ABSTRACT

PATTON, BESS LLEWELLYN  An Examination of the Ability of High School Wealth and Academic Preparation to Predict First Year Retention of African American and White Students Enrolled in the North Carolina Community College System Associate Degree of Nursing Programs. (Under the direction of Duane Akroyd and Susan Barcinas.)

The framework for this study used Tinto’s (1975) theoretical framework for student persistence and incorporated the examination of high school wealth, the absence of poverty, as measured by the percentage of students receiving Federal Free and Reduced Lunch, along with North Carolina Department of Public School performance measures, academic performance on the ACT College Readiness Exam, and student demographic characteristics, age, race/ethnicity, and gender, as predictors of retention in the North Carolina Community College System Associate Degree in Nursing programs. Seventeen community colleges participated in this study; the sample contained 400 North Carolina public high school graduates. Using logistic regression, this study found that older students and African American students were at greater risk of attrition than younger students or White students. Additional examination of the data found that the majority of African American students enrolled in the associate degree in Nursing programs attended North Carolina public high schools of lower wealth and with a lower percentage of students passing the Reading component of the ACT College Readiness Exam than their White counterparts. Ultimately, the findings from this investigation will serve as a preliminary needs assessment for North Carolina’s community colleges to provide all students with the opportunity to pursue the American Dream while diversifying the nursing workforce to better mirror the population and meet the diversity goals of the Institute of Medicine.
An Examination of the Ability of High School Wealth and Academic Preparation to Predict First Year Retention of African American and White Students Enrolled in the North Carolina Community College System Associate Degree of Nursing Programs

by
Bess Llewellyn Patton

A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Education

Adult and Community College Education

Raleigh, North Carolina
2015

APPROVED BY:

________________________________________  _______________________________________
Duane Akroyd                          Susan Barcinas
Committee Co-Chair                     Committee Co-Chair

________________________________________  _______________________________________
Michelle Bartlett                      Saundra Williams
DEDICATION

This is dedicated to my mother, Laurel, and in the memory of my father, Tom.

You taught me to Persevere!

Thank You!
BIOGRAPHY

Bess Llewellyn Patton is a lifelong resident of the Great North State. Growing up in eastern North Carolina, she graduated from Farmville Central High School. A first generation college student, she attended Meredith College where she completed a double major in Business Administration and Political Science in three years. A member of the inaugural class, she received her Master of Business Administration from Meredith College. With an entrepreneurial spirit, she owned and operated small business enterprises in Farmville and served as an active member and officer in community, civic, and business organizations focused on improving the quality of life for the residents of her hometown and the surrounding area. Later, Bess enrolled in the community college to prepare for admission in a competitive entry medical program of study. Disappointed and dissatisfied with the educational experience at the community college she rescinded her seat and pursued a Master in Adult Education from East Carolina University to learn how to improve the student learning experience at the community college. Following graduation, Bess taught in the North Carolina Community College System and entered administration, leading the Business and Computer Technologies Department at one college. It was during this period she became aware of the inadequate academic preparation recent high school graduates brought to her college transfer courses. Desiring to be part of the solution, Bess enrolled in NC State’s Adult and Community College Education doctoral degree program to gain the knowledge and skills necessary to be an agent of change. Her goals are to assist community
colleges in developing a culture of retention while preparing students for academic success and the world of work.
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CHAPTER 1

The recent Associated Press series, *America at the Tipping Point: The Changing Face of a Nation*, described the gradual decline in the number of non-Hispanic Whites in the United States and an associated increase in minorities (Associated Press, 2013). The report projects that somewhere around the year 2043 Whites will be in the minority. The United States Census Bureau (2012) also supports this general shift of the minority population.

The Institute of Medicine’s (IOM) report, *Future of Nursing: Leading Change*, (IOM, 2011) reported that nursing, the largest component of health care workers in the United States, needs to place greater emphasis on increasing the diversity of the workforce. The United States Department of Health and Human Services Administration, Health Resources and Service Administration (HRSA), in its recent survey of registered nurses (RN) (2010), reported that minorities constitute only 16.8% of the registered nursing workforce in 2008 (HRSA, 2010). Although the report indicates that minority representation in nursing has increased from 12.5% in 2000 to 16.8% in 2008 (HRSA, 2010), the racial distribution of the RN population is substantially different from the U.S. population, which consists of 37% minorities (U.S. Census Bureau, 2012).

Like the nation, North Carolina’s RN workforce fails to mirror the diversity of the population. Of the 122,223 RNs licensed in the state (North Carolina Board of Nursing, 2014a) 8.8% are African American, while the state’s percentage of that group in the general population is 22% (U.S. Census Bureau, 2013). Although these disparities appear in other
racial groups, African Americans constitute the largest racial-minority group in nursing in North Carolina (North Carolina Board of Nursing, 2014a).

In addition to the need to diversify the RN workforce, North Carolina is also facing a future health care crisis with a potential shortage of 20,000 nurses by 2030 (Juraschek, Zhang, Ranganathan, and Lin, 2012; North Carolina Office of State Budget Management, 2013). The North Carolina Institute of Medicine (NCIOM) acknowledged the anticipated RN workforce shortage would reduce future access to primary and preventative care in the state (2013). Currently 70 of the 100 counties located in rural regions in North Carolina are medically underserved (NCIOM, 2013) given the low numbers of doctors, dentists, nurses, and allied health care professionals in the rural service areas (McGee, Spero, Hadley, Groves, Gaul, and Fraher, 2011). However, with the exception of six counties, Burke, Chowan, Graham, Haywood, Lee, and Pasquotank, all other counties located in the state have federal Health Resources and Services Administration (HRSA) Medically Underserved Area (MUA) designation (HRSA, 2013).

A majority of nursing students are trained at associate degree granting institutions (AACN, 2012a, 2012b; Aiken, Cheung, and Olds, 2009; Jeffreys, 2012). In North Carolina, 65% of the RN workforce educated in the state earns an Associate Degree in Nursing (ADN) from one of the colleges in the North Carolina Community College System (NCCCS) (Fraher, Belsky, Carpenter, and Gaul, 2008). Unfortunately, ADN programs have a high student attrition rate when compared to BSN and Diploma Nursing programs (NCBON, 2014).
The most recent information from the North Carolina Board of Nursing (NCBON) confirms a high attrition rate for nursing students enrolled in North Carolina community colleges (2014). Using information for the cohort graduating from the nursing program in May 2013, the community college nursing completion rates ranged from a high of 100% to a low of 19.7%. For the same time period, NCCCS ADN programs had an average 55.2% on-time cohort completion rate; this completion rate is low compared to the completion rate for both the Bachelor of Science in Nursing programs, 76.8%, and the Diploma in Nursing programs, 65.3%, offered within North Carolina (NCBON, 2014).

**Statement of the Problem**

**Nursing Student Attrition**

To address the pressing workforce shortage issue and high rates of attrition in nursing, the NCCCS authorized the *Study of Associate Degree in Nursing Program Success*. On February 8, 2008, the North Carolina State Board of Community Colleges (SBCC) and the NCCCS authorized a study to learn more about their ADN student population given that the system educated the majority of the North Carolina RN workforce (Fraher et al., 2008; NCCCS, 2008; NCIOM, 2008; Ralls, 2008; SBCC, 2008a).

The Fraher et al. 2008 study followed 2,237 ADN students enrolled in an entry-level nursing course during the fall semester of 2002 at the 42 community college NCCCS ADN programs and identified three factors to measure program success: graduation, passing the NCLEX-RN™, and obtaining employment as a nurse upon receipt of licensure. The study
identified successful ADN students as being White, between the ages of 24 and 40, came from a higher socioeconomic status background, and possessed a high school diploma. Unsuccessful students were identified as either younger than 24 or older than 40, were of minority race, possessed a GED in lieu of a high school diploma, and received a Pell Grant. Table 1 provides the percentage point change in probability of on-time (three years) graduation by select student characteristics presented in the Fraher et al. 2008 study.

**Table 1**  
*Percentage Change in Probability of Graduation by Student Characteristics*

<table>
<thead>
<tr>
<th>Student Characteristic</th>
<th>Change</th>
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<tbody>
<tr>
<td>African American</td>
<td>-19.96% **</td>
</tr>
<tr>
<td>Other Race/Ethnicity</td>
<td>-18.57% *</td>
</tr>
<tr>
<td>Age 18-23</td>
<td>-14.14% **</td>
</tr>
<tr>
<td>Age 41+</td>
<td>-8.86% *</td>
</tr>
<tr>
<td>GED</td>
<td>-8.84% *</td>
</tr>
<tr>
<td>Pell Grant Recipient</td>
<td>-4.14% *</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>8.52% *</td>
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</tbody>
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*P < 0.05 ** P < 0.01  
Source: Fraher et al., 2008, p. 27.

Fraher et al. (2008) identified variables contributing to the ADN student failure to graduate on time. The most powerful predictor of completion was race. African Americans were 19.96 % less likely to graduate on time and all racial minority students were 18.57 % less likely to graduate on time compared to their White peers. Age was the next most powerful predictor for program completion since students under age 24 were 14.14 % less likely to graduate and students over age 41 were 8.86% less likely to graduate compared to students aged 24-40. All other factors were 9% or less in likelihood to graduate.
The fall 2002 NCCCS ADN cohort started with 2,237 students; 1,365 or 61% of the cohort graduated and became eligible to take the NCLEX-RN (Fraher et al., 2008). Only 41% of African American ADN students in the cohort graduated within three years of program commencement compared to a 65% graduation rate of their White counterparts in North Carolina community colleges (Fraher et al., 2008). While the overall attrition rate at the NCCCS nursing program was 39% for the 2002 cohort, the greatest impact seemed to fall on African American students. What factors led to this higher rate of attrition for African American ADN students in the NCCCS?

In recent persistence studies of community college nursing students, the findings confirmed that African American students were more likely to withdraw voluntarily (Jeffreys, 2007). Seago, Keane, Chen, Spetz, and Grumbach (2012) identified that being African American correlated with failure to complete the nursing program in a bivariate analysis followed by separate logistic regressions using one of two highly correlated predictor variables, on-time graduation and any-time graduation, to the outcome of persistence. Thus, race seems to be a powerful predictor of attrition from Associate Degree in Nursing programs.

However, Milner (2013) suggested that many educational studies purporting to study race actually study the impact of income: wealth and poverty. Perhaps the finding that being an African American was a barrier to completion was really a finding of low wealth or poverty (Fraher et al., 2008). For this reason, this study examined first year completion rates
along with high school quality and academic preparation for both African American and White students and compared the findings.

The literature on RN retention is primarily devoted to identifying success factors leading to graduation and NCLEX-RN™ passage for nursing students enrolled in BSN programs. Only a few studies focused on the associate degree in nursing student were located (Jeffreys, 2007; Seago et al., 2012; Seago, Wong, Keane, and Grumbach, 2008; Shelton, 2012). Given that a significant number of students do not complete nursing programs during the first year, the literature is sparse with studies focused on identifying barriers to first-year retention of nursing students studying at the community college. While only a few research studies focused on African American nursing student retention were located (Coleman, 2008; Seago and Spetz, 2005; Wong, Seago, Keane, and Grumbach, 2006), they did not compare the findings for African American and White nursing students to determine how retention factors may differ between the two groups.

Previous research on the associate degree in nursing student retention identified academic preparation as a predictor for success and completion of the nursing programs (Jeffreys, 2007; Seago et al. 2012; Seago et al. 2008; Shelton, 2012). Fraher et al. (2008) identified a problem with low completion rates for community college nursing programs located in low wealth communities. According to Fraher et al. (2008), low wealth communities and the community colleges located in these low wealth communities face multiple challenges including “high poverty rates, low quality schools, and other social challenges that leave students less well prepared for the academic requirements of ADN
programs and with little social support (p. 48). Consequently, students attending and graduating from public high schools in geographic areas with concentrated populations living in poverty may be at a disadvantage in their academic preparation and potentially for success in the nursing program (Fraher et al., 2008).

Fraher et al. (2008) suggested that the unequal quality of the North Carolina’s public school education system and low community wealth may be possible barriers to retention of students in the associate degree of nursing programs located in communities of low wealth. Since the Fraher et al. (2008) study, admission into the NCCCS ADN programs has changed from a practice of open admissions to a statewide merit policy in which admission is competitive and based on academic qualifications. Currently, only qualified applicants, determined by academic records including high school and college grade point averages and pre-admission testing results, for example, the Test of Essential Academic Skills™ (TEAS), are admitted into NCCCS ADN programs (NCBON, 2014). This change in admission standards would suggest current and future ADN students are better prepared academically for the rigors of the nursing curriculum and ADN students are more likely to complete the ADN program than the 2002 cohort examined by Fraher et al. (2008). However, overall completion rates for the NCCCS ADN programs remain relatively constant at 55-60%, and are similar to the 61% completion rate described by Fraher et al., 2008 (NCBON 2008, 2014b). (Note: The North Carolina Board of Nursing uses a two-year time frame to measure cohort completion rates while the Fraher et al 2008 study used a three-year time frame to measure the 2002 cohort completion rate.) Given the changes in admission policy at the
state’s community college associate degree in nursing programs since the Fraher et al., 2008 study, are high school quality and the resulting academic preparation factors that impact NCCCS ADN program completion?

**High School Quality**

North Carolina has 115 public school districts that are diverse in size; smaller, rural districts, such as Hoke County, have only one high school while Charlotte-Mecklenburg, one of the largest districts in the state, has 34 high schools (NCDPI, 2014d). The state legislature provides funds to each school district based on student population with small supplements for low wealth districts and sparsely populated districts (Public Schools Forum of NC, 2013). County revenue funds, based on the property tax, supplement the school districts creating inequity in funding for low wealth districts populated by people living in poverty. Some school districts in the state have implemented additional school taxes to provide additional resources to the schools (Public Schools Forum of NC, 2013). While most North Carolina public schools, charter schools are the exception, participate in the National School Lunch Program and provide free and reduced lunches to eligible students, schools serving high populations of students living in poverty, Title 1 schools, receive additional funding to support special education programs (US Department of Agriculture, 2014; US Department of Education, 2014).

In North Carolina, geographic location determines student school assignment and the school population mirrors the local population. Most school districts in North Carolina achieved unitary status and released from the Justice Department’s order of desegregation
that resulted in mandatory busing policies to create racially diverse schools (Reardon, Grewal, Kalogrides, and Greenberg, 2012). Consequently, children of all races now attend schools segregated by income; one in five North Carolina schools are considered high poverty schools (Aud, Wilkinson-Flicker, Kristapovich, Rathbun, Wang, and Zhang, 2013).

Recent research published by Aud et al. (2013), Ladd and Loeb (2013), Milner (2013), and Reardon et al. (2012) used the percentage of students receiving free and reduced lunch (FRL) through the National School Lunch Program to identify high poverty schools. The federal government requires schools to use FRL participation to identify disadvantaged students, or students living in poverty, in No Child Left Behind academic achievement reports (NCLB, 2001). Federal guidelines use family income to determine eligibility and participation in the FRL program; if family income is below the threshold, students are identified as living in poverty and are eligible to participate in the FRL program (USDA, 2014). Participation in the FRL program is voluntary, especially at the high school level, and the schools are responsible for certifying FRL eligibility and income verification (Harwell and LeBeau, 2010). Harwell and LeBeau (2010) argued that FRL participation should not be used to measure socioeconomic status, although they provide numerous examples in educational research that use it for that purpose. Nevertheless, FRL participation is the only measure of family income at the school level data collected and published by NCDPI; in this study, the FRL participation percentage represents the best estimation available of a school’s student population living with wealth or in poverty. Therefore, in this study, FRL participation defined a school’s wealth.
Palardy (2013) noted few studies exist that examined either the impact of high school quality on postsecondary outcomes or the association between a community’s wealth and academic attainment (Hill, 2008; Perna and Titus, 2005; Wolniak and Engberg, 2010). Furthermore, income inequities have increased resulting in school resegregation based on student wealth rather than race (Reardon, 2011). Milner (2013) concluded that schools educating high levels of students living in poverty lack equitable resources compared to those schools with wealthier student populations. This lack of resources leads those students, who are most in need of high quality teaching and learning experiences, to suffer from high teacher turnover and inexperienced teachers in the classroom (Ladd and Loeb, 2013). Clotfelter, Ladd, Vigdor, and Wheeler (2007) reported that teachers and principals employed at high poverty schools had lower scores on professional exams, had less years of experience, and attended less competitive schools than those employed at low poverty schools. School performance measures, including scores on statewide assessments, are lower for low wealth schools when compared to schools with wealthier student populations (Billings, Deming, and Rockoff, 2014).

One school performance measure used in North Carolina is the high school graduation rate with the goal to increase the high school graduation rate to 89% for the 2016-2017 academic year (NCSBE, 2014). North Carolina has increased the high school graduation rate by 20.7% between 2006, 68.3%, and 2013, 82.5%, while increasing graduation requirements (NCDPI, 2014b). Yet 69% of all 2011 high school graduates enrolling in the North Carolina Community College System needed at least one
developmental course to gain the skills needed for academic success (NCCCS, 2013).

Billings, Deming, and Rockoff (2014) found that students attending Charlotte-Mecklenburg schools with high racial minority student populations had lower academic achievement and were less likely to attend college. However, recent studies in Texas, with a Top 10% college admission policy, find that high achieving students from high poverty schools are initially successful in college (Black, Lincove, Cullinane, and Vernon, 2014).

Since 1998, North Carolina has implemented statewide assessments in reading and mathematics with additional assessments in core subjects at the high school (NC State Board of Education, 2000). In 2010, North Carolina adopted the ACT® College Readiness Exam for all high school 11th graders as a measure of student performance at the school level (NCDPI, 2012). The ACT® contains five sections: English, Math, Reading, Science, and Writing. The North Carolina Department of Public Instruction publishes, annually, the number of students taking the ACT® and provides percentage of students scoring at or above the benchmark pass point for each section along with the average composite score for each school (NCDPI, 2014c).

Past studies of schools serving low wealth student populations found these schools consistently produced student outcomes with low scores on the statewide assessments (Jackson, 2009; Michelson and Everett, 2008; Sirin, 2005). These low scores are attributed to the quality of teaching, measured by turnover and experience; student outcomes are a measure of school quality (Betts and Morell, 1999; Bifulco and Ladd, 2006; Clotfelter, Ladd, and Vigdor, 2013; Ladd and Loeb, 2013). Therefore, student outcomes, for example, as
measured by proficiency on the Reading portion of the ACT® College Readiness Exam, serve as a measure of high school quality (NCDPI, 2012). Strong reading skills are essential for successful completion of the nursing curriculum (Wolkowitz and Kelly, 2010; Abele, Penphrase, and Ternes, 2013).

In summary, past research indicates that school quality varies in North Carolina not only between school districts but also within school districts (Billings, Deming, and Rockoff, 2014; Clotfelter, Ladd, and Vigdor, 2013; Jackson, 2009; Ladd and Loeb, 2013). Districts across the state are funded inequitably according to the Public Schools Forum of NC (2013). Statewide performance measures such as those used by the North Carolina State Board of Education (2014c) and the North Carolina Department of Public Instruction can be used to identify school quality (Betts and Morell, 1999). Jackson (2009) found that schools serving low wealth student populations in the Charlotte-Mecklenburg school system produced lower student outcomes on statewide assessments while Billings, Deming, and Rockoff (2014) found lower academic achievement and low participation in college for students attending low wealth high schools in their examination of the Charlotte-Mecklenburg school system.

Outside of the Charlotte-Mecklenburg system, studies on North Carolina high schools have not examined the concept of high school quality and college participation or outcomes in low wealth communities. Finally, Fraher et al. (2008) expressed concerns for the low retention rates in community college nursing programs located in low wealth communities and suggested that the public schools in low wealth communities provide a lower quality of education than those located in higher wealth communities.
Academic Preparation

Retention studies of the ADN student identified academic preparation as essential for success in the nursing curriculum (Jeffreys, 2007; Seago, Keane, Chen, Spetz, and Grumbach, 2012; Seago, Wong, Keane, and Brumbach, 2008; Shelton, 2012). Student academic preparation, measured by statewide assessments, is the outcome of school quality and is a school performance measure (Betts and Morell, 1999). Another way to interpret academic preparation is at the student level.

Since 2001, North Carolina 8th grade students selected from a high school course of study to pursue which included the following: Occupational for special education students; Career Prep, for students planning to enter the workforce after high school graduation; College/Tech Prep, for students planning to enroll in the community college system; and College/University Prep, for students planning to enroll in a baccalaureate granting institution (Michelson and Everett, 2008). In North Carolina, the individual courses are offered at multiple levels with different degrees of rigor and exposure to content: regular, advanced, honors or academically gifted, advanced placement, and international baccalaureate (NCDPI, nd). Placement into the more rigorous course offerings is based on performance on end of grade or end of course statewide assessments and teacher recommendations (Michelson and Everett, 2008). North Carolina Department of Public Instruction redesigned high school educational preparation courses of study for students entering the ninth grade in 2012 (NCDPI, nd). The two courses of study are Future Ready...
Core and Future Ready Occupational with university bound students taking advanced level courses designated as Honors and Advanced Placement (NCDPI, n.d.; NCSBE, 2013).

There exists a large body of literature devoted to the educational tracking of minority children and children living in poverty enrolled in the public schools and their disproportionate placement into tracks with reduced rigor when compared to White students (Lucas and Berends, 2007; Michelson and Everett, 2008). Michelson and Everett (2008) found that African American students attending racially identified African American schools were more likely to enroll in the college preparation course of study than if they attended racially diverse schools or predominantly White schools. However, the courses offered at the racially identified African American schools were at a level of reduced rigor than offered at the other schools (Michelson and Everett, 2008). Likewise, African American students are often denied the opportunity to participate in academically and intellectually gifted (AIG) programs even if their end of grade test scores are as high or higher than scores for those admitted into the AIG program (Cratty, 2012). Taliaferro and Decuir-Gunby (2008) studied students enrolled in the career and technical education track and learned African American students rarely have the opportunity to participate in Advance Placement courses offered to students in the college preparation track. The result of placement of African American students into the lower tracks is reduced academic preparation for success in postsecondary educational opportunities for this student population (Michelson and Everett, 2008).

In 2006, Kirst and Venezia discussed the incongruity between high school graduation requirements and expectations of college readiness. They noted that the historical model of
providing college preparatory courses only to the students in the top 10 - 15% of the class and headed to the university was outdated since more than 60% of high school graduates participate in postsecondary education (Kirst and Venezia, 2006). The high need for remediation at the community college for recent high school graduates provides evidence that many high school graduates are academically unprepared for college (Perry, Bahr, Rosin, and Woodward, 2010).

Kirst and Venezia (2006) noted that the majority of high school graduates took courses in the career and technical education track or the general education track in lieu of the more rigorous college preparation track. NCDPI does not publish breakdowns for student enrollment by educational track but does provide the percentage of total course enrollments for both advanced college preparation (Advanced Placement, International Baccalaureate, community college, and university) and career and technical education (local school and community college) on each school’s annual report card (NCDPI, 2013). Schools in high wealth counties have the financial resources and student demand to provide numerous courses in advanced college preparation. Schools with lower levels of financial resources have reduced funding available for course offerings focused on advanced college preparation but they offer their students more courses in career and technical education (NCDPI, 2013).

The inequity in course offerings between wealthy schools and low wealth schools can be identified through an examination of the state’s school report cards (NCDPI, 2013). For example, East Chapel Hill High School, located in the highest funded school district, provided advanced college preparation courses accounting for 18% of total course
enrollments and career and technical education courses accounting for seven percent of total course enrollments during the 2012-2013 academic year (NCDPI, 2013). Southeast Halifax High, located in one of the lowest wealth school districts did not offer any advanced college preparation courses but career and technical education courses accounted for 15% of total course enrollments at the school for the same year (NCDPI, 2013). The state averaged six percent of total course enrollments in advanced college preparation courses and 15% of total course enrollments for career and technical education courses for the 2012-2013 academic year (NCDPI, 2013).

Deil-Amen and DeLuca (2010) focused on students in the high school career and technical education and general education programs and found most of the students were academically unprepared for collegiate work. In one of the few studies examining the high school preparation and college attendance in North Carolina (Billings, Deming, and Rockoff, 2014) students attending Charlotte-Mecklenburg schools with concentrated populations of students living in poverty had lower academic achievement and were less likely to attend college than their peers attending schools with more wealth. Deming, Hastings, Kane, and Staiger (2011) and Jackson (2009) also studied the Charlotte-Mecklenburg school system and reported similar findings.

Students enroll in the community college come with a diversity of entering educational credentials including high school diplomas, GEDs, and those who have a previous college degree (Cohen and Brawer, 2008). Fraher et al. (2008) identified the GED credential as a negative predictor for success in the NCCCS ADN programs. This study will
also examine students entering educational credentials and the findings will add to the
literature focused on the barriers and success factors leading to first year retention in the
associate degree of nursing programs offered by the community college.

In summary, the research indicates academic preparation is an important component
for student success in postsecondary education (Deil-Amen and DeLuca, 2010; Billings,
Deming, and Rockoff, 2014). An examination of high school report cards appearing on the
North Carolina Department of Public Instruction’s website reveal that the majority of North
Carolina high school students do not enroll in the academically advanced courses offered by
the state (NCDPI, 2013). Michelson and Everett (2008) reported that African American
students have fewer opportunities to participate in courses with higher rigor and greater
content compared to their White counterparts in an examination of the Charlotte-
Mecklenburg School System. As Kirst and Venezia (2006) noted, the general and vocational
educational tracks or curriculums have reduced rigor in the curriculum and fail to provide
high school graduates with the academic rigor necessary for success in college coursework.
With nearly 70% of the 2011 North Carolina high school graduates enrolling in the North
Carolina Community College System needing developmental coursework prior to beginning
college level courses, there appears to be a disconnect between the high school curriculum
and the college readiness expectations of community college instructors and administrators
(NCCCS, 2013). Additionally, students attending low wealth schools have reduced
opportunity to take Advanced Placement courses compared to their counterparts attending
wealthier schools (Michelson and Everett, 2008). No studies were located that were focused
on high school tracking (general education, career and technical education, and college preparation education) and postsecondary educational outcomes.

This study adds to the literature by examining the possible impact of student enrollment in one of the three educational tracks, and first year retention in the NCCCS ADN programs. To date, no one has examined the proportion of students admitted into the NCCCS ADN programs by high school educational track and its impact on retention. This study examined this variable to determine if educational tracking at the high school level is a barrier to first year retention in the NCCCS ADN programs.

**Conceptual Framework**

This study examined the impact of high school quality and academic preparation on first year retention for both African American and White nursing students enrolled in the NCCCS. The conceptual framework in this study was based on the findings presented in the community college and nursing retention literature and used Tinto’s (1975) interactionist model of academic and social integration of student persistence. The conceptual framework included three factors: high school quality, student academic preparation, and student demographics (Figure 1).
Retention Theory

Tinto’s theory of student retention was conceptualized in the 1970s when college campuses were populated by white males of traditional college age. Since the original publication, Tinto has continued to revise his theory to consider additional aspects of the model for student departure in different college settings and for diverse student populations (1982, 1987, 1988, and 1994). Yet, the primary constructs of Tinto’s 1975 theory and his revisions remain focused on the academic and social integration by the student into the institution. Consequently, much of the educational research on student departure remains focused on testing and validating the propositions of Tinto’s theory for relevance in today’s
diverse collegiate population and its applicability to students enrolled in postsecondary educational institutions.

Tinto (1975) theorized that all students are characterized by family background, individual attributes, and their pre-collegiate school experiences. They enroll in courses with goal and institutional commitment. While enrolled at the college, the student interacts with both the academic system and the social system. When engaged in the academic system, students develop intellectually and their performance is graded. Successful students integrate academically and reaffirm their goal commitment to degree attainment. Academically unsuccessful students reassess their goal commitment and have to make a decision to stay at the institution or leave. Since knowledge attainment does not take place in vacuum, positive social interactions with peers, groups, and faculty lead to social integration and assist the student in building institutional commitment. Students with low academic integration are asked to leave the institution; students with both low academic integration and low social integration withdraw voluntarily.

This study focused on one part of Tinto’s conception of academic integration: the impact of the precollege school experiences by examining the quality of the high school in conjunction with the student’s academic preparation. Tinto (1975) in his review of previous retention research noted that, “most research on dropout has focused on ability as demonstrated through grade performance in high school and has shown that it, too, is related to persistence in college (100). Tinto (1975), drawing on Astin (1971), continued with the following:
Measures of ability, as obtained on a standardized test and as demonstrated in high school grade performance, are, however, measures of different aspects of individual competence. Of the two, past grade performance tends to be the better predictor of success in college if only because it corresponds more closely to the individual's ability to achieve within an educational setting with social and academic requirements not too different from that of the college (p. 100).

