IDENTIFYING MIDDLE SCHOOL STUDENTS AT RISK FOR DROPPING OUT OF HIGH SCHOOL

by

Lisa Ellis Logan

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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November 16, 2010

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ABSTRACT

Lisa Ellis Logan. IDENTIFYING MIDDLE SCHOOL STUDENTS AT RISK FOR DROPPING OUT OF HIGH SCHOOL (Under the direction of Lucinda S. Spaulding, Ph.D., Chair) Liberty University, School of Education, September, 2010.

This study examined eighth grade predictor variables for predictive power in identifying students at-risk for dropping out of high school in a northwest Georgia school district. This study involved 340 participants from the 2005/2006 ninth grade class in the selected school district. This quantitative study employed correlation analyses to determine the linear relationship between dropping out of high school and the predictor variables. Logistic regression analysis determined which set of predictor variables best predicted the student outcome. The analysis indicated that years retained, discipline referrals, socioeconomic status, final math grade, CRCT math score, and absences were the most significant predictors of high school end status (dropout or graduate). A regression model using the six variables was able to correctly classify 91.5% of the cases.

DEDICATION

This dissertation is dedicated to my two precious daughters, Sydney and Allie. I love you each very much. I am so proud of both of you. Thank you for your sacrifices during my educational journey. I pray that watching me during this process has taught you that learning is a lifelong endeavor and that you can achieve anything you truly desire.

ACKNOWLEDGEMENTS

First and foremost, I would like to praise God for opening the door to this journey and being my source of strength and endurance throughout. Thank you, gracious Lord.

I have been blessed by many who have supported and encouraged me throughout this process. First, Reverend Bill and Dr. Jo Jackson not only encouraged me to begin this journey, but were constant supporters. My heartfelt thanks to these special people, who listened to me, encouraged me, motivated me, and prayed for me.

I also would like to thank my family for their never ending support. To my sweet girls, Sydney and Allie, who sacrificed time with their mommy, to my husband, Joe Logan, who patiently accepted my time away from the family, to my parents, Don and Linda Ellis, and to my mother-in-law, Mary Logan, who took care of my daughters while I wrote, thank you, and I love you all.

I would also like to thank my friends Beth Davis, Stephanie Henze, Joy Bishop, Kathi Lanford, and Joel Svoboda. They all played integral roles in allowing me to complete this journey. Thank you for your friendship and support.

I am so thankful for my dissertation committee. Thank you, Dr. Lucinda Spaulding for serving as my chair, for guiding me through this process, for encouraging me, and for pushing me to excel. Also, thank you to Dr. Frederick Milacci and Dr. Nancy Prince. You have each been heaven sent blessings. Thank you for being with me every step of the way.

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CHAPTER ONE: INTRODUCTION

The issue of high school dropouts has been one of concern for over four decades (Jerald, 2006; Shannon & Bylsma, 2006). Prior to the 1960s, dropping out of high school was not a cause for worry. Then a paradigm shift occurred, and researchers began to study the dropout issue (Shannon & Bylsma, 2006). Despite numerous studies investigating those who drop out of high school and why, the United States has continued to see a significant portion of its high school population leave before graduation (Rumberger, 2004). According to Smink and Schargel (2004), nearly 3.5 million students enter high school every year. However, over the next four years, a significant percentage of this population drops out of school. One study reported that a student drops out of high school every nine seconds (Hickman, Bartholomew, Mathwig, & Heinrich, 2008). In 2006, 1.2 million students who entered high school as freshmen in 2002 did not graduate four years later (Edwards & Edwards, 2007). Depending on the source, the national graduation rate has been reported as 68% (Bridgeland, Dilulio, & Morison, 2006), 73.2% (Cataldi, Laird, KewalRamani, & Chapman, 2009), and 86.5% (Greene & Winters, 2002).

Moreover, schools are now required by The No Child Left Behind Act (NCLB, 2001) to increase graduation rates. Consequently, it is imperative for schools to identify students who are at risk for dropping out of high school and provide early and continuous intervention.

Background to the Study

In 1983, the United States Department of Education released *A Nation at Risk*, which reported complacency in America's education system, high levels of illiteracy, and a 60% graduation rate (National Commission on Excellence in Education, 1983; United States of Department of Education, 2008). *A Nation at Risk* prompted federal action to study and improve high school graduation rates. The Hawkins-Stafford Elementary and Secondary School Improvement Amendments of 1988 provided provisions that required the National Center for Education Statistics (NCES) to report annual high school dropout data (Seastrom & Chapman, 2006). Furthermore, in 1988 the NCES conducted a longitudinal study of an eighth grade cohort in order to determine the characteristics of students at risk of failing school (National Center for Education Statistics, 1992). In 1990, the National Governor's Association adopted the National Education Goals to be achieved by 2000. The second goal of this initiative was to increase the national high school graduation rate to 90% (Paris, 1994; Vickers, 2007). Further federal legislation (i.e. Improving America's School Act of 1994; Goals 2000: Educate America Act of 1994) required and funded standards-based content and tests in an effort to improve the high school graduation rates in America (United States Department of Education, 2008). In 1998 the Center for Education Reform published a follow-up report, *A Nation Still at Risk.* The report concluded that despite concerted federal initiatives, there was no significant change in the dropout rate (Center for Education Reform, 1998).

The most comprehensive federal school reform has been No Child Left Behind (NCLB, 2001). The goal of NCLB was to require that 100% of students in American schools be academically proficient by the spring of 2014 (Seastrom & Chapman, 2006).

Furthermore, NCLB required schools to achieve Adequate Yearly Progress (AYP) based on a series of indicators that demonstrate student achievement and progress. NCLB was the first federal legislation to incorporate an on-time high school graduation as an accountability requirement for schools and subsequently an academic indicator for AYP (United States Government Accountability Office, 2005). On-time graduation was defined as "the percentage of students who graduate from secondary school with a regular diploma in the standard number of years" (Seastrom & Chapman, 2006, p. 1).

Furthermore, NCLB (2001) required states to develop record keeping data methods to "ensure that the indicators described in those provisions are valid and reliable, and are consistent with relevant, nationally recognized professional and technical standards (Seastrom & Chapman, 2006, p. 1). Necessary records included student grade progression through school, student transfers, and graduation status. When NCLB was authorized, state and local educational agencies were under no federal authority to keep such data. Each agency calculated graduation rates independent of one another. To this day, states and local educational agencies have struggled to create unified systems for data tracking (Seastrom & Chapman, 2006). In fact, Swanson (2003) reported that only 12 states define high school dropout in a manner consistent with definition provided in NCLB.

States were allowed to determine the criteria for measuring progress in regards to graduation rate goals, resulting in little continuity between states. While states such as Georgia set a graduation rate goal of 100% by the year 2014, other states set lower goals such as California with a goal of 82.8% by 2014 (Rumberger & Losen, 2005).

Furthermore, under NCLB, states were allowed to independently determine adequate progress (Rumberger & Losen, 2005); NCLB only required 100% academic proficiency, not a 100% graduation rate (Shannon & Bylsma, 2006). Therefore, California determined that a graduation progress rate of 0.1 % each year would be adequate to meet AYP. On the other hand, Georgia measured AYP on a progress rate of 10% each year. States were also allowed to determine how to calculate the graduation rate. For example, California only counted official dropouts and graduates. Georgia's State Board of Education developed a system of tracking students entering high school as ninth graders and calculating the percentage of those students graduating in four years (Georgia Department of Education, 2007a)

National Graduation Rates

Depending on the research cited, the national dropout rate hovers between a low of 9% (Child Trends Data Bank, 2003) and a high of 50% in major American cities (Grey, 2008). Conversely, depending on the source, the national graduation rate is cited between 68% (Bridgeland et al., 2006) and 86.5% (Greene & Winters, 2002). Bracey (2009) reported similar figures with graduation rates varying between 66% and 88% depending on the calculation method.

Many factors contribute to these discrepancies, suggesting that the accuracy of both rates is in question. Every state and many local educational agencies (LEAs) are allowed to choose their own formulas, definitions, and exemptions (Greene & Winters, 2002). By using different graduation rate formulas and varying operational definitions of dropout, school systems and states have skewed data regarding the high school graduation rate and the dropout rate. Rumberger (1987) observed that "there is no

consensus definition of a high school dropout, nor is there a standard method for computing the dropout rate" (p. 103).

There are several different formulas that can be used to calculate graduation rates. The National Center for Education Statistics (NCES) reported a graduation rate of 86.5% in 2002. However, NCES obtained data from self-reports with no follow-up to determine the accuracy of the participants. This rate also included students who acquired their General Equivalency Diploma (GED) as high school graduates despite NCLB classifying GED recipients as dropouts (Swanson, 2003). Greene and Winters (2002) contended that a GED is not equivalent to a high school diploma; therefore, it should not be included in the high school graduation rate. Greene and Winters attempted to apply a consistent formula to determine the graduation statistics. In doing so, they obtained data from the Core of Common Data, a division of the United States Department of Education. Accounting for population shifts and enrollments in different grade levels, they created an estimate of enrolled students, students who graduated, and those who did not. Using their formula, Greene and Winters determined a less flattering national graduation rate of 69%.

Furthermore, graduation rates fluctuate among states due to variations of operationally defining a high school dropout. For example, Washington state does not report a student as a dropout unless the student completes paperwork officially documenting them as a high school dropout (Greene, 2002). The result was the state reported an 82% graduation rate despite the fact that only 67% of Washington students graduated high school in 2001 (Greene, 2002).

While Texas officials reported a 1% dropout rate in 2001, they neglected to account for students who reported that they were leaving school to pursue a General Equivalency Diploma (GED). They calculated the dropout rate in seventh grade; a time when very few students leave school. Audits revealed that the actual dropout rate was understated by as much as 55% in Texas (Schemo, 2003). As a result, in 2001 Texas reported an 81% graduation rate (Schemo, 2003), while outside sources revealed a 61.9% graduation rate (National Institute on the Education of At-Risk Students [NCHEMS], 2007).

Finally, as systems calculate dropout rates, it is acceptable to exclude entire populations of students such as those receiving special education services, GED students, students who dropped out before entering ninth grade, immigrants, and private school dropouts (Lehr, Clapper, & Thurlow, 2005). Many systems also provide programs that "hide" dropouts from the count by placing them in alternative school programs (Lehr et al., 2005).

Georgia's Graduation Rates

For the past 10 years, Georgia's graduation rate has consistently ranked as one of the lowest in the nation. In 1998, Georgia was 50th in the nation with a graduation rate of 54% (Greene, 2001). Greene and Winters (2002) reported Georgia's graduation rate ranked 49th in the nation in 2000. The *World Almanac Book of Facts 2008* (2008) reported that in 2004 Georgia ranked 48th with a graduation rate of 61.2%. According to the National Center for Higher Education Management Systems (2007), in 2005 Georgia ranked 47th in the country with a graduation rate of 55%.

The Georgia Department of Education (2007a) contradicted the said graduation rates by reporting in its state report card graduation rates of 65.4% in 2004 and 69.4% in 2005. The cause of such discrepancies is variations in formulas that are used by different LEAs. Each LEA in Georgia defines and reports its graduation rate to the Georgia Department of Education. Furthermore, the Georgia Department of Education does not have a consistent statewide measure to determine an accurate graduation rate. Only outside agencies such as the Manhattan Institute for Policy Research (Greene & Winters, 2002) and the National Center for Higher Education Management Systems (2007) calculate a statewide graduation rate using a formula applied uniformly throughout the state (Georgia Department of Education, 2007a).

Selected School District Graduation Rates

While the reported LEA graduation rates have continued to improve as reported in Table 1, high schools in the selected district continue to lag behind state averages. As reported by the LEA, the overall graduation rate for the selected school district in 2009 was 77.4%, which is slightly lower than the reported graduation rate of 78.9% for the state (Georgia Department of Education, 2009). The selected school district is unique in its demographic composition. The district has a 91% Caucasian student population, compared to a 46% state average, and a 14% special population compared to an 11% state average. However, the LEA graduation rate among Caucasian students is significantly lower than the state averages. Even though graduation rates among students receiving special education services in the district surpass state averages, the rates have remained dismally low (Georgia Department of Education, 2009).

Table 1

School District versus State Graduation Rate Data

Measure	County	State
2009 Graduation Rate (all students)	77.4%	78.9%
2008 Graduation Rate (all students)	72.1%	75.4%
2007 Graduation Rate (all students)	69.9%	72.3%
2009 Graduation Rate (Caucasian students)	76.9%	82.7%
2008 Graduation Rate (Caucasian students)	72.4%	80.2%
2007 Graduation Rate (Caucasian students)	70.1%	77.5%
2009 Graduation Rate (Students with disabilities)	44.7%	41.4%
2008 Graduation Rate (Students with disabilities)	43.3%	37.3%
2007 Graduation Rate (Students with disabilities)	27.6%	32.9%

(Georgia Department of Education, 2009)

Statement of Problem

With federal requirements (i.e., NCLB, 2001) to increase graduation rates, school systems must seek ways to identify at-risk students and provide early intervention. Researchers such as Dynarski et al. (2008), Jerald (2006), Rumberger (2001), and Smink and Schargel (2004) recommend that local districts develop diagnostic tools to identify potential dropouts. In following this recommendation, districts need to use data systems to determine which variables have predictive power in determining high school dropouts within the local community (Dynarski et al., 2008; Neild, Balfanz, & Herzog, 2007; Olson, 2006).

A review of the literature reveals that many factors contribute to a student's probability of dropping out of high school; however, few studies have examined the use of these risk factors in developing a predictive model for identifying at-risk students (Gleason & Dynarski, 2002). Based on recommendations to use data from the local

system (Dynarski et al., 2008; Jerald, 2006), predictor variables maintained in the local system's database were used to develop a model for identifying students at risk for dropping out.

Purpose of the Study

The purpose of this study was to develop a predictive model for the selected school district, similar school districts, and districts with individual similar predictive populations (i.e., special education, gifted, and high population of Caucasian students) to identify potential high school dropouts based on eighth grade student data records in a northwest Georgia school district. Many factors were identified as contributing to students dropping out of high school. The identified factors in this study are referred to as predictor variables. For purposes of this study, the predictor variables were (a) Criterion-Referenced Competency Test (CRCT) English scores, (b) CRCT math scores, (c) CRCT reading scores, (d) gender, (e) final course math grade, (f) final course English grade, (g) student status (special education, gifted, none), (h) number of absences, (i) number of discipline referrals, (j) number of times a student has been retained, and (k) enrollment in the free/reduced meals program. The effect of these factors on the criterion variable of high school end status (dropout or graduate) was analyzed using correlation and logistic regression statistics. The intent of this study was to use school-based data for the early identification of students at-risk for dropping out of high school.

Research Questions

The following research questions were addressed in this study:

Research Question 1: What is the nature of the relationship between high school end status (dropout or graduate) and the predictor variables in eighth grade (CRCT

English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

> Null Hypothesis (H_{O1}) for research question 1: There is no statistically significant relationship between high school end status (dropout or graduate) and eighth grade predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program).

Research Question 2: Can high school end status (dropout or graduate) be accurately predicted based on a set of eighth grade predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

> Hypothesis (H_{O2}) for research question 2: High school end status (dropout or graduate) cannot be accurately predicted based on the set of eighth grade predictor variables (CRCT scores in English, reading, and math, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of

discipline referrals, past grade retentions, and enrollment in free/reduced meals program).

Research Question 3: If high school end status (dropout or graduate) can be predicted accurately, which predictor variables offer the most predictive value?

Null Hypothesis (H_{O3}) for research question 3: None of the predictor variables (CRCT scores in English, reading, and math, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, past grade retentions, and enrollment in free/reduced meals program) have a greater capacity for predicting high school end status.

Significance of the Study

High school dropouts encounter life-long disadvantages and are more likely to be on public assistance, become pregnant at a young age, and become single parents (Lamm, Harder, Lamm, Rose, & Rask, 2005; Shannon & Bylsma, 2006). High school dropouts are eight times more likely to be incarcerated and three times more likely to be unemployed, which has a profound economic impact on the individual and the community (Bridgeland et al., 2006; Shannon & Bylsma, 2006). High school dropouts are much less likely to vote or be active in their communities (Bridgeland et al., 2006).

Furthermore, there is a correlation between education level and health. Specifically, people with more education tend to have better health (Bridgeland et al., 2006). Additionally, high school dropouts are more likely to engage in risky behaviors such as substance abuse, early sexual activity, and delinquency. Further, high school

dropouts are also at greater risk for committing suicide when compared to their peers who graduate from high school (Woods, 1995).

High school dropouts also experience numerous financial and employment disadvantages. On average, high school dropouts earn nearly $10,000 less per year than high school graduates (Bridgeland et al., 2006). The average income of high school dropouts has decreased 30% over the last 25 years whereas the average income for college graduates has increased 13%; this trend is projected to only broaden. According to Smink and Schargel (2004), high school dropouts account for 45% of minimum wage earners and experience an unemployment rate 3% higher than high school graduates. Moreover, nearly 40% of high school dropouts are unable to find employment after dropping out of school, leaving them three times more likely to be living in poverty when compared with high school graduates (Smink & Schargel, 2004).

In addition to direct costs, the economic impact of high school dropouts reaches beyond the individual, affecting the community and taxpayers (Smink & Schargel, 2004). The dropout rate can impact the movement of businesses into a community: Areas with higher dropout rates tend to have less new industry. In turn, fewer opportunities for employment negatively affect real estate values. The nation spends approximately 24 billion dollars on welfare and crime-related spending. It is estimated that high school dropouts cost the nation approximately 944 billion dollars of lost revenue including taxes. Furthermore, 82% of America's prisoners are high school dropouts. In 1996, the cost to the American public to fund local, state, and federal prisons was $47,269,959,460 (Smink & Schargel, 2004).

Identifying students at-risk for dropping out of high school is a first step towards reducing the number of high school dropouts and the lifelong consequences of that decision. The intent of this study is to provide a model for the studied district and demographically similar districts to identify potential high school dropouts so that intervention can be provided for at-risk students. Furthermore, the study focused on eighth grade data in an attempt to provide a model for early identification.

Definitions

The definitions provided below are intended to explain terms used in this study.

At-risk Student - An at-risk student is one who is likely to drop out of high school based on risk factors described in the research.

