45.0%
	(0.47)	(0.43)			(0.50)
Number of hours per week spent on homework	5.28	5.63	***	^	4.79
	(4.25)	(4.30)			(4.14)
Number of hours per day spent on tv, computer, or video games	8.26	8.04	***		8.56
	(3.85)	(3.78)			(3.92)
% Parent ever contacted about performance, behavior, or attendance (0,1)	37.6%	26.9%	***	^	52.4%
	(0.48)	(0.44)			(0.50)
Number of hours per week spent on extra-curricular activities	4.80	5.21	***		4.23
	(5.76)	(5.84)			(5.59)

Table continued on next page

**Table 1B**  
**Univariate and Bivariate Analysis**

Variables:	Full Sample	Non-Deviant	<sup>1</sup>	<sup>2</sup>	Deviant
<b>School:</b>					
% Private school (0,1)	8.1%	6.4%	***		10.5%
	(0.27)	(0.25)			(0.31)
Total school enrollment in Oct. 2001	1,454	1,469	*		1,433
	(772.64)	(771.12)			(774.35)
% Students enrolled in free lunch program	23.7%	23.6%			23.9%
	(22.31)	(22.36)			(22.24)
% Students feel safe at school (0,1)	87.8%	89.6%	***		85.1%
	(0.33)	(0.30)			(0.36)
% Participate in AP program (0,1)	18.2%	19.5%	***		16.3%
	(0.39)	(0.40)			(0.37)
<hr style="border-top: 1px dashed black;"/>					
<b>Family:</b>					
SES centile (0-100)	50.64	51.93	***		48.84
	(28.87)	(29.14)			(28.39)
% Two parent families (0,1)	76.5%	78.8%	***		73.4%
	(0.42)	(0.41)			(0.44)
Number of household resources	6.96	7.02	**		6.88
	(2.22)	(2.18)			(2.27)
<hr style="border-top: 1px dashed black;"/>					
<b>Peers:</b>					
% Hangs out with friends more than once per week (0,1)	78.1%	74.0%	***	^	83.9%
	(0.41)	(0.44)			(0.37)
% Has a close friend that has dropped out (0,1)	43.0%	37.9%	***	^	50.2%
	(0.50)	(0.49)			(0.50)
% Academic behavior is important to friends (0,1)	98.2%	98.7%	***		97.6%
	(0.13)	(0.11)			(0.15)
<hr/>					
<b>Sample n (weighted):</b>	10,948	6,373			4,575
	100%	58%			42%

<sup>1</sup> = \*\*\*p<0.001; \*\*p<0.01; \*p<0.05

<sup>2</sup>effect size greater = >.20

**Table 2**  
**OLS Regression Analysis Regressing Predictors onto Test Scores**

Variables:	Full Sample			Non-Deviant			Deviant		
	unstd.	<sup>1</sup> std.	std.	unstd.	<sup>1</sup> std.	<sup>2</sup> std.	unstd.	<sup>1</sup> std.	std.
<b>Student Role Performance Factors:</b>									
Deviant (0,1)	-0.546 ***		-0.028						
Female (0,1)	-1.555 ***		-0.082	-1.824 ***		-0.096 <>	-1.228 ***		-0.064
Minority (0,1)	-4.067 ***		-0.201	-4.427 ***		-0.216 <>	-3.597 ***		-0.183
Held back a grade (0,1)	-4.214 ***		-0.147	-4.656 ***		-0.153 <>	-3.749 ***		-0.143
Handicap (0,1)	-5.722 ***		-0.195	-5.675 ***		-0.179	-5.811 ***		-0.221
Comes to class unprepared (0,1)	-0.871 ***		-0.043	-1.183 ***		-0.054 <>	-0.520 **		-0.028
Number of hours per week spent on homework	0.158 ***		0.071	0.165 ***		0.076	0.147 ***		0.065
Hours of day spent on tv/video games/pc	-0.160 ***		-0.065	-0.183 ***		-0.074	-0.132 ***		-0.055
Parent contacted about beh/perf/attend (0,1)	-2.042 ***		-0.105	-1.946 ***		-0.092	-2.146 ***		-0.114
Hours per week spent on extracurricular activities	0.056 ***		0.034	0.049 **		0.031	0.063 ***		0.038
<b>School Factors:</b>									
Private school (0,1)	0.881 ***		0.025	0.735 *		0.019	1.129 ***		0.037
Total school enrollment in Oct. 2001	0.000		0.009	0.000		0.018	0.000		0.001
Percent of students enrolled in free lunch program	-0.031 ***		-0.072	-0.035 ***		-0.084	-0.023 ***		-0.055
Student feels safe at school (0,1)	2.462 ***		0.085	2.592 ***		0.084	2.401 ***		0.091
Participate in AP program (0,1)	3.673 ***		0.15	3.826 ***		0.162	3.385 ***		0.133
<b>Family Factors:</b>									
SES centile (0-100)	0.128 ***		0.249	0.125 ***		0.251	0.129 ***		0.248
Two parent families (0,1)	0.129		0.006	0.273		0.012	-0.034		-0.002
Number of Household Resources	0.274 ***		0.064	0.210 ***		0.049	0.362 ***		0.088
<b>Peer Factors:</b>									
Hangs out with friends more than once a week (0,1)	-0.874 ***		-0.038	-0.824 ***		-0.039	-0.945 ***		-0.037
Has a close friend who dropped out (0,1)	-1.583 ***		-0.083	-1.690 ***		-0.088	-1.438 ***		-0.077
Academic behavior is important to friends (0,1)	0.577		0.008	0.767		0.009	0.452		0.007
(Constant):	45.871 ***			46.157 ***			44.213 ***		
Adjusted R-sq.	0.527 ***			0.530 ***			0.504 ***		
n=	10,947			6,372			4,575		

<sup>1</sup>\*\*\*p<0.001; \*\*p<0.01; \*p<0.05; ns non-significant

<sup>2</sup>significant difference between non-deviant and deviant at the .05 level or higher

**Figure 2**  
**Shares of Unique Variance Explained**