Tinto (1975) provided the following passage to describe the student’s past educational experiences and its role in college persistence.

Although past educational experiences have not been explicitly referred to as being directly related to college dropout, it is clear that performance in high school, as measured either by grade-point average or rank in class, has been shown to be an important predictor of future college performance (Astin, 1971). Moreover, since it is also clear that the characteristics of the high school, such as its facilities and academic staff, are important factors in the individual's achievement (Dyer, 1968), it follows that they would also affect the individual’s performance and therefore persistence in college.

From the perspective suggested here, the characteristics of the high school are also important because they directly and indirectly affect the individual’s aspirations, expectations, and motivations for
college education (Nelson, 1972). As suggested first by Davis (1966) and later by Nelson (1972) and St. John (1971), the ability level of students in the school and the social status composition of the school affect not only the individual’s perception of his own ability, but also his expectations for future college education; in this sense, they affect his commitment to the goal of college completion (Tinto, 1975, p. 102).

Educational researchers have consistently focused on the importance of high school grade point average, and college placement exams as predictors of college performance (Astin, 1971, Tinto, 1975). However, it appears they have ignored the second part of Tinto’s (1975) message, to consider the characteristics of the high school and its qualities as an indicator of college performance as described by Davis (1966), Dyer (1968), Nelson (1972), and St John (1971) given the scarcity of this topic in the literature. One possible explanation for this failure to address high school quality might be the small percentage of high school graduates who matriculated to college in the past. Historically, only students within the top 10-15% of a high school graduating class furthered their education by attending college (Kirst and Venezia, 2006). Given that nearly 70% of high school graduates currently participate in postsecondary education (Deil-Amen and DeLuca, 2010), it is time to examine the additional factors described by Tinto (1975), qualities of the high school through the ability of the student body and school wealth, as predictors of a student’s collegiate achievement and retention.
It is important to remember that the traditional college student Astin (1971) and Tinto (1975) referenced in their work was 17-21 years of age, white, and male. During this period, college attendance was for the few individuals, those in the top 10% of their class academically, whose families had the financial ability and resources to pay the tuition, fees, and other expenses, including room and board, associated with attending college. Tinto’s college student of 1975 might barely recognize the diverse college of 2014 with students of all races, nationalities, ages, and gender participating in postsecondary educational opportunities.

Today’s recent high school graduate has strong expectations to participate in college: many high school graduates enroll at the community college with its open door policy and low cost (Cohen and Brawer, 2008) while the availability of financial aid and scholarship packages allows students in the top 10% of their class to attend the most selective colleges and universities (Niu and Tienda, 2013). Unfortunately, too many recent graduates learn their high school education has not prepared them for college level work as evidenced by the large numbers of students enrolled in developmental courses (Conley, 2007). Most retention studies on the community college student have focused on the student in need of developmental coursework (Conley, 2007). Few studies have examined the retention of the community college student who was not identified for remedial coursework.

The framework for this study used Tinto’s (1975) theoretical framework for student persistence and incorporates the examination of high school qualities along with student academic performance and student demographic characteristics as predictors of retention in
the NCCCS ADN programs. The limited studies focused on retention of associate degree nursing students identified academic preparation as a key for successful retention and completion of the program (Jeffreys, 2007; Seago et al. 2012; Seago et al. 2008; Shelton, 2012). This study increased the knowledge base of the pre-collegiate educational experiences described by Tinto (1975) in his model of academic and social integration of student persistence.

**High School Quality**

Tinto (1975) identified the pre-collegiate educational experiences as a background characteristic that each student brings to the postsecondary institution. Specifically, Tinto suggested that characteristics of the high school directly and indirectly affect a student’s academic performance (1975). Few studies have examined high school quality and its impact on postsecondary outcomes (Hill, 2008; Black, Lincove, Cullinane, and Veron, 2014; Fletcher and Tienda, 2010, 2012).

The Public School Forum of North Carolina (PSFNC, 2013) documented the inequity of funding between the 115 public school districts operating in the state. This inequity in funding for the public schools located in low wealth communities results in reduced resources available for high quality teachers and instructional materials (Milner, 2013; Ladd and Loeb, 2013). Consequently, students attending schools in low wealth communities produce lower scores on statewide assessments than their peers attending schools in higher wealth communities (Billings, Deming, and Rockoff, 2014, Michelson and Everett, 2008).
Successful students do graduate from low wealth schools and successfully participate in higher education. There are a few studies focused on the high achieving student, the student who will be most successful in college regardless of the wealth of their public schools. The best examples document the success of students attending college in Texas. The Texas House Bill 588, the Top 10% Law, guarantees automatic admission to students within the top ten percent of a high school graduating class to Texas’ public colleges and universities. This bill has opened the door for these high achieving students to attend college. Students from low wealth schools participating in Texas’ Top 10% program were found to be initially successful in their studies (Black, Lincoe, Cullinane, and Vernon, 2014; Fletcher and Tienda, 2010, 2012).

One variable used in this study to measure high school quality was school wealth. School wealth is a reflection of the local community since students often attend the high school closest to their residence (Billings, Deming, and Rockoff, 2014; Deming, Hastings, Kane, and Staiger, 2011). Many studies identified lower academic outcomes for schools in low wealth communities (Clotfelter, Ladd, and Vigdor, 2008; Clotfelter, Ladd, Vigdor, and Wheeler, 2007; Ladd and Loeb, 2013; Michelson and Everett, 2008). Michelson and Everett (2008) found that students attending low wealth high schools did not have the opportunity to participate in courses with higher levels of rigor and exposure to more content because the school did not offer advanced courses. Jackson (2009) found that students attending low wealth schools in Charlotte produced lower student outcomes on statewide assessments while Billings, Deming, and Rockoff (2014) found lower academic achievement and low
participation in college for students attending low wealth high schools in their examination of the Charlotte-Mecklenburg school system. Additionally, Michelson and Everett (2008) found that African American students attending racially diverse or predominantly White high schools in the Charlotte-Mecklenburg school system were unlikely to participate in the advanced course offerings in the College/University Prep course of study.

Another variable used in this study was a school performance measure used by NCDPI (2012). In North Carolina, all high school 11th graders take the ACT® College Readiness Exam. NCDPI uses the ACT® College Readiness Exam to assess school outcomes on student academics (NCDPI, 2014c, 2014d). The state of North Carolina, NCDPI, considers a school proficient if the majority of students achieve a composite score of 17 or better, the minimum score necessary for admission to one of the 16 University of North Carolina System institutions. An examination of the ACT® College Readiness Exam results for 2014 found that students were most successful on the English section of the test that focuses on grammar (NCDPI, 2014d). Student performance declines for proficiency on the mathematics, reading, and science portions of the tests (NCDPI, 2014d). The National Center on Education and the Economy (2013) found that textbooks used in the nursing curriculum are densely written and are at a higher level than those used in other disciplines such as college level English. Wolkowitz and Kelly (2010) and Abele, Penphrase, and Ternes (2013) found that strong reading skills were essential for success in the associate degree in nursing programs. Consequently, this study used the school score for the Reading portion of the ACT. A school with low breakeven pass rates on the reading portion of the exam has a
student population that is not ready for academic study at the collegiate level (Manning, 2014a, 2014b).

In summary, Tinto (1975) identified the pre-collegiate educational experiences as a background characteristic that each student brings to the postsecondary institution. The individual school districts are funded inequitably with lower wealth schools and school districts having fewer resources to provide high quality teaching and learning experiences. There is documented evidence that the majority of students attending low wealth high schools have reduced academic preparation compared to those students attending higher wealth schools (Jackson, 2009; Michelson and Everett, 2008; Sirin, 2005). North Carolina implemented the statewide assessment of the ACT® College Readiness Exam to measure student performance and preparation for college. While top students from low wealth high school classes have been found to be initially successful in their university studies, there has been little research that has examined high school quality and retention and student success for students attending the community college in general, and specifically, those enrolled in the nursing programs offered by the community college. Figure 2 shows the expansion of the conceptual model and includes the variables proposed to predict first year retention of students enrolled in the NCCCS ADN program.

**Academic Preparation**

As discussed earlier, Tinto (1975) identified the pre-collegiate educational experiences as a background characteristic that each student brings to the postsecondary
institution. A major concept in Tinto’s (1975) theory is that students have the academic preparation necessary for success at the institution. Without the academic preparation, it is unlikely that students will be able to successfully meet the increased academic demands of college and academically integrate into the institution. The student with weak academic preparation is unprepared for the rigors of the collegiate level studies and either voluntarily withdraws or is forced to withdraw by the college (Tinto, 1975).

Students in North Carolina have the opportunity to enroll in one of three courses of study: Career Prep, College /Tech Prep, and College/University Prep (NCDPI, 2012). A fourth course of study, Occupational, is reserved for special education students (NCDPI, 2012). Michelson and Everett (2008) discussed the multiple levels of educational intensity and instruction for courses within the College/University Prep course of study and found that African American students were unlikely to enroll in the more rigorous courses. Michelson and Everett (2008) also found that African American students attending racially diverse or predominantly White schools were more likely to be enrolled in College/Tech Prep or Career Prep than in the College/University Prep course of study. Additionally, students attending predominantly African American schools had reduced opportunities to take Advanced Placement courses and other courses in the College/University Prep course of study at the more rigorous levels (Michelson and Everett, 2008; NCDPI, 2013).

Michelson and Everett (2008) noted that the majority of North Carolina high school students enroll in the College/University Prep course of study. However, North Carolina offers courses in the College/University Prep course of study at multiple levels ranging from
regular to Advanced Placement and International Baccalaureate with the upper levels representing more rigor and student exposure to expanded content (Michelson and Everett, 2008). Overall, students enrolled in the college preparation education track at the high school have taken classes with increased rigor and often participated in additional learning experiences to prepare them for the university when compared to classes in the career and technical education track (Deil-Amen and DeLuca, 2010; Kirst and Venezia, 2006).

However, there is no way to determine course level intensity within the College/University Prep course of study without examination of the individual transcripts. Previously, grade point average was not weighted in North Carolina: there was no way to determine if a student took advanced courses or lower level courses unless the student took the Advanced Placement exam and the score was reported on the student’s transcript. The North Carolina State Board of Education implemented a new policy in September 2014 to provide additional weight to the more rigorous courses such as the Advanced Placement (NCSBE, 2014a).

Many of the studies on student retention in the nursing programs used high school and college GPA; however, these studies utilized small populations and the researchers had access to the students’ high school transcripts and community college transcripts (Jeffreys, 2007; Whyte, Madigan, and Drinkwater, 2011). Additionally, many of the research studies reviewed examined student success using grades from a specific course to predict success and completion in the nursing program (Abele et al., 2013; Jeffreys, 2007; Whyte et al., 2011). Others used self-reported GPA in their studies (Seago et al, 2012; Shelton, 2012).
Given the estimated size of the study population, N > 3000, an examination of individual high school and college transcripts is cost prohibitive.

Students enroll in the NCCCS ADN program with diverse educational experiences: high school, GED certification, and college completion (Fraher et al., 2008). Fraher et al. (2008) noted that students with GEDs were negatively impacted and at a greater risk of withdrawing from the NCCCS ADN program. Students with college degrees have previous experience with higher education, which might result in an advantage over those with a high school diploma or a GED (Cohen and Brawer, 2008; Fraher et al., 2008; Tinto, 1994).

The North Carolina Community College System collects data for students enrolled. Two variables collected are the high school educational track and the level of educational attainment acquired prior to enrollment. Data for these two variables are more consistent across the system. This study incorporated these two variables to measure student academic preparation. One was the high school educational track (Career Prep, College /Tech Prep, and College/University Prep) the student enrolled in while in high school (Deil-Amen and DeLuca, 2010; Kirst and Venezia, 2006; Mickelson, 2008). The second variable was the highest level of educational attainment, or earned educational credentials, prior to admission in the NCCCS ADN program (Fraher et al., 2008; Jeffreys, 2012).

In summary, Tinto (1975) identified academic preparation along with the pre-collegiate educational experiences as factors that are important to a student’s success and retention in a college academic program. Michelson and Everett (2008) found that a majority of North Carolina high school students enroll in the College/University Prep course of study.
but that African American students take these courses with lower levels of rigor and content exposure than White students do. Students taking courses with lower levels of rigor and exposure to content in their academic preparation may be at a disadvantage in the NCCCS’s nursing program compared to their counterparts with more rigorous preparation and attainment of educational credentials.

Figure 2: Conceptual Model with Variables

Data Sources

A NCDPI; B NCCCS

Student Demographic Characteristics

Tinto (1975) identified individual attributes as a background characteristic that each student brings to the postsecondary institution. Retention research has historically included
the demographic background characteristics this study will use. Demographic variables provide descriptive information about the population under study (Johnson, 2001). Fraher and associates focused their analysis on student demographic characteristics and concluded, “student demographic and socioeconomic characteristics are the most powerful predictors of on-time graduation” (Fraher et al., 2008, p. 2). This study included three demographic variables: gender, race, and age.

**Statement of Purpose**

The purpose of this study was to examine the impact of high school quality and student academic preparation on African American ADN students enrolled in the NCCCS ADN programs and compare the findings with their white counterparts.

**Research Questions**

1. What is the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (high school educational track and highest level of educational credentials) on African American community college nursing students’ first year retention?

2. Are there differences on the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (high school educational track and highest level of earned educational credentials) between African American and White community college nursing students’ first year retention?
**Significance of the Study**

Fraher et al. (2008) identified being African American was a barrier to completion for students enrolled in the NCCCS ADN programs. But, there have been no follow up studies to determine what specific barriers contribute to the African American ADN student attrition rate. Furthermore, Fraher et al. (2008) stated that there is a problem with high school quality in low wealth communities and students attending these schools do not receive the same academic preparation as they would have attending high school in a higher wealth community. This study seeks to provide evidence to confirm or deny the statement.

Studies such as this one will assist in the identification of factors of high school quality and academic preparation that the community college must address prior to developing an institutional culture focused on student retention. The ADN program offers an opportunity to conduct such a study given the outside accreditation requirements placed on these programs by the NCBON. A large percentage of graduating ADN students must pass the NCLEX-RN™, which serves as a validation tool for the individual ADN program’s efficiency and transparency in preparing students for licensure and employment in the nursing workforce.

The findings from this study will assist ADN program directors with the justification necessary for developing and implementing retention strategies to assist all admitted ADN students in achieving their personal educational goals of becoming a RN while improving the individual community college’s retention and graduation rates. It is my desire that the initial findings from this study will assist the NCCCS and the individual community colleges in
increasing transparency and accountability at these publicly funded institutions of higher education and lead to the development of an institutional culture focused on student knowledge attainment and retention (AACC, 2012). Ultimately, the findings from the proposed investigation will serve as a preliminary needs assessment for North Carolina’s community colleges to provide all students with the opportunity to pursue the American Dream while diversifying the nursing workforce to better mirror the population and meet the diversity goals of the IOM (2011).

**Limitations of the Study**

This study focused on students admitted to associate degree nursing programs offered by the North Carolina Community College System. Findings for this study are limited to this specific population and may not be relevant to other community college systems or nursing programs located in the nation. Admission requirements differ between the community colleges in this study but each has the same NCLEX-RN™ pass rate requirements as set forth by the North Carolina Board of Nursing, which accredits all nursing programs in North Carolina. Additionally, all high schools and colleges, in this study are accredited by the Southern Association of Colleges and Schools.

**Definition of Terms**

For the purpose of this study, definitions of terms are provided.
Achievement gap refers to the disparity in academic performance between groups of students.

Associate Degree in Nursing (ADN)/Diploma in Registered Nursing - Curriculum components for the ADN/Diploma in Registered Nursing provides for the attainment of knowledge and skill sets in the current practice in nursing, community concepts, health care delivery, communications, therapeutic interventions and current trends in health care.


Attrition is an institutional term for the student no longer enrolled in the community college prior to goal completion.

College readiness is the “acquisition of the knowledge and skills a student needs to enroll and succeed in credit bearing, first-year courses at a postsecondary institution (such as two or four-year college, trade school, or technical school) without the need for remediation (ACT, 2012). This definition is used by both NCDPI and NCCCS.

Low Wealth County is a county that has difficulty in raising funds to support the schools. Some of the factors used to determine eligibility are county adjusted property tax base, square miles in the county, population density, and per capita income.

Quality is a subjective measure of how good or bad something is.

Persistence is the consecutive enrollment of a student in core nursing courses, identified with the prefix NUR, during the first year of enrollment in the ADN program. Persistent students
enrolled in the ADN program have not withdrawn, failed, or repeated any NUR course
during the academic period defined by Fall 2013 to Fall 2014.

**Poverty** is based on 1) the federal government’s formula of the poverty line; 2) free and
reduced lunch formulas and 3) particular characteristics and situations people find
themselves in because of the amount of monetary and related material capital that they have
or do not have (Milner, 2013, p. 9).

**Race** and **ethnicity** both represent social or cultural constructs for categorizing people based
on perceived differences in biology (physical appearance) and behavior. (American

**Retention** is an institutional term for a student enrolled in consecutive semesters until goal
completion.

**Small County** is a county in which the population is so small that raising funds to support
the school would create a hardship on the population through extremely high tax rates.

Supplemental funds are based on an average daily membership (ADM) less than 3,239 or to
county school systems with ADM between 3,239 and 4,080 whose county adjusted property
tax base per student is below the state adjusted property tax base per student.

**Wealth** is a measure of the value of all of the assets of worth owned by a person, community,
company or country and an absence of poverty
CHAPTER 2

This primary focus of the literature review was on studies that have investigated academic success and retention of African American associate degree nursing students. Multiple nursing studies found that African Americans had a negative impact on successful completion of the program, as did the lack of academic preparation. Frawer et al. (2008) identified the high school as a barrier for successful completion of the nursing program. Given the finding, that academic preparation is crucial for success in nursing studies, the review included studies on high school quality with emphasis placed on North Carolina public education. The majority of studies reviewed in this literature were from peer-reviewed articles published in nursing and education journals in the past ten years.

This chapter begins with an overview of student retention theories. This is followed by a presentation of the small literature devoted to the retention of the associate degree in nursing student and the few studies devoted to the African American student enrolled in the associate degree nursing program. The concluding sections provided an overview of the literature documenting the educational inequities and school quality in North Carolina public schools.

College Retention Theory

Institutional retention and individual persistence of college students have been the focus of educational researchers for over 75 years with early studies by McNeely (1937), Spady (1970), Meyer (1970), Astin (1975, 1985). These early research studies focused on
the traditional aged, White male student enrolled at mostly selective four-year colleges and universities and culminated with Tinto’s (1975) interactionalist theory for explaining student departure. Tinto (1982) noted that attrition rates have hovered around 45% for over 100 years. Pascarella and Terenzini (1991) reviewed nearly 3000 retention studies to learn how college affects students. These studies were “based almost exclusively on samples of traditional college students who are age 18 to 22, who attend four-year institutions full-time, and who live on campus” (p. 632).

Tinto’s interactionist model of academic and social integration on student persistence is described as a sociological model given the emphasis of the student to assimilate into the culture of the institution (1975, 2012). Students not persisting in the program drop out of higher education or transfer to another institution that they believe better matches their needs and values, e.g., voluntary withdrawal. Students not meeting academic standards will fail out of the program, e.g., involuntary withdrawal or program dismissal.

Since the original publication, Tinto has continued to revise his theory to consider the roles finances and culture have on student departure (1982, 1988, 1994). Yet, the primary constructs of Tinto’s 1975 theory and his revisions remain focused on the academic and social integration by the student into the institution. Consequently, much of the educational research on student departure remains focused on testing and validating the propositions of Tinto’s theory.

The number of researchers exploring the complex issues of student retention and persistence has exploded exponentially, with each study refining the variables used to
provide a solution for the retention puzzle that continues to affect institutions of higher education (Tinto, 2012). The models contain different variables but continue to test Tinto’s theory of student departure by including academic ability and social integration.

Tinto’s 1975 theory for student departure has been criticized for its lack of applicability for commuter students, nontraditional students, minority students, and students of low wealth. These student populations are most attracted to the open door of the community college. While sparse, a few researchers have focused on the community college student including Bean and Metzner (1985), Jacoby and Garland (2004-2005) and Pascarella and associates.

Much of Tinto’s 1975 theory for student withdrawal is included in Bean and Metzner’s *Conceptual Model of Nontraditional Undergraduate Student Attrition* (1985). Since Tinto’s model was initially developed for the traditional aged student, Bean and Metzner expanded their model for the increasing nontraditional aged student enrolling on college campuses. Nontraditional students might have different college experiences given they are often attending school while working and or raising a family. This means that the social aspect of the traditional college experience might not be as important to the nontraditional student. Given the importance of social integration in Tinto’s model, Bean and Metzner thought that another model might provide better explanation for the retention/withdrawal of the nontraditional student. In their model, Bean and Metzner hypothesized that the nontraditional aged student persistence/attrition decisions are based on four factors: academic achievement; intent to leave; background and defining variables of the
student; and environmental factors. Bean and Metzner (1985) reviewed the retention research to identify the types of retention studies conducted, the methodology, and the variables used in the studies to learn more about social interactions for students and they determined that social integration, the nonacademic activities that help define the traditional college experience, held little importance for the nontraditional student and therefore did not influence the decision to depart from college.

Other researchers also expanded on Tinto’s 1975 theory for student departure. While Tinto’s (1975) focus was on the residential college student, Jacoby and Garland (2004-2005) identified transportation, multiple life roles, and the need to develop support systems outside of the college, along with a lack of a sense of belonging as characteristics that differentiates the commuter student from the traditional aged residential college student. Additionally, Pascarella and colleagues incorporated Tinto’s 1975 framework into their retention and persistence research using commuter colleges and found that academic integration was more important than social integration for persistence of commuter students, and specifically for those attending a community college (Pascarella, 1980; Pascarella and Chapman, 1983; Pascarella, Duby, and Iverson, 1983).

While Tinto’s 1975 model for student withdrawal has most often been used to explore retention of traditional students, I suggest the model is relevant for most student groups and at different types of post-secondary institutions, and not just for the first year experience of undergraduate education. While several researchers have discounted the importance of social integration as a necessary component for academic success (Bean and Metzner, 1988), I
disagree with their findings. As a doctoral student, I do not need to participate in non-curricular, extra-curricular, or university wide programs to define my social integration at a large, Research 1 University. My definition of social integration includes the interactions I have with my peers both in and outside of class, through participation in group work, projects, and even basic discussion forums in the online learning environment. Likewise, I found it important to receive feedback from faculty members on my academic work. But just as important, was a hello from the faculty member sharing a ride in the elevator. Social integration can mean being in a civil and hospitable learning environment. For me, social integration requires the development of a community of learners interacting with each other, the faculty, and the subject material while building group and individual knowledge and skills because learning does not take place alone or in a vacuum.

One of the major assumptions of students attending a four-year traditional college education is that the high school education prepared the students for the rigors of the college learning environment (Tinto, 1975). Unfortunately, the open door mission of the community college suggests that many students are not prepared for college. This results in lowered faculty expectations for the students enrolling in their courses. Many community college students enroll in postsecondary studies without a rigorous high school education and they often lack the academic preparation for college success. Community colleges provide developmental coursework in reading, English, mathematics, and Biology along with student success courses to prepare students for the faculty expectations and rigor of collegiate level work.
In summary, Tinto (1975) identified high school academic preparation as one component of the background characteristics each student brings to higher education. Given that the majority of retention research completed to date was grounded in the work of Tinto (1975) and comprised of testing different variables, student populations, and institutional settings, this research study utilized a component found in Tinto’s 1975 theory for student departure: academic preparation which is necessary for academic integration with the program and institution and a crucial component for student retention. Historically, retention research has focused on first year students selectively-admitted to the college or university and has examined dropout/retention as the students make the adjustment from their high school experiences. The literature devoted to retention of community college students is small; most of this literature is devoted to the student in need of remedial coursework and is beyond the scope of this study.

As nursing students transition from their general education studies to those focused on the nursing curriculum, first year nursing students undergo another transformation. Yet, the attrition rate for first year nursing students enrolled in the community college is much higher than that for diploma and baccalaureate nursing programs in North Carolina (NCBON, 2014). Tinto (1975) identified academic preparation, a component of academic integration, as a predictor for retention of college student. The following studies focused on the ADN student also identified academic preparation as a predictor for retention and completion.
Associate Degree in Nursing Retention

The literature devoted to nursing students in associate degree programs is very small and only a few authors utilized a theoretical framework to guide their research. Three models were located in the nursing literature that examined student persistence of community college nursing students. Each model drew on different persistence theories from the field of adult education; yet each theory used was grounded in Tinto’s (1975) thesis of academic preparation and student integration. The nursing persistence models are identified as the following: Jeffrey’s Model of Nursing Undergraduate Retention and Success (NURS), Shelton’s Model of Nursing Student Retention (MNSR), and Seago’s Conceptual Model of Academic Success (CMAS). With the exception of the Shelton Model, multiple publications describe different components of the model. Consequently, to understand the entire model, all publications were used to create a better composite of the model.

Jeffreys’ Model of Nursing Undergraduate Retention and Success (NURS)

Marianne Jeffreys created the Nontraditional Undergraduate Retention and Success (NURS), in 1993 to examine the relationship between student self-efficacy and academic and environmental factors on academic success and retention (Jeffreys, 1993). Jeffreys renamed the model in 2004 to the Nursing Undergraduate Retention and Success (NURS). She revised the model in 2007 to its present format and described in detail in her text (2012).

Examination of the Jeffreys’ 1993 NURS model reveals it is an exact duplicate of the Bean and Metzner Conceptual Model of Nontraditional Undergraduate Student Attrition
The difference between the two models is the interpretation: Bean and Metzner (1985) examined factors leading to student attrition while Jeffreys examined the same factors to identify the at-risk student who persisted and successfully completed the program (1993, 2004, and 2007). According to Jeffreys, the student’s decision to remain in a program is a multidimensional process involving interactions between the student’s background characteristics, academic factors, and environmental factors. Other factors also entering into the retention decision include student affective factors, psychological outcomes, and external factors. Jeffreys recognized that life events can interfere with academic progression and students, at times, must temporarily stop-out of school before resuming their education. In addition, students voluntarily dropout of school or are involuntarily dismissed by the institution given their poor academic progress.

Student background characteristics include age, gender, and race/ethnicity (Jeffreys, 2007). Academic factors included enrollment status (i.e. full or part time), number of local credits, and number of transfer credits. Academic outcomes included the final grade for the A&P course pre-nursing and grade point average (GPA) composed of grades from four courses: Anatomy and Physiology (A&P), English, Introduction to Psychology, and Philosophy (Ethics). The model is continuous: it follows the student’s progression beginning with student enrollment in the nursing courses, graduation from the nursing program, and ends when the student receives state licensure to practice nursing (2007, 2012).

Jeffreys’ (2007) research sample contained 112 nursing students (83% female and 53% White) enrolled in one community college’s associate degree of nursing program’s and
taking the first clinical course, NUR 101, during the 1997-1998 academic year. The attrition rate for the sample population was 25%. Using regression analysis, students leaving the program did not have high grades in the A & P course and most of the students leaving were Black and Hispanic.

**Shelton’s Model of Nursing Student Retention (MNSR)**

Elisabeth Shelton combined Albert Bandura’s 1997 theory of self-efficacy and Vincent Tinto’s 1975 theory of student retention into her conceptual framework for *Shelton’s Model of Nursing Student Retention* (MNSR) (2012). Shelton defined student retention as the product of two outcomes: student persistence and successful academic progress (2012). Without student persistence, students would withdraw from the nursing program. Without successful academic progress, students would flunk out of the nursing program.

Shelton’s (2012) research sample contained 458 current or former nursing students who completed a questionnaire focused on student background characteristics, academic self-efficacy expectations, academic outcome expectations, and perceived faculty support. Student background characteristics collected included age, gender, marital status, dependent children, financial resources, employment status, prior level of education, expected level of education, parental education, and high school and college GPA. The survey respondents were divided into three groups: Group 1 consisted of currently enrolled students \( n = 300 \); Group 2 contained former students who voluntarily withdrew \( n = 83 \); and Group 3 composed of former students who involuntarily withdrew due to academic failure \( n = 75 \). Findings from Shelton’s (2012) study revealed the students in the three groups were similar
in age: Group 1 ($M = 30.8, SD = 7.68$); Group 2 ($M = 29.1, SD = 7.68$); Group 3 ($M = 29.8, SD = 9.10$). Group 1 members had greater financial resources ($F = 3.66, p = .035$) and higher high school ($F = 6.28, p = .005$) and college GPA ($F = 29.27, p < .001$) than members in Group 3. Group 1 members also had more education ($F = 4.93, p = .010$) prior to enrolling in the nursing program and had higher educational goals ($F = 4.80, p = .018$) than the Group 2 members who voluntarily withdrew. The only significant finding between Group 2 and Group 3 was that Group 2 members, who voluntarily withdrew, possessed a higher college GPA than the Group 3 members, who had to involuntarily withdraw due to academic failure ($F = 29.27, p < .001$).