Criterion-Referenced Competency Test (CRCT) - The CRCTs are standardized test used by the state of Georgia to assess academic achievement in math, reading, language arts, science, and social studies.

Criterion Variable - For this study, criterion variable refers to students' end status as a high school dropout or a high school graduate.

Gifted Students - Gifted students are students identified by state testing methods to demonstrate high academic performance, high levels of motivation, exceptional potential, and outstanding creative ability.

High School Dropout - In the state of Georgia, a high school dropout is a student who failed to graduate from an accredited high school. Students who receive a GED are considered to be high dropouts.

Predictor Variables - The predictor variables are factors that potentially contribute to a students' decision to drop out of high school. The predictor variables

in this study are CRCT English scores, CRCT math scores, CRCT reading scores, gender, final course math grade, final course English grade, student status (special education, gifted, none), number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program.

Socioeconomic Status (SES) - SES refers to one's financial resources and is indicated in this study by enrollment in the free/reduced meals program.

Special Education - Special education is a federal program which ensures an appropriate education for students with disabilities.

Student Status - Student status includes additional classifications such as special education or gifted.

Organization of the Study

This study was organized into five chapters beginning with this introductory Chapter One. Chapter Two consists of the historical background, theoretical framework, a review of existing literature on the predictor variables of dropouts, early identification models, and early prevention followed by an explanation of this study's contribution to the research field. The methodology is described in Chapter Three, including a review of the predictor and criterion variables, the research questions and null hypotheses, the research setting and sample, as well as the design of the study and the statistical analyses that were used to analyze the data. Chapter Four presents the results of the study, including correlation analysis of the variables and logistic regression analysis to determine predictive ability of the variables. This study concludes with Chapter Five in

which an overview of the study is provided along with a conclusion and discussion of the results and recommendations.

CHAPTER TWO: REVIEW OF LITERATURE

This chapter consists of a review of the historical background for this problem, a discussion of the theoretical framework guiding this study, and a review of existing literature on the predictor variables, early identification models, and early prevention interventions. It concludes with an explanation of this study's potential contribution to the research field.

Historical Background

Historically, it was quite common for students to drop out before or during high school (Shannon & Bylsma, 2006). The graduation rate in 1900 was only approaching 6.4% (Fine, 1991). A report on high school dropouts in the 1940s discovered a 50% dropout rate among adults aged 25 to 29 (Shannon & Bylsma, 2006). In 1964, the United States Department of Health, Education, and Welfare sponsored a national study involving students (N = 600,000) and teachers (N = 4,000) (Coleman et al., 1966). The study focused on the equal educational opportunities of students from different ethnicities and religions. While the study did not specifically address at-risk students or dropout data, it was the first study to examine the correlation of socioeconomic status and ethnicity to academic achievement. The study revealed that African American students performed significantly lower on standardized achievement test scores than Caucasian students. Furthermore, the study found that African American students from low-income backgrounds performed at a higher academic level when placed in integrated schools (Coleman et al., 1966)

The National Center for Education Statistics (1992) conducted the most comprehensive longitudinal study of students, at-risk characteristics, and factors affecting transition from elementary school to high school then to postsecondary options. The study began with eighth grade students ($N = 25{,}000$) from nearly 1000 schools in the United States, later referred to as the National Education Longitudinal Study of 1988. The study continued through the students tenth grade year in order to examine transition years from elementary/junior high/middle school to high school and twelfth grade to examine transition to postsecondary opportunities. When controlling for demographic factors, the results revealed several factors common to at-risk eighth grade students:

- students from single-parent families, students who were overage for their peer group, or students who had frequently changed schools;
- eighth-grade students whose parents were not actively involved in the student's school, students whose parents never talked to them about school-related matters, or students whose parents held low expectations for their child's future educational attainment;
- students who repeated an earlier grade, students who had histories of poor grades in mathematics and English, or students who did little homework;
- eighth-graders who often came to school unprepared for classwork, students who frequently cut class, or students who were otherwise frequently tardy or absent from school;
- eighth-graders who teachers thought were passive, frequently disruptive, inattentive, or students who teachers thought were underachievers; and

- students from urban schools or from school with large minority populations. (p. vi)

Historically, many factors have been identified with at-risk students. Among the most common factors are demographic, family situations, school environment, and personal academic attributes. Students possessing these risk factors have a greater chance of failing in school and as a consequence dropping out of high school (National Center for Education Statistics, 1992).

Theoretical Models

Because dropping out of high school is a complex process resulting from a multitude of factors, several theoretical models have emerged to explain the phenomenon (Rumberger & Lim 2008). While these models do not vary greatly in predictor variables, the models differ in approach and understanding of underlying causes.

Perspective Model

Rumberger's (1983, 1987, 1995, 2001, 2004, 2008) research on high school dropouts has spanned 25 years. Based on this research, Rumberger (1995, 2001, 2004) developed two theoretical frameworks from two different perspectives of the reasons students drop out of high school. The first framework is based on individual factors and was termed the individual perspective. The individual perspective focuses on student attributes including student achievement, student engagement, and background characteristics. The three dimensions of student achievement are (a) academic achievement in the form of grades and test scores, (b) educational stability in terms of continuous enrollment in the same school, and (c) educational attainment as indicated by years completed in school. Student engagement is more complex as it is reflective of

students' attitudes, behaviors, values, and beliefs towards school. School attendance and student discipline are the most common measures of student engagement (Rumberger, 2001). High absenteeism and misbehavior at school are indicative of students becoming disengaged with school. In addition, Rumberger (2001) recognized background characteristics such as gender, race, ethnicity, language background, and immigration status as important predictor variables as to who drops out of high school.

Rumberger's (1995, 2004) second framework focuses on contextual factors in the student's environment and is termed the institutional perspective. This perspective emphasizes external environment, family background, and school setting that impact the individual. Environmental factors such as peer group, neighborhoods, and employment opportunities can affect the student's decision to leave school. Rumberger (2001) identified poverty stricken neighborhoods as having increased dropout rates. Family factors such as low parental support, parents' educational attainment, single parent families, and low familial socioeconomic status have all been associated with increased risk of dropping out of high school (Rumberger, 2001, 2004). Many school contexts play a strong role in predicting student outcomes. School composition, resources, structure, and policies have been identified as predictor variables for dropout rates (Rumberger, 2001).

Process Model

Finn (1989) offered two models that suggest dropping out of high school is a process beginning in elementary school. The first model, termed frustration-self-esteem model, emphasizes a cyclical process of school failure and misbehavior. The theoretical foundation is that early academic failure leads to low self esteem, which in turn results in

behavior problems. As a result of the cascading effect of early school failure, the student either drops out of school or is removed due to behavioral issues. The frustration-self-esteem model is the foundation for studying delinquency among teenagers (Finn, 1989).

The participation-identification model suggests that the precursor to withdrawing from school is the lack of involvement in school. The lack of participation leads to low academic performance, less identification with school, and behavioral and emotional withdrawal from school. Students who fail to connect with the school, participate in extracurricular activities, or engage in learning activities are more likely to reject school and dropout (Finn, 1989).

Theory Model

Battin-Pearson et al. (2000) identified five primary theories: (a) academic mediation theory, (b) general deviance theory, (c) deviant affiliation theory, (d) poor family socialization theory, and (e) structural strains theory. Evidence is well documented to support that poor academic achievement is a major factor contributing to dropping out of high school (Hammond, Linton, Smink, & Drew, 2007; Janosz, LeBlanc, Boulerice, & Tremblay, 1997; Jimerson, Anderson, & Whipple, 2002; Pallas 1987; Stroup & Robbins, 1972; Woods 1995). However, the academic mediation theory suggests that academic progress is a mediating factor contributing to the other factors and is a powerful predictor of other predictor variables. In a longitudinal study of 808 students from a Seattle elementary school, Battin-Pearson et al. found statistical evidence to support the notion that academic achievement was a mediating factor with other factors including general deviance, low parent expectations, ethnicity, gender, socioeconomic status, and antisocial behaviors.

The general deviant theory and deviant affiliation theory are based on the premise that deviant behavior and association with deviant peers are predictive of dropping out of high school (Battin-Pearson et al., 2000). General deviant behaviors include delinquency, drug use, cigarette use, early sexual activity, and teen pregnancy. All factors have been found to be predictive of dropping out of high school. Involvement in general deviant behavior is a strong predictor of dropping out of high school. There is less research to support the deviant affiliation theory. High school dropouts tend to have associations with deviant friends, antisocial peers, as well as other dropouts. Research supports the notion that peers strongly influence the academic achievement of one another (Battin-Pearson et al., 2000). The impact of social relationships may influence one's decision to drop out of high school. Except association with deviant friends, these predictors are strongest when coupled with academic achievement. Association with deviant friends was a strong predictor of dropping out of high school regardless of academic achievement (Battin-Pearson et al., 2000).

The poor family socialization theory and structural strains theory link family and demographic factors to the likelihood of dropping out of high school (Battin-Pearson et al., 2000). Poor family socialization includes factors such as low parental academic expectations and lack of parental education. Independent of academic achievement, this theory does not account for a significant number of high school dropouts. However, when coupled with poor academic achievement, family socialization factors are strong predictive factors for dropping out of high school. Structural strains theory asserts that demographic factors are strong predictors of dropping out of high school. Of the demographic factors, low socioeconomic status significantly results in students dropping

out of school regardless of academic achievement. Other demographic factors, such as ethnicity and gender, were mediating factors with academic achievement and did not stand alone in contributing to dropping out of high school.

Typological Model

While recognizing there are different reasons students drop out of school, the typological approach recognizes that different types of students drop out of high school. Based on two samples, one from a 1974 cohort (N = 791) and the other a 1985 cohort (N = 797) of Montreal area high school students, Janosz, Le Blanc, Boulerice, and Tremblay (2000) identified four types of dropouts: (a) quiet dropouts, (b) disengaged dropouts, (c) low-achiever dropouts, and (d) maladjusted dropouts. Quiet dropouts accounted for 38% (n = 63) to 41% (n = 124) of the dropouts in the study. They were characterized by acceptable school behavior and school attendance, a moderate level of educational commitment, and an overall positive school profile. Disengaged dropouts accounted for the smallest portion of dropouts ranging from 6.6% (n = 20) to 10.9% (n = 18). Disengaged dropouts exhibited low to average school misbehavior, average academic performance, and a low commitment level to school. Low-achiever dropouts possessed a weak commitment to school, low to average school misbehavior, and extremely low academic performance. Low-achievers accounted for 8.3% (n = 23) to 14.5% (n = 21) of the high school dropouts. Finally, the maladjusted dropouts were recognized by their high level of school misbehavior, low level of commitment to school, and low academic performance. From Janosz et al.'s study, 38.6% (n = 64) to 43.9% (n = 132) of high school dropouts fell in the maladjusted typology.

Theoretical Foundation

Several theoretical models have emerged in an attempt to understand who drops out of high school and why they choose this path. The diversity of theoretical models results from the fact that there is no single reason students decide to drop out of high school (Rumberger & Lim, 2008). The path to dropping out of high school is a complex process. Through a review of 203 peer reviewed studies, Rumberger and Lim (2008) identified numerous approaches to the issue and analyses of many different predictor variables. Rumberger (1987, 1995, 2004) recommends a comprehensive approach to addressing dropout factors. Within in a comprehensive approach, studies acknowledge that students drop out of school for a myriad of reasons. Determining the strongest set of predictor variables is vital to providing prevention and intervention (Hammond et al., 2007; Rumberger, 2004; Smink & Schargel, 2004; Stanley & Plucker, 2008).

The intent of this study was to utilize predictor variables that are student factors and available in a school database. Therefore, the study primarily focused on predictor variables relating to Rumberger's (2001) framework of individual perspective. The individual perspective addresses at-risk domains that are highly correlated to risk of dropping out (e.g., student achievement, student engagement, and demographic characteristics) (Battin-Pearson et al., 2000; Janosz, LeBlanc, Boulerice, & Tremblay, 2000; Rumberger, 2001). Variables associated with these domains include variables addressed in all of the aforementioned theoretical models including course grades, grade retention, behavior, attendance, and socioeconomic status.

Predictor Variables

Prior research attempts to study single risk factors related to dropping out of high school has failed to encapsulate the scope of the problem (Prevatt & Kelly, 2003). While one study asserted that at-risk factors and dropping out of high school were purely correlational (Dalton, Glennie, Ingels, & Wirt, 2009), another study criticized the body of research which largely ignored causal events that led to dropping out of high school (Prevatt & Kelly, 2003). More than 100 variables have been found to correlate with dropping out of high school, with a focus on (a) demographic characteristics, (b) family related factors, (c) past school performance, (d) student engagement, (e) adult responsibilities, and (e) school and neighborhood characteristics (Balfanz, 2007; Cairns, Cairns, & Neckerman, 1989; Gleason & Dynarski, 2002; Hammond et al., 2007; Rumberger & Lim, 2008).

Demographic Characteristics

Significant risk factors for high school dropouts include ethnicity, race, and gender. Several studies note that African American and Hispanic students are more likely to dropout than Caucasian students (Gleason & Dynarski, 2002; Laird, Kienzl, DeBell, & Chapman, 2007). In 2005, of all high school dropouts aged 16 to 24, 41.3% were Hispanic, 39.3% were Caucasian, 16.7% were African-American, and 1.2% were Asian (Laird et al., 2007). When the overall percentage of each race was accounted for in the general population, Hispanics and African-Americans accounted for disproportionate percentages of the high school dropouts. Smink and Schargel (2004) reported an annual dropout rate of 28% for Hispanic students, 13% for African Americans students, and 7% for Caucasian students. When accounting for the Hispanic dropout population, 29.1%

were foreign born, and 38.7% were children of foreign born parents. Furthermore, 58.1% of the Hispanic dropout population were male, and 41.9% were female (Child Trends Data Bank, 2003).

Compounding the problem for Hispanic students was that a disproportionate number of Hispanic students also fell into other at-risk categories. Hispanic students had the highest rate of absenteeism with over a third missing more than three days per month. An estimated 28% of Hispanic students lived in poverty. Hispanic teenage females had the highest teen pregnancy rate, and 65% of Hispanic students attended urban schools (Smink & Schargel, 2004).

Furthermore, evidence indicated that students whose primary language was not English also had higher dropout rates. Smink and Schargel (2004) found that for students who had difficulty speaking English, the dropout rate was 44% in 1997 compared to 12% for those who spoke English proficiently. Further, the dropout rate for non-English speaking Hispanic students was four times higher than English speaking Hispanic students (Smink & Schargel, 2004).

Most studies suggest that males tend to drop out at a higher rate than females. However, there are studies indicating that this tendency is only evident when analyzing entire sets of data. In a national sample ($N = 2200$) based on United States Census data of people aged 16 to 24, Rumberger (1987) reported that 16% of males were dropouts compared to 12% of females. A similar study involving a cohort of Chicago students ($N = 917$) revealed that the dropout rate for males was 57% ($n = 255$) and 45% ($n = 211$) for females (Ensminger & Slusarcick, 1992). Using data obtained from the October, 2005 Current Population Survey ($N = 50{,}000$), the Common Core of Data, and the annual GED

Testing Services statistical report, Laird, Kienzl, DeBell, and Chapman (2007) determined the dropout rate in 2005 for males to be 4.2% and females to be 3.4%. Furthermore, Laird et al. found 56.3% of high school dropouts aged 15-24 were males and 43.7% were females. Using logistic regression analysis to analyze data from 6762 participants from the Panel Study of Income Dynamics (PSID), Crowder and South (2003) found that females only had a slightly lower dropout rate (49%) when analyzing the entire sample or as a subset of Caucasian students. When analyzing data from a subset of African American students, females were more likely to drop out (52%). Lichter, Cornwell, and Eggebeen (1993) found similar results from data in the March Supplement of the 1990 Population Census Survey of people aged 16 to 24 (N = 19,748). Based on multiple logistic regression analysis, females had lower dropout rates when analyzing data as an entire sample. However, when analyzed as a rural subset, females had higher dropout rates.

Family Related Factors

Family related factors such as socioeconomic status and parental characteristics are also highly predictive variables for identifying high school dropouts. In a study by the United States Department of Education examining national dropout rates from 1972 to 2000, Kaufman, Alt, and Chapman (2001) documented the dropout rates by family income level over the 28 year period. Kaufman et al. found that students from high family incomes had the lowest dropout rate, fluctuating slightly between 1.0% (in 1991) and 2.7% (in 1998). However, the dropout rate for students from low income families fluctuated between 9.5% (in 1990) and 17.4% (in 1978). Smink and Schargel's (2004) findings affirmed the correlation between income level and leaving school, reporting a

dropout rate three times greater for children of poverty. The figure was even more dramatic for females from the lowest socioeconomic homes, having a dropout rate five times greater than females in the highest socioeconomic homes. Males from the lowest socioeconomic strata were two and a half times more likely to drop out than males from more affluent homes. More recently, Laird et al. (2007) determined that the dropout rate for students from the lowest socioeconomic status was six times greater than high income families. In collaboration with Communities in Schools and the National Dropout Prevention Center/Network, Hammond, Linton, Smink, and Drew (2007) reviewed 3400 studies on high school dropouts in an attempt to determine the risk factors and conditions under which students drop out of high school. This extensive review revealed that 83.3% of the studies referred to low socioeconomic status as a valuable predictor of dropout status.

Woods (1995) found that poverty was the strongest non-school related predictor of dropping out of high school. In fact, this factor was so crucial that it blurred the impact of every other risk factor. Woods also found family life had a significant impact on high school dropouts. In addition to socioeconomic status, stress in the home, family support systems, single-parent families, minimally educated parents, and whether siblings completed high school also impacted the dropout rate. Students were less likely to graduate from high school if one or both of their parents had dropped out of school (Lamm et al., 2005).

Jerald (2006) also identified the following factors negatively influenced at-risk students: (a) single parent homes, (b) mother who dropped out of school, (c) lack of parental support, and (d) parents who do not know their child's friends' parents.

Examining 808 participants, Battin-Pearson et al. (2000) found family strains did not account for a significant number of dropouts when examined independently of academic achievement. However, when coupled with poor academic achievement, family socialization factors were strong predictive factors for dropping out of high school.