Academic self-efficacy expectations and academic outcomes expectations were found to be not significant; Shelton attributed these two constructs to the decision to apply for admission into the program, not in persistence after admission. Shelton also found that the academic outcome construct ($F = 3.23, p = .051$) was positively correlated with the perceived faculty support construct ($F = 19.33, p < .000$). In other words, students with good grades did not feel threatened by faculty and were more likely to complete the nursing program.

**Seago’s Conceptual Model of Academic Success (CMAS)**

On the surface, Seago’s (2008, 2012) *Conceptual Model of Academic Success* (CMAS) appears to be a simplistic model. However, tracing the origins of CMAS reveals the model’s complexity given CMAS incorporates the work of multiple educational, motivational, and adult learning theories in addition to the ideas presented by Pascarella (1982), Pascarella and Terenzini (1991) and Tinto (1975, 1982, 1988). According to Seago
et al. (2012), three of the models constructs, dispositional, situational, and institutional are
directly derived from Tinto’s retention work which focused on the integration of academic
and social factors; the CMAS also includes a fourth construct, career values (Seago et al.,
2012).

Seago et al. (2008) described the development of a survey administered to nursing
students affiliated with six schools affiliated with the Central Valley Nursing Diversity
Initiative, which funded retention interventions, and six similar in size institutions, not
associated with the initiative, which served as the control group. Over 1000 students enrolled
in the nursing education programs completed the survey items designed to measure the four
constructs consisting of dispositional, career values, situational and institutional. Unable to
collect data from the four 4-year colleges, the sample population was reduced to the eight
community colleges in the study and contained 738 survey respondents. Seago et al. (2008)
described their use of confirmatory factor analysis using Principal Components Analysis with
Varimax rotation to confirm the validity of the survey items within the constructs.¹ Both the
Seago et al. (2008) and the Seago et al. (2012) articles used the same survey data.
Descriptive statistics from the survey population revealed that most students were married
women with dependent children, were 31 years of age, and possessed an overall GPA of 2.56
(Seago et al., 2012).

Being African American correlated with failure to complete the nursing program in a
bivariate analysis. Descriptive statistics identified high GPAs in pre-nursing courses ($M =
2.76, SD = 0.78$) and science courses ($M = 2.66, SD = 0.86$) as predictors of student success
and persistence. Separate logistic regression analyses using the two highly correlated predictor variables were run using any-time and on-time graduation as the outcome variables. No other relevant findings were identified among the situational, institutional, or dispositional constructs although there were differences in the schools’ graduation rates. Limitations of the study included a lack of consistency and possible underfunding for the retention strategies implemented at the intervention colleges and the inability to collect the data simultaneously from all schools; the intervention schools were surveyed during the fall semester and the control institutions were surveyed during the spring semester.

Each of the previous three models of nursing retention and their associated studies were grounded in Tinto’s (1975) theory of student departure. These studies identified academic achievement as a predictor of student completion in the nursing program. Jeffreys (2007) studied 112 community college nursing students enrolled in a single nursing program and identified end of course grades in Anatomy and Physiology as a predictor for completion of the nursing program. Studies by Shelton (2012), Seago et al, (2008), and Seago et al, (2012) used surveys and self-reported GPA and found that those not completing the program had lower grades and academic preparation than those completing the program. Academic preparation and academic integration are relevant for success in nursing curriculums provided by the community college.

In summary, the nursing models identified in the literature confirmed the relevancy of Tinto’s (1975) theory for the inclusion of academic preparation and academic integration in retention theory. In these studies, the successful nursing students were identified as white,
female, and older than 25. Additionally, each of the studies identified African American nursing students at risk for program completion. The following studies examine additional predictors nursing programs use to identify successful nursing students.

**Academic Preparation in Nursing Studies**

Fulcher and Mullin (2011) noted that both the Associate Degree in Nursing (ADN) and the Bachelor of Science in Nursing (BSN) prepare nursing students for licensure and initial entry into the workforce. Fulcher and Mullin (2011) identified that there is little difference in the educational quality of the different pathways to an initial nursing license. Fulcher and Mullin, (2011) noted that there were several advantages, time and money, to earning an ADN over a BSN. Students enrolled in the ADN were able to start their nursing studies in their first year after admission to the program versus the third year of enrollment in BSN programs (Fulcher and Mullin, 2011). Additionally, minority students were more likely to enroll in their local community college nursing program than in a BSN program. This finding is important given the high need for minority nurses in rural and urban areas. Given the low cost of the community college education compared to the cost of a BSN education, and the reduced time to employment, students were better off to earn their initial entry into the nursing profession, the RN designation, at the community college (Fulcher and Mullin, 2011).

Abele, Penphrase, and Ternes (2013) used an exploratory retrospective study to learn more about the role academic probation has on student attrition. Students at a Midwestern
university were enrolled in either a traditional baccalaureate nursing program (N=302) or an accelerated second-degree program (N=25) and were placed on academic probation for failing one or more courses in the nursing curriculum between 2002 and 2010. Students in the study were either currently on academic probation (N=200) or had been dismissed and readmitted to the program (N=127).

The outcome variable for the Abele et al. (2013) study was program completion while predictor variables included total number of course failures and reading skills. This study focused on Reading skills as measured by the final grade received in Psychology 225: Introduction to Lifespan Developmental Psychology (PSY 225). Abele and associates found that every increase in a letter grade earned in PSY 225 led to a 60% increase in the odds that a student would complete the nursing program. As the number of classes failed increased, a student’s odds of failure to complete also increased. A student failing two classes was 36% more likely not to complete the nursing program. The findings informed research that other courses outside of the science core should be identified as predictors of academic success for nursing programs.

Given the importance of GPA and standardized test scores are on nursing program admission criteria, Wolkowitz and Kelley (2010) examined the Test of Essential Academic Skills™ (TEAS) used by many nursing programs to learn which part of the test best predicts a student’s success in a nursing program. The TEAS has four components and tests student knowledge in reading, math, science, and English usage. To learn more about the TEAS, statistical assessment of the results were performed for 46,865 first time examinees taking the
version 3.0 test between January 2008 and January 2009. The TEAS contained 170 questions with a mean score of 72.62% and a standard deviation of 10.23%. Number of questions, mean, and standard deviation for each component of the test are as follows: reading contained 40 questions, $M = 86.09$, $SD = 10.82$; math contained 45 questions, $M = 66.79$, $SD = 16.39$; science contained 30 questions, $M = 63.08$, $SD = 13.72$; and English contained 55 questions, $M = 74.23$, $SD = 93.71$.

Additionally, Wolkowitz and Kelly (2010) learned some nursing programs also use the RN Fundamental produced by Assessment Technologies Institute assessment to test a student’s knowledge of nursing fundamentals. The RN Fundamental exam contained 60 questions, $N = 25,933$, $M = 68.75$, $SD = 8.91$ for tests administered between January and December 2008. A survey of nursing programs that had purchased either the TEAS or the RN fundamental was sent to 314 and completed by 149 directors of nursing programs to learn if the tests were used for admission decisions; 48.3% responded they used the TEAS for preadmission decisions and 30.2% responded they used the TEAS for post-admission decisions. A few schools, 13.4%, used the TEAS for both preadmission and post-admission decisions while 8.1% did not use the TEAS in admission decisions.

The final sample used by Wolkowitz and Kelly (2010) contained 4,105 participants who had taken both the TEAS and the RN Fundamental assessments. Multiple regression analysis was used to identify the strength of the TEAS individual components to the RN Fundamental score for ADN and BS programs. Scores for the BS program ($N=2000$) were higher than the scores for the ADN programs ($N=1,743$). The science component was found
to be a strong predictor of nursing program success accounting for 15% of the variance and a statistically significant effect $t(4104) = 13.28$, $p < .01$. ADN program correlations found the science, reading, and English components had large statistically significance effects while the math component was found to not be statistically significant. Findings were as follows:

Science $t(1,742) = 7.91$, $p < .001$; Reading $t(1,742) = 4.35$, $p < .001$; English $t(1,742) = 4.86$, $p < .001$; and math $t(1,742) = 0.51$, $p = .61$.

With these findings, Wolkowitz and Kelley (2010) suggested preadmission programs continue to use the total TEAS score and to examine Science and Reading scores as predictors of student success in the nursing program. They called for more research on the role science courses and courses with reading requirements have on student success. Given the heavy reading requirements in nursing programs, these findings confirmed the importance for students to possess strong reading skills.

There exists a small quantity of literature devoted to the biological sciences in the nursing curriculum. Nursing is an applied science, grounded in the study of both anatomy and physiology that define the multiple systems working in synergy within the human body. Yet, students struggle with the science courses in the nursing curriculum and many fail to understand the relevance for inclusion in their studies. Students have a demonstrated difficulty in both mastery of the science content but also in its application through praxis.

Nursing curriculum is offered through university programs in Australia and these programs require completion of multiple science courses including anatomy and physiology, microbiology, and pharmacology. Jordan, Davies, and Green (1999) surveyed four
consecutive cohorts (N = 339) representing 84% of the students enrolled in a university nursing program in 1994 and 1995. Faculty were also surveyed (N = 73) and the response rate reported was 78%. The survey contained dichotomous and Likert-type scaled responses along with open-ended questions and focused on 1) the difficulties encountered in the biosciences, 2) the value of the sciences to nursing practice, 3) theory to practice linkage, and 4) the allocation of curriculum time and resources. This paper focused on the students’ difficulties with the science courses including the related time issues and the relevance of the science courses to the nursing curriculum. Main findings reported by Jordan et al. (1999) included the following: students thought the biosciences were the hardest part of the nursing curriculum, the majority of faculty members teaching the science modules were trained as registered nurses with a Diploma in Nursing, students were unhappy with the curriculum design and implementation, and students reported exam failure along with increased anxiety and stress.

Crane and Cox (2013) noted the ongoing discussion in the nursing literature regarding the problems with science courses in the nursing curriculum. Nursing programs in Australia do not require previous science study prior to admission. In addition, while nursing programs were situated within university settings, admissions criteria for nursing students were lower than those required for the rest of the student applicants. They provided reasons Australian nursing students have academic problems with the bioscience courses in the nursing curriculum, which included lack of science exposure in high school, lack of understanding of relevance of science to the nursing curriculum, and science phobia.
According to Crane and Cox (2013), the problem is not that nursing students lack the prerequisite science knowledge; these students lack a science background through exposure to high school biology classes. They never engaged in scientific inquiry and consequently they do not understand the significance for the material in the courses. Crane and Cox explored the self-efficacy and student motivational literature to address the impact the requisite science courses have on student motivation, participation, and learning. Students were not interested in learning science. Interest is requisite for internal motivation to learn and affects performance. Performance affects self-efficacy; poor results lower the student’s self-efficacy and increase the likelihood of performance avoidance approaches to their studies. Ultimately, poor student performance, measured by course grades, is a result of the stress and anxiety these courses create for the student. Unsuccessful students, unable to overcome the stress created by these courses fail or withdraw from their studies.

Crane and Cox (2013) suggested nursing programs in Australia add an introduction course to the curriculum to assist the science phobic students to understand how science is involved in all aspects of our lives through engagement in non-graded activities. Students should not fear science; instructors need to recognize the lack of engagement in these courses requires instructional strategies, such as the flipped classroom, to break through the barriers.

Whyte, Madigan, and Drinkwater (2011) collected academic records for 543 students enrolled in the first semester science course at an Australian university during 2008 and 2009. The students were enrolled in the nursing program, the paramedic program, or a dual major of the two programs. University staff had previously completed a University
Admission Index (UAI), which ranks prospects on their high school academic performance and included a grade for high school biology.

Whyte et al. (2011) used three dependent variables involving GPA in the study. The first regression analysis examined the GPA for the first semester science course. GPA was set as 1 = pass and 0 = fail. Statistically significant predictors for success in this course included older students with previous college experience and high school biology. Health related experience had a negative effect on the predicted final grade for the course. The second regression analysis examined the bioGPA. This GPA was composed of grades only from the bioscience curriculum. Statistically significant effects were found for mature students and the high school biology class. The final regression analysis focused on the clinical GPA.

Whyte et al. (2011) examined predictors based on the clinical GPA and composed of all grades in the nursing or paramedic program. Statistically significant predictors included mature students and previous college experience. Again, previous experience in the health field had a negative effect on student grades. Additionally, being male also resulted in a negative effect on student grades. Whyte et al. (2011) concluded that passing the bioscience course was a good predictor of successful program completion and that high school biology provided students with an introduction to the bioscience course.

Pence (2011) used Jeffrey’s NURS model in her study to determine what the relationship was between emotional intelligence, motivation, demographic variables, and retention for 390 first-year students attending nine associate-degree nursing schools in
Illinois. Students completed the Motivated Strategies for Learning Questionnaire (MSLQ), a valid, reliable, and easy-to-administer 81-item measure containing 15 subscales described in Pintrich, Smith, Garcia, and McKeachie (1991). Pence (2011) used hierarchical logistic regression in the study. The sample contained data records for 362 students retained after the first semester and the 26 students who left their respective programs. Examination of the mean scores for the MSLQ variables found none to be statistically significant. Likewise, Pence found emotional intelligence was not statistically significant. However, the regression analysis suggested a relationship existed with student age. Retained students had a mean age of 29.34 (n = 363; p = .026) while non-retained students were older with a mean age of 33.20. The inferential analysis for the demographic variables indicated that only race/ethnic background (p < .001) and ADN school (p = .017) were statistically significant with retention at the end of the first semester. Minority students composed 25% of the total sample but represented 42.1% of the students not retained after the first semester.

Pryjmachuk, Easton, and Littlewood (2009) examined factors associated with attrition using data collected for 1,259 students enrolled in four cohorts of students enrolled in a university nursing program in the United Kingdom. In the United Kingdom, there are two paths to receive education to become a nurse: diploma or university degree. Overall, attrition rates are low in the United Kingdom: 24% for Scotland, 16% for England, 9% for Wales and 6% for Northern Ireland. However, there was a concern that the rates of attrition were incorrect and that if the real rate were higher, problems would arise for the British Department of Health. A survey was completed that included every nursing program in the
United Kingdom and the attrition rate was determined to be 25% and at a cost of £57 million a year or $114 million in US dollars at current conversion rates of $2 per £. Since the British Department of Health provides the nursing education this cost represented a significant loss of resources. Driving this study was the implementation of a national contract for preregistration nurse education that would pay a fixed amount per student and only for the time the student was actively enrolled in the program. Program directors needed to identify characteristics of successful students in the program to develop both student recruitment and retention programs.

Pryjmachuk et al. (2009) completed regression analysis with nine predictor variables and one outcome variable, program completion. Gender, age, race, nursing branch, host trust, highest qualification on entry, original domicile and the cohort. There were four nursing branches students choose between at initial registration: Adult (general), Mental (Psychiatric), Child, and Learning (developmental) disability. Students completed one year of foundation coursework before a two year focused study in their branch. The host trust was the healthcare provider the student was assigned to for clinical education. In the United Kingdom, there are seven acute/general health care trusts and three mental health care trusts. Students were predominantly female (85%) and White (90%). Education qualifications were increasing with the majority of students enrolling with Level 3 qualifications, attaining the ‘A’ Level. Level 2 qualifications were the minimum requirements for education in the nursing program. Levels 4-6 represented attainment of a certificate, diploma, or degree. The majority of students were vocational versus academic and they came from outside of the
area. Nearly 72% of the students were in the adult branch, 16% were in the mental branch, 8% in the child branch and 4% were in the learning disability branch. Each of the cohorts had attrition rates greater than 25% with attrition of 33% for the last cohort.

Pryjmachuk et al. (2009) ran chi square tests to identify possible predictors. Variables with a $p < .025$ were entered into a logistic regression and included the following: Host Trust, Age on Entry, HiQual 1 (academic), HiQual 2 (vocational), and Original Domicile. Given their non-significant Wald statistics, Host Trust, HiQual 2 and Original Domicile were removed and the analysis rerun using Age on Entry and HiQual1. This final analysis yielded a statistically significant model ($X^2 = 28.886, d.f. = 4; p < 0.001, n = 1122$) with a Nagelkerke pseudo $R^2$ of 0.036. Odds ratios were included for all variables.

The findings reported by Pryjmachuk et al. (2009) identified students older than 25 should be the focus of recruitment efforts. In addition, the minimum educational qualifications should be raised from a Level 2, some high school, to a Level 3 that corresponds to completion of high school. White students were more likely to complete compared to racial minority students. Examination of the racial minority population suggested that those with English as a second language were more likely to drop out of the nursing programs.

Hopkins (2005) examined data for 383 ADN students enrolled in a small, private health science college located in the Southeastern United States. Hopkins collected data from the registrar’s office including demographic and academic variables. Students were enrolled in the first nursing course in which a final grade of 77 was passing; for this study, success
required a final grade above 80. Students were female (89.6%) and White (62.1%) with a mean age of 28.2 years, SD =7.68 with students ages ranging from 18 to 59.

Hopkins’ (2005) purpose for this predictive study was to identify the factors that significantly explained first semester success. Academic variables included high school GPA, SAT scores, college GPA scores, and Nursing Entrance Test (NET) scores. The NET contains six components focused on the following: math skills, reading comprehension, test taking skills, stress level, social interaction, and learning style. Only the math and reading scores were used for admission to the nursing program and students must score above the 50th percentile on each to be eligible for admission.

Hopkins (2005) used exploratory factor analysis to confirm the correlation of the high school GPA, SAT, and NET scores. Five additional factors were identified with principal component analysis of the individual components of the NET: reasoning, learning style, analytic, anxiety, and commitment. The final variables used in the regression analysis include the five previously identified plus college GPA, age, race, and gender.

Logistic regression by Hopkins (2005) revealed three statistically significant variables: reasoning, analytic, and college GPA. Overall, the model did a good job in predicting success (99%) but failed to predict students failing (5.9%) with an overall success rate of 82.5%. Since 68 (17.75%) of the students failed the course, Hopkins (2005) suggested the use of the model to identify students at risk of failing for intervention programs such as tutoring during the course or completion of developmental coursework prior to enrollment.
A qualitative study by Rogers (2010) interviewed six graduates and three faculty members from an associate degree in nursing program in West Virginia. Document analysis procedures assisted in the identification of three emergent theme categories: student related, collaborative related, and curriculum related. Guiding this research were two questions. “First, what contributes to success in program completion and on the NCLEX-RN™? Second, what are the experiences of successful nursing students?” (p. 96). The students in the program were predominantly female and White. The ADN program enrolled approximately 96 students annually, had an 80% retention rate, and 89% pass rate on the NCLEX-RN™. Each of the interview participants completed consent forms. The data were collected in semi-structured, open-ended, and face-to-face interviews, which were audiotaped for transcription and analysis.

Rogers (2010) noted that all participants identified motivation as a factor for success. Two faculty members and five of the six students identified the need for critical thinking skills. Two faculty members and three students identified testing skills while two of each group identified active participation, growth, and maturity. Four students identified organizational skills and five students identified health care experience and prioritization of roles and responsibilities. Study habits, was identified by all six students and one faculty member. One faculty member and three students identified rest and nutrition along with the ability to manage life events and extreme stress.

According to Rogers (2010), three themes emerged in the collaboration category with communication identified by each of the three faculty members and five of the six students.
All participants identified faculty involvement while two faculty members and five students identified support systems. The one male student participant did not identify either communication or support systems.

Rogers (2010) reported four themes emerged in the curriculum category. Teaching methods and program examinations did not get many mentions. However, the students mentioned two items related to NCLEX-RN™ preparation with six identifying practice tests and five identifying NCLEX-RN™ workshops. Rogers attributed this last finding to the recent NCLEX-RN™ administration taken by the students.

A finding reported by Rogers (2010) follows. Instructors and students recognized that a lecture-focused classroom environment does not stimulate critical thinking, a skill, identified as important for success in the nursing curriculum and on the NCLEX-RN™. One suggestion for future research identified the need to examine student academic backgrounds and compare the successful students to unsuccessful students. Additionally, unsuccessful students might need to place more emphasis on study and organizational skills. Finally, the students might have placed more emphasis on the preparation for the recent administration of the NCLEX-RN™ in the interviews.

In summary, there were few studies located that focused on the community college nursing student. Many of the nursing studies reviewed in this section were not grounded in retention theory. The purpose of these studies was to identify predictors of academic success in the nursing curriculum. Fulcher and Mullin (2011) found there was no difference in educational preparation for initial entry into the workforce between ADN and BSN programs.
Abele et al. (2013) found that strong reading skills were necessary for success in the nursing curriculum. Wolkowitz and Kelly (2010) identified the reading and science scores from the TEAS test was a better predictor of success than the composite score. More academic preparation in the science courses (Jordan et al., 1999; Crane and Cox, 2013; Whyte et al., 2011;) was recommended for students considering nursing in Australia along with the raising of nursing program admission standards to an equivalent of a high school diploma in both Australia as well as in Great Britain (Pryjmachuk et al., 2009). Pence (2011) used the Jeffrey (2007) model to guide her survey research, which found age, race, and the specific school attended were statistically significant. A logistic regression by Hopkins (2005) revealed statistically significant variables: reasoning, analytic, and college GPA for success in the nursing curriculum. A qualitative study by Rogers (2010) identified the lecture method of teaching as not conducive to developing the critical thinking skills necessary for success in the nursing curriculum. These studies identified good grades, a strong biology background, and success in reading intensive courses correlated with successful persistence and completion for community college nursing students that confirms Tinto’s (1975) concept of academic preparation as a background variable and a component for successful academic integration. Yet, these finding fails to explain why African Americans are not successful in nursing studies. The following section explores the small literature located focused on the minority nursing student.
Minority Nursing Studies

Studies focused on the racially minority nursing student enrolled in associate degree programs are sparse in the literature. Studies focused on Hispanic nursing students have increased. However, there are few studies focused on the African American studying nursing at the associate degree level.

Wong, Seago, Keane, and Grumbach (2008) studied 1,377 nursing students to learn if the students’ race or ethnicity was associated with perceptions about institutional, dispositional, and situational factors and whether perceptions differed by college. This study was part of a larger study (described in the Seago Conceptual Model of Academic Success presented earlier in this paper). Analysis of the multivariate regression models identified that being of a minority race was associated with negative perceptions of institutional diversity. African American students had negative perceptions of their peers and their instructors and reported little interaction with them. This finding was not significant among the students from other minority groups. All minority students reported financial difficulties in attending college. Additionally, students with dependent children reported having difficulties with the nursing program. Wong et al. (2008) suggested faculty of the nursing programs should pay more attention to the needs of students who are of low wealth and who are responsible for dependent children.

Seago and Spetz (2005) examined completion rates for students enrolled in community college nursing programs in California. Data records including enrollment, graduation, and NCLEX-RN™ pass rates were collected for the academic years 1995-1996
to 2001-2002. For the academic year 2000-2001 there were 6,670 slots new students enrolling in one of the nursing programs offered by the California Community College System. For the academic year 2000-2001, African American nursing students had lower on-time completion rates. Overall, programs with large numbers of African American nursing students had lower first time pass rates on the NCLEX-RN™ (77.5%) compared to the statewide average pass rate of 84.4%. Only half of the African American students admitted to nursing programs between 1995 and 2001 completed the nursing program. Seago and Spetz (2005) provided one explanation for the poor success rate for African American nursing students: inadequate educational preparation. Additionally, for students completing the nursing program, the cultural bias of the NCLEX-RN™ could be responsible for the low pass rates for minority students.

Coleman (2008) reported on her qualitative study focused on African American enrolled in a predominantly White, two-year nursing program located near Chicago. She interviewed 14 African American students to learn more about their experiences in the nursing program. The article did not identify the year of the interviews. Four themes emerged from the interviews: difference, coping and surviving, support systems, and the institutional context. Students reported feelings of isolation given their physical differences. Additionally, the students reported alienation by both students and faculty and fear of failing the courses. Consequently, the students developed coping and survival skills, which were not described in the article beyond hard work. These students had a support system from their families but identified difficulties in developing support systems with peers and faculty.
members. Finally, the students identified the institution as detached to the cultural needs of the African American student. The overall implication from this article was that the African American students enrolled at the predominantly white nursing program were victims of racism and the school needed to develop a culture that was more amenable for African American students.

Loftin, Newman, Gilden, Bond, and Dumas (2013) completed a comprehensive review of the literature focused on interventions used by nursing programs to increase the diversity of their students. Guiding the literature review was the methodology described by Whittemore and Knafl (2005) to extract data, summarize, and synthesize findings for the 11 studies. The eleven studies focused on retention interventions used at schools with large Hispanic populations enrolled in a community college or students enrolled in a nursing program at a four-year college. Additionally, Loftin et al. (2013) incorporated Jeffreys’s (2004) Nontraditional Undergraduate Retention and Success (NURS) model in the study. Barriers identified included financial and work issues, inadequate academic preparation and study skills, lack of support from family, and racial and ethnic discrimination. Each of the studies examined the outcome of student retention. Eight programs implemented workshops focused on remediation skills including study, time management, and advanced reading skills. These workshops were part of a summer bridge program, new student orientation, or built into the early weeks of the first semester nursing coursework. Another school hired a retention coach who also worked with students during review sessions. Mandatory supplemental instruction was another retention intervention successfully implemented at one
baccalaureate level nursing program. According to Loftin et al. (2013), a problem with the studies reviewed was the lack of information provided about the implementation of the program and the outcomes for the program beyond graduation or NCLEX-RN™ success. This finding makes it difficult for practitioners to design and replicate the programs discussed in the literature in their respective nursing programs. Loftlin et al. (2013) called for more research on interventions and the publication of these papers with complete details to encourage program replication.

In summary, the findings by Loftin et al. (2013) highlight the problem with much of the literature focusing on retention in the associate degree nursing programs in general and specifically for African American nursing students. The majority of articles located were grounded neither in theory nor in research; the articles located and not used in the literature review provided commentary on issues without substantiation or replicability. Of the few relevant articles located and included in this review, one finding identified was the lack of academic preparation for minority nursing students led to attrition from the program. Loftin et al. (2013) reviewed the literature to learn how nursing programs were working to increase both the academic and social integration of students as a means to increase retention.

Overall, the body of literature devoted to the retention of students enrolled in nurse preparation programs at the community college is small. This is discouraging given the role the community college has in preparing the nation’s nursing workforce (AACN, 2012a, 2012b, Fulcher and Mullin, 2011). The Wong et al. (2008) and the Seago and Spetz (2005) studies used the Seago Model discussed. Loftin et al. (2013) used the Jeffrey (2004) NURS
model while Coleman (2008) did not identify a theoretical framework for her study. Additionally, the literature Loftin et al. (2013) located focused on minority retention at the community college was of the quality that makes it difficult for researchers and practitioners to replicate and build on to increase minority representation in the field of nursing as called for by the IOM (2011). The small body of literature reviewed identified African American students as the racial group most negatively affected by program attrition in associate degree of nursing programs provided by community colleges. Finally, these studies identified inadequate academic preparation in reading and science as barriers to program retention. Given the research emphasis, academic preparation, as described by Tinto (1975), acts as a barrier to retention for students enrolled in the associate degree of nursing programs, the findings confirm students with poor academic preparation are more likely to be lost to attrition from the nursing program.

Table 2 provides a snapshot of the attrition rates for select studies. Attrition rates were collected from the North Carolina Board of Nursing (NCBON) for Bachelor of Science Nursing (BSN) programs, diploma programs, and associate degree in Nursing programs offered by public and private non-profit educational institutions. The most recent published data is for cohorts that completed their studies in the spring semester of 2014 (NCBON, 2015). While there are for-profit institutions offering nursing education leading to eligibility to take the NCLEX in North Carolina, this data is not included in the table (NCBON, 2015). Attempts to locate current national retention/attrition rates for the nation’s nursing
educational institutions were futile; the most recent information located was published in 2007 by the National League for Nursing (NLN), (2007).

Table 2
Published attrition rates in select nursing programs

<table>
<thead>
<tr>
<th>Research/Source</th>
<th>Year of Publication</th>
<th>Program Type</th>
<th>N</th>
<th>Attrition Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeffreys</td>
<td>2007</td>
<td>Associate</td>
<td>112</td>
<td>25%</td>
</tr>
<tr>
<td>Shelton</td>
<td>2012</td>
<td>Associate</td>
<td>458</td>
<td>34%</td>
</tr>
<tr>
<td>Rogers</td>
<td>2010</td>
<td>Associate</td>
<td>96</td>
<td>20%</td>
</tr>
<tr>
<td>Fraher, et al.</td>
<td>2008</td>
<td>Associate</td>
<td>2,237</td>
<td>39%</td>
</tr>
<tr>
<td>NCBON</td>
<td>2015</td>
<td>BSN</td>
<td>971</td>
<td>20%</td>
</tr>
<tr>
<td>NCBON</td>
<td>2015</td>
<td>Diploma</td>
<td>64</td>
<td>36%</td>
</tr>
<tr>
<td>NCBON</td>
<td>2015</td>
<td>Associate</td>
<td>2942</td>
<td>42%</td>
</tr>
<tr>
<td>NLN</td>
<td>2007</td>
<td>Associate</td>
<td>NA</td>
<td>20%</td>
</tr>
</tbody>
</table>

The literature review continues with an examination of studies focused on school wealth and student achievement.