Past School Performance

Several studies suggest that the strongest predictor of leaving school is poor academic performance (Janosz et al., 1997; Jimerson et al., 2002; Stroup & Robbins, 1972; Woods, 1995). In their review of 3400 studies, Hammond et al. (2007) found that 100% of the articles cited low academic achievement as a dropout risk factor. Pallas (1987) concluded that low academic achievement was the strongest predictor of who drops out of school. Factors associated with poor academic achievement included low grades, low test scores, placement on nonacademic track, overage for grade level, grade retention, and disciplinary issues.

Grade retention and the consequence of being overage are among the strongest predictors of dropping out of high school (Cairns et al., 1989; Montes & Lehmann, 2004). Nine out of ten high school dropouts had been retained at least one year (Slavin & Madden, 1989). Slavin and Madden (1989) supported this idea, reporting that not only did grade retention not improve academic achievement, but one grade retention increased the risk of dropping out by nearly 50%, and repeating more than one grade increased one's chance to 90%. Montes and Lehmann (2004) posited that grade retention warranted being singled out due to its strong predictive power. Repeating one grade doubled the chance of a student dropping out of school, and repeating more than one grade raised the risk four times (Woods, 1995).

More specifically, Jimerson, Anderson, and Whipple (2002) evaluated 17 research articles spanning nearly three decades (1972-1999) and found that grade retention was the most powerful predictor of dropping out of high school, followed by attendance and changing schools frequently. Further, grade retention was equally predictable regardless of socioeconomic status. Students who were retained in kindergarten through fourth grade were five times more likely to drop out of school whereas a student who repeated a later grade was 11 times more likely to drop out.

In a longitudinal study of 475 seventh grade participants, Cairns, Cairns, and Neckerman, (1989) examined the predictive value of aggression risk, socioeconomic status, grade retention, race, and academic ratings on high school outcome. Based on grade retention, Caucasian females had the highest dropout rate among students who had repeated one grade. For those who had repeated two or more grades the dropout rate was 67% (n = 4) for Caucasian females and 100% (n = 3) for African American females. However, Caucasian males accounted for the largest dropout group among those who had not repeated a grade. Finally, by seventh grade, retention was predictive among all groups for dropping out of high school (Cairns et al., 1989).

Academic performance is also reflected in grades and test scores. In two different surveys, regardless of demographic factors, failing school was the most cited reason for leaving school (Jerald, 2006). Barrington and Hendricks (2001) identified the typical dropout as a student who exhibited poor academic achievement throughout their education. By third grade, they had below average test scores and test scores below their known ability; this declining trend continued through elementary school. By the time the typical dropout was in seventh grade, they were considered an underachiever by any

standards, had poor attendance, and failing grades. Jerald (2006) noted that poor academic performance continued through ninth grade and until the student dropped out of school. One significant difference between early dropouts and later dropouts was elementary school grades. Students who dropped out early had poor elementary grades; however, those who dropped out later had elementary grades comparable to those in the lowest quartile of the graduating class (Jerald, 2006).

Course failures and timing of the failures also impact student outcomes (Silver, Saunders, & Zarate, 2008). Findings with ninth grade students (N = 48,561) in the Los Angeles Unified School District suggested that failing courses in middle or high school significantly lessens a student's chances of graduating (Silver et al., 2008). Students who failed one course in middle school had less than a 50% graduation rate. On average, middle school students who dropped out in high school failed four times more courses than those who graduated. Silver, Saunders, and Zarate (2008) also reported that students who failed one high school course had a 64% graduation rate, and for every subsequent course failure, the graduation rate dropped 10%.

Timing of course failure also appears to be significant in predicting student outcome (Silver et al., 2008). Students who failed courses in sixth and seventh grades but passed all courses in eighth grade had higher graduation rates than those who failed courses in eighth grade. Students who failed courses every year during middle school had less than a 20% graduation rate (Silver et al., 2008).

Grades in the freshman year of high school are also a critical predictor of graduating (Allensworth & Easton, 2007; Rumberger & Arellano, 2007). Based on a sample of 1,343 California sophomores, 26% were deemed at-risk by having a low grade

point average (GPA) in ninth grade, and 7% were at-risk by being retained in the ninth grade. Compared to an 89% graduation rate for students not at-risk, the graduation rate of students with a low ninth grade GPA was 64%, and the graduation rate for those who were retained in ninth grade was 34%. Research conducted by the Consortium on Chicago School Research (Allensworth & Easton, 2007) in 2004-2005 found that among 24,894 ninth graders in Chicago public schools, 95% of students who had a B average at the end of their freshman year graduated in four years. In contrast, students who concluded their freshman year with a C average were more likely to drop out than graduate. The graduation rate for students who had an F average at the end of ninth grade had a 1% graduation rate (Allensworth & Easton, 2007).

Test scores also reflect poor academic performance and an increased risk for dropping out of high school. Hickman, Bartholomew, Mathwig, and Heinrich (2008) found that reading scores in kindergarten were significantly lower for high school dropouts. In fourth and sixth grades, Stanford Achievement Tests reading scores were significantly lower (Lamm et al., 2005). Furthermore, Lamm, Harder, Lamm, Rose, and Rask (2005) reported that students who scored greater than 65% on standardized math and science tests had a 95% graduation rate. Contrary to other studies, Balfanz, Herzog, and Ivers (2007) found that fifth grade standardized test scores were not highly predictive of dropping out of high school. Standardized test scores were only predictive for the lowest 10th percentile. In an analysis of 203 peer-reviewed published research articles, Rumberger and Lim (2008) found course grades to be a more consistent predictor than test scores. Whereas test scores tend to reflect student ability on a given day, grades are

more reflective of effort and ability over an extended period of time (Rumberger & Lim, 2008).

Using a sample of students (N = 12,729) from the National Educational Longitudinal Study of 1988 (NELS:88), Reardon and Galindo (2002) examined the relationship between dropout rate and eighth grade achievement test requirements in math and reading. The findings suggested that eighth grade achievement test requirements increased the dropout rate among students in urban schools, students in high poverty schools, and minority students. The value of eighth grade achievement test scores as predictor variables for dropout rates was strongest among students who scored two standard deviations below the mean (Reardon & Galindo, 2002).

Student Engagement

Success in school has been strongly linked to engagement in school (Rumberger & Lim 2008). Students reflect educational engagement through their academic efforts, behaviors, and more informal aspects of school such as peer relationships and school involvement (Rumberger, 2001). Disengagement from school leads to absenteeism, poor academic performance, and classroom behavioral issues. Disengagement with the education process was identified in multiple studies as a risk factor for dropping out of high school. Two separate surveys revealed that students who did not like school were more likely to drop out (Jerald, 2006). Jordon, Lara, and McPartland (1999) administered a list of 21 reasons for dropping out of school to 1000 high school dropouts and asked the participants to select all reasons that applied. Jordon et al. found that 51% of survey respondents listed dropping out of school because they did not like school. This is compared to only 44% who said they dropped out of school because they were

failing. Another survey using a national sample (N = 2308) found that of students who considered dropping out, 76% stated school was boring and 42% stated they were not learning much (MetLife, 2002).

Research also suggests that disengagement with school results when students fail to form meaningful peer relationships in school (Ellenbogen & Chamberland, 1997; Yazzi-Mintz, 2007). Relationships are central to the concept of engagement inside and outside the school context (Yazzi-Mintz, 2007). Within the context of school, engagement occurs at many levels including the school community, school personnel and students, the school structure, and opportunities available at school. In 2006, the High School Survey of Student Engagement was administered to 81,499 high school students from 110 different high schools in 26 states (Yazzie-Mintz, 2007). The results indicated that social aspects of school were a primary motivating force for school engagement. When asked "Why do you go to school?" 73% of students responded, "I want to get a degree and go to college" (p. 4); 68% also responded, "because of my friends" (p. 4). However, 67% reported being bored in school while only 2% reported never being bored. These alarming results are primary causes of disengagement, which is demonstrated to be a primary cause of dropping out of high school (Yazzi-Mintz, 2007).

Ellenbogen and Chamberland (1997) surveyed 234 students in order to examine the relationship between high school students at-risk for dropping out and friendships. Ellenbogen and Chamberland found that friendships tended to affect at-risk students. Overall, at-risk students did not have fewer friends, but they tended to have more friends of the opposite sex, have more friends who were high school dropouts, and have fewer friends at school. Furthermore, Bear, Kortering and Braziel (2006) interviewed 52

participants with mild learning disabilities. The interview questions addressed best and worst parts of school and advantages and disadvantages of school. According to the students, the best part of school was socializing and specific classes. The worst part of school was certain classes, teachers' attitudes, and schoolwork. These findings suggested that students who are connected to school socially are more likely to be connected to school academically.

Extracurricular activities also tend to reflect a level of engagement in school. In a longitudinal study examining the correlation between involvement in extracurricular activities and dropping out of high school, Mahoney and Cairns (1997) conducted annual interviews with students ($N = 392$) in seventh through twelfth grade. They completed the Interpersonal Competence Scale (ICS) to assess academic competence and utilized yearbooks to identify involvement in extracurricular activities. For students who were already at-risk, involvement in extracurricular activities was correlated to lower dropout rates. However, there was no significant relationship established between extracurricular activities and dropout rate for students who did not possess other at-risk characteristics (Mahoney & Cairns, 1997).

According to McNeal (1995), the type of extracurricular activity was significant. In a study based on data collected in 1980 by the National Center for Educational Statistics, McNeal examined the correlation between at-risk students ($N = 14,249$) participation in extracurricular activities and dropping out of high school. At-risk students who participated in athletics were 1.7 times less likely to drop out, and at-risk students who participated in fine arts related activities were 1.2 times less likely to drop

out. However, participation in academic or vocational clubs had no statistically significant effect on the dropout rate.

Absenteeism is a general indicator of disengagement from school (Rumberger & Lim 2008; Silver et al., 2008). Allensworth and Easton (2007) found that ninth grade attendance rates were eight times more reliable than eighth grade standardized test scores at predicting whether a student will graduate. Nearly 87% of students who missed less than one week of school their freshman year graduated in four years, whereas students who missed more than two weeks of school had a 41% graduation rate.

Middle school absenteeism is also a strong predictor of high school outcome (Silver et al., 2008). Based on their study of 48,561 ninth graders, Silver et al. (2008) reported that students who dropped out of high school had an absentee rate twice that of high school graduates. While students with less than five absences in seventh, eighth, or ninth grades had a graduation rate of 69%, students with an average of 10 to 20 absences per year experienced a 40% graduation rate. For students with more than 21 absences per year, the graduation rate fell to between 17% and 24%. These findings are supported by Balfanz (2007), who studied four cohorts of Philadelphia 6th graders and found an attendance rate of less than 80% to be one of the four most powerful predictors of dropping out of school. At least 75% of the students with attendance rates below 80% did not graduate.

Deviant behavior at school also reflects low levels of student engagement and is a strong predictor variable for dropping out of high school (Balfanz, Herzog, & Ivers, 2007; Battin-Pearon et al., 2000; Newcomb et al., 2002; Rumberger & Lim, 2008; Suh & Suh, 2007). Synthesizing finding from 49 studies, Rumberger and Lim (2008) found that

29 of the studies suggested that general deviance was a strong predictor of high school outcome. Balfanz et al. (2007) identified school misbehavior to be one of four strongest sixth grade predictor variables; whereas, Suh and Suh (2007) identified school behavioral issues as one of three strongest predictor variables for 12 to 16 year olds for predicting high school outcomes. Furthermore, Battin-Pearson et al. (2000) described general deviance as any misbehavior including delinquency, drug use, cigarette use, early sexual activity, and teen pregnancy. As a construct, Battin-Pearson et al. found general deviance to be predictive of school outcome.

Newcomb et al. (2002) studied data from 808 students from the Seattle Social Development Project. Controlling for academic achievement and demographic characteristics, the data suggested that deviant behavior before the age of 14 was a statistically significant predictor variable for dropping out of high school by the age of 16. The broad category of deviant behavior in Newcomb et al.'s study included school misbehavior, early sexual activity, substance abuse, and delinquency (outside of school misbehavior); however, combining the specific types of deviance into a broad category of general deviance was a stronger predictor than any single category of deviance.

Fagan and Pabon (1990) studied six inner city neighborhoods utilizing cluster samples of 250 youth from schools in each neighborhood and nonrandom participants based on referral (N = 2,467). Using self report surveys and multiple regression analysis to determine relationship between high school outcome and the predictor variables, only 16.1% of male high school students were found to be multiple delinquency offenders, compared to 42.1% of male high school dropouts. However, the difference between female high school students (8.4%) and female dropouts (10%) who were multiple

delinquency offenders was not statistically significant. When examining substance abuse, the significance became more evident for both genders. Of male students, 21.06% reported substance abuse compared to 77.45% of male dropouts. For female students, the substance abuse rate was 17.38%; however, the abuse rate was 31% for female dropouts.

Student Status

Student statuses, such as students with disabilities and giftedness, have seldom been the focus of dropout studies (Kemp, 2006; Renzulli & Park, 2002; Reschly & Christenson, 2006; Wagner, 1991; Wagner, 1993; Zabloski, 2010). In a review of 259 studies, Prevatt and Kelly (2003) identified only 18 studies that addressed students with disabilities and no studies that addressed giftedness. Rumberger and Lim (2008) had similar results: Only 7 of 203 journal published studies included populations of students with disabilities and none of gifted students. Wagner (1991) contended that one reason for the lack of study is the conception that such "programs are assumed to provide individualized services that should ameliorate whatever risk of dropping out these students might experience" (p. 2). However, existing research suggests that students from the gifted population as well as students with disabilities constitute a significant portion of the high school dropout numbers (Wagner, 1993).

There is conflicting research regarding the dropout rate of gifted students. Renzulli and Park (2000, 2002) analyzed data from the NELS: 88 in which students, parents, administrators, and teachers completed three follow-up questionnaires over four years. Furthermore, Renzulli and Park interviewed students classified as gifted dropouts from the NELS: 88. Students classified as gifted in the NELS:88 had participated in the school's gifted program. Renzulli and Park's study suggested a 20% dropout rate among

gifted students. Overall, the demographic characteristics of gifted dropouts closely resembled that of dropouts from general populations. In both populations, dropouts tended to be of minority status, low socioeconomic status, and have undereducated parents. To the contrary, Hansen and Johnston-Toso (2007) surveyed a sample ($N = 14$) over one year using a Leaving School Questionnaire and suggested that gifted students tended to be Caucasian, male, and of middle to high socioeconomic status. Further conflicting findings are reported by Matthews (2006). Matthews reported a 0.48% dropout rate among gifted students ($N = 7916$). Unlike Renzulli and Park's national sample, Matthews' sample was taken from the Duke University Talent Identification Program. In order to participate in this program, students had to provide documentation of 95th percentile grade level academic achievement.

Students with disabilities are typically served by special education programs; as a result, there is an assumption that these students receive the individualized attention necessary to ensure high school graduation (Wagner, 1991). However, students with disabilities face challenges in school that place them at an increased risk for dropping out (Bear, Kortering, & Brazial, 2006; Dunn, Chambers, & Rabren, 2004; Kemp, 2006; Wagner, 1991; Wagner, 1993). For example, students with learning disabilities (LD) tend to not only have low academic achievement but also high incidences of behavioral problems (Bear et al., 2006; Kemp, 2006; Reschly & Christenson, 2006). Students who have emotional or behavioral disorders (EBD) also exhibit deviant behavior (Reschly & Christonsen, 2006). As noted by Janosz, LeBlanc, Boulerice, and Tremblay (1997), Jimerson et al. (2002), Stroup and Robbins (1972), and Woods (1995), poor academic achievement is one of the strongest predictors of dropping out of high school.

Furthermore, many studies have suggested the strong predictive power of deviant behavior in identifying potential high school dropouts (Balfanz et al., 2007; Battin-Pearon et al., 2000; Newcomb et al., 2002; Rumberger & Lim, 2008; Suh & Suh, 2007).

Wagner (1991, 1993) was one of the first researchers to study dropout tendencies of students with disabilities. In 1987, Wagner (1991) conducted phone interviews with parents of students with disabilities ($N = 8184$) as a part of the National Longitudinal Transition Study of Special Education Students (NLTS). The results indicated that 32.5% of students with disabilities who entered ninth grade dropped out of high school (Wagner, 1991). An additional 8% of students with disabilities dropped out before entering ninth grade (Wagner, 1993). Of the dropouts with disabilities, bivariate analyses indicated no significant difference between gender, ethnicity, and dropping out (Wagner, 1991). However, Wagner found a significantly higher dropout rate of students with disabilities from lower socioeconomic statuses (11% versus 6%) and overage students with disabilities (11% versus 5%).

Studies have also revealed significant dropout rate differences among the categories of disabilities (Dunn et al., 2004; Wagner, 1993). Wagner (1993) reported the dropout rate for all eleven federally recognized special education disability categories. The lowest dropout rates were among deaf students (11.3%), visually impaired students (12.1%), and orthopedically impaired students (13.5%). The highest dropout rates were among learning students with disabilities (28.5%), students with intellectual disabilities (29.9%), and students with emotional disturbances (48.1%). The *23rd Annual Report to Congress* (United States Department of Education, 2002) reported that mild disabilities,

such as LD (27.1%) and EBD (50.6%), tended to have higher dropout rates than more severe disabilities such as visual impairment (11.8%) and autism (9.5%).

Reschly and Christenson (2006) studied the predictive power of at-risk variables among students with LD and EBD. For students with EBD, the strongest predictor variable was grade retention (73%). Adding misbehavior as a second variable increased the correct identification of dropouts to 83%. Among students with LD, the strongest predictor was a composite of grade retention, low socioeconomic status, and math and reading standardized test scores. These four variables correctly identified 77% of dropouts with LD (Reschly & Christenson, 2006). For both—students with LD and EBD—missing more than 10 days of school increased the probability of dropping out of school (22% for students with EBD and 45% for students with LD) (Reschly & Christenson, 2006).