Studies on School Wealth and Student Achievement

Sirin (2005) conducted his meta-analysis of 58 research articles published between 1990 and 2000 to learn the effect size of the correlation between socioeconomic status and achievement in studies utilizing regression analysis. As Sirin noted, this was only the second study of this type; the first, published by White (1982), focused on 59 journal articles published between 1918 and 1975. In that study, White (1982) found that the correlation between socioeconomic status and academic achievement decreased as the student moved through elementary school into secondary school. Sirin, on the other hand, found the relationship to increase until high school and then return to elementary school levels and
provided several explanations for this finding. First, high school students might be reluctant to apply for free and reduced lunch; family income is the basis for eligibility. Second, those students with the lowest academic achievement are those most likely to drop out of high school prior to graduation. Overall, the effect size for socioeconomic status and achievement at the school level, measured by the Pearson’s correlation coefficient \( r \), ranged from .11 to .85, mean = .60 (\( SD = .22 \)). The average effect size for fixed effects was .67 with a 95% confidence interval of .66 to .67 and significantly different from zero (\( z = 14.26, p < .001 \)).

Sirin (2005) examined the methodology of the relationship between socioeconomic status and achievement. Six components used to identify socioeconomic status were identified in the literature: parental education, parental occupation, family income, free or reduced price lunch, neighborhood characteristics, and home. The first three are the best indicators to use if the information comes from the parents. However, many data sources do not collect this information; free or reduced lunch is an acceptable method to determine the socioeconomic status of the school.

Sirin (2005) noted that school populations often mirror the economic characteristics of the students’ residential neighborhoods and the resulting disparities in property tax valuations and revenue collections. Schools located in areas with low property values often have reduced resources to meet the increased needs of the student population. Inequitable distribution of school resources is more noticeable across school districts than within school districts, although schools with low levels of financial need often have more parental involvement than those with larger populations of high need students in the school district.
Studies using socioeconomic status as a dichotomous variable (high or low) provided the smallest effects with reduced correlation; studies without range restrictions provided the largest effect and increased the correlation.

Sirin (2005) found that the studies examined used four measures of student achievement: general, math, verbal, and science scores. Studies using general education measures such as a school composite score had the smallest effect sizes while studies using math scores had much larger effect sizes. Minority status was also a significant predictor: increasing minority student populations negatively affected the correlation between socioeconomic status and academic achievement.

Sirin (2005) also found that family SES is significant for White students’ academic achievement but not for Black students. He attributed this finding to the neighborhoods of Black students. However, Black students had lower SES and lower academic achievement than the White students did and he attributed that to the low quality schools the majority of Black students attended.

Milner (2013) conducted a meta-analysis of the literature focused on the intersection of race and poverty on educational outcomes through the lens of critical race theory. Milner (2013) concluded that schools educating high levels of students living in poverty lack equitable resources compared to those schools with student populations not living in poverty. This lack of resources leads to those students, who are most in need of high quality teaching and learning experiences, to suffer from high teacher turnover, inexperienced teachers, and
attending schools with questionable leadership by inexperienced principals who are waiting for a better school assignment.

Wolniak and Engberg (2010) examined data for 3,750 college students completing the National Longitudinal Survey of Freshmen in the spring of 2000. The purpose of the study was to learn if high school context affected first year GPA in college. Students completing the survey attended the most selective colleges and universities in the nation. Consequently, the findings might not be relevant for other postsecondary institutions.

Using a three-block linear regression model, Wolniak and Engberg (2010) found the final model explained 24% of the variance for students’ grades. Black and Hispanic students had statistically significant lower grades than White students did. Students from households with income less than $50,000 also had statistically significant lower grades. Female students had statistically significantly higher grades than male students did. Students whose mother had a college education had statistically significantly higher grades than students did when their mother had a high school education.

According to Wolniak and Engberg (2010), students with high SAT test scores and high school GPA had statistically significant higher grades than students with lower scores. The quality of the high school infrastructure was statistically significant and positive for higher grades while exposure to school violence in high school was statistically significant and negative for grades. Students with low, less than $50,000, and medium, $50,000-$75,000 family income attended schools with lower quality infrastructure and lower quality of teaching, and more exposure to violence than did students with a family income greater
than $75,000. Wolniak and Engberg (2010) concluded that wealth was associated with better high school contexts and affects college students’ first year grades.

Dorosin, Haddix, Jones, and Trice (2011) chronicled school inequities in North Carolina. At the county level, many school districts were unifying the multiple small schools in the county into one county public school system. Often, for political reasons, the wealthier city schools systems did not consolidated into the county system. However, after desegregation, White flight to the county suburbs left many of these city systems predominantly African American. The 1969 merger of the Charlotte-Mecklenburg schools systems created the largest school system in the state until recent years. The Court ordered Charlotte-Mecklenburg Schools (CMS) to bus students within the district to create racially balanced schools. Consequently, CMS achieved racially balanced schools. Like many public school districts in the South, CMS was under unitary status orders and supervised by the Justice Department. Having achieved unitary status, the Justice Department removed CMS from supervision in 1999 and the school system returned to neighborhood schools; now, the system contains schools that are as segregated as they were in 1965.

Many school districts across the South achieved unitary status and release from court-ordered desegregation efforts. Reardon, Grewal, Kalogrides, and Greenberg, (2012) investigated the extent that desegregation persisted following release from court supervision. They utilized data compiled annually by the National Center for Education Statistics, which includes school and district level data by grade, race, and free and reduced lunch eligibility. They developed a database of all school districts under unitary status supervision and
documented whether schools were released and the year of release, or if they remained under the court-ordered supervision. The vast majority of public school districts under unitary status orders in 1990 were located in Southern states: 387 out of 483 nationally.

According to Reardon et al. (2012), by 2009, the Justice Department declared unitary and released from the court-ordered supervision 161 of the Southern school districts and 54 non-Southern districts. Reardon et al. (2012) reported that the findings from the data suggested schools located in districts released from unitary status orders in the 1990s experienced rapid increases in their black proportion when compared to non-dismissed schools and districts than those schools released since 2000. As African American enrollment increased, White enrollment did not, leading Reardon et al. (2012) to conclude that White middle class students do not leave private schools and return to public schools. Finally, the findings suggested that the return to resegregation of the schools was largest for school districts that were more effective in their desegregation programs and policies. Elementary schools experienced greater resegregation than middle schools and high school. At the time of publication, it was unknown what effect racial resegregation of the schools has had on student achievement and Reardon et al. (2012) called for more studies in this area.

Reardon and Owens (2014) continued the research started by Reardon et al. (2012) and examined racial and economic trends taking place in the nation’s public schools since Brown v Board of Education (1954) and the recent trend to return to racially segregated schools. Reardon and Owens (2014) suggested that in addition to racial segregation, the schools were becoming more economically segregated than they were in 1990. Many
researchers suggested these two types of segregation affect student academic achievement; however, Reardon and Owens contend that the literature poorly defines many of the mechanisms used to link income segregation. Specifically, studies looking at race segregation and negative student outcomes might really be examining unequal distribution of resources and other disparities in the school such as teacher quality.

Reardon and Owens (2014) called for future research on racial segregation to focus on the following three questions. “First, how does the segregation of a schooling system affect the total quantity of available resources in the system? Second, how are resources distributed among schools in relation to schools’ racial and socioeconomic composition? Third, how do these school resources affect students’ educational outcomes?” (Reardon and Owens, 2014, p. 29). The authors concluded that there is a need to develop quality research to identify factors and supply answers to these questions; the findings will provide a better understanding of why and how segregation matters.

The Public School Forum of North Carolina (PSFNC) isolates state and federal funding to identify each of the 100 county’s capacity and effort on public school spending. The findings, published annually, provide evidence of the disparity in public school funding among high and low wealth regions of the state (2013). For example, during the academic year 2010-2011, Orange County provided $4,225 per average daily membership (ADM) of 18,761 students while Swain County provided $420 per ADM of 1,888 students; the state average was $1,762 per ADM with 24 counties providing additional funding above the state average. For the same period, the North Carolina Legislature provided additional funds for
28 small counties with low student population and 68 low wealth counties lacking a real property tax base to generate additional revenues. Small county funds increased Hyde County’s supplemental school spending by $3,329 per ADM of 575 to $5,633 per ADM while low wealth county funds increased Hoke County’s school spending by $693 per ADM of 7,945 to $1,183 per ADM.

Recognizing that many studies purporting to measure the Black-White achievement gap really measure the income achievement gap, Reardon (2011) examined the growth of the income gap and compared the income gap to the income achievement gap. Using 19 national data collections, he found the income achievement gap was 30 to 40 percent larger for children born in 2001 than those born in 1974. The income achievement gap was more than twice the Black-White achievement gap. The relationship between parental education levels and student achievement has remained constant over the past 50 years. Finally, the income achievement gap did not appear to be directly related to income inequity. However, the rising income inequity might be attributing to the income achievement gap, as families with more discretionary income might be investing more resources in their children’s education through day care, extracurricular activities, vacations, housing, and school choice. This finding might be a result that families with higher incomes have higher parental education leading to better employment opportunities.

Reardon (2011) suggested social changes, such as the polarization of the family, contributes to the income achievement gap. Single parent households are more likely to be headed by younger women with lower levels of education and unemployed while married
women are more likely to be older, have high levels of education, and employment. Another societal component is the trend of marital homogamy in which people marry those with similar levels of education attainment. Since parental education and student achievement levels have remained constant, Reardon attributed the current achievement gap to increases in income, which has risen for African Americans, Whites, and Hispanics. Consequently, it is income, not race, which is responsible for documented inequities in education.

Following up on Reardon’s 2011 work Duncan, Kalil, and Ziol-Guest (2013) examined the role of income inequity in educational attainment. They used data from the Panel Study of Income Dynamics and concentrated on cohorts of children born between the late 1960s to the late 1990s. Using regression analysis, they found that the income gap between high and low-income children accounted for about 70% of the achievement gap. They attributed most of the achievement gap to the increase of single mothers who have children at a young age compared to married mothers who are older and possess more education than the single mothers possess. Race was not included in the analysis.

Aud, Wilkinson-Flicker, Kristapovich, Rathbun, Wang, and Zhang (2013) publish an annual report to inform policy makers and the public of the status and trends found in the nation’s schools. A major finding for this edition, using 2011 data, was that one in five schools was classified as high poverty, measured by 75% or more of the student population receiving free and reduced lunch. This was an increase from one in eight schools identified as high poverty in 2000. Over 10.3 million school age children were living in poverty in 2011. Nationally, 13% of White, 39% African American, 34% Hispanic and 36% of Native
American children were living in poverty. Of those, 72% lived in single parent households with 45% living in households headed by women. The national high school graduation rate was 78.2% with 80.7% for suburban areas, 79.9% for rural areas and 68% for urban areas. A large portion, 68%, of those graduates enrolled in postsecondary education in the fall of 2011.

To summarize, this section of the literature review examined research focused on the correlation of school wealth and student achievement. Researchers have shown that the historic Black-White achievement gap is really an income achievement gap with the findings that it is income, not race, which is responsible for the inequities in educational achievement. The income achievement gap becomes apparent when examining the inequities in North Carolina school funding and student achievement. The finding that wealthy students attend schools in communities with higher wealth, higher school funding, and greater learning opportunities while students living in poverty tend to reside in communities of low wealth and attend schools with large numbers of students of low wealth, reduced funding, and reduced educational opportunities reinforces the finding that inequities exist in North Carolina Public Schools.

**School Quality**

Ladd and Loeb (2013) identified the three most common proxies for school quality: resources or inputs, internal processes and practices, and student outcomes. Researchers utilize a variety of resources and student outcomes to measure school quality. However,
many of the internal processes and practices in schools are difficult and expensive to objectively measure and compare.

According to Ladd and Loeb (2013), spending per student at the district level is one of the most equitable ways to measure financial resources in terms of both quantity and quality. Removal of capital expenditures in this figure removes costs associated with differentials in real estate and property values based on geography and population density and allows for easy and straightforward comparisons between school districts. For example, if District A spends 25% more per student than District B, one would be correct to assume that District A might have more highly qualified teachers or provides additional programs than District B. The use of spending per student also prevents the need to adjust for cost differentials that result in teacher pay for hard to fill positions or in areas where the private market competes for the teachers.

Ladd and Loeb (2013) identified teacher quality as the major expenditure under spending per student. There are four main criteria used to measure teacher quality. First, pre-service test scores on the Praxis II exam measures proficiency in the teaching field of study. Teachers scoring higher on the Praxis II possess higher content knowledge than those with lower scores. Second, the competitiveness of the teacher’s undergraduate institution, which provided the teacher training, is a measure of quality of the undergraduate teaching program. This measure implies that highly competitive institutions provide a higher quality education than a nonselective institution; the students admitted to the highly competitive institution possess greater academic preparation than students who attend institutions with
lower admission standards. Third, teacher experience correlates with student achievement. New teachers require time to acquire their classroom management skills and better develop their teaching skills and materials. Finally, National Board Certification is available to teachers with several years of experience who have invested their own time and money to increase their credentials. Ladd and Loeb (2013) cited recent research finding that schools composed of high poverty students had more teachers with weaker credentials compared to schools with more affluent student populations.

According to Ladd and Loeb (2013), one major drawback of using spending per student as a measure of school quality is the need for some schools to spend more on special populations than other schools. For example, schools with large numbers of students with requisite individualized education plans (IEP) provide smaller classes, which require more teachers in the school and raises the cost per student. These students with IEPs are more likely to require the use of educational specialists to help them overcome their specific learning and/or physical disability that also increases the cost per student. Finally, per student spending for educational specialists in a district might not be distributed equitably among the schools in the district.

Ladd and Loeb (2013) noted that student outcomes are a measure of school quality. This measure utilized student test scores on standardized tests and is currently driven by the accountability program of No Child Left Behind (NCLB). North Carolina Department of Instruction designed these tests to measure student learning, if a student scores high they have learned, if they scored low they did not learn. Consequently, Ladd and Loeb (2013)
identified schools with higher proficiency levels, measured by students test scores, as schools of higher quality than schools with lower proficiency scores.

According to Ladd and Loeb (2013), there are problems with relying solely on school proficiency scores based on test scores include the school’s narrow focus on reading and math scores at the expense of music and art in children’s education. Likewise, these tests fail to measure other traits valued by society including the ability to work in groups, develop empathy, and gain knowledge and achievement in other subjects such as science and history. Finally, schools cannot compensate for students from disadvantaged socioeconomic backgrounds. Many of these students lack the means and the opportunity to participate in educational activities outside of the school that students from more affluent backgrounds engage in during the school year and summer vacation.

Ladd and Loeb, (2013) concluded that while the measures described above are not perfect, they are the best measures available at this time. School quality does differentiate within and across districts. They suggest utilizing multiple measures and take into account the composition of the school population given that different groups will provide different results.

Within each group of schools, Clotfelter et al. (2007) ranked the schools from high to low based on percentage of students receiving free lunch, a measure of student poverty in the literature. They divided the schools into quartiles based on percentage of students receiving free lunch; schools in the first quartile were identified as high poverty schools while schools in the fourth quartile were identified as low poverty schools. Comparing the differences between quartile 1 and quartile 4 over time, the researchers discovered that each group experienced increases in student poverty; however, the increase was much larger for high poverty schools than for low poverty schools.

The findings from this study (Clotfelter et al., 2007) provided evidence that high poverty schools have a greater percentage of teachers and principals with weaker qualifications than those employed at low poverty schools. They called for additional research to examine teacher credentials and student achievement at high poverty schools. High poverty schools, with low student achievement, need better tools, through strong and effective teachers and leaders to reduce the academic achievement gap.

Clotfelter, Ladd, and Vigdor (2008) utilized administrative data stored in the North Carolina Education Research Center at Duke University. NCDPI collected data from statewide end of course (EOC) tests in North Carolina. Clotfelter et al. (2008) used the data to examine the relationship between teacher credentials and student achievement at the high school level. They focused on a single characteristic of teachers, the test score from their Praxis II licensure exam that previous research identified to be predictive of student achievement. Teacher preparation included those with traditional education degrees and
lateral entry provisional licenses. Clotfleter et al. (2008) used the student’s eighth grade test scores in math and reading to serve as proxies for student ability and motivation. The sample included students from four cohorts of 10th grade students enrolled from 1999/2000 through 2002/2003 academic years. At the time of the study, five high school courses had EOC tests: Algebra I, Geometry, English II, Biology, and Economic, Legal and Political Systems (ELP). Clotfelter et al.’s (2008) final sample included only those students matched to at least three teachers for the EOC tests.

Clotfelter et al. (2008) estimated a model with student fixed effects to minimize bias associated with the non-random distribution of teachers and students in assigned classrooms within schools. The findings included evidence that teacher credentials did affect student achievement. Teachers with a master’s degree and National Board Certification were significant and positively predictive of higher student achievement. Teachers receiving their credentials from highly selective and competitive college education programs were significant and positively associated with student achievement. Male teachers and African American teachers were found to be less effective than White, female teachers were. Male teachers had a large, significant negative coefficient with female students while African American teachers had a large, significant negative coefficient for White students and a small, negative effect found for African American students.

According to Clotfelter et al. (2008), high poverty schools had higher proportions of inexperienced teachers (17.3%), teachers from less competitive institutions (27.4%), and teachers with non-regular licenses (20.5%). Low poverty schools had smaller proportion of
inexperienced teachers (14.6%), fewer teachers from less competitive institutions (14.2 %) and fewer teachers with non-regular licenses (13.3%). The authors concluded these findings contribute to the Black-White academic achievement gap at the high school level in North Carolina.

In a later research study, Clotfelter, Ladd, and Vigdor (2010) built on their earlier findings. The 2008 study by Clotfelter et al. found that teacher quality was distributed unevenly among schools; African American students and those from disadvantaged backgrounds experienced negative consequences from exposure to low teaching quality. Since 2007, school districts cannot use race for student assignments; socioeconomic status is the default factor used to make school assignments balanced. Clotfelter et al. (2010) provided evidence that race was highly correlated with poverty. Another variable correlated with race was living in a single parent household.

To measure teacher quality the Clotfelter et al. (2010) utilized four variables: teacher’s licensure test scores, competitiveness of undergraduate institution, years of teaching experience, and National Board certification. Previous research identified these variables as predictive of student achievement in North Carolina and other states. Competiveness of the undergraduate institution was associated with student achievement at the high school level while National Board Certification is important in elementary schools.

Using longitudinal data collected on North Carolina teachers, Clotfleter et al. (2010) examined teacher response, to stay or leave, for those employed at high poverty and high minority schools. They estimated probit models to learn the role salary plays in regards to
filling teaching vacancies. They also estimated competing-risk hazard models to learn how school demographics influence teacher retention.

Clotfelter et al. (2010) reported “…no salary differentials would be large enough to compensate [high-quality teachers] for being in schools with concentrations of [high-poverty, minority] students” (p. 40). Their study found that there was some evidence that incentives may affect short-term teacher retention, but the small size of the incentive was not a useful policy tool for improving the retention of high quality teachers in high poverty schools. They also estimated salary increases of 40% to 50% would be necessary for school districts to retain high quality teachers in the high need schools.

No Child Left Behind (NCLB) (2001) is the latest reauthorization of the 1965 ESEA. The U.S. Department of Education, under NCLB, mandated the states identify and improve performance of the nation’s lowest performing schools and provided funding through the School Improvement Grant and more recently, the Race to the Top initiative. Given NCLB’s emphasis on student performance for all student populations, it is easy to identify the Black-White achievement gap within schools as a driver for this legislation. Schools with high proportion of African American students and students living in poverty tend to have lower academic performances, a finding documented in the literature.

Clotfelter, Ladd, and Vigdor (2009) utilized administrative data stored in the North Carolina Education Research Center at Duke University and NCDPI collected data from statewide end of course (EOC) tests in North Carolina to document the academic achievement gap for North Carolina students enrolled in grades 3 through 8. Five, intact
coHORTs of students were studied for six years each with the earliest cohort enrolled in third grade in 1994/1995 and the final cohort completing the eighth grade in 2004/2005. The researchers normalized the achievement tests scores for both reading and math to a mean score of zero and a standard deviation of one for each test and year to provide comparability over different tests used by NCDPI during the study period.

Clotfelter et al. (2009) examined the academic achievement of African American, Hispanic, Asian, American Indian, and Multiracial students compared to White students over the six years. White student scores were normalized at the mean of zero. African American students’ scores remained consistently lower in both reading and math when compared to White students: -.71 standard deviations in third grade to -.776 standard deviations in eighth grade in reading and -.78 standard deviations in third grade to -.81 standard deviations in eighth grade in math.

Clotfelter et al. (2009) suggested that another way to examine the achievement gap is to examine the percentage of students in the upper and lower tails of the score distributions. Racial disparities existed in an examination in the tails of the distribution in both reading and math. In reading, 25% of African American students scored below the 10th percentile of Whites and 30% of White students score higher than the African American 90th percentile. However, in four out of five cohorts African American students made little progress in narrowing the gap at the 90th percentile. In math, African American students made progress at the low end by .02 to .04 standard deviations. The Black-White achievement gap grew by .01 to .04 standard deviations at the 90th percentile. Clotfelter et al. (2009) concluded that
school efforts to meet NCLB standards affected the narrowing in the gap for math. They suggested that the schools reallocated teaching resources to low achieving students resulting in a widening of the gap for the high achievers. They called for more research in this area to learn if the gap at the higher end of the distribution was due to reallocation of resources or a result of more peers with low achievement.

Riegle-Crumb and Grodsky (2010) used data from the 2002 Education Longitudinal Study to identify racial disparities for students enrolled in high school advanced math courses. This study found African American students enrolled in advanced math courses had lower test scores than either White or Hispanic students. African American students had lower rates of participation in Calculus, lower tenth grade math test scores, lower math grade point average, lower parental education, and lower family income than White students did. The achievement gap was greatest for African American students with the lowest family income. Attending racially segregated schools affected the achievement for all student racial groups, but minority concentration was found to have a greater effect on the higher achieving black students; achievement declined as the percentage of African American students increased in the school population. Riegle-Crumb and Grodsky (2010) concluded that African American students attending schools with high minority concentrations did not learn the same material in the Calculus courses as students attending more heterogeneously populated schools.

Cratty (2012) analyzed an entire third grade cohort in North Carolina and examined graduation and dropout rates with emphasis on the academically or intellectually gifted
(AIG) and special education populations. North Carolina ranked in the top 10% nationally in both the number of high school dropouts and the number of students scoring a three or higher in the Advanced Placement exams. The initial population contained 100,366 first time third graders enrolled in the fall of 1997. Annual attrition was 3.2% and accounted for the loss of 28,686 students from the cohort by the twelfth grade. Another 3,269 special educational students had ambiguous exits from school and the author excluded them from the final sample. The final sample cohort contained 68,401 students. Data used in the analysis was collected by the North Carolina Department of Public Instruction and stored by the North Carolina Education Research Data Center and included end of grade and course test scores, grade retention, and identification as an exceptional student.

Cratty (2012) examined students admitted to the AIG program and found students admitted to the program were White and of higher socioeconomic status with parental education at the college and beyond levels. Few minority students and those from lower socioeconomic status participated in the program even though many of these students had end of grade test scores as high as or higher than scores for those students admitted into the AIG program. After reviewing student files, Catty found that many parents of AIG students requested their child’s placement into the program.

Cratty (2012) noted that the State of North Carolina funds AIG programs with $1,163 per pupil expenditure and capped at 4% of the total school enrollment. Most schools have a 15% AIG enrollment while 23% of this cohort participated in AIG programs at least one year during the study period. Given the small expenditure from the state, local school boards may
be supplementing the AIG programs with additional funds. AIG students experienced gains in math and reading tests and scored one full standard deviation above the non-AIG students. In eighth grade, AIG students were more likely to enroll in Algebra I. Preparation for college included AP courses for AIG students during the high school years.

According to Cratty (2012), AIG programs in the elementary grades create critical thinking skills while providing multiple experiential learning experiences to supplement the standard curriculum. Catty suggested the expansion of the program’s experiential component to those most at risk of dropping out of school. Simulation results suggest expanding the program would reduce student dropout rates by 25%.

The end of court-ordered busing for racially balanced schools and the ruling in Belk v Charlotte-Mecklenburg Public Schools (1999) in which race could no longer be used for school assignments has led to the resegregation of many of the public schools in Charlotte, North Carolina (Jackson, 2009). The Charlotte-Mecklenburg School (CMS) system is one of the largest public school districts in the state. Researchers have used the CMS district as a quasi-experimental population to document changes in student achievement (Billings et al., 2014; Deming et al., 2011; Jackson, 2009).

The end of student busing in Charlotte-Mecklenburg Schools (CMS) provided Jackson (2009) the opportunity to investigate the relationship between changes in student attributes and changes in teacher quality while holding schools and neighborhoods unchanged. CMS ended its busing program for unitary status in 2002 and schools assignments returned to neighborhood schools. The result was a school population
homogenous with the local neighborhood, both racially and economically. Teacher transfers also increased resulting in experienced teachers leaving the schools with large populations of African American students.

As a rule, Jackson (2009) found that teachers within the CMS district were paid according to the published salary scale, which was based on years of experience. Teachers working at high poverty schools did not earn extra pay for what many might consider harder work: teaching academically underprepared students. Teachers transfer within a district for different reasons: to teach in a school with student characteristics correlating to academic success, to teach in a school with neighborhood characteristics correlating to academic success, or to teach in a school closer to their residence.

To measure teacher quality, Jackson (2009) used Praxis II scores: high scores represented higher teacher quality. Another measure of teacher quality was years of experience. Jackson found that the number of teacher transfers increased the year prior to the implementation of the new policy. The findings confirmed that both White and Black teachers of higher quality and with more teaching experience transferred to schools with student attributes associated with race. Schools that experienced an increase in the Black enrollment share saw a decrease in the proportion of experienced teachers, and a decrease in the proportion of teachers with high scores on their licensure exams. These same schools saw a decline in student performance.

Jackson’s (2009) empirical work was one of the first documenting the shift of the teaching workforce in anticipation of school demographic changes. Consequently, CMS
schools with high populations of African Americans and economically disadvantaged students were staffed by teachers of lower quality and less experience than schools with more equitable distributions. Jackson urged policy makers to consider this finding before implementing more charter schools and other policies, which will have implications affecting the demographics of the student body.

Using Federal census tracks, administrative data from CMS, and arrests and incarceration records from the county, Billings, Deming, and Rockoff (2014) examined the results of redistricting following CMS’s 2002 return to neighborhood schools. The data from CMS included data spanning academic years from 1995/1996 through 2010/2011. Every student enrolled in the system had socioeconomic data, achievement on North Carolina End of Grade and End of Course exams, graduation, and college attendance. Data records were matched to arrests and incarceration records maintained in the county for years 1998 through 2011. Additionally, CMS students were matched to records maintained by the National Student Clearinghouse, a nonprofit organization that provides degree and enrollment verification for more than 3,300 colleges and 93% of students nationwide.

The analysis by Billings et al. (2014) utilized six cohorts starting the sixth grade from fall of 1996 through the fall of 2002. The first cohort graduated in the spring following the fall 2002 implementation of the new neighborhood school attendance areas and the last cohort graduated in 2009. Finally, all students were placed into one of the 981 micro-neighborhoods using census data from 2000 and address information to examine racial composition and socioeconomic status of the neighborhood and school segregation. The
census blocks were sorted into three groups using the minority composition of students in the schools prior to 2002: less than 20% minority, 20-66% minority, and greater than 66% minority.

The sample used by Billings et al. (2014) contained 43,949 students. Billings et al. (2014) determined that 7,931 students lived in census blocks with less than 20% minority population, 17,989 students lived in census blocks containing 20-66% minority, and 15,100 students lived in neighborhoods with more than 66% minority population. Students could elect to enter a lottery to attend magnet schools or another school in the district; most students attended the assigned school. Results of the regression analysis identified statistically significant, large, negative effects for test scores, graduation rates, and college participation for racial minority students: an increase for each 10 percentage points in minority student population growth resulted in a reduction just over 1% in both high school graduation and four-year college participation. Arrest rates and rates of incarceration were statistically significant, large, and negative for minority male students.

To offset the loss of teachers documented earlier in Jackson (2009), CMS offered additional resources to attract teachers to four high-poverty and high minority schools identified as the High School Challenge beginning in the fall of 2006 (Billings et al., 2014). Efforts were successful: three of the schools increased their test results by an average of 12%. The fourth school underwent transformation into five small academies including international baccalaureate studies, business studies, and technology. In a separate examination of teachers with baccalaureate degrees from selective institutions, those teachers were found to
have a large, significant, and positive effect on test scores and four-year college participation. Teacher pay was also significant but the effect size was small. Billings et al. (2014) concluded that the resulting racial resegregation was detrimental to all students, given lower test scores, lower college participation, and higher crime in high minority neighborhoods since 2002.

Deming, Hastings, Kane, and Staiger (2011) examined the effects of attending one of CMS 14 high schools. The fall of 2002 was the start of the implementation of school attendance lines assigning students to schools on proximity rather than busing students for racial diversity. CMS created four choice zones used to transport students to school. Students wishing to attend schools outside of their choice zone were responsible for their transportation to school. Student choice allowed students to attend schools other than the assigned school with 95% of the parents submitting choice applications. While many of CMS’s students chose to attend the assigned school, CMS received 29,584 choice applications for students desiring to transfer to other schools. CMS officials prioritized the lottery applications into three groups: students who attended the school in previous years and their siblings; free and reduced lunch eligibility; and students applying to a school within their own choice zone.

The initial sample used by Deming et al. (2011) contained 28,584 students. Deming et al. (2011) reduced the sample to 20,021 after excluding students not enrolled in CMS in the 2001-2002 or fall 2002 school years and rising 12th graders. While most students chose to attend the assigned school, 48% (9,719) chose a school other than the one assigned with
49% (4,736) receiving their first school choice. CMS assigned nearly 32% (3,118) to schools based on the lottery priority groups. The remaining 19% (1,865) students did not receive their choice assignment; their second and third school choices were oversubscribed by this time and their school assignment was to one of the schools with remaining capacity. However, a significant share of students losing the initial lottery eventually enrolled in the school by moving to the guaranteed neighborhood or by admission from the wait list for the school; these students were predominantly White with higher family incomes.

Deming et al. (2011) compiled descriptive statistics for the 14 high schools in the district including three magnet schools located within the inner city. Five main outcomes were identified: two school quality measures, 9th grade math and English end of course exam scores, and three educational attainment measures. The educational attainment measures were graduation from high school, enrollment in a four-year college, and enrollment in a very competitive four-year college. The very competitive four-year colleges were identified as Duke, UNC-CH, Davidson, and Wake Forest. English and math scores were standardized with the mean set to zero; the resulting scores ranged within 1.5 standard deviations. Three of the five outcomes were found to be strong predictors of academic success: high school graduation, enrollment in a four-year college, and end of course math scores. The other two outcomes, English scores and very competitive four-year college enrollment were found to be ineffective as predictors.

Deming et al. (2011) ranked the schools based on their standardized score for quality. Four high schools were identified as the lowest quality schools based on outcome measures
and preference based on school choice. African American students with high levels of poverty attended these four schools. The remaining high schools were identified as high quality neighborhood schools for the analysis.

Demings et al. (2011) compared the lottery winners to the lottery losers using regression analysis. Lottery winners from low quality school neighborhoods attended schools with better outcomes; the winners were 8.7% more likely to graduate from high school, 6.6% more likely to attend college, and 5.7% more likely to graduate with a baccalaureate degree. No evidence was found for lottery winners from high quality school neighborhoods.

Billings et al. (2013), Deming et al. (2011), and Jackson (2009) documented the impact of the return to de facto segregation in the CMS district schools. In their findings, the researchers reported African American students were more likely to attend a highly segregated school. Attending highly segregated schools composed of African American students and students living in poverty resulted in lower high school graduation rates and college participation.

Much of the literature located focused predominantly on graduation rates and college participation at selective colleges for high school students. However, Deil-Amen and DeLuca (2010) explored a group of high school students, the underserved, who lacked academic preparation for neither college nor career participation. For members of this group enrolling in non-selective colleges, most are in need of remediation in English, reading and mathematics prior to enrollment in curriculum classes. Deil-Amen and DeLuca (2010)
estimated as many as 40% of high school graduates compose this group of students while another 25% take two or more career track courses. The remaining students take college preparatory classes. Nearly 70% of high school graduates enroll in postsecondary education. For members of this group enrolling in non-selective colleges, most are in need of remediation in English, reading and mathematics prior to enrollment in curriculum classes.

To compound the problem, too many college graduates are underemployed in positions that do not utilize the education accompanying a degree. Deil-Amen and DeLuca (2010) attributed this finding to an increase in college degrees for positions previously held by high school graduates. Office and administration assistants remain the largest segment of the workforce. The top 15% of the nation’s largest occupations, excluding registered nurses and managers, are low wage occupations. Historically, school administrators tracked lower achieving students into vocational education high school curriculums. The assumption was that students not going to college would have the necessary skills to enter the workforce directly from high school. For those entering the community college, curriculum advisors diverted many of the low academic achievers to vocational training programs instead of the transfer programs to a four-year institution. They suggested this practice is responsible for the BA gap between students in two-year and four-year institutions. Vocational education underwent revision at the high school to become career and technical education (CTE). College track students are placed in college preparatory Advanced Placement courses and AIG programs and are predominately populated by white students with higher levels of socioeconomic status. However, a large number of students do not enroll in either of these
tracks, CTE or college preparatory, and spend their high school years completing general education courses. These students turn to the open door of the community college for workforce training.

Yet, many of the workforce development programs at the community college are by selective admission. Deil-Amen and DeLuca (2010) described the admission criteria for engineering, nursing, and information technology programs at a community college in Chicago. At the opposite end of the spectrum was career education for employment in traditionally low wage jobs found in early childhood and hospitality. Sadly, the underprepared students enroll in college oblivious of their lack of academic preparation. The marginalization of these students at the high school is reinforced at the community college and their options for gainful employment with living wage positions are limited. Deil-Amen and DeLuca (2010) called for an increase in adequate instruction at all levels of elementary and secondary education along with defined pathways for students from school to work. One example of a successful program, cited by Deil-Amen and DeLuca (2010), is the career academy, which provides students with course work and internships. Another example described by Deil-Amen and DeLuca (2010) is the Early College program but the results have been small given the need to remediate students in the skills necessary for successful participation in college.

Taliaferro and DeCuir-Gunby (2008) examined the underrepresentation of African American students in advanced classes, specifically, Advanced Placement (AP) classes. They identified several reasons for the low participation rate in AP classes by African
American students. First, White teachers do not recommend African American students to enroll in the AP classes. Second, African American students enrolling in these classes are more likely to experience alienation given there are few African American students enrolled in the AP classes. Finally, students enrolled in the AP classes are unlikely to take the exams for credit or if they do, they score below the level needed for proficiency measured by a score of 3 or higher.

Using a case study methodology, Taliaferro and DeCuir-Gunby (2008) conducted interviews with 11 African American women employed at one of 10 urban high schools in North Carolina and included six teachers, four guidance counselors, and one school administrator. Three of the high schools were predominantly African American while seven were predominantly White. Findings from the study confirmed the low number of African American students enrolled in AP classes and the participants identified the problem as lack of academic preparation and tracking beginning in elementary school. Consequently, the interviewees believed the students lacked both motivation to participate and confidence in their ability to succeed in the AP courses.

Additionally, Taliaferro and DeCuir-Gunby (2008) noted that there was not a lot of advocacy for African American students to enroll in the AP courses. White students, with scores below the recommended cut point, received waivers to enroll in the courses when parents intervened. The parents of the African American students were unlikely to know about the waivers and did not advocate for placement. For African American students enrolling in the course, being the only African American in the course meant a sense of
loneliness and isolation; these students also lacked peer support for study groups and assignments.

Taliaferro and DeCuir-Gunby (2008) concluded the paper with a call for developing a college-going environment through education of both students and their parents on the different pathways to prepare for college participation. They suggested more college visitations, and community partnerships promoting college preparation and participation. Finally, Taliaferro and DeCuir-Gunby (2008) called for more research on educational equity for African American students.

Betts and Morell (1999) were the first to examine the effects of high school quality on college GPA. They used student data for 5,623 students enrolled at the University of California, San Diego (UCSD) from 1991 to 1993. Betts and Morell (1999) collected racial composition, and the number and types of teachers for each high school from the California Department of Education files. They used two variables to measure school socioeconomic status: the percentage of school-aged children participating in Aid to Families with Dependent Children (AFDC) and the percentage of students receiving free and reduced lunch at the school. Using the 1990 Census of Population dataset, Betts and Morell (1999) collected the percentage of college graduates and the medium household income. A final data set from the Educational Testing Service contained school codes and the average math and verbal scores for the SAT for students taking the test in 1992. Additionally, they collected student high school GPA and UCSD GPA for each student.
Regression analysis by Betts and Morell (1999) revealed that student high school GPA and SAT scores were predictive of success at UCSD as were student gender and race. High school quality did matter. There was a significant and positive effect for teaching experience while a negative effect was found for teachers possessing advanced degrees. Years of teaching experience for high school teachers had a positive effect. Students attending high schools with large percentage of families receiving AFDC funds or low baccalaureate degree attainment had significantly lower UCSD GPAs than students from wealthier areas or with a higher educated population did. They called for more research on high school quality to assist colleges in identifying students in need of additional student services.

Do schools utilize different college-linking strategies and do these strategies influence college attendance? Hill (2008) examined the practices used in Texas high schools and identified three “college-linking” strategies: traditional, clearinghouse, and brokering. Schools using traditional strategies (9%) had limited capacity and limited commitment on the part of guidance counselors to provide basic information on college attendance. These schools were less likely to encourage college visits and assist with college applications compared to schools using a clearinghouse or brokering strategy. Hill identified high schools using a clearinghouse strategy (25%) as one that encouraged college visits, assisted students with the completion of both college and financial aid applications and contacted with college representatives. They were less likely to communicate with parents about college and financial options. The brokering strategy was used by 66% of the high schools and utilized
their resources to encourage college visits, help all students with college applications, assist with financial aid applications, and provide contact with college representatives than either the schools using the traditional or clearinghouse strategy.

According to Hill (2008), student populations differed between the high schools and their college linking strategies. African American and Hispanic students were more concentrated in schools using the traditional strategy. Hill (2008) suggested that the different strategies reflect the socioeconomic characteristics of the school with high poverty schools using traditional strategies while schools that were more affluent used the brokering method. Hill (2008) carried the analysis further by examining college attendance patterns by strategy. Students attending schools using the traditional strategy were more likely to either not enroll in college (40%) or enrolled at the community college (49%) rather than attend a four-year college (11%). Schools utilizing the brokering or the clearinghouse were more likely to have students attend a four-year college (49%, 41%) or not enroll (32%, 36%) than attend a community college (19%, 23%). Examining the different strategies also suggest these schools emphasized the stratification of four-year schools versus the community college. For the small number of Hispanic students attending high schools employing the clearinghouse strategy, Hispanic students were more likely to choose not to pursue college rather than attend a community college. African American students were more likely to enroll at a four-year school than enroll at a community college. Hill (2008) called for more research to identify additional variables influencing college enrollment and choice of postsecondary institution for students. Students attending highly stratified schools need to have a clear
understanding of their options and schools should work to encourage postsecondary participation.

Long, Conger, and Iatarola (2012) used panel data on a cohort of high school students in Florida. Students were identified as eighth graders in 1998/99 and graduated high school in 2002/03. The sample contained 106,736 students who either graduated from high school or received a GED. A second analysis followed 32,794 students into postsecondary education.

According to Long et al. (2012), Florida courses were identified by a code with a 1 being assigned to the least rigorous courses such as pre-algebra and consumer math. Algebra I was a level 2 course and Honors Algebra was a level 3 course. For students planning to enroll in college, student participation in level 3 courses by race was high for White students (65%) and low for African American students (15%), Hispanic students (15%), and Asian students (4%). Graduation rates were higher for students taking math at level 3 classes (88%) than lower level math classes (62%). Students taking a level 3 math course in the ninth or tenth grade also scored higher on the Florida Comprehensive Assessment Test administered in the spring of the tenth grade.

Long et al. (2012) used the percentage of students receiving free and reduced lunch to identify the schools as high or low poverty. Students were more likely to take rigorous math courses if they attended a low poverty high school (27%) or a high school with large concentrations of high ability students as measured by eighth grade scores on the Florida end of grade math exam (28%). At high poverty schools, student participation in a Level 3 math
course was low (17%) and at schools with high concentration of low ability students 16% of students enrolled in a level 3 math course. Participation rates in other Level 3 courses also were differentiated by race and poverty levels. The exception was Level 3 foreign language; all schools reported low rates of participation.

Using logistic regression, Long et al. (2012) identified a large effect for attending a four-year college for students attending a low poverty high school while students from high poverty schools had an effect for high school graduation and enrollment in a community college. The largest effects were for students taking Level 3 courses in the first two years of high school. Students taking only one Level 3 course benefit; students do not need to take Level 3 courses across the curriculum or every year of high school. These findings led the authors to conclude a relationship exists between taking Level 3 courses and college attendance at Florida public postsecondary institutions but discussion was limited.

In summary, this section of the literature review provided an examination of the recent studies focused on identifying factors of school quality. School quality does differentiate within and across districts in North Carolina (Ladd and Loeb, 2013). North Carolina uses student scores on standardized tests as a performance measure of school quality. Researchers found that low wealth schools had lower test scores and identified factors leading to the disparities in school quality. This finding was attributed to weaker teacher and principal credentials and lack of experience in the schools and classroom employed by the low wealth schools and a direct result of a lack of financial resources. Additionally, there is little advocacy for African American students to participate in the more
rigorous courses at both the elementary and secondary schools. This finding was documented with AIG program participation in the elementary grades and Advanced Placement course participation in the high school and extended to college linking strategies and suggested programs of study at the community college level for both African American students and students of low wealth.

**The Texas Top 10%**

The literature devoted to the academic achievement gap is focused primarily on students with lower achievement. The current accountability movement initiated by the 1983 *Nation at Risk* and No Child Left Behind of 2001 has resulted in penalties for schools failing to raise both the test scores and graduation rates for student populations with historical low levels of achievement. There are a few studies focused on the high achieving student, the student who will be most successful in college. The Texas House Bill 588, the Top 10% Law, guarantees automatic admission to students within the top ten percent of a high school graduating class to Texas’ public colleges and universities. This bill has opened the door for these high achieving students to attend college. Yet, critics of the bill believe that many of these students are unqualified to attend the elite colleges and universities given they provide education of lower academic quality than schools with large non-minority populations and whose parents have more income. The studies in this section of the literature review focus on academic achievement of the brightest students in Texas attending college under the Texas Top 10% law.
Fletcher and Tienda (2010) examined the racial academic achievement gap that begins in early elementary school and widens during secondary education. This achievement gap suggests many students lack the preparation for college and life after school. In this study, they examined the quality of high school as an explanation for the racial academic achievement gap, which also persists at the collegiate level.

Data used in this study by Fletcher and Tienda (2010) were collected by the Texas Higher Education Opportunity Project (THEOP) and the Texas Education Agency. Using data spanning from the early 1990s through 2003, the sample contained records for 201,690 Texas high school graduates enrolled at four public postsecondary institutions with different degrees of selectivity: University of Texas in Austin, Texas A & M, Texas Tech, and University of Texas in San Antonio. The University of Texas in Austin had the most selective admission criteria while the University of Texas in San Antonio is nearly an open door institution. Hispanic students comprised 43% of the freshman class at the University of Texas at San Antonio, 15% at Texas A & M and Texas Tech, and 6% at the University of Texas in Austin. Black students, comprising 3-5% of the freshman class, were not represented well at any of the four universities. Likewise, Asian students also represented a small portion of the classes with the exception of 17% at the University of Texas in Austin. White students were in the majority at the three most selective colleges.

Fletcher and Tienda (2010) examined three variables: first semester GPA, academic probation, and 6th semester GPA. On an annual basis, 13 to 16% of freshmen are placed on academic probation at the colleges; the rate rises to 40% for first year students attending the
University of Texas in San Antonio. Regression analysis identified the GPA of Black students was .40 points below White students and Hispanic students’ GPA was .23 points for students attending the University of Texas in Austin. Adding high school control variables, high school rank and SAT scores, reduced the Black-White gap to 0.09 points and the Hispanic-White gap to 0.04 points for these students. Similar results were found for the other three schools: the Black-White gap disappeared at the University of Texas in San Antonio. Results were similar for students placed on academic probation; the control variables reduced the gap by half yet a 6% gap for Black students remained and a gap over 4% for Hispanic students.

Fletcher and Tienda (2010) found that results for 6th semester GPA remained similar to first semester GPA results even after the weakest students left the schools. To test the role of high school quality, they created a high school fixed effects specification model. This model assumed that students attending the same high school had similar teachers, curriculum, and preparation for college. Regression analysis with this component revealed statistically significant effects on each of the three college variables. At the University of Texas in Austin and Texas A&M, Black students did better than their White high school classmates on the first semester GPA although this advantage disappeared by the 6th semester GPA. Fletcher and Tienda (2010) concluded the racial achievement gaps will remain until disparities in high school quality are eliminated. They called for additional research to identify the mechanisms and create solutions to remedy the racial achievement gaps.
Building on the work published in 2010, which identified high school quality as a factor for racial postsecondary achievement gaps, Fletcher and Tienda (2012) examined high schools with high levels of poverty to learn if minority students from these schools did better in college than their White classmates. The Texas Top 10% law guarantees admission to the state’s colleges and universities to students ranked in the top 10% of their class from every high school in the state. Additionally, the University of Texas in Austin and Texas A & M, the flagships of the university system, implemented scholarship programs for the students hailing from these low income schools. The law increased racial diversity at the most selective schools in the system. However, critics of the law suggest these students from the high poverty schools lack the academic preparation to succeed academically. Fletcher and Tienda used data collected by the Texas Higher Education Opportunity Project (THEOP) and the Texas Education Agency to learn more.

Using 10 years of data, Fletcher and Tienda (2012) stratified high schools by percentage of free and reduced lunch eligible students into affluent, less than 25% poor, more than 75% poor, and average, composed of those schools in the middle two quartiles. They examined the differences between the schools using racial composition along with Algebra I pass rates, the percentage of students taking the SAT, and the SAT average score. Schools with low rates of poverty were predominantly White with few Hispanic or Black students. Students attending affluent schools were more likely to pass Algebra I (58.8% vs. 34.4%), take the SAT (75.2% vs. 53%), and scored higher (1037.8 vs. 863.0) compared to students attending high poverty schools.
Fletcher and Tienda (2012) identified the colleges used in the study as the University of Texas in Austin, Texas A & M, both selective schools, and the University of Texas in San Antonio, which has low selectivity admission standards. Longhorn and Century schools are high poverty high schools identified in a special Texas initiative to increase college participation for graduates of these schools and attend the University of Texas in Austin and Texas A & M. Following implementation of the Top 10%, admissions increased from high schools across the state changing the demographics of the three universities. The University of Texas in Austin and Texas A & M freshman classes became saturated with Top 10% admits; students from affluent high schools lost to middle and low income students at the University of Texas in Austin while middle income students lost admission to poor income students at Texas A & M. Demographics did not noticeably change at University of Texas in San Antonio with the exception of Longhorn and Century scholars attracted to the other two schools. Low-income students attending the University of Texas in Austin were Hispanic and White at Texas A & M.

Fletcher and Tienda (2012) used first and sixth semester GPAs to measure academic achievement. University of Texas in Austin students had the highest GPA while students at University of Texas in San Antonio had the lowest. Graduation rates at both the University of Texas in Austin and Texas A & M varied by high school quality; graduation rates at University of Texas in San Antonio are low, 5%, regardless of high school quality.

Using a fixed effects model stratified by school income levels, the regression analysis by Fletcher and Tienda (2012) revealed Hispanic and Asian students outperformed their
white counterparts at the University of Texas in Austin during their first semester. At Texas
A & M, Asian students did better than White students and Hispanic students had slightly
lower first semester GPAs. The gap in GPA was smaller between students from poor schools
than the more affluent schools. Black students scored higher than their same high school
classmates did at Texas A & M. Overall, Black and Hispanic students had higher GPAs than
the White students from the same high schools leading Fletcher and Tienda to suggest
motivation and other factors not included in the variables used in the study led to these
results.

By the end of the sixth semester, Fletcher and Tienda (2012) reported that students
from high poverty high schools had lower GPAs than their counterparts from affluent high
did. White students from the poor high schools had higher GPAs than their same school
Hispanic classmates did by .15 points. White students from affluent high schools scored .06
points higher than their Hispanic high school classmates did. Black students attending Texas
A & M also had lower GPAs than their White counterparts. Overall, racially minority
students experienced lower GPAs than the White students did regardless of high school
income levels after completion of the sixth semester at both the University of Texas in Austin
and Texas A & M; no racial differences were noted for the University of Texas in San
Antonio. Racial minority students had reduced probabilities of graduation at all schools.
Racial minorities from more affluent schools graduated at a higher rate compared to those
from the high poverty schools. Fletcher and Tienda (2012) suggested more research studies
examine the success rates at the average schools to learn more about disparities of curriculum rigor.

The University of Texas in Austin (UTA) utilizes the Texas Top 10% automatic admission law and provided a student population from heterogeneous high schools for Black, Lincove, Cullinane, and Veron (2014) to study high school quality and student performance for students from lower socioeconomic backgrounds. The initial data set contained 49,575 students admitted to UTA from 2002 to 2009 of which 31,302 students enrolled under Top 10% admission policy. The final data set composed of juniors in college contained 23,411 students.

To measure the high school quality and composition, Black et al. (2014) focused on three factors: the social setting, academic preparation, and school resources. The social setting variables included free and reduced lunch percentages, minority percentages, and the rate of student mobility, based on the percent of students transferring in or out of the school. Measures of school-level academic preparation included the percent of students taking AP exams and percent taking the SAT. School resource measures included the average years of teaching experience and per pupil funding. Additionally, district total enrollment measured district capacity and economies of scale to reflect support for college preparation for students.

Black et al. (2014) compared the students admitted to UTA under Top 10% to those admitted under traditional admission practices. The Top 10% students were diverse,
possessed lower SES, and had lower college preparation than the traditional students. All students were first time in college and under the age of 21 at time of admission.

Examination of the Top 10% students’ high schools by Black et al. (2014) revealed high school populations with large percentages of free and reduced lunch, large minority populations, large rates of mobility, and large special education populations, and were associated significantly with a decrease in college GPA for freshman. Students enrolling from high schools with college preparation programs including SAT and AP curriculum were associated significantly with an increase in college GPA. Likewise, large schools districts and schools with experienced teachers were significant and associated with an increase in college GPA. There were significant effects associated with free and reduced lunches and teacher experience for females while a high Black population influenced males. Free and reduced lunch percentages influenced low-income students’ college GPA negatively while teacher experience positively influenced the college GPA for higher income students. Further examination found the effects of high school quality persisted through the junior year of college with free and reduced lunch and minority student populations significantly having a negative effect on college GPA.

Niu and Tienda (2013) examined college persistence among 2,752 Texas students who enrolled in college in the fall following their 2002 high school graduation using data collected by the Texas Higher Education Opportunity Project (THEOP) and the Texas Education Agency in this study. Less than 25% (N=694) of the student sample qualified under the Texas Top 10% law. This study used the economic composition as a measure of
school quality. Using the percentage of students receiving free and reduced lunch, schools were divided into quartiles: poor, average, and affluent. The vast majority of these students enrolled in a four-year college 85%, N=608, with the remaining students enrolling in a community college or technical school requiring less than two years. High school economic composition for the 694 students identified 155 were from poor high schools, 300 were from average schools, and 239 were from affluent schools.

Using multivariate analysis, Niu and Tienda (2013) identified students from affluent high schools as having statistically significant higher rates of graduation from a four-year college while students from poor high schools had higher dropout rates. Community college students from high affluent high schools were 1.87 times more likely to transfer to a four-year college while students from poor high schools were half as likely to transfer. Students attending affluent high school had parents with baccalaureate degrees and with statistically significant large effects more likely to transfer to a four-year college. Compared to White students, Hispanic students were two times as likely to complete their studies at the community college while Asian students were 2.4 times more likely to transfer to a four-year college.

Since students attending affluent high schools are presumed to have more rigors in their academic preparation, Niu and Tienda (2013) did not identify any factors of academic preparation as statistically significant but this finding could be a result of the low number of students qualified under the Texas Top 10% who actually attend college. Students with SAT scores above the 75th percentile were unlikely to remain at the institution, suggesting the
under-matching of institutional characteristics undermines the persistence of high achieving students. Niu and Tienda (2013) called for the universities to provide supplemental curriculum for students attending poor high schools with summer programs and professional development opportunities for the faculty.

In summary, the studies in this section of the literature review focused on the brightest students attending selective universities in Texas. Minority students, Asian, African American, and Hispanic students, from high poverty high schools did well initially, even outperforming their White counterparts from the same high schools. By the sixth semester, they had lower grades than their White counterparts did. Students from high poverty schools also had lower graduation rates than students from affluent schools did suggesting factors beyond the scope of these studies were involved that affected the graduation rate. The initial success rate finding suggests that for these academically gifted students, their high school college preparation courses provided the necessary rigor for their initial success. However, only a small number of students from high poverty schools had the opportunity to attend four-year colleges and universities.

**College Readiness**

While many students dream of attending the state flagship university, few students ranking below the top 10% tier matriculate to the selective schools in the state. Many will turn to the community college to earn college credit and work preparation skills. One of the biggest problems facing these students is their lack of college readiness for collegiate level academic work.
Conley (2007) defined “college readiness as the level of preparation a student needs in order to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary institution” (p.5). Conley suggested that part of the college freshman attrition problem can be attributed to the lack of college readiness including a lack of work ethic measured by time spent studying. One reason provided for the lack of college readiness is the high school curriculum, in that, many of the high school classes lack quality and rigor.

According to Conley (2007), most states increased graduation requirements among the many requirements of No Child Left Behind (NCLB). However, increased graduation requirements have not led to improvement in college rates of readiness; taking more courses has not improving student learning. At the same time, mean high school GPAs have increased by .30 points since 1990 and provides evidence of grade inflation although another explanation could be the increased weight awarded to Advanced Placement courses. Most states now require end of course exams that test basic skills in English and math. However, these tests not only lack alignment with postsecondary needs, they also have low cut points for passing. Comparison of state tests exam scores to scores by the National Assessment of Educational Progress exam identified the need to improve definitions for “proficiency”.

After analyzing transcripts, Conley (2007) also identified problems with Advanced Placement courses. Student transcripts include Advanced Placement courses without the exam grade. Additionally, some transcripts contained courses identified as Advanced
Placement that do not exist. Conley suggested that the increase in the misrepresentation of Advanced Placement courses works to inflate a student’s college readiness and GPA.

However, according to Conley (2007), the biggest problem facing college bound high school graduates is learning they need remediation before taking college-level coursework. Nationally, the remediation rate is 40% and this number increases for students attending the community college. The high school curriculum is not preparing students with the skills needed but also set low levels for expectations and demands for student learning. This lack of preparation is the biggest barrier to college completion; the low completion rate of the developmental course sequences prevents students’ enrollment in entry-level courses. Many of these entry-level courses are college transfer courses and the content, quality, and rigor must meet the needs of the baccalaureate granting colleges as defined in college articulation agreements.

Conley (2007) suggested high schools work with students to develop key cognitive strategies including intellectual openness, inquisitiveness, interpretation, precision and accuracy, and problem solving. Additionally, students need to develop skills in both writing and research to supplement knowledge in English, math, science, social studies, world languages, and the arts. Time management and study skills should be taught within these courses as part of student development. Finally, high schools must take on the responsibility for developing an intellectual climate devoted to student learning and excellence. As long as high schools continue to have low expectations of their student populations, mediocrity will
continue to be a problem and students will remain unprepared to participate in a collegiate education.

Michelson and Everett (2008) examined the Class of 2005 enrolled in North Carolina (N = 68,817) and in the Charlotte- Mecklenburg School (CMS) system (N = 5,161) and determined that institutionalized “neotracking” occurred within the high school course of study resulted in race and class-based stratification. In North Carolina, students select one of three high school courses of study in the eighth grade: College/University Prep, for students intending to pursue a four-year degree; College Tech Prep, for students planning to enroll in the community college; and Career Prep, for students planning to enter the workforce after high school graduation. A fourth course of study, Occupational, is reserved for special education students. Students enrolled in the College Tech Prep and Career Prep select from one of ten Career Pathways and take courses to prepare for employment in the career area. Using contingency table analysis, the majority of students in North Carolina (71.1% White, 62.7% African American) and in CMS (91.1% White, 82.1% African American) enrolled in the College/University Course of Study.