Adult Responsibilities

Two primarily adult responsibilities emerged in the literature as contributing to the high school dropout rate: becoming a parent and employment. In a review of 3400 studies on high school dropouts, 25% of the articles listed parenthood as a risk factor (Hammond et al., 2007). The National Campaign to Prevent Teen Pregnancy (2002) reported that 41% of females who had children before the age of 18 never graduated from high school. Furthermore, children of teen parents were 50% more likely to repeat a grade and were less likely to graduate from high school. Similarly, Gleason and Dynarski (2002) and Cairns et al. (1989) listed parenthood as increasing the chances of dropping out of high school. When Suh, Suh, and Houston (2007) studied the risk factors identified with three categories of dropouts, sexual activity at age 15 or younger was one

of only four factors that crossed all categories. Smink and Schargel (2004) noted that Hispanic teenagers had the highest teen birth rate. This was a possible factor contributing to the elevated dropout rate for Hispanic students.

A second factor associated with adult responsibilities is a student's employment. Not only does the number of hours worked per week affect the dropout rate, but the type of work also contributes. Working more the 20 hours per week significantly increases one's chances of dropping out of high school (Gleason & Dynarksi, 2002; McNeal, 1997; Pallas, 1984).

McNeal (1997) conducted a study using a national cluster-probability sample (N = 20,493) to determine the role of employment in dropping out of high school. Occupations were divided into eight types of categories including non-worker, manufacturing, retail, service, farming, lawn care, babysitting, and other. Results indicated that 59.1% of the sample was employed. Using logistic regression analysis, McNeal concluded that students chose employment over school for many reasons such as financial burdens, family responsibilities, and to gain adult status. Significance was also found in the type of employment; as the intensity of the job increased, so did the likelihood of dropping out of school. Jobs in service, manufacturing, and farming fields were associated with higher dropout rates than job such as babysitting and lawn care. Males tended to hold a larger percentage of the manufacturing and farming jobs.

School and Neighborhood Characteristics

School location appears to also play a role in the high school dropout rate, with Southern states consistently ranking lower than the rest of the country in high school graduation rates (Greene & Winters, 2002). In 2004, six of the eight lowest state

graduation rates were in the South, with New York being the only Northern state in the bottom 20% (The World Almanac Book of Facts 2008, 2008). Students of all races in Southern states had lower graduation rates than students in other regions of the country in 2004. For example, in 2000 Florida had the lowest graduation rate (60%) among Caucasian students followed by Georgia (63%) and Tennessee (63%). Mississippi had the lowest graduation rate (23%) for Hispanic students followed by Florida (48%) (Greene & Winters, 2002).

Furthermore, the high school dropout rate is much higher in major cities than in suburban districts (Gleason & Dynarski, 2002). Based on statistics from the federal Department of Education, in 2004 Georgia's graduation rate in suburban districts was 61.8%. In contrast, the graduation rate in Atlanta was only 46.1%. The discrepancy has been even greater in areas, such as New York, where in 2004 the graduation rate in New York City was only 47.9% but in suburban regions was 82.9% (Grey, 2008).

The Alliance for Excellent Education (2009) described "dropout factories," which are high schools with greater than a 50% dropout rate. There are nearly 2000 high schools identified as dropout factories across America, accounting for about 12% of all high schools (The Alliance for Excellent Education, 2009). Most dropout factories were found in large Northern and Western cities and the Southern states including Georgia. All dropout factories had high minority populations, which has been identified as a risk factor by itself (Study Ranks, 2007). Nearly 50% of African American students, 40% of Hispanic students, and a mere 11% of Caucasian students attend the "dropout factories" (Balfanz & Letgers, 2004).

Exacerbating the problem is a host of other damaging factors. Pascopella (2003) found that teachers in the dropout factories were not only underpaid, but they were also much less experienced than the average teacher. The schools tended to be in poorer neighborhoods; therefore, the schools had less money, fewer resources, and less educated parents. High school dropouts from these dropout factories accounted for 69% of all African American dropouts, 63% of all Hispanic dropouts, and only 30% of Caucasian dropouts in America (Pascopella, 2003).

Christle, Jolivette, and Nelson (2007) studied 196 high schools in Kentucky comparing high schools with the highest dropout rates to those with the lowest dropout rates. In a correlation analysis, gender, school size, and expulsion rates did not differ among the schools. However, they did vary greatly in areas of academic achievement, attendance rates, and successful transitioning programs. High schools with high dropout rates had a significantly greater population below the poverty level, had a significantly greater grade retention rate, and higher suspension rates.

Many studies concluded school performance factors such as academic achievement and grade retention were the strongest predictors of dropping out of high school (Balfanz, 2007; Cairns et al., 1989; Gleason & Dynarski, 2002; Jerald, 2006; Woods, 1995). However, other studies suggest the significant impact of factors associated with (a) demographics, (b) family characteristics, (c) student engagement, (d) adult responsibilities, and (e) school and neighborhood characteristics (Balfanz, 2007; Cairns et al., 1989; Gleason & Dynarski, 2002; Hammond et al., 2007; Rumberger & Lim, 2008).

Views from High School Dropouts

Surveys and interviews reveal a disconnect between data associated with risk factors and student's perception of school experiences that lead to school disengagement and subsequent decisions to drop out of high school (Yazzi-Mintz, 2010). Hence, combating the dropout issue requires not only understanding data-driven risk factors but also understanding student perspectives (Bridgeland et al., 2006; Smink & Schargel, 2004; Yazzi-Mintz, 2010). A study funded by the Bill and Melinda Gates Foundation examined four ethnically and racially diverse focus groups of high school dropouts (N = 467) ranging in age from 16 to 24 years old. The dropouts represented 25 different areas from large cities to small towns. Females and males were nearly equally represented in the groups. Each person in the focus groups was interviewed in a face to face setting. The participants' responses revealed no single predominant reason for dropping out of high school. The top five reasons students reported as impacting their decision to leave school were (a) uninteresting classes, (b) failing in school (c) excessive absences, (d) peer associations with others not interested in school, and (e) too much freedom (Bridgeland et al., 2006).

Surprisingly, in the aforementioned study, 86% of the interviewees reported passing grades when they left school, 58% had two or less years of school left, 70% believed that they could have graduated, and 81% recognized high school graduation as fundamental to their success in life. Overall, nearly all participants regretted leaving school and had a desire to go back to school with students their own age (Bridgeland et al., 2006). Similar results were reported by Paulson (2006), whose results indicated that 90% of dropouts were passing at the time of leaving school.

For half of the interviewees, school was boring and uninteresting. According to these participants, the teachers did not involve them and did not make the subject relevant to their lives. As a result, the students became disengaged with school. Many students (69%) reported that they were not motivated to work hard. Eighty percent of the participants indicated that teachers had low expectations and required little to no homework. Consequently, the students developed an apathy and boredom in the classroom that led to their skipping classes and school. Bridgeland, Dilulio, and Morison (2006) found that low expectations and low quantities of homework negatively affected the dropout rate. Similar findings were reported among gifted dropouts (Zabloski, 2010). Based on interviews of seven gifted high school dropouts, the students experienced boredom, a lack of motivation, and low expectations of teachers.

Thirty-five percent of the interviewees reported that they were failing in school when they left school. Interestingly, half of this group attributed their lack of success to poor preparation by elementary and middle schools. Many reported that they fell behind in earlier years and were never able to get recover. Of this group, a third had repeated a previous grade. Approximately 43% stated that they had too many absences and were not able to make up the work. In general, nearly 60% reported absenteeism as a factor leading to their decision to drop out of high school (Bridgeland et al., 2006).

In the Bridgeland et al. (2006) study, 38% of the participants cited too much freedom as a factor leading to their decision to drop out of school. High school provides more freedom and fewer rules than middle school. As children get older, parents tend to grant more freedom and become less involved in their child's education. This newfound

freedom led some students to make poor choices such as skipping school and associating with others who were disengaged from school (Bridgeland et al., 2006).

Similar results were found in a survey study involving approximately 30,000 students. Lehr, Clapper, and Thurlow (2005) identified two types of reasons students drop out of high school. The first set of reasons was identified as push effects. Push effects are reasons students feel pushed out of school and are located within the school doors. The result of push effects is a student feels rejected by the school. Lehr et al. reported that at least 10% of participants stated the following push factors led them to drop out of high school: did not like school, failing grades, did not get along with teachers and/or other students, frequently suspended, and expelled from school. Other push effects included academic challenges, feeling unsafe in school, being behind in school, and lack of a sense of belonging in school (Lehr et al., 2005).

Pull effects are life circumstances that draw students out of school and are not caused by factors within the school setting (Lehr et al., 2005). Pull effects reported by at least 10% of the dropouts in the above mentioned study included being offered a job, pregnancy, marriage, and needing to help support the family. Other pull effects included wanting to travel, working full time, caring for ailing family members, and having friends who dropped out of high school (Lehr et al., 2005).

In a study in Texas from 1994-1995 (Smink & Schargel, 2004), students (N = 20,212) who dropped out were asked to state a reason for their decision to leave. The top ten reasons that were reported (in order of frequency) were poor attendance, to enter a GED program, to get a job, poor grades, overage, marriage, pregnancy, discipline issues,

failed required graduation exams or did not meet graduation requirements, and to enter an alternative program.

Similar to data-based research, studies examining student perspectives reveal the importance of grades, grade retention, attendance, and discipline in the dropout issue. However, student perspective surveys also offer a unique view revealing factors not easily attained in school data, such as boredom with school, the lack of teacher interest, and too much freedom in school.

Early Identification Predictor Sets

Previous research has suggested that sets of predictor variables are useful in determining which students will drop out of high school (Balfanz et al., 2007; Gleason & Dynarksi, 2002; Suh & Suh, 2007; Vaughan, 1992; Vickers, 2007). Gleason and Dynarski (2002) studied data from middle school students (N = 2,672) and data from high school students (N = 2,808) gathered from 1992 to 1995 from four school programs: Dallas, Texas; Phoenix, Arizona; Santa Ana, California; and Grand Rapids, Michigan. The purpose was to determine the relationship between dropping out of high school and five categories of predictor variables: (a) demographic and family characteristics, (b) school performance, (c) personal characteristics of engagement, (d) adult responsibilities, and (e) school or neighborhood characteristics. Demographic characteristics included race, ethnicity, socioeconomic status, and parents' educational attainment. Enrollment in public assistance programs was used as an indicator of low socioeconomic status. School performance has consistently been identified as the strongest predictor of future dropping out of high school. Academic performance indicators included grades, standardized test scores, grade retention, and discipline issues. Certain psychological characteristics such

as student engagement, low self-esteem, and low academic expectations have been associated with high school dropouts. Students who became parents or worked more than 20 hours a week were more likely to drop out of high school. Communities classified as rural or urban also tended to be predictive of high school dropouts (Gleason & Dynarksi, 2002).

Although many students exhibit one or more risk factors, they do not all drop out of high school. In fact, most students who exhibit a single factor do not drop out of high school. Gleason and Dynarski (2002) found that the strongest predictor of who will drop out of high school was a composite of risk factors. For example, as a single factor, high absenteeism was predictive among 15% of the dropout population. Used in conjunction with overage by at least two years, the set was predictive among 27% of the dropout population (Gleason & Dynarski, 2002). When a composite of three factors was used, the at-risk population decreased and the percentage who dropped out was 34%.

The literature also suggests that students become disengaged in the early school years, and numerous dropout risk behaviors are evident in during these years (Balfanz et al., 2007). After an initial review of about 20 variables (i.e., demographic characteristics, special education status, course failures in English and math, discipline marks, suspensions, fifth grade standardized test scores, grade retention, attendance, high school outcome status), Balfanz et al. (2007) followed 12,972 middle school students in the Philadelphia School District from 1996 to 2004 and determined that four predictor variables had the greatest predictive power: (a) fifth grade test scores and sixth grade final course grades, (b) behavior marks and suspensions, (c) number of days absent and less than 80% attendance rate, and (d) status variables such as special education status

and being overage for grade. As individual predictor variables, four factors were found to be powerful predictors of high school failure: (a) high absenteeism, (b) failed sixth grade math, (c) failed sixth grade English, and (d) misbehavior in school. Students with less than an 80% attendance rate in sixth grade were 68% less likely to graduate, students with poor behavior marks were 56% less likely to graduate, and students who failed sixth grade math were 54% less likely to graduate. Overall, students with one or more risk factor in sixth grade had only a 29% graduation rate. Using regression analysis, 60% of high school dropouts were accurately predicted when the four 6th grade variables were analyzed as a set (Balfanz et al., 2007).

Utilizing data from the National Longitudinal Survey of Youth (NLSY97) involving students aged 12 to 16 (N = 6,192), Suh and Suh (2007) identified 16 statistically significant predictor variables of high school dropouts: (a) low grades in eighth grade, (b) low socioeconomic status, (c) suspensions, (d) student expectations, (e) absenteeism, (f) living with both biological parents, (g) enrichment risk, (h) physical environment risk, (i) sexual activity at or before the age of 15, (j) number of members in the house, (k) friends with plans to go to college, (l) fighting at school, (m) teacher perceptions, (n) prior threats of bodily harm, (o) location within the United States, and (p) reside in a metropolitan area. Suh and Suh found that most at-risk students were subject to multiple predictor variables. However, "as the number of risk factors increases, not only do the dropout rates rise dramatically, but the number of significant predictors decreases" (p. 200). As a consequence, it is vital to target predictor variables with the strongest predictive value in order to identify the greatest number of at-risk students. Suh and Suh's study suggested that academic failure, behavioral issues, and low

socioeconomic status were the strongest predictor variables for dropping out of high school. The dropout rate for students was 17.1%, 32.5% 47.7% for students with one, two, and three predictor variables, respectively.

Vaughan (1992) developed a methodology to identify potential high school dropouts in the Chesapeake Public School System in Virginia. After a thorough literature review, Vaughan (1992) identified many factors that had potential predictive power in identifying dropouts. Vaughan's intent was to develop an early identification system of potential dropouts that was applicable to the specified school system and practical to the schools within in the system. Therefore, Vaughn limited the scope of his study to predictor variables that were available through school records. These variables included parents' marital status, education and occupation, achievement test scores, attendance, grade retentions, number of schools attended, student transfers, race, and gender. Vaughan presented a methodology that identified future high school dropouts with 90% to 98% accuracy.

In a similar study, Vickers (2007) constructed a predictive model for male high school dropouts in a Virginia school district. The predictor variables used in this study were also based on their availability through school data records (i.e., absences, grade retentions, grade point average, socioeconomic status, in-school suspension, out-of-school suspension and ethnicity). Multiple regression analyses revealed that based on these variables, potential dropouts could be identified with 86% accuracy.

Early Intervention

Many risk factors are present at an early age, suggesting that early intervention is a key to high school graduation. Minority students, special education students, students

of low socioeconomic status, and students who do not speak English as their primary language require intervention that begins in preschool or elementary school (Henderson & Mapp, 2002).

Smink and Schargel (2004) suggested a four faceted approach to preventing high school dropouts. One facet included early interventions such as family engagement, early childhood education, and early literacy development. Research suggests that when students have family members who are engaged in their education they are more likely to

- earn higher grade point averages and scores on standardized tests or rating scales,
- enroll in more challenging academic programs,
- pass more classes and earn more credits,
- attend school regularly,
- display more positive attitudes about school,
- graduate from high school and enroll in postsecondary programs, and
- refrain from destructive activities such as alcohol use and violence.

(Henderson & Mapp, 2002, p 101)

With parental role vital to student success, schools must implement strategies to connect parents to their children's education and their children's school. Smink and Schargel (2004) recommended several strategies, including improving parental involvement, eliminating barriers to parental involvement, and building collaborative relationships. All of these strategies begin with creating a welcoming environment and learning about the parent background in terms of educational level, cultural values, and language barriers. In order to improve parental involvement, teachers must appreciate the

value of a trusting collaborative relationship and develop it through frequent personal communication. Once this is accomplished, teachers and administrators must create opportunities for parental involvement such as considering parents interests in activities and allowing them to plan and organize the activities. Schools can remove barriers to parental involvement by providing transportation and childcare and by encouraging parents to send another family member if necessary.

Early intervention also takes the form of early childhood education. While it is difficult to document the long term effects of early childhood education, programs like Head Start have provided much needed information. A longitudinal study of former Head Start children ($N = 3593$) found that this sample had fewer dropouts, less truancy, and lower rates of teen pregnancy (Lazar, Darlington, Murray, Royce, & Snipper, 1982).

Furthermore, recent brain research suggests that meaningful early childhood experiences have the potential to positively influence future success (Bredekamp, 1987; Lazar et al., 1982; Smink & Schargel, 2004). Hence, early education should encompass best practices that are age and developmentally appropriate in order to provide meaningful experiences. From birth to three years old, appropriate experiences include interactive conversations with adults, consistent routines, interactions with a variety of people, and exposure to books and music. During the preschool years, children need sensory experiences, holistic learning environments, play that encourages creativity, and opportunities to learn about the alphabet and number systems. Once children enter primary school, their learning environments should build on earlier experiences and provide a wide range of learning opportunities (Bredekamp, 1987; Smink & Schargel, 2004).

One of the most critical components of early childhood education is early literacy programs (Smink & Schargel, 2004). Often students with reading difficulties have not had an adult read aloud to them on a regular basis, and their exposure to books has been limited. Children need adults to read early and often to them. Early literacy strategies include reading to children, providing a large number and variety of books, and teaching phonics. It is also important for young students to begin reading and writing (Flippo, 2001).

Middle and High School Intervention

Despite research on the topic of high school dropouts, surprisingly little research on dropout intervention programs has been conducted (Samuels, 2007; Stanley & Plucker, 2008). However, improving the graduation rate of at-risk high school students requires a multi-dimensional approach. First, students must be identified early, even before they enter a high school classroom, through analysis of locally-based data. A multi-dimensional approach favors parent involvement, guidance through transition from middle school to high school, changes in classroom instruction, and the provision of support systems and alternative schooling to address the varying needs of at-risk students.

Recommendations for Local Data Based Research

Several studies have recognized differences among students as well as differences among communities and school districts (e.g. Dynarski et al., 2008; Jerald, 2006). These studies recommended utilizing local data to most effectively identify potential high school dropouts. Jerald (2006), from the American Diploma Project Network, concluded that districts should conduct individual studies based on district data from grades six and beyond to determine which factors are the most predictive for the local district. This

recommendation is further supported by a panel representing the United States Department of Education (Dynarski et al., 2008). The panel presented six recommendations to address and reduce the dropout problem. The first recommendation "advises schools and districts to utilize data systems that support realistic diagnosis of the number of students who drop out and that help identify individual students at high risk of dropping out" (Dynarski et al., 2008, p. 4).