The CMS system was used for more extensive analysis. An examination of course of study enrollment by race revealed that the racial composition of the schools influenced African American student enrollment. At predominantly White schools (73.7%) and racially balanced schools (81.6%) African American students enrolled in the College/University Prep course of study at a lower rate than at predominantly African American schools (87.9%).
However, the examination of schools by wealth found that students attending the low wealth schools with minority populations were less proficient on end of course statewide assessments. On average, 62% of the students attending the low wealth, high minority schools were unprepared for college. However, Michelson and Everett (2008) questioned the academic preparation for the 38% scoring proficient on the state assessments. Further examination of AP Exam pass rates found that students attending these schools had low pass rates and more underqualified teachers than did students attending a wealthier, predominantly White high school. Additionally, the low wealth schools had reduced college preparation course offerings in math and science courses. The authors concluded the African American students had reduced opportunity to enroll in the advanced courses at the high wealth schools and few opportunities to take those courses at the low wealth schools.

Lucas and Berends (2007) used the 1980 High School and Beyond national survey data and follow up surveys of this population (N = 11,211) to examine tracking at 798 high schools. Their analysis incorporated multi-level modeling and revealed that statistically significant differences were found for student enrollment in the college preparation track. White students were more likely to take the college preparation track if African American students attended the school and the African American students were “crowded out” and had reduced opportunity to enroll in the college preparation track. Consequently, African American students enrolled in courses with reduced rigor compared to their White peers.

Barnes and Slate (2014) used three years of data (2006/07, N= 1,099; 2007/08, N=1,364; and 2008/09, N=1,377) from the Texas Education Agency Academic Excellence
Indicator System study to examine the achievement gap and college readiness rates for African American, Hispanic, and White students. Texas requires all students to pass the Texas Assessment of Knowledge and Skills as a condition of high school graduation. A score of 2200 in both English and math was equivalent to a 500 each on the SAT verbal and math sections or a 19 on the ACT English and math subtests.

Barnes and Slate (2014) reported the following results. During the first year of the study, 31.11% of all students scored greater than 2,200 on both tests: 17.20% of African American students, 22.26% of Hispanic students, and 40.73% of White students. For the 2007/08 academic year, study results declined with 30.74% of all students identified as being college ready: 18.73% of African American students, 24.16% of Hispanic students, and 38.89% of White students. The last year of the study examined the academic year 2008/09 and identified 39.42% of all students as ready for college: 27.3% of African American students, 32.8% of Hispanic students, and 48.85% of White students. The results were statistically significant with a small effect for differences between African American and Hispanic English scores. The results comparing Hispanic to White students and African American to White students were statistically significant with large effect sizes for the differences in English. Comparison of African American to Hispanic, Hispanic to White, and African American to White for math scores were also statistically significant with a large effect size for the differences.

Further examination of the data by Barnes and Slate (2014) revealed the majority of the African American and Hispanic students attended large urban schools; additionally, the
racially minority students were of lower socioeconomic status. The academic achievement gap narrowed by 2% between White and Hispanic students but increased by 6% from 15% to 21% between White and African American students. In conclusion, there were racial differences between college readiness between African American, Hispanic, and White students and the vast majority of students enrolled in Texas public schools were not prepared for college success as measured by English and math scores on the Texas Assessment of Knowledge and Skills exam.

Are our high schools doing enough to prepare students for college? The National Center on Education and the Economy (NCEE) responded no. NCEE released in May 2013 What Does It Really Mean to Be College and Work Ready? Findings from this research study identified a huge problem for community college students in that recent high school graduates lack English literacy; they cannot read and comprehend textbooks written for and used at the college level. Using empirical tests to grade reading levels of textbooks used in first year courses, the researchers found that most texts books reviewed were at grade 11-12 level. However, textbooks for first year Nursing and Biotechnology programs were at level 13 while English Composition texts were at the low level of 9.6. The researchers also noted that high school students do not receive instruction in graphic or nonprose literacy, which are prevalent in advanced textbooks used by nursing and science students. The section on text complexity concluded with the following statement.

It is notable that college instructors in our study described different ways that they addressed the lack of preparation among their students for read-
ing. Their strategies include creating *PowerPoints* and outlines, treating the text as a review resource for foundational information covered in class, and even making the texts optional. While these approaches can be seen as understandable, even commendable efforts to promote student learning, the end result is that many of our college students are likely left without the skills to handle the reading demands in the classes they will take subsequently, and very likely in the workplace as well (NCEE, 2013, p.9).

NCEE (2013) researchers chose one community college from each of seven states for additional study. Course syllabi, tests, and samples of student work were collected for multiple fields of study including automobile mechanics, business, computer science, and nursing. These courses included general education courses and entry-level courses in multiple fields of study that introduce students to the language and vocabulary of the field. Findings included low reading expectations, and few writing requirements outside of English composition courses. Furthermore, the researchers noted that the community college instructors had low student expectations given the modest performance measures. These low expectations do nothing to prepare students for further study or success in the workplace.

The NCEE (2013) researchers noted that the low expectations probably mirror the abilities of the students. Community colleges cannot raise standards until the high schools raise their standards. One goal of this research project was to collect evidence of the problem and to start the conversation on the needs to improve literacy, writing skills, and knowledge
attainment of the students at both the high school and the community college. The NCEE researchers noted that the new Common Core Standards being promoted in K-12 will work to improve student proficiency and called for the development and implementation of parallel initiatives at both the high school and the community college to raise course quality and rigor. In closing, the NCEE researchers noted their disappointed in the quality of the community college courses examined and called for more research focused on course quality using larger samples.

In summary, neighborhood school assignments often mean African American students and students living in poverty attend low wealth schools. Often these schools are characterized as low quality given the amount of local funding, teacher turnover, and the lack of experienced teachers in the classroom to provide quality education. Students are measured on their knowledge attainment through standardized state exams beginning with reading and math in the third grade and continue into high school with end of course exams in Algebra I, Biology, and English II. Eleventh graders take the ACT assessment as part of the statewide assessment for college readiness. The schools are accountable for these performance measures along with the need to increase the high school graduation rate. The low percentage of high school students identified as proficient on the standardized tests is mirrored at the community college with large numbers of students enrolled in developmental coursework.

In conclusion, while Tinto’s (1975) framework is often used to examine retention of first year students enrolled in a four-year college, there is relevance and
applicability of his framework for diverse groups of student populations participating in higher education. Tinto (1975) called for both academic and social integration as necessary for student success and retention in college. Tinto (1975) identified previous academic preparation (elementary and high school) as a prerequisite for successful academic integration at the collegiate level. Successful nursing students have good grades from both high school and in their general education classes at the community college. Studies identified student success in high school biology, college anatomy and physiology, and the science portion of the preadmission nursing exams along with reading intensive general education courses as good indicators of success in the nursing curriculum. Therefore, Tinto’s framework is appropriate for this study of first year retention of nursing students at the community college given the emphasis on high school quality and academic preparation.

Now is the time to identify and include additional variables to determine if there are unique and previously unidentified barriers leading to societal inequities among the different populations attending the community college. One area not examined in the nursing literature is the connection between the high school environment and success in the nursing curriculum. Many African American students attend high schools with large populations of minority students and concentrated poverty; both are predictors of lower educational quality. Does the high school environment and the resulting academic preparation create a barrier affecting African American students’ first year retention in the associate degree of nursing program?
CHAPTER 3

In this chapter, I will introduce the methodology used to answer the following research question. What is the impact of high school quality (high school wealth composition and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (high school educational track and highest level of educational attainment) on African American community college nursing students’ first year retention compared to White community college nursing students’ first year retention in the associate degree nursing (ADN) programs provided by the NCCCS?

Design of the Study

This study used a predictive cross-sectional research design (Johnson, 2001). According to Johnson (2001), the clearest way to classify research is through the primary research objective. Johnson (2001) defined non-experimental research as the study of the independent and dependent variables without manipulation or randomization but rather in their natural state as they occur. Using his typology, for two dimensional classification of non-experimental quantitative research, this study’s primary research objective is prediction and the second dimension, time, is cross-sectional (2001).

Population and Sample

The population for this study was composed of students enrolled in the NCCCS Associate Degree of Nursing programs. Students accepted into the NCCCS ADN programs
enroll in the first course of the nursing curriculum, *NUR 111: Intro to Health Concepts*, and a prerequisite for the remaining courses in the curriculum.

**Data Collection**

This study utilized a secondary analysis of data from a student database collected by the NCCCS and stored in the NCCCS Data Warehouse. The NCCCS collects demographic and transcript data for each student enrolled in one or more of the 58 community colleges comprising the system. The data organized in the Data Warehouse Business Objects Universe contains data for the Curriculum Student, (NCCCS, nd). The individual community college staff in the Office of the Registrar uses the NCCCS’s data management software, Ellucian™, to create individual student files. The Curriculum Student Information II Universe contains 293 objects collected for students in this database.

Data used to measure high school quality are collected by the NCDPI and published on the organization’s website and is available to the public. NCDPI collects this data to complete state and national accountability reports.

**Study Variables**

**Dependent Variable**

The dependent variable, Student Retention, is a dichotomous, categorical variable, and will be coded 0 = Not Retained and 1 = Retained. Initial enrollment in the nursing
curriculum is determined by enrollment in course NUR 111 in the fall semester of 2013. The student is considered retained if enrolled in a level 200 NUR course in the fall semester 2014.

**Independent Variables**

Independent variables in this study are divided into three groups: high school quality, academic preparation, and student demographics. Data were collected from the participating community colleges and NCDPI. The literature reviewed suggested that schools targeted for improvement do not improve at a rapid pace. NCDPI also publishes demographic information for each school that is available for the academic year 2007-2008 to 2012-2013. Demographic composition of school districts does not change rapidly unless the school system has made substantial changes to school assignments as the Charlotte Mecklenburg School System did in 2002.

Figure 3 is a visual representation of the conceptual framework and shows the variables identified in Table 3. Table 3 contains all variables, classifications, and description of operation. Not all variables identified will be included in the logistic regression. Some of the variables were collected for demographic purposes and linkage of data sets.

**High school quality.**

Two variables were used to measure high school quality.

*High school wealth composition.* This is a continuous variable measured on the interval scale and NCDPI publishes this information on its website. The literature reviewed
Figure 3: Conceptual Model with Variables
Data Sources: NCDPI; NCCCS

Table 3
Summary of Variables and Measures

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Source: Measurement</th>
<th>Coding for Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td>NCCCS: Was the student retained in the ADN program 1 year later as evidenced by enrollment in a 200 level course?</td>
<td>1 = Retained</td>
</tr>
<tr>
<td>First year Retention</td>
<td></td>
<td>0 = Not Retained</td>
</tr>
</tbody>
</table>

**High School Quality Independent Variables**

<table>
<thead>
<tr>
<th>Variable Description</th>
<th>Source: Measurement</th>
<th>Percentage with range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Wealth</td>
<td>NCDPI: The percentage of the high school student population receiving Free and Reduced Lunch</td>
<td>between 0% and 100%.</td>
</tr>
<tr>
<td>ACT Reading Scores</td>
<td>NCDPI: The percentage of the high school 11th grade student population passing the ACT Reading Test</td>
<td>between 0% and 100%</td>
</tr>
</tbody>
</table>
Table 3 continued

**Student Academic Preparation Independent Variables**

<table>
<thead>
<tr>
<th>Educational Track</th>
<th>NCCCS: 2 dummy variables indicating The educational track the student enrolled in during high school.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1= College/ University Preparation (C) 2= College Tech Preparation (B, T) 3= Career Prep (G, O, V) 0= Unknown</td>
</tr>
<tr>
<td>B=Both College and Tech Prep; C=College Prep; G=General Tech; O=Other High School Track; T= College Tech Prep; V=Vocational Prep; U=Unknown.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational Credentials</th>
<th>NCCCS: 2 dummy variables indicating the highest level of educational credentials entering ADN students enroll with</th>
</tr>
</thead>
<tbody>
<tr>
<td>00=Never Attended School; 01-12=Highest Grade Completed; '---' = GED; 13=Adult High School Diploma; 14=Post High School Vocational Diploma; 15=Associate Degree; 16=Bachelor Degree; 17=Master Degree or Higher</td>
<td></td>
</tr>
<tr>
<td>1= GED 2= High School Diploma 3= Post high school 4= Associate Degree 5= Bachelor Degree 6= Master Degree or Higher 13= Adult High School</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>NCCCS: 6 dummy variables indicating race/ethnicity for each student enrolled in the ADN nursing program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=White 2=Black 3=American Indian 4=Hispanic 5=Asian 6=Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>NCCCS: 2 dummy variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Male 0 = Female</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age, Year of Birth</th>
<th>NCCCS: Age will be calculated based on age as of August 15, 2013, prior to the start of the semester and rounded to the nearest month. Students will be grouped into 3 categories: under age 23, 24-40, and over age 40. 3 dummy variables will be used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Under age 23 2 = 24-40 3 = Over age 40</td>
<td></td>
</tr>
</tbody>
</table>
Table 3 continued

**Variable of Connection between data sets**

| High School of Record | NCCCS: High school of record for each student to connect the NCCCS ADN list student to the NCDPI high school |

identified school wealth, based on the wealth of the student population, is a contributor to the academic achievement gap. It is measured by the percentage of students receiving Free and Reduced Lunch and is the only measure collected by the individual schools to measure family income. Schools with concentrated poverty lack the resources available to schools with a wealthier student population. Additionally, schools with high levels of poverty provide an indirect measure of parental education and indicate the economic conditions of the local community. For discussion purposes, wealth composition for each school is defined with the following:

1\textsuperscript{st} quintile: High Poverty (more than 80% receive FRL).

2\textsuperscript{nd} quintile: Majority High Poverty (more than 60% receive FRL)

3\textsuperscript{rd} quintile: Average (40-60% receive FRL)

4\textsuperscript{th} quintile: Majority Affluent (less than 40% receive FRL);

5\textsuperscript{th} quintile: Affluent (less than 20% receive FRL)

*High school proficiency measure.* This is measured by the percentage of students scoring at the breakpoint pass rate for the Reading portion of the ACT\textsuperscript{®} College Readiness Exam. This is a continuous variable measured on the interval scale. NCDPI publishes this information on its website. High school quality is measured by the output such
as student scores on standardized tests. The literature provided evidence that Reading is a good predictor for success in the associate degree of nursing program.

**Academic preparation.**

Two variables were used to measure student academic preparation.

**High school educational track.** This is a categorical variable collected by the NCCCS. This variable represents the highest level of education achieved by the student at the high school. The College Prep corresponds with the NCDPI College/University Prep high school course of study for students planning to attend a four year college or university. College Tech corresponds with the NCDPI College Tech Prep high school course of study which prepares students for the community college and the workforce. Career Prep corresponds with the NCDPI high school course of study Career Prep which prepares students for the workforce.

The data were recoded to reflect the following:

1 = College/ University Prep
2 = College Tech Prep
3 = Career Prep

**Highest education completed.** This is a categorical variable. This information is collected by the NCCCS and indicates the highest educational level attained.

1 = GED
2 = High School Diploma
3 = Post high school credential
4 = Associate Degree
5 = Bachelor Degree
6 = Master Degree or Higher
13 = Adult High School Diploma

The data were recoded into a binary variable with a GED, Adult High School, and High School Diplomas, and Associate Degree coded a zero (0) and all others to a one (1).

**Student characteristics.**

Frawer et al. (2008) concentrated on student characteristics for their analysis. Age and race were both found to be predictors of attrition.

**Age.** Age is a continuous variable; this study used the same age brackets used by Fraher et al. (2008): under age 23, 24-40, and over age 40. The community colleges were asked to calculate age of the student as of August 15, 2013, prior to the start of the semester.

**Race.** The community college classifies students into six racial categories: 1=White, 2=Black, 3=American Indian, 4=Hispanic, 5=Asian, 6=Other/Biracial.

**Gender.** The community college classifies student gender into two categories. The student's gender or sex code, M=Male F=Female. The data were recoded 0= Male, 1 = Female.

**Analysis**

**Descriptive Statistics**

Descriptive statistics of all data selected for analysis were conducted using the
SAS 9.3 frequency procedure. The primary purpose for the inclusion of the demographic variables is to control for their influence upon the dependent variable.

**Analysis**

Two questions guided this research.

1. What is the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (high school educational track and highest level of educational credentials) on African American community college nursing students’ first year retention?

2. Are there differences on the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (high school educational track and highest level of earned educational credentials) between African American and White community college nursing students’ first year retention?

This study utilized logistic regression. Logistic regression is an appropriate inferential statistical test when the criterion variable is categorical with multiple predictor variables (King, 2010). Logistic regression can accommodate both categorical and continuous predictor variables (King, 2010). Logistic regression is used to determine model significance, to identify which independent variable(s) contribute to the effect, and to determine the magnitude and direction of impact of each independent variable (King, 2010).
The criterion or dependent variable in the study, Student Retention, is a dichotomous, categorical variable, and coded 0 = Not Retained and 1 = Retained. Initial enrollment was determined by enrollment in the course NUR 111, the first course in the nursing curriculum in fall 2013. A student was retained if the student was enrolled in a 200 level NUR course in the fall 2014 semester at the community college of entry in the ADN program of study.

Assumptions of logistic regression are different from those for linear regression. Linear regression assumes the data are normally distributed and the outcome has a linear relationship between the predictor variables. However, in this study, the outcome is categorical which violates the assumption of linearity. Logistic regression assumes the data are not normally distributed and a linear relationship is not present. Transformations of the data assist in creating a linear relationship and overcoming the problem of violations of the assumption of linearity. The assumption of logistic regression is that there is a linear relationship between the predictor variables and the logit of the outcome variable. This assumption is tested by examining the interaction term between the predictor variable and its log transformation for significance.

Logistic regression does not require the independence of errors or that the errors are normally distributed. The assumption in logistic regression is that the data records are independent and do not represent different people at different points of time. Another assumption is to check for multicollinearity; predictors are not too highly correlated. To test for multicollinearity, I will examine the Collinearity statistics. One is the Variance Inflation Factor (VIF): VIF value is greater than 10 identifies the presence of multicollinearity. The
second test examines tolerance, which should be above 0.2. Finally, the goal of logistic regression is to find the most parsimonious model that best estimates the outcome variable.

Logistic regression builds on the mathematical principles of linear regression. The linear regression line is expressed as \( Y = \beta_0 + \beta_1 X + e \) where \( Y \) is the dependent variable and the remainder of the equation represents the independent variables. The purpose of logistic regression is to identify the predicted probability that \( Y = 1 \) and the student was retained given certain values of \( X \). The \( \ln \) refers to the natural logarithm while \( \beta_0 + \beta_1 X \) represents the line of regression with \( \beta \) representing the regression coefficient. The formula appears below.

\[
\text{logit } p_i = \ln \left( \frac{p_i}{1-p_i} \right) = \beta_0 + \beta_1 X_{1,i} + \ldots + \beta_k X_{k,i}
\]

In the formula given, \( p_i \) is the likelihood that students were retained will result while \( 1 - p_i \) is the likelihood that students were not retained. Thus, the fraction \( (p_i / 1 - p_i) \) is the odds ratio. \( \beta_o \), the intercept term, is the odds ratio (i.e., likelihood) that student retention will result when all predictor values equal 0.

King (2010) recommended measuring the fit of model; the log-likelihood is an indicator of how much unexplained information exists after the model has been fitted. The larger the value of the log-likelihood the more unexplained information exists. Additional tests of the model include Hosmer-Lemeshow goodness of fit, the Wald statistic, and the likelihood ratio test. These three tests incorporate the Pearson chi square statistic which is used when the outcome variable is categorical.
The maximum likelihood $R^2$ is similar to the Pearson correlation coefficient between observed values of the outcome and the valued predicted by the regression model. The Pearson correlation coefficient ranges from -1 to +1 with values closest to -1 suggesting a strong negative relationship and values closest to +1 suggesting a strong positive relationship between the outcome variable and the predictor variables. The score statistic represents the cut points used to interpret the significance of the $p$-value: $p < .05$, $p < .01$, or $p < .001$.

**Summary**

Data collected from the individual community colleges and NCDPI were used to create variables used in the logistic regression. Some of the variables collected identified the schools while others were used for demographic purposes. The logistic regression predicted the variables that best fit the model to identify barriers to retention for students enrolled in the NCCCS ADN program. A second model was developed for White students and the findings compared to African American students for differences and similarities between the two populations.
CHAPTER 4

In this chapter, the results of the data collection for the variables, described in the previous chapter, are systematically presented and explained. Incomplete and missing data for one of the variables resulted in the need to remove one of the variables, high school education track, from the logistic regression and therefore this variable needed to be removed from the research questions previously presented. The treatment of this variable is presented in detail on page 152. The revised research questions appear below:

1. What is the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of educational credentials) on African American community college nursing students’ first year retention?

2. Are there differences on the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of earned educational credentials) between African American and White community college nursing students’ first year retention?

This study was submitted for consideration to North Carolina State University and many of the participating North Carolina Community College’s Institutional Review Boards. This study was approved by all Institutional Review Boards. The desired data for this study were readily available from the individual community college’s student records and there was minimal risk for loss of student confidentiality. Each data record was assigned a unique
identifier code by the individual community college personnel and the information did not contain student names or identifying codes used by the individual colleges.

Two additional data sets for the individual high schools were obtained from NCDPI’s website. One of these data sets, Child Nutrition Services, Free and Reduced Student Data by Site (NCDPI, 2014a), was created by NCDPI to meet federal reporting requirements for participation in the National School Lunch Program. The second data set used in this study contains the ACT® College Readiness Exam results by high school. The high school of graduation provided by the individual community colleges for each student in the sample was used to merge data from the NDPI data sets with the individual student records.

Initial plans for data analysis were to create two different logistic regression models: one using the African American students in the sample and compare the findings to a regression using only White students in the sample. Unfortunately, the small number of African American nursing students in the total population (N = 73) and in the sample of North Carolina public high school graduates was too small (N = 51) for valid analysis via logistic regression.

Two logistic regression models were created and used to answer the research questions. The first logistic regression uses African American and White North Carolina public high school graduates and answers the first research question. The second logistic regression utilizes interaction terms for the White students in the sample and answers the second research question.
Results of analyses are included in this chapter. The first section provides an overview of demographic characteristics of the population using summary statistics. The second section provides demographics of the sample. The final section uses logistic regression analysis to describe the sample.

**Descriptive Statistics**

This study utilized a secondary analysis of data from a student database collected by the individual community colleges. Much of the data collected was self-reported by students through completion of the individual community college’s application for admission. The individual community college staff in the Office of the Registrar use data management software to create individual student files.

Presidents of the fifty-five community colleges offering the Associate Degree in Nursing program were contacted first by mail and later a follow-up email for permission to contact key personnel for data collection. Twenty-five community college presidents or their representatives initially responded; seventeen community colleges agreed to participate in this study. Each of the participating community colleges required additional institutional review and approval at the local college level before release of data.

Seventeen community colleges, representing a 30.9% participation rate, provided the requested data to complete this study. These institutions included community colleges located in all geographic areas of the state of North Carolina and represented small rural, large urban, and suburban schools. To protect the identity of the individual community
colleges, colleges were assigned numbers (1-17) based on size of the beginning cohort. Size of the beginning cohorts enrolled in the first course in the nursing curriculum, NUR 111, ranged from 20 students to 61. Cohort size decreased after one year for each school. Retention and attrition rates were calculated for each community college with retention rates ranging from 87.5% to 40% and attrition rates ranging from 12.5% to 60%. Table 4 provides information on the participating community colleges, presented in ascending order by beginning cohort size.

The Population

The data received from the participating community colleges were recoded for statistical analysis. Criteria for inclusion in the population included acceptance into the associate degree in nursing program and enrollment in the initial course, NUR 111 during the fall semester of 2013. A second variable, retention, was derived from enrollment in the individual community college’s nursing programs NUR courses in the fall semester of 2014. Additional variables requested from the individual community colleges included gender, race, age, high school graduation status (GED, high school diploma, or adult high school diploma), high school of graduation, high school educational track, and highest education completed. Students self-report this information on the community college application and community college personnel enter the responses into the database management system used by the individual community college. I learned during conversations with community college personnel during data collection that not all community colleges collect and/or enter the same information into the database and there is no attempt by community college
personnel to verify this information (i.e. the information provided by the student is not compared to high school transcripts for high school education track).

The population contained 668 records: 73(10.93%) were male and 595 (89.07%) were female. White students (N = 525) comprised 78.59% of the population while students of a minority race (N = 143) represented 21.41% of the population. Minority representation included 73 African Americans, 11 Native Americans, 21 Hispanic, 12 Asian, and 26 students who self-identified as Other.

Table 4
One year retention for nursing students in the population

<table>
<thead>
<tr>
<th>College</th>
<th>Beginning Cohort Fall 2013</th>
<th>Cohort Fall 2014</th>
<th>Retention Rate</th>
<th>Attrition Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC 1</td>
<td>20</td>
<td>8</td>
<td>0.40</td>
<td>0.60</td>
</tr>
<tr>
<td>CC 2</td>
<td>22</td>
<td>18</td>
<td>0.82</td>
<td>0.18</td>
</tr>
<tr>
<td>CC 3</td>
<td>24</td>
<td>21</td>
<td>0.87</td>
<td>0.13</td>
</tr>
<tr>
<td>CC 4</td>
<td>29</td>
<td>25</td>
<td>0.86</td>
<td>0.14</td>
</tr>
<tr>
<td>CC 5</td>
<td>31</td>
<td>13</td>
<td>0.42</td>
<td>0.58</td>
</tr>
<tr>
<td>CC 6</td>
<td>31</td>
<td>27</td>
<td>0.87</td>
<td>0.13</td>
</tr>
<tr>
<td>CC 7</td>
<td>32</td>
<td>27</td>
<td>0.84</td>
<td>0.16</td>
</tr>
<tr>
<td>CC 8</td>
<td>35</td>
<td>27</td>
<td>0.77</td>
<td>0.23</td>
</tr>
<tr>
<td>CC 9</td>
<td>35</td>
<td>25</td>
<td>0.71</td>
<td>0.29</td>
</tr>
<tr>
<td>CC 10</td>
<td>40</td>
<td>20</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>CC 11</td>
<td>41</td>
<td>36</td>
<td>0.88</td>
<td>0.12</td>
</tr>
<tr>
<td>CC 12</td>
<td>45</td>
<td>27</td>
<td>0.60</td>
<td>0.40</td>
</tr>
<tr>
<td>CC 13</td>
<td>48</td>
<td>22</td>
<td>0.46</td>
<td>0.54</td>
</tr>
<tr>
<td>CC 14</td>
<td>48</td>
<td>33</td>
<td>0.69</td>
<td>0.31</td>
</tr>
<tr>
<td>CC 15</td>
<td>60</td>
<td>38</td>
<td>0.63</td>
<td>0.37</td>
</tr>
<tr>
<td>CC 16</td>
<td>61</td>
<td>53</td>
<td>0.87</td>
<td>0.13</td>
</tr>
<tr>
<td>CC 17</td>
<td>66</td>
<td>38</td>
<td>0.58</td>
<td>0.42</td>
</tr>
<tr>
<td>Total</td>
<td>668</td>
<td>458</td>
<td>0.69</td>
<td>0.31</td>
</tr>
</tbody>
</table>
The majority of students attended North Carolina high schools (N = 509, 76.20%); however a larger than expected number attended out of state high schools (N = 135, 20.2%), had attended international schools (N = 14, 2.1%) or location of secondary education was unknown (N=10, 1.5%). Most students attended public high schools (N = 571, 85.48%) while 44 students (6.59%) attended private/parochial secondary schools and the type of school was unknown for 53 (7.93%) students. Students were predominantly high school graduates (N = 560, 83.83%) although the population included students who possessed a GED (N = 50, 7.49%) or an Adult High School Diploma (N = 7, 1.05%). High school graduation status was unknown for 51 students (7.63%).

Over half of the students in the population (N= 367 54.9%) self-reported the high school education track they participated in with most of those students identifying college preparation (N= 284, 42.52%). Forty-one students identified their high school educational track as Technical and Career preparation education (6.14%) and 42 students identified their high school educational track as General Education (6.28%). Many students did not self-report their high school educational track (N= 301, 45.06%).

Students enrolled in the associate degree of nursing program with a diversity of previous education. Students self-reported their highest level of educational attainment on the individual community college’s application form. Students possessed as their highest level of educational attainment the GED (N = 43, 6.43%), a high school diploma (N = 398, 59.58%), an adult high school diploma (N = 7, 1.05%), a vocational diploma (N = 19, 2.84%), an associate degree (N = 71, 10.63%), a baccalaureate degree (N= 89, 13.32) a
Master’s degree (N = 7, 1.05%) or this information is unknown (N = 34, 5.09%). Finally, out of the cohort which began their nursing curriculum in the fall of 2013, 458 (68.6%) were enrolled in nursing courses one year later while 210 (31.4%) were not retained one year later as evidenced with enrollment in a nursing course in the fall of 2014. This information is presented in Table 5. Tables for White, Minority, and African American students are included in the Appendix.

The population (N = 668) ranged in age from 18 years to 61 years (M = 29.23, SD = 8.79). High school wealth, measured by the absence of Free and Reduced Lunch recipients ranged from 2.29% to 100% (N= 568, M = 53.87, SD = 21.56). Students attending private/parochial schools were coded as attending a school with zero poverty or a 100% wealth school. Students attending public schools were coded based on the percentage of Free and Reduced Lunch participants. The high school ACT Reading Test Mean scores ranged from 13.5 to 25.40 (N = 400, M = 17.96, SD = 1.83) on a 36 point scale. A score of 21 on the ACT Reading Test is the designated pass point and indicates a student is college ready. Schools with pass rates less than 5% (N = 3) were recoded to 4.9% for all ACT tests. The percentage of students at an individual high school scoring a 21 or higher on the ACT reading ranged from 4.9% to 69.5% (N = 440, M = 25.51, SD = 11.13). This information is presented graphically in Table 6.

The Sample

This study focused on White and African American nursing students who had graduated from North Carolina public high schools. This resulted in a reduction of the
### Table 5
Demographic Variables of the Population ($N = 668$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>73</td>
<td>10.93</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>595</td>
<td>89.07</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td>White</td>
<td>525</td>
<td>78.59</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>73</td>
<td>10.93</td>
</tr>
<tr>
<td></td>
<td>Native American</td>
<td>11</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>21</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>21</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>26</td>
<td>3.88</td>
</tr>
<tr>
<td><strong>Location of High School</strong></td>
<td>North Carolina</td>
<td>509</td>
<td>76.2</td>
</tr>
<tr>
<td></td>
<td>Out of State</td>
<td>135</td>
<td>20.2</td>
</tr>
<tr>
<td></td>
<td>International</td>
<td>14</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>School Funding</strong></td>
<td>Public</td>
<td>571</td>
<td>85.48</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>44</td>
<td>6.59</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>53</td>
<td>7.93</td>
</tr>
<tr>
<td><strong>High School Graduation</strong></td>
<td>GED</td>
<td>50</td>
<td>7.49</td>
</tr>
<tr>
<td>Description</td>
<td>High School Diploma</td>
<td>560</td>
<td>83.83</td>
</tr>
<tr>
<td></td>
<td>Adult High School</td>
<td>7</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>51</td>
<td>7.63</td>
</tr>
<tr>
<td><strong>High School Educational Track</strong></td>
<td>College Prep</td>
<td>284</td>
<td>42.52</td>
</tr>
<tr>
<td></td>
<td>Technical Prep</td>
<td>41</td>
<td>6.14</td>
</tr>
<tr>
<td></td>
<td>General Education</td>
<td>42</td>
<td>6.28</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>301</td>
<td>45.06</td>
</tr>
<tr>
<td><strong>Highest level of Educational Attainment Prior to Admission</strong></td>
<td>GED</td>
<td>43</td>
<td>6.43</td>
</tr>
<tr>
<td></td>
<td>High School Diploma</td>
<td>398</td>
<td>59.58</td>
</tr>
<tr>
<td></td>
<td>Adult High School</td>
<td>7</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>Vocational Diploma</td>
<td>19</td>
<td>2.84</td>
</tr>
<tr>
<td></td>
<td>Associate Degree</td>
<td>71</td>
<td>10.63</td>
</tr>
<tr>
<td></td>
<td>Baccalaureate Degree</td>
<td>89</td>
<td>13.32</td>
</tr>
<tr>
<td></td>
<td>Master’s Degree</td>
<td>7</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>34</td>
<td>5.09</td>
</tr>
<tr>
<td><strong>First Year Retention</strong></td>
<td>Retained</td>
<td>458</td>
<td>68.6</td>
</tr>
<tr>
<td></td>
<td>Not Retained</td>
<td>210</td>
<td>31.4</td>
</tr>
</tbody>
</table>
Table 6

*Descriptive Statistics for Population*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ((N = 668))</td>
<td>18</td>
<td>61</td>
<td>29.23</td>
<td>8.79</td>
</tr>
<tr>
<td>High School Wealth ((N = 568))</td>
<td>2.29%</td>
<td>100%</td>
<td>53.87</td>
<td>21.56</td>
</tr>
<tr>
<td>High School ACT Reading Mean ((N = 400))</td>
<td>13.5</td>
<td>25.4</td>
<td>17.96</td>
<td>1.83</td>
</tr>
<tr>
<td>High School ACT Reading Percentage ((N = 400))</td>
<td>4.9</td>
<td>69.5</td>
<td>25.51</td>
<td>11.13</td>
</tr>
</tbody>
</table>

The sample contained 400 records: 44 (11%) were male and 356 (89%) were female. White students \((N = 349)\) comprised 87.25% of the sample population while African American students \((N = 51)\) represented 12.75% of the sample population. Nearly two thirds of the students in the sample \((N= 255, 63.75 \%)\) self-reported the high school education track they participated in with most of those students identifying college preparation \((N= 205, 51.25\%).\) Thirty-three students identified their high school educational track as Technical and Career preparation education \((8.25\%)\) and 17 students identified 48 their high school
Students enrolled in the NCCCS’ associate degree nursing program with a diversity of previous education. Students self-reported their highest level of educational attainment on the individual community college’s application form. Students possessed as their highest level of educational attainment a high school diploma (N = 288, 72%), a vocational diploma (N = 14, 3.50%), an associate degree (N = 40, 10%), a baccalaureate degree (N= 56, 14%), or a Master’s degree (N = 2, 0.5%). Out of the 400 students in the initial cohort which began...
the nursing curriculum in the fall of 2013, 267 (66.75%) were enrolled in nursing courses one year later while 133 (33.25%) were not retained one year later as evidenced with enrollment in a nursing course in the fall of 2014. This information is presented in Table 8.

Table 8  
Demographics of the Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>44</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>356</td>
<td>89%</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>White</td>
<td>349</td>
<td>87.25%</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>51</td>
<td>12.75%</td>
</tr>
<tr>
<td>High School Educational Track</td>
<td>College Prep</td>
<td>205</td>
<td>51.25%</td>
</tr>
<tr>
<td></td>
<td>Technical Prep</td>
<td>33</td>
<td>8.25%</td>
</tr>
<tr>
<td></td>
<td>General Education</td>
<td>17</td>
<td>4.25%</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>145</td>
<td>36.25%</td>
</tr>
<tr>
<td>Highest level of Educational Attainment Prior to Admission</td>
<td>High school Diploma</td>
<td>288</td>
<td>72%</td>
</tr>
<tr>
<td></td>
<td>Vocational Diploma</td>
<td>14</td>
<td>3.50%</td>
</tr>
<tr>
<td></td>
<td>Associate Degree</td>
<td>40</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Baccalaureate Degree</td>
<td>56</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Master’s Degree</td>
<td>2</td>
<td>.50%</td>
</tr>
<tr>
<td>First Year Retention</td>
<td>Retained</td>
<td>267</td>
<td>66.75%</td>
</tr>
<tr>
<td></td>
<td>Not Retained</td>
<td>133</td>
<td>33.25%</td>
</tr>
</tbody>
</table>

The sample (N= 400) ranged in age from 18 years to 58 years (M = 27.8, SD = 8.32). High school wealth, measured by the absence of Free and Reduced Lunch recipients ranged from 5.36% to 90.57% (N= 400, M = 49.67, SD = 16.03). The high school ACT Reading
Test Mean scores ranged from 13.5 to 25.40 ($N = 400$, $M = 17.9$, $SD = 1.82$) on a 36 point scale. A score of 21 on the ACT Reading Test is the designated pass point and indicates a student is college ready. Schools with pass rates less than 5% ($N = 2$) were recoded to 4.9% for all ACT tests. The percentage of students at an individual high school scoring a 21 or higher on the ACT reading ranged from 4.9% to 69.5% ($N = 400$ $M = 25.3$, $SD = 11$). This information is presented in Table 9.

Table 9
Descriptive Statistics for Sample ($N = 400$).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18</td>
<td>58</td>
<td>27.8</td>
<td>8.32</td>
</tr>
<tr>
<td>High School Wealth</td>
<td>5.36</td>
<td>90.57</td>
<td>49.67</td>
<td>16.03</td>
</tr>
<tr>
<td>High School ACT Reading Mean</td>
<td>13.5</td>
<td>25.4</td>
<td>17.9</td>
<td>1.82</td>
</tr>
<tr>
<td>High School ACT Reading Percentage</td>
<td>4.9</td>
<td>69.5</td>
<td>25.3</td>
<td>11</td>
</tr>
</tbody>
</table>

Demographics of the Sample

The data received from the 17 participating community colleges and NCDPI were recoded for statistical analysis. The sample of NCCCS associate degree in nursing students was composed of 400 North Carolina public high school graduates. Students in the sample began their associate degree in nursing studies in the fall of 2013 with enrollment in NUR
111, the first course in the nursing curriculum. The following sections describe the treatment and operationalization of the individual variables along with the findings.

**Retention (RETAINED).**

All students in the sample were enrolled in the initial nursing course, NUR 111 in the fall semester of 2013. I asked the individual community colleges to report if the associate degree in nursing program retained the individual students. Specifically, was the student enrolled in a 200 level course in the nursing curriculum one year later, in the fall of 2014? For retention purposes, the student had to be enrolled in the cohort course sequence without repeating any nursing curriculum courses. One community college used a different course sequence, which did not include a 200 level course for the fall semester of 2014, but confirmed first year retention of the students in their nursing program. The dependent variable RETAINED was coded 0 for not retained and 1 for retained.

The SAS 9.3 Frequency Process provided the following information of the nursing student sample. For the sample \(N = 400\), 267 (66.75 %) were retained versus 133 (33.25%) who were not retained. For White students in the sample \(N = 349\), 243 (70%) were retained compared to 106 (30%) who were not retained. For African American nursing students \(N = 51\), 24 (47%) were retained while 27 (53%) were not retained.

**Age (AGE).**

Age is a continuous variable. Participating community colleges were asked to provide the age of the students in the sample as of August 15, 2013. Students self-reported
this data on the individual community college’s application and this information was entered into the student record by admission staff. Results were two digit numbers representing the age of the student at the beginning of the nursing program. The SAS 9.3 Univariate Process and the Frequency Process provided the following information of the nursing student sample. Variable Age \((N = 400)\) ranged from 18 years to 58 years \((M = 27.8, SD = 8.32)\). This study used the same age brackets used by Fraher et al. (2008): under age 24, 24-40, and over age 40. Students in age group 1 were 23 years in age and younger \((N = 157, M = 21.12, SD = 1.27)\) and represented 39.25 % of the sample. Students in age group 2 were between the age of 24 and 40 years of age \((N = 198, M = 29.02, SD = 4.28)\) and represented 49.50 % of the sample. Students in age group 3 were over the age of 40 \((N = 45, M = 6.42, SD = 4.55)\) and represented 11.25 % of the sample. Figure 4 shows the distribution and probability plot and Table 10 provides the data described above.

**Gender (GENDER).**

The participating community colleges provided the gender of each student in the sample. Students self-reported this data on the individual community college’s application and this information was entered into the student record by admission staff. The community college classifies student gender into two categories. The student's gender or sex code, M=Male F=Female. This data were recoded 0 = Male, 1 = Female. The SAS 9.3 Frequency Process provided the following information. The sample was majority female \((N = 356, 89 \%)\). Male nursing students composed the remainder of the sample \((N = 44, 11 \%)\).
Figure 4. Distribution and probability plot AGE.

Race / Ethnicity (RACE).

The participating community colleges provided the race of each student in the sample. Students self-reported this data on the individual community college’s application and this information was entered into the student record by admission staff. The community college classifies students into six racial categories: 1 = White, 2 = Black, 3 = American Indian, 4 = Hispanic, 5 = Asian, 6 = Other. Given the focus of this study, the sample
contained nursing students who self-identified as either White or African American. A SAS 9.3 Frequency Process was run to determine the racial/ethnicity of the sample. The majority of the sample was composed of White nursing students (N = 349, 87.25%). African American nursing students (N = 51, 12.75%) completed the sample. For the logistic regression, 0 = African American, 1 = White.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE (N = 400)</td>
<td>18-58</td>
<td>27.41</td>
<td>7.86</td>
</tr>
<tr>
<td>AGE Under 24 (N = 157)</td>
<td>18-23</td>
<td>21.12</td>
<td>1.27</td>
</tr>
<tr>
<td>AGE 24-40 (N = 198)</td>
<td>24-40</td>
<td>29.02</td>
<td>4.28</td>
</tr>
<tr>
<td>AGE Over 40 (N = 45)</td>
<td>41-58</td>
<td>46.42</td>
<td>4.55</td>
</tr>
</tbody>
</table>

**High School Education Track (HSTC).**

This is a categorical variable collected by the NCCCS. This variable represents the highest level of education achieved by the student at the high school. The College Prep corresponds with the NCDPI College/University Prep high school course of study for students planning to attend a four-year college or university. College Tech corresponds with the NCDPI College Tech Prep high school course of study, which prepares students for the community college and the workforce. Career Prep corresponds with the NCDPI high school course of study Career Prep which prepares students for the workforce.

The data were recoded to reflect the following:

1 = College/University Prep

2 = College Tech Prep
3= Career Prep

In conversations with community college representatives, I learned that students self-report this data on the individual community colleges’ application. Many students did not report this information or this information was not recorded in the student record by admissions staff. This variable contained missing data (\(N = 145, 36\%\)). Consequently, this variable was dropped from the logistic regression analysis and the model. For those student records with data, 205 (51.25%) reported college transfer courses, 33 (8.25%) reported career/vocational education, and 17 (4.25%) reported a general education high school curriculum.

**Educational Credentials (HIED).**

Educational credentials represent the highest level of education completed by the student. The participating community colleges provided information for this variable. Students self-reported this data on the individual community college’s application and this information was entered into the student record by admission staff. Students identified their highest education as a GED, High School Diploma, Adult High School Diploma, Associate Degree, Baccalaureate Degree, or a Master’s Degree or higher. This variable was operationalized by recoding the less than baccalaureate degree attainment as a zero (0) and baccalaureate degree attainment as a one (1). The sample was composed predominantly of nursing students with less than a baccalaureate degree (\(N = 342, 85.50\%\)) compared to the group with baccalaureate degree attainment (\(N = 58, 14.50\%\)). In addition to the traditional high school diploma (\(N = 288, 72\%\)), students reported completion of a post-secondary
diploma or certificate ($N = 14, 3.50\%$) and completion of an Associated Degree ($N = 40, 10\%$). Students also reported completion of a baccalaureate degree ($N = 56, 14\%$) or a graduate degree ($N = 2, 0.5\%$).

**High School Wealth (WEALTH).**

Wealth is a continuous variable measured on the interval scale. Wealth ranges from zero, representing the complete absence of wealth, i.e., extreme poverty, to 100%, representing affluence and the absence of poverty. Milner (2013) defined poverty, the lack of wealth, as “particular characteristics and situations people find themselves in because of the amount of monetary and related material capital that they have or do not have” (p. 9).

The literature reviewed identified school wealth, based on the wealth of the student population, as a contributor to the academic achievement gap. The percentage of students receiving Free and Reduced Lunch (FRL) is the only measure collected by the individual schools to measure family income. Schools with concentrated poverty lack the resources available to schools with a wealthier student population. Additionally, schools with high levels of poverty provide an indirect measure of parental education and indicate the economic conditions of the local community.

Academic researchers used the percentage of students receiving FRL through the National School Lunch Program to identify low wealth schools (Aud et al., 2013; Ladd and Loeb, 2013; Milner, 2013; and Reardon et al., 2012). The federal government requires schools to use FRL participation to identify disadvantaged students, or students living in
poverty, in No Child Left Behind academic achievement reports (NCLB, 2001). Federal guidelines use family income to determine eligibility and participation in the FRL program; if family income is below the federal threshold guidelines, students are identified as living in poverty and are eligible to participate in the FRL program (USDA, 2014). Harwell and LeBeau (2010) noted that student participation in the FRL program is voluntary, especially at the high school level, and the schools are responsible for certifying FRL eligibility and income verification.

The participating community colleges provided the high school of graduation for students in the sample. I matched individual records to school data, collected and published by NCDPI (2014a). NCDPI publishes a Microsoft Excel™ file providing average daily membership, the number of students receiving free and reduced lunch, and the percentage of students identified as needy along with grade levels served for each public school in the state on its website (2014a). The NCDPI Microsoft Excel™ file is focused on the percentage of students in need, i.e., it measures the percentage of poverty or lack of wealth found in the school.

For discussion purposes, wealth composition for each school is defined with the following:

1\textsuperscript{st} quintile: High Poverty (more than 80\% receive FRL).

2\textsuperscript{nd} quintile: Majority High Poverty (more than 60 \% receive FRL)

3\textsuperscript{rd} quintile: Average (40-60\% receive FRL)

4\textsuperscript{th} quintile: Majority Affluent (less than 40\% receive FRL);
5th quintile: Affluent (less than 20% receive FRL).

The wealth composition classification scale presented above is based on wealth not poverty. Schools with a large percentage of students living in poverty are in the first quintile while schools with a small percentage of students living in poverty are in the fifth quintile. This results in the need to align the data from NCDPI to the wealth composite scale and prepare the data for logistic regression. To obtain a school wealth value for each school, I subtracted the percentage of students in need from 100 to get the percentage of wealth at a school. Therefore, the variable wealth was operationalized as a percent of students at a high school not receiving free and reduced lunch.

For example, the NCDPI Microsoft Excel™ file (2014a) reported that Eastern Alamance High School in Alamance County had 34.03% of its student population classified as needy. This corresponds to the finding that 65.97% of the student population is not needy and live with more wealth than those classified as needy. Using the wealth composition classification scale presented above, Eastern Alamance High School is a Majority Affluent high school given that less than 40% of the student population participates in the federal free or reduced lunch program.

The SAS 9.3 Univariate procedure was run on the sample. The Wealth variable ranged from 5.36 to 90.57 (N = 400, M = 49.67, SD = 16.03). The Wealth variable is negatively skewed, 0.33, and a kurtosis of 0.08. Figure 5 shows the distribution and probability plot for the Wealth variable.
Figure 5. Distribution and probability plot for WEALTH.

The High Poverty (more than 80% receive FRL) high schools had student wealth values ranging from 5.36% to 18.88% ($N = 20, M = 13.11, SD = 4.82$) with skewness of -.76 and kurtosis of -.92. The High Poverty schools accounted for 5% of the sample. The Majority High Poverty (more than 60% receive FRL) high schools had student wealth ranging from 20.41% to 39.38% ($N = 71, M = 31.76, SD = 6.03$) with skewness of -.57 and kurtosis of -.86 and accounted for 17.75% of the sample. The largest group of schools, Average (40-60% receive FRL) high schools, had student wealth values ranging from 40.48% to 59.84% ($N = 203, M = 49.39, SD = 5.42$) with skewness of .09 and kurtosis of -
1.09 and accounted for 50.75 % of the sample. Accounting for 24.50% of the sample, Majority Affluent (less than 40% receive FRL) high schools had student wealth values ranging from 60.28% to 78.01% \( (N = 98, M = 67.76, SD = 4.22) \) with skewness of .26 and kurtosis of -.101. The smallest group of schools (2% of sample) based on student wealth was the Affluent (less than 20% receive FRL) high schools with student wealth values ranging from 81.57% to 90.57% \( (N = 8, M = 85.27, SD = 4.04) \) with skewness of .08 and kurtosis of -2.34. Table 11 provides the descriptive statistics for variable Wealth.

<table>
<thead>
<tr>
<th>High School Wealth</th>
<th>Frequency</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Poverty</td>
<td>20</td>
<td>5.36 to 18.88</td>
<td>13.11</td>
<td>4.82</td>
</tr>
<tr>
<td>Majority High Poverty</td>
<td>71</td>
<td>20.41 to 39.38</td>
<td>31.76</td>
<td>6.03</td>
</tr>
<tr>
<td>Average</td>
<td>203</td>
<td>40.48 to 59.84</td>
<td>49.39</td>
<td>5.42</td>
</tr>
<tr>
<td>Majority Affluent</td>
<td>98</td>
<td>60.28 to 78.01</td>
<td>67.76</td>
<td>4.22</td>
</tr>
<tr>
<td>Affluent</td>
<td>8</td>
<td>81.57 to 90.57</td>
<td>85.27</td>
<td>4.04</td>
</tr>
</tbody>
</table>

**High School Proficiency Measure (READP).**

High school quality is measured by the output such as student scores on standardized tests (Betts and Morell, 1999). North Carolina implemented the statewide assessment of the ACT\textsuperscript® College Readiness Exam to measure student performance and preparation for college. Additionally, the ACT\textsuperscript® College Readiness Exam is used as a high school proficiency measure by NCDPI. The ACT\textsuperscript® College Readiness Exam is composed of five sections: English, Math, Reading, Science, and Writing. The Reading portion of the exam has scores ranging from 0 to 36 with a breakpoint pass score of 21. According to ACT\textsuperscript® (2012),
students scoring 21 points or more are considered to have the reading skills necessary for academic success at the collegiate level.

This study used the ACT® College Readiness Exam results for the 2013-2014 academic year. NCDPI (2014c, 2014d) compiled and published the ACT® College Readiness Exam results by individual high school. The data contained the number of students taking the exam, the mean composite score for the four content sections, the mean score for each section, the percentage of students scoring at or above the breakpoint for passing for each section, and the percentage of students passing the four content areas along with the percentage of students passing the four content areas and the writing section of the exam. NCDPI does not publish the percentage of students at a high school passing the ACT® College Readiness Exam when less than five percent or more than 95% of the students taking the exam pass the exam. Results for these schools are designated as <5% or >95% in the Microsoft Excel™ file (2014d).

The participating community colleges provided the high school of graduation for students in the sample, which I matched to school data, collected and published by NCDPI (2014d). Variable READP represents the percentage of students scoring at or above the breakpoint pass score of 21 for the Reading portion of the ACT® College Readiness Exam. This is a continuous variable measured on the interval scale with values ranging from zero to 100%. High schools identified by NCDPI as having less than five percent (<5%) passing the exam were recoded to 4.9% for statistical analysis. Only one high school in the NCDPI
dataset had a pass rate greater than 95% on the reading section. There were not any students in the sample who reported attending this high school.

Nursing students in the sample were graduates of North Carolina public high schools with ACT Reading exam percentage of students passing with a score of 21 or better out of a possible 36 points ranging from < 5% to 69.5% \((N = 400, M = 25.31, SD = 11.03)\). The READP variable presented skewness of .91 and kurtosis of 1.12. Schools identified as having less than 5% passing (< 5%) \((N = 2)\) were recoded to 4.9% for statistical analysis.

I also created four groups based on the SAS 9.3 PROC UNIVARIATE statistics for further analysis. The percentage of students passing the ACT® College Readiness Exam. The LOWEST group contained high schools with the lowest percentage of pass rates on the ACT Reading exam. Percentage of pass rates in this group ranged from 4.9% to 17.6% \((N = 108, M = 13.5, SD = 3.25)\). The second group, LOW, had percentage of pass rates ranging from 17.6% to 23.40% \((N = 99, M = 20.84, SD = 1.69)\). The third group, HIGH, had percentage of pass rates ranging from 23.5% to 31.4% \((N = 97, M = 28.05, SD = 2.62)\). The fourth group, HIGHEST, had percentage of pass rates ranging from 31.5% to 69.5% \((N = 96, M = 40.42, SD = 8.45)\). Figure 6 shows the distribution and probability plot for the READP variable created by the SAS 9.3 Univariate Process. Table 12 provides the descriptive statistics for the four groups composing variable READP.
Figure 6. Distribution and probability plot READP.

Table 12
Distribution of Percentage Passing ACT Reading Exam

<table>
<thead>
<tr>
<th>High School Read Pass Percentage</th>
<th>Frequency</th>
<th>Range</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest</td>
<td>108</td>
<td>4.9% - 17.4%</td>
<td>13.5</td>
<td>3.25</td>
</tr>
<tr>
<td>Low</td>
<td>99</td>
<td>17.6% - 23.4%</td>
<td>20.84</td>
<td>1.69</td>
</tr>
<tr>
<td>High</td>
<td>97</td>
<td>23.5% - 31.4%</td>
<td>28.05</td>
<td>2.62</td>
</tr>
<tr>
<td>Highest</td>
<td>96</td>
<td>31.5% - 69.5%</td>
<td>40.42</td>
<td>8.45</td>
</tr>
</tbody>
</table>
The Logistic Regression

Using SAS version 9.3 statistical software, logistic regression (PROC LOGISTIC) was used to answer the research questions. The dependent variable in the logistic equation was RETAINED (0 = not retained, 1 = retained). The independent variables were all modeled on this dependent variable. The descending option was used in the PROC LOGISTIC model statement to tell SAS to estimate the model on 1 (retained) rather than the default 0 (not retained).

Research Question One

The conceptual framework for Model 1 is depicted in Figure 7. Model 1 was created to answer the first research question.

What is the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of educational credentials) on African American community college nursing students’ first year retention?

In Model 1, the following variables were included in the logistic regression: Age, Gender, Race, Educational Credentials (HIED), School wealth (WEALTH), and READP (ACT® reading test Percentage Pass rate). RACE was coded: 0 = African American, 1= White. The dependent variable in the logistic equation was RETAINED (0 = not retained, 1 = retained). The independent variables were all modeled on this dependent variable. The descending
option was used in the SAS 9.3 PROC LOGISTIC model statement to tell SAS to estimate the model on 1 (retained) rather than the default 0 (not retained). The model and supporting information for the logistic regression for Model 1 is presented in Table 13 and the Hosmer and Lemeshow Goodness of Fit results are presented in Table 14.

For Model 1, the Likelihood Ratio test p-value was 0.0038 ($X^2 = 19.21; df = 6$) which indicates that the model is significant overall, and at least one of the predictor variables has a coefficient not equal to zero. Other tests used to test Model 1 included the Score Chi-Square
test \((X^2 = 19.8; \ df = 6, \ p = 0.0030)\) and the Wald Chi-Square test \((X^2 = 18.55; \ df = 6, \ p = 0.0050)\). These three tests confirmed Model 1 is significant.

**Table 13**

*Model 1 Logistic regression results for sample of nursing students \((N = 400)\)*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>(\beta)</th>
<th>(SE\ \beta)</th>
<th>(p)</th>
<th>Log Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.2161</td>
<td>0.7044</td>
<td>0.7590</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.0276</td>
<td>0.0134</td>
<td>0.0391*</td>
<td>0.973 (1.027)**</td>
</tr>
<tr>
<td>Gender</td>
<td>0.5442</td>
<td>0.3308</td>
<td>0.1000</td>
<td>1.723</td>
</tr>
<tr>
<td>Race</td>
<td>0.7732</td>
<td>0.3315</td>
<td>0.0197*</td>
<td>2.167</td>
</tr>
<tr>
<td>Educational Credentials (Baccalaureate degree or higher)</td>
<td>0.0777</td>
<td>0.0795</td>
<td>0.3285</td>
<td>1.081</td>
</tr>
<tr>
<td>School Wealth</td>
<td>0.00675</td>
<td>0.00932</td>
<td>0.4687</td>
<td>1.007</td>
</tr>
<tr>
<td>Reading % Pass rate</td>
<td>0.000125</td>
<td>0.0137</td>
<td>0.9927</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Note:* Likelihood Ratio \((p = 0.0038, \ chi-square = 19.2107, \ df = 6); R² = 0.0469, C statistic = 0.611. HL Goodness of Fit Test \((p = 0.1512, \ chi-square = 12.0006, \ df = 8)\). *Predictors with \(p\)-value .05 or less. ** Osborne (2006) suggested reporting the inverse log odds ratio when \(\beta\) is negative for easier interpretation.

The Hosmer and Lemeshow Goodness of Fit statistic was not significant \((p > .05)\) and therefore the model is a good fit for the data \((X^2 = 12.00; \ df = 8; \ p = 0.15)\). This statistic is obtained by calculating the Pearson chi-square statistic from the \(2 \times g\) table of observed and expected frequencies, where \(g\) is the number of groups. The statistic appears below.

\[
\hat{\chi}^2_{HL} = \sum_{i=1}^{g} \frac{(O_i - N_i \hat{p}_i)^2}{N_i \hat{p}_i(1 - \hat{p}_i)}
\]

Ideally, each group should have an equal number of observations, the number of groups should exceed 5, and expected frequencies should be at least five. For the present data, 10 groups of 40 were created. The expected frequencies exceeded 5 in all cells. The Hosmer and Lemeshow Goodness of Fit tests shows Model 1 overestimated expected results in five of the ten tests for retention and overestimated expected results for attrition in four of
the ten tests. The results of the Hosmer and Lemeshow Goodness of Fit test performed in the SAS 9.3 Logistic procedure for Model 1 follow in Table 14.