Neild, Balfanz, and Herzog (2007) considered "whether the ordinary data that school districts keep in student records could operate as a crystal ball of sorts to predict which students might dropout" (p. 29). To answer this query, Neild et al. tracked a cohort of 14,000 students in Philadelphia. The findings from this study suggested that sixth graders exhibiting just one of the four risk factors (failing grade in math, failing grade in English, low attendance rate, or unsatisfactory behavior) had a 75% of dropping out of high school. Similar studies were repeated in other cities (e.g. Boston and Indianapolis) with similar results (Neild et al., 2007).

Parent Involvement

Efforts to increase the home to school connection can help reduce the dropout rate. High school dropouts in the study conducted by Bridgeland et al. (2006) believed that their parents' lack of involvement played a role in their decision to drop out. High schools have a tendency not to be a parent friendly environment. As a result, parental involvement wanes during high school. In order to improve this trend, high schools need to establish programs that positively encourage parents to connect to the school and work collaboratively for the child's benefit. It is important for educators to establish and maintain frequent communication and feedback with parents. By beginning with positive

communication, parents are more receptive to negative information. If a relationship has been established between the school and the parents, they are more likely to work together to resolve problems. Often, parents are not aware that there is a problem until it is out of control (Bridgeland et al., 2006).

Transition Programs

Transitioning from middle school to high school is challenging for many students (Edwards & Edwards, 2007). For this reason, it is important to ease the transition process with transition programs that support the students and parents. Transition events help students acclimate to the new environment and academic requirements of high school. Successful transition programs begin during the eighth grade year and involve the parents, students, and a committee of teachers from both schools. Furthermore, transitioning from middle school to high school is an ongoing process, not a one-time event. During multiple events, the students' fears, academic concerns, social needs, and emotional needs are addressed (Edwards & Edwards, 2007). Students are presented with information and expectations of high school. Eighth graders and their parents are given the opportunity to tour the high school campus. Most importantly, students begin to build relationships with teachers and counselors who will serve as their advocates in high school.

Classroom Instruction

Many of the reasons students drop out relate directly to the classroom setting. Whether through professional development or mentor programs within the schools, teachers need to know, understand, and implement active learning strategies (Stanley & Plucker, 2008). Students report that classes and school work are boring, not interesting,

not applicable, and not relevant (Bridgeland et al., 2006; Lehr et al., 2005). Bridgeland et al. (2006) reported that 81% of dropouts wanted better teachers and stated that they needed "to see the connection between school and getting a job" (p. iv). Furthermore, 75% of the students believed smaller classes and more one on one time with the teacher would have been beneficial to keeping students in school. Other research has suggested that the quality of the teacher is a predictor of student success (Karlinsky, 2008; Smink & Schargel, 2004).

Support Systems

There is a significant discrepancy in the percentage of students who reported that they knew a teacher member cared about them and those who also reported that they could talk to the faculty member about personal problems (Bridgeland et al., 2006). Too often, at-risk students are the students who need the most individualized attention and support. Therefore, schools need to ensure that every student has a strong connection with at least one caring adult in the school who they can talk to about school and personal problems (Edwards & Edwards, 2007; Karlinsky, 2008).

Further, schools can build connections with community members who can in turn build connections with individual students (Smink & Schargel, 2004). Community members can build connections with students through mentor and tutoring programs. Both allow opportunities for students to work one on one with a caring adult. Over time, the relationship will build trust while addressing specific needs. Service learning projects allow community members to establish a personal connection with a student while promoting civic responsibility and potentially career development (Smink & Schargel, 2004).

Alternative Schooling

Bridgeland et al, (2006), Edwards and Edwards (2007), and Smink and Schargel (2004) concur that alternative schools can improve the graduation rate by addressing the specific needs of students. Students need options to complete high school; however, most school districts have only one path to graduation. Once school districts accept differences among students, they can create different schools and graduation plans. Alternative schools can provide alternate paths to graduation as well as specialized programs to at-risk students.

Alternative schooling is based on the belief that education occurs in many ways and in many different settings, and it affirms the need for varied and creative curriculum. Smink and Schargel (2004) identified several different organizational forms of alternative schooling. There are a variety of alternative schools that offer summer programs, social behavior programs, unique programs such as special job skills, and/or programs that focus on students' interests. Charter schools are a widely known alternative school. They operate independently but are under contract between the local school district and the state agency. Charter schools typically address specialized needs of a small population of students. Another type of alternative school is second chance schools, which provide alternative learning for troubled students and serve as a last chance before being expelled or sent to jail.

Contribution of the Study

Rumberger (1987), Vaughan (1992), and Vickers (2007) expressed the need for further study in order to develop a model to identify potential high school dropouts. Furthermore, Jerald (2006) from the American Diploma Project Network and Dynarksi et

al. (2008) addressed the specific need for study of local school data to identify potential high school dropouts. The Georgia Department of Education (2007b) recommended that schools utilize data from their feeder schools in order to develop strategic action plans that will increase student achievement and graduation rates.

Based on these recommendations, the intent of this study was to determine if available school district data can be used to predict potential dropouts in order to provide early intervention for at-risk students. Even though similar studies have been conducted in other geographic areas such as Phildelphia, Pennsylvania (Balfanz et al., 2007), Montreal, Canada (Gleason & Dynarksi, 2002), and two unspecified school districts in Virginia (Vaughan, 1992; Vickers, 2007), no such study has been conducted in this school district located in northwest Georgia. This school district's student population is not represented in previous research, with its 91% Caucasian population and a lower than average population (44.6%) from a low socioeconomic background (The Governor's Office of Student Achievement, 2009). Further, the school district is not considered a rural or an urban area, which have been almost exclusively examined in previous studies. Therefore, the conclusions from other studies cannot soundly be generalized to the school district in this study.

Many factors have been identified as predictive for dropping out of high school, with the most significant being academic performance, low socioeconomic status, high absenteeism rates, grade retention, and delinquency issues (Battin-Pearson et al., 2000; Jimerson et al., 2002; Suh, Suh, & Houston, 2007; Rumberger, 1987). Hence, the review of the literature suggests that the following variables are appropriate for inclusion in this study: (a) CRCT English, math and reading scores, (b) gender, (c) final course math

grade, (d) final course English grade, (e) student status (special education, gifted, none), (f) number of absences, (g) number of discipline referrals, (h) number of times a student has been retained, and (i) enrollment in the free/reduced meals program. Enrollment in the free/reduced lunch meals program is a common indicator of socioeconomic status (Balfanz et al., 2007; Gleason & Dynarski, 2002; Vickers, 2007); therefore, it was used in this study as the indicator for socioeconomic status. Ethnicity and race were not included in this study despite their significance in the literature because the studied district has very little ethnic diversity. The district student population in this study was 91% Caucasian, 3% African American, 2% Hispanic, 1% Asian, and 2% Multi-racial. Statistical Solutions (2009) suggested that more than 30 subjects are needed in a data sample for logistic regression. Based on the reported percentages, the number of students from varying ethnic backgrounds did not to meet the criteria for inclusion in this study.

These predictor variables in this study were chosen for three reasons. First, previous research has established the relationship between the predictor variables and the criterion variable (high school end status). Secondly, researchers (see Dynarksi et al., 2008; Georgia Department of Education, 2007b; Jerald, 2006) have recommended utilizing local data to determine specific predictor variables for the school district and have identified this as the first step necessary to developing a successful intervention program for students at-risk for dropping out. The Georgia Department of Education (2007b; 2008c) identified characteristics of middle and high school students that are indicative of potential dropouts: course credit deficiency, grade retention, low CRCT scores, less than a 92% attendance rate, history of behavior problems, and being

economically disadvantaged. Lastly, prior studies have not examined, individually or collectively, the correlation of the specific predictor variables in this study.

Student status (special education and giftedness) has not been widely studied as a predictor variable for dropping out of high school (Kemp, 2006; Renzulli & Park, 2002; Reschly & Christenson, 2006; Wagner, 1991). Studies that have been conducted (i.e. Dunn et al., 2004; Renzulli & Park, 2002; Reschly & Christenson; Wagner, 1991; Wagner, 1993) have focused on the predictive power of the aforementioned variables for correctly identifying special education dropouts. Similarly, studies of gifted dropouts (i.e. Hansen & Johnston-Toso, 2007; Matthews, 2006; Renzulli & Park, 2000; Renzulli & Park, 2002) have analyzed characteristics of gifted dropouts but not the predictive power of gifted status. The studies have not used special education or gifted status as predictor variables. This study contributes to the body of research by using student status as a predictor variable.

This proposed study focused on eighth grade data based on recommendations from prior research (see Balfanz et al., 2007; National Center for Education Statistics, 1992) suggesting predictor variables may identify potential dropouts as early as middle school. The Georgia Department of Education (2007b) asserted that "we must view grades six through twelve as a seamless continuum" (p. 3) and that extracting information from the data of feeder schools is a proactive measure "that will raise student achievement and graduation rates" (p. 6). By identifying at-risk students based on eighth grade data, this study may provide feeder high schools with information enabling them to develop effective early intervention and prevention plans.

In addition to providing valuable information, the study may also fill a gap in the literature. Most studies focus on high school students and at-risk factors. However, in Rumberger and Lim's (2008) review of 203 peer reviewed studies, 28 of 33 studies focusing on eighth grade data used data from the NELS:88. Studies published as recently as 2007 (Rumberger & Lim, 2008) have relied on data from 1988 to determine at-risk factors for potential dropouts. The remaining five studies used data from 1980 to 1998. Furthermore, the data was collected from specific populations such urban, rural, or high crime areas. Therefore, the findings from these studies are not only outdated for current application, but they are also not easily transferrable to the district in this study or districts with similar demographics. Lastly, few studies have addressed standardized tests as a predictor variable, and the sparse research is contradictory. Vickers (2007) addressed this as a recommendation for further research, acknowledging that there is a lack of correlational data on high school dropouts and high-stakes testing.

Summary

Many factors contribute to the dropout rate with no single variable being solely responsible. Furthermore, a review of the literature indicates dropping out of school is not an impulsive decision for most students. Rather, students become disenchanted over an extended period of time, losing their focus and sense of purpose in school. School is not relevant nor is it interesting, so students make the decision to leave school to pursue what they perceive to be more meaningful options.

In terms of at-risk, Smink and Schargel (2004) suggested that nearly one third of all students face challenges that increase their risk of dropping out of school. Risk factors range from race and ethnicity, to gender, socioeconomic status, academic performance,

family background, personal characteristics, and even school and neighborhood characteristics.

While there is no simple solution for reducing the dropout rate, there is strong consensus that it can and must be improved (Dynarski et al., 2008; Greene & Winters, 2002; Stanley & Plucker, 2008; Jerald, 2006). No matter the reason, it is important to identify students as early as possible (Balfanz et al., 2007; Rumberger, 1987; Smink & Schargel, 2004). With the proper predictive models to identify at-risk students, support systems and interventions can be implemented for those with the greatest need.

CHAPTER THREE: METHODOLOGY

Chapter Three describes the methods employed in this research. The chapter includes an overview of the study, research questions, the research setting and participants, the research variables, design of the study, data collection methods, instrumentation, and data analysis procedures.

Overview of the Study

This study employed a nonexperimental quantitative correlational design using logistic regression analysis in order to develop a predictive model for identifying high school dropouts based on eighth grade data. Factors that contribute to high school students dropping out of high school were identified through an extensive review of the literature.

Research Questions

The following research questions were addressed in this study:

Research Question 1: What is the nature of the relationship between high school end status (dropout or graduate) and the predictor variables in eighth grade (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

> Null Hypothesis (H_{O1}) for research question 1: There is no statistically significant relationship between high school end status (dropout or graduate) and eighth grade predictor variables (CRCT English, math and

reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program).

Research Question 2: Can high school end status (dropout or graduate) be accurately predicted based on a set of eighth grade predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

Null Hypothesis (H_{O2}) for research question 2: High school end status (dropout or graduate) cannot be accurately predicted based on the set of eighth grade predictor variables (CRCT scores in English, reading, and math, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, past grade retentions, and enrollment in free/reduced meals program).

Research Question 3: If high school end status (dropout or graduate) can be predicted accurately, which predictor variables offer the most predictive value?

Null Hypothesis (H_{O3}) for research question 3: None of the predictor variables (CRCT scores in English, reading, and math, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, past

grade retentions, and enrollment in free/reduced meals program) have a greater capacity for predicting high school end status.

Variables

Data for the following predictor variables and the criterion variable were collected from school data records and coded for statistical analysis.

Predictor Variables

Based on extensive studies by researchers in the field (e.g., Battin-Pearson et al., 2000; Jimerson et al., 2002; Suh et al., 2007, Rumberger, 1987), many factors have been identified as predictor variables for dropping out of high school. Variables that can be attained with appropriate permissions from student data records with complete anonymity were used in this study. The predictive variables that were examined were eighth grade Criterion-Referenced Competency Test (CRCT) scores in English, reading and math, gender, final course math grade, final course English grade, student status (special education, gifted, none), number of absences, number of discipline referrals, past grade retention, and enrollment in the free/reduced meals program.

Criterion Variable

The criterion variable for this study was the end status of the student as a high school dropout or a high school graduate. Based on a four year completion plan for high school, students who entered high school as ninth graders in August 2005 should have graduated high school in the May of 2009. Students who dropped out of high school were coded in the system database, thereby allowing the opportunity to identify students who graduated, dropped out, or transferred. Only students who were coded as a "high school graduate" or a "high school dropout" were included in this study.

Design of the Study

This quantitative study used correlation analysis and logistic regression analysis to analyze the data. The linear relationship between dropping out of high school and the predictive variables were determined individually using correlation analysis. Logistic regression analysis was utilized to determine how well the set of predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student had been retained, and enrollment in the free/reduced meals program) predicted the criterion variable (high school dropout or high school graduate).

Research Setting and Sample

This study involved participants from the 2005/2006 ninth grade class in the selected school district in northwest Georgia. Inclusion in the study was based on complete data records. Details describing the research setting, population, and sample are described in further detail below.

Research Setting

This study was conducted in a public school district in northwest Georgia. The school district consists of two primary schools, eight elementary schools, three middle schools, three high schools and one alternative school. According to the Governor's Office of Student Achievement (2009), for the school year 2008/2009, the student population of the studied district enrolled 10,420 students consisting of 1% Asian, 3% African American, 2% Hispanic, 2% Multi-racial, and 91% Caucasian. Of the student population, 44.6% were eligible for free and reduced meals, 13.6% were served in special

education, 0.6% were served in the English Language Learners (ELL) Program, 18.6% were served in the Early Intervention Program (EIP), and 14.4% were served in the gifted program (The Governor's Office of Student Achievement, 2009). Table 2 depicts the school district in comparison to the entire state of Georgia.

Table 2

School District versus State Data

Measure	County	State
Student Population	10,420	1,615,066
Caucasian Students (2008/2009)	91%	46%
African American Students (2008/2009)	3%	38%
Hispanic Students (2008/2009)	2%	10%
Asian Students (2008/2009)	1%	3%
Multi-racial Students (2008/2009)	2%	3%
Enrolled in Free/Reduced Meals	43%	53%
Special Education Services	14%	11%
ELL Program Services	0.6%	6%
EIP Program Services	18.6%	19.1%
Gifted Program Services	14.4%	9.3%

ELL (English Language Learners)
EIP (Early Intervention Program)
(The Governor's Office of Student Achievement, 2009)

The school district serves a suburban county with a population of approximately 62,000 (United States Census Bureau, 2009). Nearly 20% of the county's land is used for farming (Center for Agribusiness and Economic Development, 2010); however, the county is predominantly a bedroom community to a metropolitan area in Tennessee with 73.2% of its residents employed outside the county (Center for Agribusiness and Economic Development, 2010). The median household income for the county is $47,990, which is slightly below the state average of $50,834. Compared to Georgia's population which is 34.6% minority, this county's minority population is merely 4.9%

(United States Census Bureau, 2009). Table 3 depicts the research setting in comparison to the entire state of Georgia.

Table 3

County versus State Data

Measure	County	State
Population (2008 est.)	62,825	9,685,744
Farm land	19.8%	27.4%
Median household income	$47,990	$50,834
Employed outside of county	73.2%	41.5%
Persons below poverty level (2008)	11.4%	14.7%
Unemployment Rate (2009)	8.6%	10.3%
% Caucasian Persons (2008)	95.1%	65.4%
% African American Persons (2008)	2.7%	30.0%
% Hispanic Persons (2008)	1.9%	8.0%

(Center for Agribusiness and Economic Development, 2010; The Governor's Office of Student Achievement, 2009; United States Census Bureau, 2009)

Population and Sample

The participants for this study were selected based on ninth grade enrollment in the 2005/2006 school year (graduating class of 2009). According to The Governor's Office of Student Achievement (2009), 943 students entered ninth grade in this school district in the fall of 2005. The contingency for participation in this research was complete student data records having all factors included in this study.

This was a convenience sample, as it was selected based on the researcher's employment in the county and access to the data. Although this is a convenience sample, dropping out of high school is a problem in this district. In 2009, graduation rate was 1.5% lower than the state average and 3% lower than the minimum required graduation rate to meet Adequate Yearly Progress (AYP). Researchers (see Dynarski et al., 2008; Jerald, 2006; Rumberger, 2004; Smink & Schargel 2004) recommend that local districts

develop diagnostic tools to identify potential dropouts. In following this recommendation, districts need to use data systems to determine which variables have predictive power in determining high school dropouts within the local community (Dynarski et al., 2008; Olson, 2006; Neild et al., 2007). Therefore, this sample was worthy of being studied based on its graduation rate, its unique demographics, the sparse research of the student status (special education and giftedness), and the composite of predictor variables used in this study.

Instrument

The Criterion-Referenced Competency Test (CRCT) is a series of standardized tests used by Georgia to assess academic achievement in math, reading, language arts, science, and social studies. The CRCTs in English, math, and reading are administered annually to grades one through eight (Georgia Department of Education Testing Division, 2006).

Georgia uses the CRCT to assess English, reading, math, social studies, and science in first through eighth grade. The purpose of administering the CRCT is to offer a valid measure to determine adequacy of the local school district's educational services and to provide a measure of student knowledge and progress in a school year. The test also serves as an accountability instrument in determining a school's Adequate Yearly Progress (AYP), required by the No Child Left Behind Act (Georgia Department of Education Testing Division, 2006).

The Georgia Department of Education has developed a curriculum for all courses. The curriculum is referred to as the Georgia Performance Standards. The CRCT is designed to assess school's educational services and student achievement based on the

GPS in grades one through eight in reading, English, and mathematics (Georgia Department of Education, 2008a). Each test is graded for correctness and given a numeric score (generally 650 to 900). In addition to the numeric score, students receive a performance level rating of "does not meet standards," "meets standards," or "exceeds standards" based on the level of performance (Georgia Department of Education, 2008a). A numeric score of greater than 800 must be achieved in order to meet the standard. Eighth grade students must meet or exceed standards in reading and math to be promoted to the ninth grade (high school) (Georgia Department of Education, 2008b). Due to anticipated access to CRCT scores in the school district's database, the overall CRCT scores in English, reading, and math were used as a measure of English, reading, and math competency in this study.

Validity refers to the extent to which an instrument measures what it claims to measure. In order to validate an instrument, test content must be examined and found to be free of bias and provide sufficient sampling of all domains of the Georgia Performance Standards. To ensure validity, the CRCT was developed and utilized in several stages. The first stage involved determining the purpose of the test followed by delineating specific guidelines. Test questions were written by qualified writers during the third stage. Once a test question was developed and reviewed, it was inserted in CRCT tests as a field test question during the fourth stage. The test questions were then reviewed by a committee of Georgia educators for percentage of student correctness as well as potential bias among various populations. If a test item was determined to be free of bias and acceptable for inclusion in the CRCT test, the test item was reviewed by another

committee of educators and state leaders before being approved by the Georgia Board of Education (Georgia Department of Education Testing Division, 2006).

Reliability is a measure of the degree to which an instrument measures what it is intended to measure consistently. Using statistical methods, reliability assesses an instrument's consistency in results for the same student when the instrument is used repeatedly. The Georgia Department of Education Testing Division (2006) reported the following reliability coefficient ranges for the CRCT tests: 0.85 to 0.89 for English, 0.79 to 0.86 for Reading, and 0.87 to 0.91 for Math.

Data Collection and Coding Procedures

After obtaining permission from the superintendent of the selected school district and necessary approvals to conduct research with human subjects from Liberty University's Internal Review Board (IRB) (see Appendix A), data was obtained from the Director of Technology, who also oversees data management for the school district. The data was collected from the selected school district's data base system, Infinite Campus. In order to maintain full confidentiality and anonymity, the data only identified the student by a random number; the researcher never knew the identity of any student. Students who could not be identified as graduating or dropping out of high school were excluded from the data set.

Statistical Solutions (2009) stated that the categorical criterion variable (student end status) must be coded in such a way that the desired outcome is "1." To maintain consistency, predictor variables with desirable outcomes such as passing CRCT tests and passing eighth grade classes were coded consistently with "1." Other categorical variables were coded in a manner consistent with research data of dropouts and

graduates. This coding system is similar to the coding system set forth by Gleason and Dynarksi (2002), Vaughan (1992), and Vickers (2007):

1. Students who were identified as high school dropouts were coded as "0." Students identified as high school graduates were coded as "1."
2. Each of the CRCT scores (English, math and reading) were coded as follows: did not meet standards "0," meets standards "1."
3. Gender was coded as follows: male "0," female "1."
4. Final course grades in English and math were coded as follows: fail "0" or pass "1."
5. Students who were classified special education were coded "0." Students with no classification were coded "1."
6. Students who were classified gifted were coded "0." Students with no classification were coded "1."
7. Students who received free/reduced meals were coded as "0," and students who do not receive free/reduced meals were coded as "1."
8. The number of years retained were coded on a categorical scale as the total number of grade retentions by eighth grade. It was possible to code number of years retained categorically due to the fact that no student had been retained more than one year. Therefore, one year retained was coded as "0" and no grade retentions were coded as "1." Although this seems contradictory, this was consistent with coding of the predictor variables.
9. Absences for students were recorded on a continuous scale as a total for each student's eighth grade school year.

10. The number of discipline referrals was counted on a continuous scale as the total number of events during eighth grade.

After coding, the data was then put in datasets, and data spreadsheets were constructed using Statistical Package for Social Sciences 19 (SPSS 19) (2010). In order to run logistic regression, complete data sets are necessary (Field, 2009). Therefore, students with incomplete datasets (49%) were removed from the data sample. The data was first screened for outliers. Testing of assumptions was also required to ensure that the logistic regression analysis provided a sound model that is generalizable to a population (Field, 2009). Peng, Lee, and Ingersoll (2002) stated that assumptions "may be tested by the normal *z* test or may be taken to be robust as long as the sample is random" (p. 10). However, as the sample used in this study was not randomly selected, the evaluation of test assumptions was necessary. Linear regression and logistic regression require the following test assumptions: (a) variables are quantitative (i.e., categorical, continuous), (b) predictor variables vary in value, (c) independence of observations, (d) normality, (e) no multicollinearity, (f) assumption of linearity of predictor variables, and (g) large set of data (Field, 2009; Statistical Solutions, 2009).

To meet the assumptions, the criterion and predictor variables were set as categorical or on a continuous scale. This resulted in varying values of each variable. Normality was determined by visually observing data plots, histograms, and frequency distributions (Osborne & Waters, 2002). Independence of observations was established by single data points for each variable. Testing for the assumption of linearity was done by comparing the Pearson correlation coefficient and the eta value (Garson, 2010). Multicollinearity was checked using tolerance and VIF statistics (Field, 2009). For

optimal logistic regression, more than 30 subjects in a data sample is necessary, and this requirement was met with the final sample size of 340 (Statistical Solutions, 2009)

Data Analysis Procedures

This study used correlation and logistic regression analyses in order to determine any correlation and predictability between the criterion variable (high school end status) and the predictor variables: (a) Criterion-Referenced Competency Test (CRCT) English scores, (b) CRCT math scores, (c) CRCT reading scores, (d) gender, (e) final course math grade, (f) final course English grade, (g) student status (special education, gifted, none), (h) number of absences, (i) number of discipline referrals, (j) number of times a student has been retained, and (k) enrollment in the free/reduced meals program.

For each predictor variable, the data was analyzed for percentages and frequencies. Correlation analysis was used to determine linear relationships between variables (Triola, 1992). Therefore, the relationship between the predictor variables and the criterion variable were examined in order to determine linear relationships between each of the predictor variables and the criterion variable.

Logistic regression analysis was used to determine if high school dropouts and high school graduates could be identified based on predictor variable sets from eighth grade data. Logistic regression analysis is recommended when the criterion variable is categorical (i.e., dropout or graduate) and the predictor variables are categorical or continuous (Field, 2009). Based on this criterion, logistic regression analysis was the best statistical analysis based on this study using a categorical outcome and including categorical and continuous predictor variables. By using logistic regression analysis, it was possible to examine predictor variables individually and in various combinations in

order to determine which set provided the greatest predictive value for determining student end status (dropout or graduate). Furthermore, logistic regression analysis is also a common statistical application in education research because it allows for the prediction of an outcome with limited statistical assumptions (Peng, Lee, & Ingersoll, 2002). Finally, the logistic regression analyses were validated with goodness-of-fit statistics as recommended by Peng et al. (2002).

Summary

The purpose of this quantitative study using correlation and logistic regression analyses was to provide the basis for determining significant variables in order to develop a predictive model for identifying potential dropouts among eighth grade students in a district in northwest Georgia. The methodology chosen for this study was based on similar statistical analyses by Battin-Pearson et al. (2000), Janosz et al. (2000), Rumberger (1987, 1995), Vaughan, (1992), and Vickers, (2007). The predictor variables examined included CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status (special education, gifted, none), number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program. These variables were identified in the literature as predictive of dropping out of high school and were used in this study due to their availability through the school database.

CHAPTER FOUR: RESULTS

The intent of this study was to determine if high school end status (dropout or graduate) can be accurately predicted by the set of eighth grade predictor variables Chapter Four consists of receipt of data and coding, descriptive statistics for the sample (i.e., frequencies, means, and standard deviations), and followed by statistical screening for outliers and test assumptions for using logistic regression analysis. The remainder of the chapter is organized in terms of the study's findings in relation to the following three research questions:

Research Question 1: What is the nature of the relationship between high school end status (dropout or graduate) and the predictor variables in eighth grade (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

Research Question 2: Can high school end status (dropout or graduate) be accurately predicted based on a set of eighth grade predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

Research Question 3: If high school end status (dropout or graduate) can be predicted accurately, which predictor variables offer the most predictive value?

Receipt of Data and Data Coding

According to The Governor's Office of Student Achievement (2009), the northwest Georgia school district enrolled 943 ninth grade students in the fall of 2005. However, the Director of Technology only provided data for students whose high school end status was coded as graduate or dropout. The total number of data sets provided by the Director of Technology was 667 (525 students whose status was graduated and 112 students whose status was dropout). The data was provided in two Excel spreadsheets (i.e., dropout or graduate). The data was then coded as follows:

1. Students who were identified as high school dropouts were coded as "0." Students identified as a high school graduate were coded as "1."
2. Each of the CRCT scores (English, math and reading) were coded as follows: did not meet standards "0," meets standards "1."
3. Gender was coded as follows: male "0," female "1."
4. Final course grades in English and Math were coded as follows: fail "0" or pass "1."
5. Students who were classified special education were coded "0." Students with no classification were coded "1."
6. Students who were classified gifted were coded "0." Students with no classification were coded "1."
7. Students who received free/reduced meals were coded as "0," and students who do not receive free/reduced meals were coded as "1."
8. The number of years retained were coded on a categorical scale as the total number of grade retentions by eighth grade. It was possible to code number

of years retained categorically due to the fact that no student had been retained more than one year. Therefore, and one year retained was coded as "0" and no grade retentions were coded as "1." Although this seems contradictory, this was consistent with coding of the predictor variables.

9. Absences for students were recorded on a continuous scale as a total for each student's eighth grade school year.
10. The number of discipline referrals was counted on a continuous scale as the total number of events during eighth grade.

Due to the requirement of complete data sets to conduct logistic regression analysis (Field, 2009),students whose data was incomplete were removed from the data sets. The resulting data set ($N = 340$) included 294 graduated students and 46 high school dropouts. The removal of students with incomplete data resulted in a higher sample graduation rate (86.5%) than the overall graduation rate (77.4%) of the district's population ($N = 943$) in 2009.

Descriptive Statistics

The frequencies of the binary data for the criterion variable (end status) and predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of times a student has been retained, and enrollment in the free/reduced meals program) are depicted in Table 4. Table 5 presents the descriptive statistics for the continuous predictor variables (number of absences and the number of discipline referrals). Each predictor variable had a minimum of 30 subjects as deemed necessary for logistic regression analysis (Peng et al., 2002).

Table 4

Description of Categorical Variables (N = 340)

Variable	Graduate	Dropout
Criterion Variable		
Student End Status	294 (86.5%)	46 (13.5%)
Predictor Variables		
Gender		
Male	144 (49.0%)	34 (73.9%)
Female	150 (51.0%)	12 (26.1%)
Years Retained		
No retention	283 (96.3%)	25 (54.3%)
One retention	11 (3.7%)	21 (45.7%)
Free/Reduced Meals		
Enrolled	83 (28.2%)	31 (67.4%)
Not Enrolled	211 (71.8%)	15 (32.6%)
Student Status		
Special education	35 (11.9%)	11 (23.9%)
Gifted	45 (15.6%)	1 (2.2%)
None	214 (72.5%)	34 (73.9%)
CRCT Math Score		
Did not meet standards	42 (14.3%)	29 (63.0%)
Met standards	252 (85.7%)	17 (37.0%)
CRCT English Score		
Did not meet standards	25 (8.5%)	16 (34.8%)
Met standards	269 (91.5%)	30 (65.2%)
CRCT Reading Score		
Did not meet standards	23 (7.8%)	13 (36.1%)
Met standards	271 (92.2%)	33 (63.9%)
Final English grade		
Did not pass	15 (5.1%)	18 (39.1%)
Passed	279 (94.9%)	28 (60.9%)
Final math grade		
Did not pass	12 (4.1%)	18 (39.1%)
Passed	282 (95.1%)	28 (60.9%)

Table 5

Description of Continuous Variables (N = 340)

Variable	Minimum	Maximum	Mean	Standard Deviation
Predictor Variable				
Absences				
Graduate	0	23	5.8	4.68
Dropout	1	34	10.7	5.92
Discipline Referrals				
Graduate	0	27	1.2	3.35
Dropout	1	92	8.8	14.12

Correlation Analysis

Research Question 1

Correlation analysis was used to address Research Question 1: What is the nature of the relationship between the predictor variables and the criterion variable (dropout or graduate), and the corresponding null hypothesis that there is no statistically significant relationship between dropping out of high school and the eighth grade predictor variables. Correlation coefficients are used to determine the degree to which two variables are related to each other in terms of degree of association and whether the relationship is positive or negative. Correlation coefficients range between -1 to 1 with coefficients closer to 0 indicating weak or absent relationship. Negative coefficients indicate variables that move in opposite directions, while positive coefficients indicate variables that move in the same direction.

Correlation coefficients among the variables in this study are presented in Table 6. Pearson correlation coefficients (r) are appropriate when variables are continuous; however, Pearson correlation is not effective in determining relationships among

categorical variables. To determine the correlation among categorical variables, phi correlation coefficients are most appropriate (Field, 2009). Based on correlation coefficients, all of the predictor variables except gifted status were found to be significantly correlated to the criterion variable (dropout or graduate). The most highly correlated variables with end status were number of years retained, passing or failing eighth grade math, passing or failing the CRCT math test, the number of discipline referrals, and passing or failing eighth grade English. Pearson and phi correlation do not measure the power of the relationship; the correlation only measures the significant presence between the variables. The power of the relationship and the predictive power of the variables were considered after logistic regression analysis was conducted.

Table 6

Correlation Matrix (N = 340)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. End Status	1	.171**	.284**	.120*	-.131*	.410**	.276**	.227**	.393**	.423**	-.328**	-.398**	-.493**
2. Gender		1	.066	.119*	-.070	.142**	.118*	.099	.174**	.110*	.000	-.172**	-.129*
3. Free/Reduced Meals			1	.102	-.190**	.248**	.081	.120*	.188**	.152**	-.214**	-.088	-.162**
4. Special Ed. Status				1	-.156**	.347**	.276**	.255**	-.013	.271**	-.049	-.198**	.240**
5. Gifted Status					1	-.182**	-.146**	-.136*	-.190**	-.123*	.089	.115**	.097
6. CRCT Math Score						1	.565**	.435**	.345**	.401**	-.154**	-.215**	-.357**
7. CRCT English Score							1	.518**	.275**	.362**	-.178**	-.180**	.266**
8. CRCT Reading Score								1	.210**	.264**	-.200**	-.213**	-.235**
9. Final English Grade									1	.283**	-.237**	-.213**	-.221**
10. Final Math Grade										1	-.238**	-.207**	-.376**
11. Absences											1	.202**	.285**
12. Discipline Referrals												1	.133**
13. Years Retained													1

* p < .05. ** p < .001.

Logistic Regression Analysis

Test Assumptions for Logistic Regression

Before logistic regression analyses were performed, the testing of assumptions was required to ensure that logistic regression analysis provides a model that is generalizable to a population (Field, 2009). Peng et al. (2002) stated that assumptions "may be tested by the normal *z* test or may be taken to be robust as long as the sample is random" (p. 10). However, the sample in this study was not randomly selected, and therefore, it was necessary to ensure the following test assumptions were met: (a) variables are quantitative (i.e., categorical, continuous), (b) predictor variables vary in value, (c) independence of observations, (d) normality, (e) assumption of linearity of predictor variables, (f) there is no multicollinearity, and (g) large set of data (Field, 2009; Osborne & Waters, 2002; Statistical Solutions, 2009).

The criterion variable (dropout or graduate) and 10 predictor variables (gender, enrollment in the free/reduced meals program, special education status, gifted status, CRCT math score, CRCT English score, CRCT reading score, final English grade, final math grade, and number of years retained) were categorically coded variables; two predictor variables (absences and discipline referrals) were coded as continuous variables, thus meeting the test assumptions for quantitative and varying values of the variables. Furthermore, the assumption of independence of observations was met by complete data sets providing a single data point for each predictor variable.

Normality, which is described as the normal distribution of data along a bell-shaped curve (Osborne & Waters, 2002), was determined by visually observing data plots, histograms, and frequency distributions. Normality was only tested for the

continuous variables, since categorical data does not exhibit normality (Osborne & Waters, 2002). Figure 1 and Figure 2 present the histograms for the continuous variables. Analysis for normality indicated only one outlier in the data. The outlier was found in the number of discipline referrals (92). This outlier was removed during logistic regression analysis as recommended by Field (2009) and Osborne and Waters (2002).

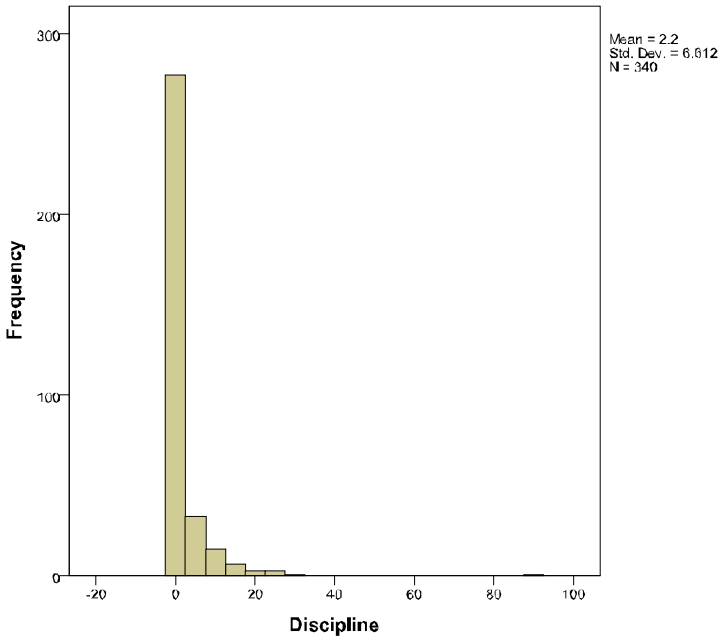

Figure 1. SPSS 19 (2010) histogram of frequency of discipline referrals

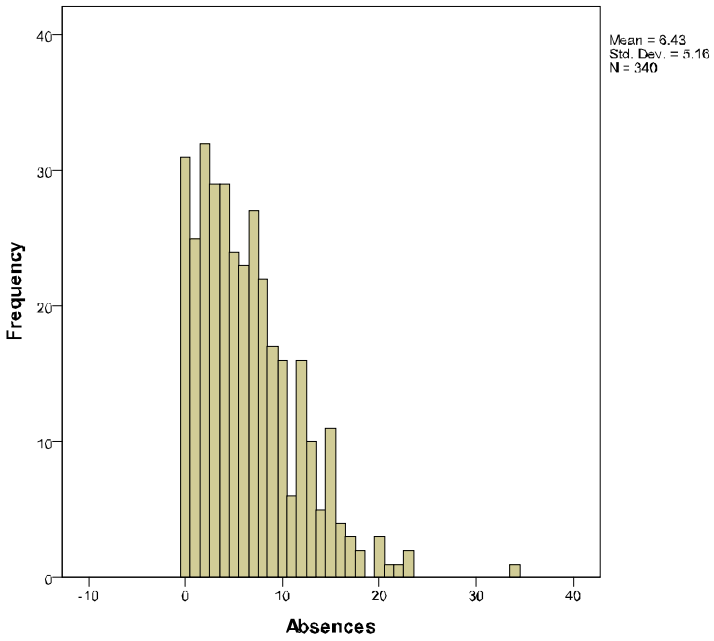

Figure 2. SPSS 19 (2010) histogram of frequency of absences.

Logistic regression analysis requires the assumption of linearity between each predictor variable and the criterion variable in order to ensure that the analysis does not underestimate the strength of the relationship (Statistical Solutions, 2009). To meet this assumption, the simplest solution is to make the predictor variables categorical. This was possible for 10 of the 12 predictor variables. However, the number of absences and the number of discipline referrals remained best as continuous predictor variables. Testing for the assumption of linearity was done by comparing the Pearson correlation coefficient and the eta value. The eta coefficient is a correlational value indicating nonlinear association. If the eta coefficient is equal to the Pearson *r* correlation coefficient, then there is a linear relationship between the predictor variable and the criterion variable (Garson, 2010). Using SPSS 19 (2010), the eta coefficients for the number of absences

and the number of discipline referrals were calculated. In each case, the eta coefficient in fact equaled the Pearson r correlation coefficient. For the number of absences, the eta coefficient as well as the Pearson r was -.328 and -.398 for the number of discipline referrals.

Multicollinearity is a statistical situation in which two or more independent variables are highly correlated (Field, 2009). As a result of multicollinearity, logistic regression may fail to find a highly correlated predictor variable significant. For logistic regression to produce a generalizable model, the assumption of no multicollinearity must be met. Based on observation of the correlations in Table 6, several variables were highly correlated. Therefore, to ensure there was no multicollinearity in this study, tests for multicollinearity were performed. According to Field (2009), tests for multicollinearity are tolerance, variation inflation factors (VIF), Eigenvalues, condition indexes, and variance proportions. Table 7 provides Tolerance and VIF values for the predictor variables. If the tolerance value is less than .1 and the VIF values are greater than 10, then multicollinearity exists (Field, 2009). Tolerance and VIF values for the predictor variables in this study were in the range to conclude that no multicollinearity was present. Furthermore, collinearity diagnostics, Eigenvalues, condition indexes, and variance proportions, of the predictor variables in this study supported the conclusion that no multicollinearity was present. Table 8 illustrates the collinearity diagnostics for each predictor variable. Multicollinearity is present if variance proportions within a row exhibit values close to 1 (Field, 2009).

Table 7

Tolerance and VIF values for the Predictor Variables (N = 340)

Variable	Tolerance	VIF
Gender	.929	1.076
Free/Reduced Meals	.871	1.149
Special Education Status	.783	1.277
Gifted Status	.925	1.081
CRCT Math Score	.532	1.880
CRCT English Score	.564	1.774
CRCT Reading Score	.679	1.472
Final English Grade	.775	1.291
Final Math Grade	.718	1.393
Absences	.826	1.210
Discipline Referrals	.875	1.142
Years Retained	.760	1.316

Table 8

Collinearity Diagnostics (N = 340)

Dimension	Eigen value	Condition Index	Variance Proportion 1	2	3	4	5	6	7	8	9	10	11	12	13
1. End Status	9.283	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2. Gender	1.242	2.735	.00	.01	.00	.00	.00	.02	.22	.00	.00	.00	.25	.00	.00
3. Free/Reduced Meals	.117	8.890	.00	.00	.00	.01	.07	.04	.00	.00	.12	.00	.00	.63	.00
4. Special Education Status	.050	13.638	.00	.00	.40	.74	.10	.00	.00	.02	.03	.12	.00	.03	.00
5. Gifted Status	.016	23.798	.99	.00	.08	.01	.04	.09	.04	.04	.21	.14	.07	.12	.25
6. CRCT Math Score	.364	5.052	.00	.10	.00	.00	.00	.39	.08	.25	.00	.00	.16	.00	.01
7. CRCT English Score	.468	4.455	.00	.85	.00	.00	.00	.03	.02	.03	.00	.00	.01	.00	.00
8. CRCT Reading Score	.793	3.421	.00	.01	.00	.00	.00	.00	.56	.00	.00	.00	.35	.00	.00
9. Final English Grade	.090	10.0155	.01	.01	.01	.00	.45	.01	.00	.02	.20	.08	.01	.00	.32
10. Final Math Grade	.080	10.0806	.00	.00	.44	.12	.18	.01	.00	.03	.11	.06	.02	.06	.00
11. Absences	.260	5.970	.00	.00	.01	.01	.00	.39	.03	.57	.00	.00	.04	.00	.02
12. Discipline Referrals	.260	5.970	.00	.00	.01	.02	.15	.02	.04	.02	.00	.00	.07	.01	.40
13. Years Retained	.058	12.673	.00	.00	.06	.09	.01	.00	.00	.01	.33	.59	.01	.14	.00

Finally, the assumption of a large data set was met in this study. The best method for logistic regression is a likelihoods ratio method. Using this method requires a sample size greater than 30. This study included 340 students, meeting the assumption of a large data set.

Research Question 2

In order to investigate Research Question 2 inquiring if the set of eighth grade predictor variables can accurately predict high school end status and test the null hypothesis that high school end status cannot be accurately predicted based on the set of eighth grade predictor variables, the initial logistic regression analysis included all variables. Using SPSS 19 (2010), logistic regression analyses were performed. All models produced by logistic regression are presented in Table 9 along with the Chi-square values, Nagelkerke's R-square values, and the classification success rate. The Chi-square and Nagelkerke's R-square indicated the significance of each added variable. Higher Chi-square values and Nagelkerke's R-square values approaching 1 indicated stronger significance and effect size (Statistical Solutions, 2009). The classification success rates reflected the model's predictive success in correctly identifying the criterion variable of end status (dropout or graduate).

To address Research Question 2 an initial list wise method of logistic regression analysis was performed. The list wise method included all variables. Based on this, Model 1 included all variables in this study and produced a Chi-square of 135.48, R-square of .601, and a classification success rate of 91.5%. However, not all variables were individually significant indicating the need for further analysis was appropriate.

Research Question 3

Subsequent logistic regression analyses were conducted to address Research Question 3, inquiring which predictor variables have a greater capacity for predicting high school end status, and to test the null hypothesis that none of the predictor variables have a greater capacity for predicting high school end status. A likelihoods ratio method of logistic regression analysis was implemented to determine the order of variables entering the model. Based on the first run of this analysis, model 2 included the number of years retained as this predictor variable possessed the greatest predictive power producing a Chi-square of 55.652 and an R-square of .276 and a classification success rate of 89.4%. Model 3 added the predictor variable discipline referrals. This model produced a Chi-square of 94.254 and an R-square of .442 with a classification success rate of 92.1%. Using likelihoods ratio method including all variables, model 3 produced the greatest classification success rate; subsequent models yielded lower classification success rates.

After removing the least significantly correlated variables (gender, gifted status, special education status, and CRCT reading), a second likelihoods ratio method of logistic regression analysis was performed. With this analysis, models 2 and model 3 were identical to the first analysis. However, model 4 contained the variables number of years retained, discipline referrals, and enrollment in the free and reduced meals program. This model yielded a Chi-square of 108.01, an R-square of .497, and a classification success rate of 91.5%. In model 5, the final math class grade variable was added and yielded a Chi-square of 116.06, R-square value of .528, and a classification success rate of 90.6%. The CRCT math score variable was added to model 6 producing a Chi-square

of 119.69, R-square of .543, and a classification success rate of 91.2%. Model 7 included absences, and the results were a Chi-square of 124.47, R-square of .560, and a classification success rate of 91.5%.

Subsequent analyses adding and removing variables yielded only two models with a classification success rate equal to or greater than those in models 1 through 7. Model 8 included eight variables (CRCT math, final math grade, final English grade, discipline referrals, number of years retained, absences, enrollment in the free/reduced meals program, and special education status) and produced a Chi-square of 132.19, R-square of .589, and a classification success rate of 92.1%. Finally, all eight models were significant at the .05 level; however, not all individual variables within the models were significant.

Table 9

Logistic Regression Models Based on Likelihoods Ratio Method (N = 340)

Model	Chi-Square	Nagelkerke's R-square	Classification Success Rate
Model 1 All Predictor Variables	135.48	.601	91.5%
Model 2 Years Retained	.652	.276	89.4%
Model 3 Years Retained Discipline Referrals	94.254	.442	92.1%
Model 4 Years Retained Discipline Referrals Free/Reduced Meals	108.01	.497	91.5%
Model 5 Years Retained Discipline Referrals Free/Reduced Meals Final Math Grade	116.06	.528	90.6%
Model 6 Years Retained Discipline Referrals Free/Reduced Meals Final Math Grade CRCT Math	119.69	.543	91.2%
Model 7 Years Retained Discipline Referrals Free/Reduced Meals Final Math Grade CRCT Math Absences	124.47	.560	91.5%
Model 8 8 Variables	132.19	.589	92.1%

Goodness-of-Fit

Peng et al. (2002) recommended that proper reporting of logistic regression results presents adequate information regarding goodness-of-fit statistics. Therefore, for each model reported, the Hosmer and Lemeshow (H-L statistic) goodness-of-fit Chi-square value and the *p* value were reported (see Table 10). If the H-L goodness-of-fit test value is large, then there is a lack of fit of the model, and data does not adequately fit the model (Peng et al., 2002). If the *p* value is less than .05, then the null hypothesis is rejected and there is insufficient evidence of a good fit of the model. If we fail to reject the null hypothesis ($p > .05$), then there is sufficient evidence of goodness-of-fit for the model (Statistical Solutions, 2009). Based on the H-L statistic, models 2 through 5 lacked a fit to the data, and therefore, were not suitable models for further consideration in this study.

Table 10

Hosmer and Lemehow Goodness-of-Fit Test (N = 340)

Model	H-L Statisitc	significance
1	5.180	.738
2	.000	.000
3	32.017	.000
4	17.643	.003
5	15.947	.007
6	10.613	.060
7	9.372	.312
8	8.074	.426

Analysis of Models

For each model, the most meaningful measure was the odds ratio, also known as the exp *b*. The odds ratio for continuous predictor variables "estimates the change in the odds of membership in the target group for a one-unit increase in the predictor" (Wright, 1995, p. 223). For categorical predictor variables, the odds ratio "tells you how much more likely it is that an observation is a member of the target group rather than a member of the other group" (Wright, 1995, p. 225). If the odds ratio for a predictor variable is greater than 1, this suggests that odds of the outcome occurring increases for that predictor variable. On the other hand, if the odds ratio is less than one, the odds of the outcome occurring decrease as the predictor variable increases. An easy way to understand odds ratio less than one is to divide one by the odds ratio number. For example, in this study the outcome value of one equaled graduation. One way to view an odds ratio is to state that the ratio of students who graduate to those who are retained one year is 1:.083. If this ratio is divided it equals 12.05. Therefore, it can also be reported that in model 6 students who have been retained one year were 12.05 times more likely to drop out of high school. Tables 11, 12, 13, and 14 present the logistic regression analyses for models 1, 6, 7, and 8 respectively.

Table 11

Significance of Individual Predictors in Model 1 (N = 340)

Variable	*B*	*Wald*	*p*	Odds ratio
Constant	3.084	3.322	.068	.046
Years retained	-2.807	17.906	.000	.060
Discipline	-.138	9.532	.002	.871
Free/Reduced Meals Program	-1.260	6.845	.009	.284
Final Math Grade	-1.235	3.754	.053	.291
CRCT Math	-1.208	3.849	.050	.299
Absences	-.087	3.706	.054	.917
Gender	.527	1.082	.298	1.694
CRCT Read	-1.038	1.649	.199	.354
CRCT English	-.064	.007	.933	1.066
Final English Grade	-1.051	3.031	.082	2.860
Special Education Status	-1.310	3.149	.076	.270
Gifted Status	.245	.048	.827	.874

$\hat{Y}$ = 3.084 + -2.807 (years retained) + -.138 (discipline referrals) + -1.260 (enrollment in free/reduced meals program) + -1.235 (final math grade) + -1.208 (CRCT math score) + -.087 (absences) + .526 (gender) + -1.038 (CRCT read) + -.064 (CRCT English) + -1.051 (final English grade) + 1.310 (special education status) + .245 (gifted status).

Table 12

Significance of Individual Predictors in Model 6 (N = 340)

Variable	*B*	*Wald*	*p*	Odds ratio
Constant	1.576	7.549	.006	.206
Years retained	-2.486	20.641	.000	.083
Discipline	-.148	14.751	.000	.862
Free/Reduced Meals Program	-1.393	9.617	.002	.248
Final Math Grade	-1.242	4.641	.031	.289
CRCT Math	-.949	3.998	.046	.387

$\hat{Y}$ = 1.576 + -2.486 (years retained) + -.148 (discipline referrals) + -1.393 (enrollment in free/reduced meals program) + -1.242 (final math grade) + -.949 (CRCT math score).

Table 13

Significance of Individual Predictors in Model 7 (N = 340)

Variable	*B*	*Wald*	*p*	Odds ratio
Constant	2.463	11.595	.001	.085
Years retained	-2.187	15.296	.000	.112
Discipline	-.138	11.783	.001	.871
Free/Reduced Meals Program	-1.233	7.241	.007	.292
Final Math Grade	-1.101	3.602	.049	.332
CRCT Math	-1.084	4.899	.027	.338
Absences	-.091	4.675	.031	.913

$\hat{Y}$ = 2.463 + -2.187 (years retained) + -.138 (discipline referrals) + -1.233 (enrollment in free/reduced meals program) + -1.101 (final math grade) + -1.084 (CRCT math score) + -.091 (absences).

Table 14
Significance of Individual Predictors in Model 8 (N = 340)

Variable	*B*	*Wald*	*p*	Odds ratio
Constant	1.893	6.010	.014	.151
Years retained	-2.678	17.895	.000	.069
Discipline	-.121	9.264	.002	.886
Free/Reduced Meals Program	-1.240	7.013	.008	.289
Final Math Grade	-1.192	3.490	.062	.304
CRCT Math	-1.045	3.871	.049	.352
Absences	-.076	2.875	.090	.927
Final English Grade	-1.171	3.973	.046	.310
Special Education Status	-1.110	2.586	.108	3.309

$\hat{Y}$ = 1.893 + -2.678 (years retained) + -.121 (discipline referrals) + -1.240 (enrollment in free/reduced meals program) + -1.192 (final math grade) + -1.045 (CRCT math score) + -.076 (absences) + -1.171 (final English grade) + -1.110 (special education status).

Summary

The number of years retained was determined to have the highest correlation (-.493) to the criterion variable and was also determined through logistic regression analysis to possess the single largest power (12.05) for predicting high school dropouts. While not as highly correlated, the number of discipline referrals demonstrated a very high predictive power. Although absences were highly correlated with graduate end status (-.328), this variable was not determined to have predictive power based on not being found significant in the logistic regression models. Using SPSS 19 (2010), logistic regression analysis produced four models that were found to be significant predictor models for predicting high school dropouts. In Chapter Five, the models are discussed, and conclusions and implications are derived from the models.

CHAPTER FIVE: DISCUSSION

Chapter Five begins with a summary of the study, overview of the problem, and review of the methodology. Most importantly, Chapter Five presents conclusions and implications based on the findings of this study. Finally, Chapter Five concludes with limitations and delimitations, followed by recommendations for future research.

Summary of the Study

This study examined a set of predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number) in order to determine whether or not student end status (dropout or graduate) can be predicted based on eighth grade data. Data from 340 students who entered the ninth grade in August 2005 in a northwest Georgia school district was collected and analyzed. Of the 340 students, 294 graduated and 46 dropped out by May 2009.

Overview of the Problem

With federal requirements (i.e., NCLB, 2001) to increase graduation rates, school systems must seek ways to identify students at risk for dropping out of high school in order to provide early intervention. Researchers (see Dynarski et al., 2008; Jerald, 2006; Rumberger, 2005; Smink & Schargel 2004) recommend that local districts develop diagnostic tools to identify potential dropouts. In following this recommendation, districts need to use data systems to determine which variables have predictive power in determining high school dropouts within the local community (Dynarski et al., 2008; Olson, 2006; Neild et al., 2007).

A review of the literature revealed that many factors contribute to a student's probability of dropping out of high school; however, few studies have examined the use of these risk factors in developing a predictive model for identifying at-risk students (Gleason & Dynarski, 2002). Based on recommendations to use data from the local system (Dynarski et al., 2008; Georgia Department of education, 2007b; Jerald, 2006), predictor variables maintained in the local system's database were used to develop a model for identifying students at risk for dropping out.

Purpose

The purpose of this study was to develop a predictive model for the selected northwest Georgia school district, similar school districts, and districts with individually similar predictive populations (i.e., special education, gifted, high population of Caucasian students,) to identify potential high school dropouts based on eighth grade student data records. Many factors have been identified as contributing to students dropping out of high school. The identified factors in this study are referred to as predictor variables. For purposes of this study, the predictor variables were (a) Criterion-Referenced Competency Test (CRCT) English scores, (b) CRCT math scores, (c) CRCT reading scores, (d) gender, (e) final course math grade, (f) final course English grade, (g) student status (special education, gifted, none), (h) number of absences, (i) number of discipline referrals, (j) number of times a student has been retained, and (k) enrollment in the free/reduced meals program. The effect of these factors on the criterion variable (high school dropout or high school graduate) was analyzed using correlation and logistic regression analyses. The intent of this study was to use school-based data for the early identification of students at-risk for dropping out of high school.

Review of Methodology

This quantitative nonexperimental study used correlation analysis and logistic regression analysis to develop a predictive model for identifying potential dropouts based on eighth grade data in a district in northwest Georgia. The predictor variables examined included CRCT scores in English, reading, and math, gender, final course math grade, final course English grade, student status (special education, gifted, none), number of absences, number of discipline referrals, past grade retention, and enrollment in the free/reduced meals program. These variables were identified in the literature as predictive of dropping out of high school and were available through the local school district database.

The study included 340 students (graduates = 294; high school dropouts = 46) who entered ninth grade in August 2005 and thus were expected to graduate in the spring of 2009. In August 2010, data were collected from the northwest Georgia school district. In total, data for 525 high school graduates and 112 high school dropouts was available. The data was coded, incomplete datasets were removed (n = 185), assumptions for logistic regression analysis were tested, and data was analyzed using correlation and logistic regression analysis techniques.

Findings and Discussion

Conclusions and a discussion of the results in Chapter Four were based on three research questions that provided the foundation of this study.

Research Question 1

Research Question 1: What is the nature of the relationship between dropping out of high school and the predictor variables in eighth grade (CRCT English, math and

reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

To answer Research Question 1, a correlation analysis was performed to test the null hypothesis that there is no statistically significant relationship between dropping out of high school and the eighth grade predictor variables. For number of absences and the number of discipline referrals, Pearson's *r* correlation coefficient indicated $p > .05$ between the number of absences and gender, the number of absences and gifted status, the number of absences and special education status, and the number of discipline referrals and enrollment in the free and reduced meals program. For these four relationships, the null hypothesis failed to be rejected and there was no significant relationship. For all other variables a $p < .001$ was produced, which resulted in rejecting the null hypothesis and concluding that a significant relationship existed between absences and discipline and the other predictor variables (i.e., CRCT English, math and reading scores, gender, final course math grade, final course English grade, and number of times a student has been retained).

The 10 categorical variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of times a student has been retained, and enrollment in the free/reduced meals program) were analyzed using phi correlation coefficients. When *p* values were examined, the null hypothesis was rejected in most cases. Most importantly the null hypothesis was rejected with end status and every variable. A significant

relationship was indicated with end status and the following variables $p < .001$ level: (a) number of years retained, (b) final math grade, (c) CRCT math score, (d) number of discipline referrals, (e) final English grade, (f) number of absences, (g) enrollment in the free/reduced meal program, (h) CRCT English score, (i) CRCT reading score, and (j) gender. At $p < .05$, the remaining variables were found to be significantly related to end status including special education status and gifted enrollment status.

In terms of correlation analysis, this study supports prior research suggesting that risk factors including gender (Crowder & South, 2003; Ensminger & Slusarcick, 1992; Laird et al., 2007; Rumberger, 1987), poverty (Hammond et al., 2007; Kaufman et al., 2001; Wood, 1995), poor academic performance (Janosz et al., 1997; Jimerson et al., 2002; Stroup & Robbins, 1972; Woods, 1995), and personal characteristics (Balfanz et al., 2007; Battin-Pearon et al., 2000; 2007; Jerald, 2006; Jordon et al., 1999; Newcomb et al., 2002; Rumberger & Lim, 2008; Suh & Suh, 2007) are correlated with an increased risk of dropping out of high school.

Research Question 2

Research Question 2: Can high school end status (dropout or graduate) be accurately predicted based on a set of eighth grade predictor variables (CRCT English, math and reading scores, gender, final course math grade, final course English grade, student status [special education, gifted, none], number of absences, number of discipline referrals, number of times a student has been retained, and enrollment in the free/reduced meals program)?

To answer Research Question 2, logistic regression analysis was utilized to test the null hypothesis that high school end status cannot be accurately predicted based on

the set of eighth grade predictor variables. Based on the set of 12 predictor variables, model 1 was 91.5% successful in predicting student end status. Upon goodness-of-fit testing using Hosmer and Lemeshow Chi-Square values, model 1 was deemed a good fit for predicting high school end status (dropout or graduate).

Similar to prior research of predictor sets of variables (Balfanz et al., 2007; Gleason & Dynarksi, 2002; Vaughan, 1992; Vickers, 2007), these four models included the following variables: (a) number of years retained, (b) number of discipline referrals, (c) free/reduced meals program, and (d) final math grade. However, contrary to prior research, CRCT math scores were also included in the best predictor models in this study.

Research Question 3

Research Question 3: If high school end status (dropout or graduate) can be predicted accurately, which predictor variables offer the most predictive value?

In order to answer Research Question 3, further review of the logistic regression analysis was required to test the null hypothesis that none of the predictor variables have a greater capacity for predicting high school end status. Seven models were created that accurately predicted high school end status (dropout or graduate) with a success rate above 90%. Based on the H-L goodness-of-fit values, models 6 through 8 provided a good fit for predicting student end status. In determining the variables that produced the greatest capacity for predicting end status, it was important to examine classification success rate as well as individual predictor variable significance. Based on this evaluation, model 8 was rejected because each model had $p > .05$ for one or more predictor variable. This indicated that the variables in the three models were not significant, resulting in a failure to reject the null hypothesis.

In models 6 and 7, all of the predictor variables were significant at the $p < .05$ allowing the null hypothesis to be rejected. However, the H-L goodness-of-fit statistic indicated that model 7 was a better fit than model 6. Therefore, model 7 was concluded to be the best model for predicting high school student end status. The overall classification success rate for this model was 91.5% and included six variables: (a) the number of years retained, (b) number of discipline referrals, (c) enrollment in the free/reduced meals program, (d) eighth grade final math grade, (e) CRCT math score, and (f) absences. The following is the regression equation for model 7:

$\hat{Y}$ = 2.463 + -2.187 (years retained) + -.138 (discipline referrals) + -1.233 (enrollment in free/reduced meals program) + -1.101 (final math grade) + -1.084 (CRCT math score) + -.091 (absences).

In all models, number of years retained possessed the greatest predictive power, which is consistent with prior research (Cairns et al., 1989; Jimerson et al., 2002; Montes & Lehmann, 2004; Slavin & Madden, 1989; Woods, 1995). Using model 7, students who had been retained one year were 8.91 times less likely to graduate from high school. Failing eighth grade math resulted in a student being 3.01 times less likely to graduate. This is also consistent with prior research finding course failures to be highly predictive of high school end status (Rumberger & Arellano, 2007; Silver et al., 2008).

Very significant in this study was enrollment in the free/reduced meals plan, which was used as an indicator of socioeconomic status. Students who were enrolled in this service were 3.42 times less likely to graduate from high school. This is consistent with similar findings reported in previous studies (Hammond et al., 2007; Kaufman et al., 2001).

Also consistent with prior research was the significance of discipline (Battin-Pearon et al., 2000; Newcomb et al., 2002; Rumberger & Lim, 2008; Suh & Suh, 2007). In the selected model, an increased number of discipline referrals resulted in a student being 1.15 times less likely to graduate. Absences were also found to be a significant predictor in this study, mirroring findings from prior research (Allensworth & Easton 2007; Balfanz et al., 2007; Rumberger & Lim 2008; Silver et al., 2008). Students who had a higher number of absences were 1.10 times less likely to graduate from high school.

One point of interest was found with standardized test scores. Findings from this study found that passing the CRCT math test to be a significant predictor variable for high school end status. There is conflicting research on the significance of standardized tests (Balfanz et al., 2007; Lamm et al., 2005; Reardon & Galindo, 2002). Lamm et al. reported that students who scored greater than 65% on standardized math and science tests had a 95% graduation rate. However, Balfanz et al. reported that standardized test scores were only predictive of dropping out for the lowest 10th percentile. Similarly, Reardon and Galindo (2002) found the predictive value of eighth grade standardized test scores only for students who scored two standard deviations below the mean.

Implications and Discussion

As schools in Georgia strive to meet the educational needs of students, the schools must also make Adequate Yearly Progress (AYP). In order to do this, high schools must increase graduation rates to an unprecedented 100% by the year 2014 (see NCLB 2001). The only way this will become possible is by early identification and intervention of at-risk students.

The focus of this study was to develop a model for identifying at-risk students in a northwest Georgia school district based on eighth grade local data to identify potential high school dropouts as recommended by the American Diploma Project Network (Jerald, 2006) and the Georgia Department of Education (2007b). However, this is only the first step. The subsequent steps are to utilize the model to identify at-risk students, and then most importantly, to develop an intervention plan for these students.

Once students are identified as at-risk, it is imperative that schools strive to meet the individual needs of these students by providing interventions promoting student success at the high school level. Whatever the intervention, it is imperative that interventions be individualized and student focused. As discussed in Chapter Two, a multi-dimensional approach favors parent involvement (Bridgeland et al., 2006), guidance through transition from middle school to high school (Edwards & Edwards, 2007), changes in classroom instruction (Karlinsky, 2008; Smink & Schargel, 2004; Stanley & Plucker, 2008), providing support systems (Edwards & Edwards, 2007; Karlinsky, 2008; Smink & Schargel, 2004), and alternative schooling to address the varying needs of at-risk students (Bridgeland et al., 2006; Edwards & Edwards, 2007; Smink & Schargel, 2004).

The studied district created a graduation task force in 2009 consisting of middle school and high school principals and graduation coaches. Based on the findings of this study, it is imperative that the issue of dropping out of high school be viewed as a K-12 issue. In addition to the middle and high school principals, primary school and elementary school principals should also be part of the task force. With all stakeholders

on the graduation task force, the following interventions efforts are worthy of consideration and implementation:

1. Involve parents by establishing positive and frequent communication practices, by developing an open door policy to parents, and by working collaboratively with parents to resolve problems.
2. Require remediation programs in reading and mathematics for students at all grade levels when course grades or CRCT scores do not indicate academic proficiency.
3. Implement an advisement program within schools that promotes individual and personal relationships between students and at least one adult in the building.
4. Assign personnel (e.g., guidance counselors and graduation coaches) to work with at-risk students to develop personal goals, graduation plans, life skills, and to provide individualized guidance.
5. Conduct multiple transition events with feeder schools to ensure at-risk students are acclimated to the new school.
6. During transition years, purposefully create a schedule for students with the most effective teachers, smallest class sizes, and if necessary remedial courses.
7. Develop a district wide homework policy that delineates the purpose of homework and describe best uses of student homework.

8. Implement a district wide grading policy in which students are assigned the grade of incomplete until the learning standard is met and a passing grade is achieved.
9. Offer creative scheduling options (e.g., intercession programs during holiday breaks) for students to catch up on course work.
10. Plan opportunities for students to explore post secondary education options and possible careers.
11. Increase accessibility to credit recovery programs.
12. Expand the alternative school options with nontraditional school hours, with course offerings, and with instruction delivery models.
13. Offer individual and/or small group programs focused on anger management, conflict resolution, and drug and alcohol prevention.

Of primary importance is to involve the parents. High schools tend not to be a parent friendly environment. As a result, parental involvement wanes during high school. In order to improve this trend, schools need to establish programs that positively encourage parents to connect to the school and work collaboratively for the child's benefit. Parents require frequent communication and feedback. Developing relationships among the school, parents, and the student will enable all parties to work together to resolve problems.

Moreover, the transition from middle school to high school is a challenging experience for many students (Edwards & Edwards, 2007). For this reason, high schools must seek ways to ease the transition experience. Successful transition programs begin during the eighth grade year and involve the parents, students, and teachers from both

schools in an effort to acclimate students to high school. During the multiple events, the students' fears, academic concerns, social needs, and emotional needs are addressed (Edwards & Edwards, 2007). Students are presented with information and expectations of high school. Eighth graders and their parents are given the opportunity to tour the high school campus. Most importantly, students begin to build relationships with teachers and counselors who will serve as their advocates in high school.

Whether through professional development or mentor programs within the schools, teachers need to know, understand, and implement active learning strategies to improve classroom instruction and homework (Stanley & Plucker, 2008). Research indicates that students tend to drop out when they are bored in the classroom (Bridgeland et al., 2006; Yazzi-Mintz, 2007). To reduce this tendency, classroom instruction and homework must be purposeful, relevant and meaningful. Students also tend to dropout when they fall behind academically (Bridgeland et al., 2006; Finn, 1989). Therefore, it is important for schools to identify at-risk students offer remedial programs to help students perform on grade level.

A significant number of high school dropouts report a lack of teacher and adult support within the school (Bridgeland et al., 2006; Karlinsky, 2008). Many at-risk students are the students who need the most individualized attention and support, yet high schools are notorious for being impersonal. Therefore, high schools need to ensure that each student has a strong connection with at least one caring adult in the school by creating homerooms, advisement programs, or other situations where students have meaningful contact with an adult in the building on a regular basis.

Schools can get the community involved with at-risk students through mentoring and tutoring programs. Not only do these interventions allow students to receive much needed support, they provide opportunities for the schools to connect with community members. It also gives students an opportunity to build trusting relationships with adults who care about them (Bridgeland et al., 2006; Smink & Schargel, 2004).

Alternative schooling offers students unique opportunities to receive a high school education in a more conducive learning environment. Alternative schools may offer nontraditional school hours, create alternative graduation paths, or provide alternative instructional models such as online learning. There are a variety of alternative schools offering summer programs, social behavior programs, unique programs such as special job skills and/or programs that focus on students' interests (Bridgeland et al., 2006; Edwards &Edwards, 2007; Smink & Schargel, 2004).

Limitations and Delimitations to the Study

There were two primary limitations to this study related to the availability of the data from the school district under study and its demographics. Due to the accessibility of data, the sample in this study was taken from one public school district in northwest Georgia. Furthermore, the population in this school district is 91% Caucasian, and its student enrollment in the free and reduced meals program (43%), which is indicative of socioeconomic status, is lower than the state average (53%) (The Governor's Office of Student Achievement, 2009). Therefore, this study is not fully generalizeable to other school districts with different demographics.

Even though there is a multitude of predictor variables identified in the literature as being predictive of dropping out of high school, this study was delimited to variables

available through the local school data records. Twelve predictive variables in student data records that were identified in the research were available for this study.

Additionally, only students whose high school end status (dropout or graduate) were coded were included in this study. Furthermore, only students with complete data records for the predictor variables were included in this study. Logistic regression analysis requires the removal of incomplete data sets (Field, 2009). Therefore, 327 data sets were removed, thus reducing this study's sample size from 667 students to 340 students. The removal of students with incomplete data created a sample that did not accurately reflect the graduation rate (77.4%) of the school district in 2009. High school dropouts in this study were more likely to have incomplete data sets than high school graduates creating an inflated graduation rate of the sample. The graduation rate of the sample in this study was 86.5%. As a result, the sample in this study was not a true representative sample of the district and potentially skewed the findings in this study. Lastly, this study relied on the consistency and the accuracy of record keeping and record transfer by the school district.

Recommendations for Further Research

The concern of high school dropouts has been in the forefront of educational research and school reform for nearly 40 years. However, the issue remains one of concern. There are hundreds of reasons for dropping out of high school. While this study focused on school data variables, there is a need for further research in several areas. The following recommendations for further research are suggested as areas to extend the current research base:

1. As with any study, it bears replication in order to determine its accuracy and viability. This study should be replicated in school districts with similar demographics.
2. A follow-up study testing the model developed in this study should be conducted in order to determine its efficacy in practice.
3. Numerous studies, including this one, have been limited by data availability and accessibility. If the high school dropout issue is to be addressed on a large scale, then educational organizations from the local district to the state and federal level need comprehensive and compatible data collection methods as well as operational definitions for coding data. A study is needed at a large scale with reliable unbiased data to analyze.
4. The original intent of this study was to examine fifth grade data as well. However, data keeping became a limiting factor (i.e. the district could not provide fifth grade data such as final course grades, number of absences, number of discipline referrals, and enrollment in the free/reduced meals program). Extending this research to fifth grade data would allow middle schools to identify and intervene with at-risk students as early as sixth grade.
5. A longitudinal study of student data from kindergarten to graduation could allow educational personnel to determine the characteristics of potential at-risk students. The earlier school personnel are able to recognize at-risk behaviors, the sooner interventions can be provided to at-risk students.
6. In recent years, several high schools have created smaller learning communities such as freshmen academies. A study investigating the effect of

the smaller learning communities on the high school dropout rate would be noteworthy.

Conclusion

Using logistic regression analyses, this study produced a final model that generated a 91.5% classification success rate for predicting high school dropouts for this school district. The model included six significant predictor variables (listed in order of significance): (a) the number of years retained, (b) number of discipline referrals, (c) enrollment in the free/reduced meals program, (d) eighth grade final math grade, (e) CRCT math score, and (f) absences. The findings in this study were consistent with prior research except standardized math test scores were found to be significant, which disconfirmed findings from previous studies. Most significantly, these findings provide the local school district in this study a highly predictive model (91.5% classification success rate) for identifying students at risk for dropping out of high school. This will allow school personnel to strategically implement interventions and supports that might promote student success, which not only improves the school's opportunity to meet federal requirements, but most importantly, positively influences the course and post high school outcomes of these young peoples' lives.

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APPENDIX A

LIBERTY
UNIVERSITY

Center for Counseling and Family Studies

July 30, 2010

IRB Approval 859.060110: Identifying Middle School Students At-risk for Dropping Out of High School

Dear Lisa,

We are pleased to inform you that your above study has been approved by the Liberty IRB. This approval is extended to you for one year. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. Attached you'll find the forms for those cases.

Thank you for your cooperation with the IRB and we wish you well with your research project.

Sincerely,

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