**Table 14**

*Model 1 Hosmer and Lemeshow Goodness of Fit Test*

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Observed</th>
<th>Retained = 1 Expected</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>14</td>
<td>16.89*</td>
<td>26</td>
<td>23.11</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>27</td>
<td>22.06</td>
<td>13</td>
<td>17.94*</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>27</td>
<td>24.95</td>
<td>13</td>
<td>15.05*</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>27</td>
<td>26.76</td>
<td>13</td>
<td>13.24</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>22</td>
<td>27.99*</td>
<td>18</td>
<td>12.01</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>28</td>
<td>28.66*</td>
<td>12</td>
<td>11.34</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>32</td>
<td>29.17</td>
<td>8</td>
<td>10.83*</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>33</td>
<td>29.58</td>
<td>7</td>
<td>10.42*</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>29</td>
<td>30.00*</td>
<td>11</td>
<td>10.00</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>28</td>
<td>30.95*</td>
<td>12</td>
<td>9.05</td>
</tr>
</tbody>
</table>

* Overestimation of predicted results

The model fit statistics for the model with predictor variables (AIC = 503.54, SC = 531.48, -2LogL = 489.54) differ from the values for the intercept alone (AIC = 510.75, SC=514.74, -2LogL = 508.75). R-square was also evaluated to determine the amount of error reduced by the full model versus the intercept only model. The R-square value of 4.7% indicated that the model does predict a small amount of variance in retention.

The SAS 9.3 REG Process was run to identify collinearity of the variables. Two measures are used to identify collinearity of the variables: tolerance levels and the Variance Inflation Factor (VIF) (King, 2010). The tolerance for a variable is one (1) minus the $R^2$ that results from the regression of the other variables on that variable. A value of one (1) for both tolerance and VIF means the variables are completely unrelated. If the tolerance levels are
near zero (0) and the VIF is very large, the variables are related and collinearity is present. Tolerance was greater than .2 for all variables and the VIF was under 10.

**Research Question Two**

Model 2 with race interaction variables was created to answer the second research question follows.

*Are there differences on the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of earned educational credentials) between African American and White community college nursing students’ first year retention?*

Model 2 differs from Model 1 with the inclusion of three race interaction variables: RACE*HIED, RACE*WEALTH, and RACE*READP. RACE was coded: 0 = African American, 1= WHITE. The dependent variable in the logistic equation was RETAINED (0 = not retained, 1 = retained). The independent factors and variables were all modeled on this dependent variable. The descending option was used in the PROC LOGISTIC model statement to tell SAS to estimate the model on 1 (retained) rather than the default 0 (not retained). The conceptual framework for Model 2 is presented in Figure 8 and includes the interactive terms used in the logistic regression. The model and supporting information for the logistic regression for Model 2 is presented in Table 15 and the supporting Hosmer and Lemeshow Goodness of Fit results are presented in Table 16.
The Likelihood Ratio (LR) Chi-Square test was used to test Model 2. The global null hypothesis: BETA=0 holds that all of the predictors regression coefficients are equal to zero. For Model 2, the Likelihood Ratio test $p$-value was 0.02 ($X^2 = 19.53; df = 9$) which indicates that the model is significant overall, and at least one of the predictor variables has a coefficient not equal to zero. Other tests used to test Model 2 included the Score Chi-Square test ($X^2 = 20.09; df = 9, p = 0.02$) and the Wald
Table 15
*Model 2: Logistic regression results with race interaction variables for sample of nursing students (N = 400)*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>SE β</th>
<th>p</th>
<th>Log Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.0403</td>
<td>0.9831</td>
<td>0.9673</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.0276</td>
<td>0.0134</td>
<td>0.0398*</td>
<td>0.973</td>
</tr>
<tr>
<td>Gender</td>
<td>0.5439</td>
<td>0.3315</td>
<td>0.1009</td>
<td>1.723</td>
</tr>
<tr>
<td>Race</td>
<td>0.5436</td>
<td>0.9516</td>
<td>0.5679</td>
<td></td>
</tr>
<tr>
<td>Educational Credentials</td>
<td>0.0564</td>
<td>0.1526</td>
<td>0.7116</td>
<td></td>
</tr>
<tr>
<td>(Baccalaureate degree or higher)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wealth</td>
<td>-0.00506</td>
<td>0.0245</td>
<td>0.8362</td>
<td></td>
</tr>
<tr>
<td>Reading % Pass rate</td>
<td>0.0198</td>
<td>0.0439</td>
<td>0.6514</td>
<td></td>
</tr>
<tr>
<td>RACE*HIED</td>
<td>0.0286</td>
<td>0.1789</td>
<td>0.8729</td>
<td></td>
</tr>
<tr>
<td>RACE*WEALTH</td>
<td>0.0137</td>
<td>0.0264</td>
<td>0.6037</td>
<td></td>
</tr>
<tr>
<td>RACE*READP</td>
<td>-0.0220</td>
<td>0.0462</td>
<td>0.6338</td>
<td></td>
</tr>
</tbody>
</table>

*Note. Likelihood Ratio (p = 0.0211 chi-square = 19.5247, df = 9); R² = 0.0476, C statistic = 0.614. HL Goodness of Fit Test (p = 0.8346, chi-square = 4.2428, df = 8). Predictors with p-value ≤ .05 or less.*

Chi-Square test \( (X^2 = 18.80; df = 9, p = 0.03) \). All three tests were statistically significant and the model can be accepted. However, it should be noted that high multicollinearity exists in the model due to the inclusion of the interaction variables. The SAS 9.3 REG Process was unable to calculate the two measures used to identify collinearity of the variables: tolerance levels and the Variance Inflation Factor (VIF) (King, 2010).

The Hosmer and Lemeshow Goodness of Fit statistic was not significant \( (p > .05) \) and therefore the model is a good fit for the data \( (X^2 = 4.24; df = 8; p = 0.83) \). For the present data, 10 groups of 40 were created. The expected frequencies exceeded five in all cells. The Hosmer and Lemeshow Goodness of Fit tests shows Model 2 with the interaction variables overestimated expected results in three of the ten tests for retention and overestimated expected results for attrition in five of the ten tests. The results of the Hosmer and
Lemeshow Goodness of Fit test performed in the SAS 9.3 Logistic procedure follow in Table 16.

Table 16

<table>
<thead>
<tr>
<th>Group</th>
<th>Total</th>
<th>Observed</th>
<th>Expected</th>
<th>Observed</th>
<th>Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>15</td>
<td>16.99*</td>
<td>25</td>
<td>23.01</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>25</td>
<td>21.89</td>
<td>15</td>
<td>18.11*</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>27</td>
<td>24.88</td>
<td>13</td>
<td>15.12*</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>28</td>
<td>26.68</td>
<td>12</td>
<td>13.32*</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>24</td>
<td>27.95*</td>
<td>16</td>
<td>12.05</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>28</td>
<td>28.65</td>
<td>12</td>
<td>11.35</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>30</td>
<td>29.17</td>
<td>10</td>
<td>10.83*</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>30</td>
<td>29.62</td>
<td>10</td>
<td>10.38*</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>30</td>
<td>30.08</td>
<td>10</td>
<td>9.92</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>30</td>
<td>31.08*</td>
<td>10</td>
<td>8.92</td>
</tr>
</tbody>
</table>

* overestimated predicted results

The model fit statistics for the model with predictor variables (AIC = 509.22, SC = 549.12, -2LogL = 489.22) differ from the values for the intercept alone (AIC = 510.75, SC=514.74, -2LogL = 508.75). R-square was also evaluated to determine the amount of error reduced by the full model versus the intercept only model. The R-square value of 4.8% indicated that the model does predict a small amount of variance in retention.

Logistic Regression Results

The results of the logistic regression models for predicting first year retention for students enrolled in the North Carolina Community College Associate Degree in Nursing Program are presented in Table 12 and Table 14. All students were at risk of not being retained given the value of the model intercept. For Model 1, the intercept was 0.2161 and
the intercept was 0.0403 in Model 2. For Model1, the logistic regression analysis revealed that two of the six predictor variables have a statistically significant relationship in the prediction of first year retention resulting for nursing students enrolled in the community college associate degree program. Age had a negative relationship, while race was positive for White students. Model 2 with race interaction variables identified one of the nine predictor variables as statistically significant, AGE (-.03, p = 0.04).

The coefficient for AGE (-0.03, p = 0.04), indicated that older students are more likely to not be retained. The odds ratio for students was very close to one, 0.97. Osborne (2006) suggested using the inverse of the odds ratio for variables when the coefficient is negative for easier interpretation. The inverse odds ratio, 1.03, which suggested minimal negative impact for the majority of students enrolled in the nursing program. However, the oldest students were more likely to not be retained in the North Carolina Community College Associate Degree in Nursing program within the first year compared to younger students.

The variable RACE was modeled on African American students = 0 and White students = 1. The odds ratio of retention for a White student was 2.17 times as likely to be retained in the nursing program after the first year compared to an African American student. Another way to look at this is that African American students are only 46% as likely to be retained and 54% as likely to not be retained by the North Carolina Community College System Associate Degree in Nursing program within the first year compared to White students.
Summary

Two models were developed using logistic regression. Both models identified Age as statistically significant in the prediction of retention. In Model 1, the logistic regression also identified Race in the predictive model for first year retention for students enrolled in the North Carolina Community College Associate Degree in Nursing Program with a significant effect. Two significant variables were associated with the odds of first year retention: Age was negative (odds ratio = 0.97 (1.03)) and being White was positive (odds ratio = 2.13). Model 2 included race interaction variables and identified age as statistically significant and negative. Model 2 failed to identify additional statistically significant variables. In Chapter 5, the results of this study are discussed including the findings from previous research and suggestions for future practice.
Chapter 5

The purpose of this study was to learn if high school quality (high school wealth composition and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of educational attainment) had an impact on African American community college nursing students’ first year retention compared to White community college nursing students’ first year retention in the associate degree nursing (ADN) programs provided by the NCCCS.

This study used a predictive cross-sectional research design (Johnson, 2001) utilizing secondary data analysis of data collected by the North Carolina Community Colleges and the North Carolina Department of Public Instruction. The sample used for this study included 400 students enrolled in 17 community colleges located in North Carolina. In this chapter, the conclusions and implications drawn from the research results will be discussed in comparison with prior research findings.

Conclusions and Discussion

Two variables were identified with the logistic regression as having an affect on student retention in the NCCCS Associate Degree in Nursing program: AGE and RACE. Following data collection, the variable used to examine the individual student’s high school educational track was removed from the research questions given the large percentage of missing responses. The revised questions follow:
1. What is the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of educational credentials) on African American community college nursing students’ first year retention?

2. Are there differences on the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of earned educational credentials) between African American and White community college nursing students’ first year retention?

**Research Question One**

The first revised research question follows.

What is the impact of high school quality (high school wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of educational credentials) on African American community college nursing students’ first year retention?

The analysis of the logistic regression for Model 1, presented on page 164, did not identify statistically significant variables to answer this question. The significant findings revealed that African American nursing students were 46% as likely to be retained after the first year of the nursing curriculum compared to White students. Older students were 1.027 times less likely to be retained compared to younger students. The small size of African American
nursing students in the sample ($N = 51$) prevented a separate logistic regression analysis for African American nursing students.

African American students were underrepresented in the associate degree of nursing program in the North Carolina Community College System institutions participating in this study. African American nursing students comprised 10.9% ($N = 73$) of the total population ($N = 668$) and 12.75% ($N = 51$) of the sample ($N = 400$) used in the logistic regression. Three of the participating community colleges did not have any African American students enrolled in their nursing programs. Another eight community colleges participating in the study had five or fewer African American students enrolled in the beginning cohort. Four community colleges had 100% retention rates for African American students while four community colleges did not retain any African American nursing students. Table 17 provides information on the retention rate for all African American and White nursing students by participating community college.

The retention rate for African American nursing students was 47% ($N = 24$) compared to the overall retention rate of 66.75% ($N = 400$) for the sample. Of the five African American male nursing students in the focused sample, only one was retained. (Note: There were 10 African American male nursing students in the population and only one was retained). Age influenced the African American nursing student with 60% attrition rate ($N = 5$) for students under the age of 25 and 82% attrition rate for students over age 40 ($N = 11$) compared to 43% attrition rate ($N = 35$) for students between the age of 24 and 40. This information is presented in Table 18.
Table 17
Retention rates by participating community colleges

<table>
<thead>
<tr>
<th>College</th>
<th>White</th>
<th>Retained</th>
<th>% Retained</th>
<th>African American</th>
<th>Retained</th>
<th>% Retained</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC 1</td>
<td>13</td>
<td>7</td>
<td>54%</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CC 2</td>
<td>19</td>
<td>15</td>
<td>79%</td>
<td>0</td>
<td>0</td>
<td>na</td>
</tr>
<tr>
<td>CC 3</td>
<td>22</td>
<td>21</td>
<td>95%</td>
<td>0</td>
<td>0</td>
<td>na</td>
</tr>
<tr>
<td>CC 4</td>
<td>26</td>
<td>23</td>
<td>88%</td>
<td>0</td>
<td>0</td>
<td>na</td>
</tr>
<tr>
<td>CC 5</td>
<td>21</td>
<td>11</td>
<td>52%</td>
<td>9</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>CC 6</td>
<td>23</td>
<td>20</td>
<td>87%</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>CC 7</td>
<td>28</td>
<td>23</td>
<td>82%</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>CC 8</td>
<td>30</td>
<td>23</td>
<td>77%</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>CC 9</td>
<td>20</td>
<td>15</td>
<td>75%</td>
<td>10</td>
<td>7</td>
<td>70%</td>
</tr>
<tr>
<td>CC 10</td>
<td>27</td>
<td>15</td>
<td>56%</td>
<td>10</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td>CC 11</td>
<td>27</td>
<td>22</td>
<td>81%</td>
<td>7</td>
<td>7</td>
<td>100%</td>
</tr>
<tr>
<td>CC 12</td>
<td>39</td>
<td>25</td>
<td>64%</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CC 13</td>
<td>43</td>
<td>21</td>
<td>49%</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CC 14</td>
<td>31</td>
<td>26</td>
<td>84%</td>
<td>12</td>
<td>6</td>
<td>50%</td>
</tr>
<tr>
<td>CC 15</td>
<td>52</td>
<td>34</td>
<td>65%</td>
<td>5</td>
<td>2</td>
<td>40%</td>
</tr>
<tr>
<td>CC 16</td>
<td>44</td>
<td>38</td>
<td>86%</td>
<td>8</td>
<td>6</td>
<td>75%</td>
</tr>
<tr>
<td>CC 17</td>
<td>60</td>
<td>34</td>
<td>56%</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>373</td>
<td>71%</td>
<td>73</td>
<td>36</td>
<td>49%</td>
</tr>
</tbody>
</table>

Table 18
African American retention by age groups

<table>
<thead>
<tr>
<th>Age</th>
<th>Retained</th>
<th>Not Retained</th>
<th>Total</th>
<th>Retention Rate</th>
<th>Attrition Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Under 24</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Age 24-40</td>
<td>20</td>
<td>15</td>
<td>35</td>
<td>57%</td>
<td>43%</td>
</tr>
<tr>
<td>Age over 40</td>
<td>2</td>
<td>9</td>
<td>11</td>
<td>18%</td>
<td>82%</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>27</td>
<td>51</td>
<td>47%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Seventy-five percent of the African American nursing students reported taking the college preparation curriculum in high school ($N = 37$) while two had taken career and technical education curriculum and seven students took the high school general education curriculum (data were missing for the remainder of the students). All students in the sample
were graduates of North Carolina public high schools. The lack of participation in higher education also affected the African American nursing student with 11.7% \( (N = 6) \) having a baccalaureate degree or higher. The logistic regression, Model1, found that students with a baccalaureate degree or higher were 1.081 times as likely to be retained compared to students with lower academic credentials.

The small sample size of the African American nursing student did not provide the power to observe the impact of the selected variables anticipated to predict retention. The logistic regression analysis failed to identify any of the variables as having statistical significance for variables identified in the literature as having an effect on retention. However, examining the North Carolina Public high schools by wealth levels and percentage of pass rates for the ACT® College Readiness Exam in Reading does provide evidence of educational inequities for the African American student population and might partially explain the low retention and completion rates for African American students in the NCCCS Associate Degree in Nursing program. The remainder of this section incorporates the findings and links this study’s findings to the findings from studies identified in the literature review.

African American nursing students attended schools whose student population possessed little wealth. For those attending North Carolina high schools \( (N= 51) \) African American nursing students graduated from High Poverty (more than 80% receive FRL) high schools \( (N = 10, 20.4\%) \), Majority High Poverty (more than 60 % receive FRL) high schools \( (N = 14, 26.5\%) \), Average (40-60% receive FRL) wealth high schools \( (N = 23, 46.9\%) \), and
Majority Affluent (less than 40% receive FRL) \((N = 3, 6.1\%)\). Only one African American student (1.96\%) had attended a high school categorized as Affluent (less than 20% receive FRL). Forty-one (80.39\%) African American nursing students attended a high school with a wealth score below 50%.

Additionally, African American nursing students also graduated from high schools with lower percentage of students passing the ACT® College Readiness Exam in Reading. A majority of the African American nursing students \((N = 44, 86.27\%)\) graduated from a high school categorized as Lowest \((N = 31, 60.78\%)\) or Low \((N = 13, 25.49\%)\). Five African American nursing students had attended a high school categorized as High (9.8\%) and two students had attended a high school categorized as Very High (3.92\%). Table 19 shows the retention / attrition rate for the five high school wealth categories and the four reading categories for African American nursing students \((N = 51)\).

This study also sought to learn if previous participation in higher education had an effect on retention. Fifteen African American nursing students (10.9\%) reported a previously earned baccalaureate degree. For the nine students (60\%) not retained, two graduated from a High Poverty (more than 80% receive FRL) high school, five graduated from an Average (40-60% receive FRL) wealth high schools, and two graduated from high schools classified as Majority Affluent (less than 40% receive FRL). For the six students retained, five graduated from high schools with wealth scores below 45% and percentages of passing the ACT® College Readiness Exam in Reading ranged from 8.4% to 23%. The sixth retained
student attended an Affluent (less than 20% receive FRL) high school with a wealth score of 88% and 67% of students passing the ACT Reading exam.

Table 19
African American student retention by high school wealth and reading

<table>
<thead>
<tr>
<th></th>
<th>Retained</th>
<th>Attrition</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Cum %</td>
<td>N</td>
</tr>
<tr>
<td>High School Wealth</td>
<td></td>
<td>Row %</td>
<td></td>
</tr>
<tr>
<td>High Poverty</td>
<td>4 4</td>
<td>7.84 40</td>
<td>6 6</td>
</tr>
<tr>
<td>Majority High</td>
<td>7 11</td>
<td>13.73 50</td>
<td>7 13</td>
</tr>
<tr>
<td>Poverty</td>
<td>11 22</td>
<td>21.57 48</td>
<td>12 25</td>
</tr>
<tr>
<td>Average</td>
<td>1 23</td>
<td>1.96 33</td>
<td>2 27</td>
</tr>
<tr>
<td>Majority Affluent</td>
<td>1 24</td>
<td>1.96 100</td>
<td>0 0</td>
</tr>
<tr>
<td>Affluent</td>
<td>1 24</td>
<td>1.96 100</td>
<td>0 0</td>
</tr>
<tr>
<td>Total</td>
<td>24 24</td>
<td>47.06 80</td>
<td>27 27</td>
</tr>
</tbody>
</table>

High School Percentage Pass ACT Reading exam

<table>
<thead>
<tr>
<th></th>
<th>Retained</th>
<th>Attrition</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Cum %</td>
<td>N</td>
</tr>
<tr>
<td>Lowest</td>
<td>14 14</td>
<td>27.45 45</td>
<td>17 17</td>
</tr>
<tr>
<td>Low</td>
<td>6 20</td>
<td>11.76 46</td>
<td>7 24</td>
</tr>
<tr>
<td>High</td>
<td>3 23</td>
<td>5.88 60</td>
<td>2 26</td>
</tr>
<tr>
<td>Highest</td>
<td>1 24</td>
<td>1.96 50</td>
<td>1 27</td>
</tr>
<tr>
<td>Total</td>
<td>24 24</td>
<td>47.06 80</td>
<td>27 27</td>
</tr>
</tbody>
</table>

This study’s logistic regression analysis, Model 1, found that African Americans nursing students were only 46% as likely as White nursing students to be retained in the nursing program after the first year. African American nursing students in this study had a one year retention rate of 47% compared to the 41% retention rate (three year completion rate) published by Fraher et al. (2008). Jeffreys (2007) noted that most students left the nursing program during the first year. Additionally, the low percentage (10.9%) of African American students with a baccalaureate degree prior to enrollment in the associate degree in nursing programs is similar to the findings documented in other retention research studies.
focused on the associate degree in nursing programs (Fraher et al., 2008; Jeffreys, 2007; Pence, 2011; Seago et al., 2008; Seago et al., 2012; Shelton, 2012).

Retention studies of the ADN student identified academic preparation as essential for success in the nursing curriculum (Jeffreys, 2007; Seago et al., 2012; Shelton, 2012). Loftin et al. (2013) identified inadequate preparation and study skills as primary barriers to retention for ADN students. International researchers also documented inadequate academic preparation as a barrier to success for students enrolled in nursing programs (Crane and Cox, 2013; Pryjmachuk et al., 2009; and Whyte et al., 2011).

Several researchers documented educational inequities, which might affect the academic preparation of African American nursing students graduating from North Carolina high schools. Riegle-Crumb and Grodsky (2010) concluded that African American students attending high schools with high minority concentrations did not learn the same material in the advanced high school math courses as students attending more heterogeneously populated high schools. Cratty (2012) found that in North Carolina, African American students are often denied the opportunity to participate in academically and intellectually gifted (AIG) programs even if their end of grade tests scores are as high as or higher than scores for White students admitted into the AIG program. Taliaferro and Decuir-Gunby (2008) learned that African American students attending high school in North Carolina rarely have the opportunity to participate in Advance Placement courses offered to students in the college preparation track. In another study focused on North Carolina high school students, Michelson and Everett (2008) determined that the placement of African American students...
into the lower educational tracks results in reduced academic preparation for success in postsecondary educational opportunities for this student population. Educational inequities in North Carolina public schools reduce the opportunity African American students have to participate in learning activities designed to prepare students with the academic preparation many White students can access.

The majority of African American nursing students \((N = 41, 80.39\%)\) in the sample attended low wealth high schools with wealth scores below 50%. The finding that 86.3% \((N = 44)\) of African American nursing students attended high schools with low percentage of students passing the ACT® College Readiness Exam in Reading suggests there might be additional problems in these low wealth schools. Michelson and Everett (2008) examined the Charlotte - Mecklenburg Schools and concluded that African American students had reduced opportunity to enroll in the advanced courses at the high wealth schools and few opportunities to take those courses at the low wealth schools. Milner (2013) concluded that schools educating high levels of students living in poverty lack equitable resources compared to those schools with wealthier student populations.

This lack of resources leads those students, who are most in need of high quality teaching and learning experiences, to suffer from high teacher turnover and inexperienced teachers in the classroom (Ladd and Loeb, 2013). The findings in this study mirror the findings by Clotfelter et al. (2007, 2008) and Jackson (2009) in that many African American students attended low wealth schools with low academic performance in North Carolina. Clotfelter et al. (2007) provided evidence that low wealth schools in North Carolina have a
greater percentage of teachers and principals with weaker qualifications than those employed at wealthier schools. The 2008 study by Clotfelter et al. found that teacher quality was distributed unevenly among schools in North Carolina; African American students and those from disadvantaged backgrounds experienced negative consequences from exposure to low teaching quality. According to Clotfelter et al. (2008), low wealth schools had higher proportions of inexperienced teachers (17.3%), teachers from less competitive institutions (27.4%), and teachers with non-regular licenses (20.5%) compared to the wealthy schools with smaller proportion of inexperienced teachers (14.6%), fewer teachers from less competitive institutions (14.2 %) and fewer teachers with non-regular licenses (13.3%). Jackson (2009) found that schools in the Charlotte-Mecklenburg Public School System with high populations of African Americans and economically disadvantaged students were staffed by teachers of lower quality and less experience than schools with more equitable distributions. Clotfelter et al. (2008) concluded teacher quality in low wealth schools contributed to the African American-White academic achievement gap at the high school level in North Carolina.

Additional studies documented the racial and economic inequities in education and the associated academic performance for students attending low wealth schools. Reardon (2011) found the income achievement gap was more than twice the size of the African American-White Achievement gap. Reardon concluded it is income, not race, which is responsible for documented inequities in education. Reardon and Owens (2014) suggested that studies looking at race segregation and negative student outcomes might really be
examining unequal distribution of resources and other disparities in the school such as teacher quality. Duncan, Kalil, and Ziol-Guest (2013) found the income gap between high and low-income children accounted for about 70% of the achievement gap. Siren (2005) noted that African American students had lower SES and lower academic achievement than the White students did and he attributed that to the low quality schools the majority of African American students attended. Wolniak and Engberg (2010) concluded that wealth was associated with better high school contexts and affects college students’ academic performance.

School performance measures, including scores on statewide assessments, are lower for low wealth schools when compared to schools with wealthier student populations (Billings, Deming, and Rockoff, 2014). The finding that low wealth schools have lower performance measure scores compared to wealthier schools was confirmed for the sample used in this study. In their examination of North Carolina and Charlotte-Mecklenburg public schools by wealth, Michelson and Everett (2008) found that students attending the low wealth schools with large minority populations were less proficient on end of course statewide assessments. On average, 62% of the students attending the low wealth, high minority schools were unprepared for college and Michelson and Everett (2008) questioned the academic preparation for the 38% scoring proficient on the state assessments. Table 20 provides the means of percentage of high school students passing the individual components of the ACT® College Readiness Exam for students enrolled in the community college ADN
program. The individual components of the ACT® College Readiness Exam components are English, Math, Reading, and Science.

**Table 20**
Mean pass rates for ACT® College Readiness Exam components.

<table>
<thead>
<tr>
<th>Wealth Status</th>
<th>N</th>
<th>English</th>
<th>Math</th>
<th>Reading</th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Poverty</td>
<td>20</td>
<td>22.33</td>
<td>10.32</td>
<td>15.34</td>
<td>7.99</td>
</tr>
<tr>
<td>Majority High Poverty</td>
<td>71</td>
<td>27.97</td>
<td>15.83</td>
<td>17.5</td>
<td>11.39</td>
</tr>
<tr>
<td>Average</td>
<td>203</td>
<td>37.05</td>
<td>22.74</td>
<td>23.51</td>
<td>16.17</td>
</tr>
<tr>
<td>Majority Affluent</td>
<td>98</td>
<td>50.48</td>
<td>33.15</td>
<td>34.07</td>
<td>25.72</td>
</tr>
<tr>
<td>Affluent</td>
<td>8</td>
<td>74.71</td>
<td>64.58</td>
<td>57.77</td>
<td>52.30</td>
</tr>
</tbody>
</table>

There is also evidence that African American students attending North Carolina high schools might be taking courses at a level of reduced rigor. There exists a large body of literature devoted to the educational tracking of minority children and children living in poverty enrolled in the public schools and their disproportionate placement into tracks with reduced rigor when compared to White students (Lucas and Berends, 2007; Michelson and Everett, 2008). In a study focused on North Carolina public schools, Michelson and Everett (2008) found that African American students attending racially identified African American schools were more likely to enroll in the college preparation course of study than if they attended racially diverse schools or predominantly White schools. However, the courses offered at the racially identified African American schools were at a level of reduced rigor than offered at the other schools (Michelson and Everett, 2008). This finding by Michelson and Everett (2008) might explain the high percentage of African American students reporting participation in the college preparation track while enrolled in high school in this study.
There is also the possibility that retained nursing students from the High Poverty and Majority High Poverty high schools excelled in the high school environment and under different financial circumstances or counseling might have attended a baccalaureate granting college or university. Hill (2008) identified disparities in high school counseling departments on college going and suggested that the different strategies reflect the socioeconomic characteristics of the school with low wealth high schools using traditional strategies while high schools that were more affluent used the brokering method. Hill (2008) carried the analysis further by examining college attendance patterns by strategy. Students attending high schools using the traditional strategy were more likely to either not enroll in college (40%) or enrolled at the community college (49%) rather than attend a four-year college (11%).

In summary, the literature reviewed identified academic preparation as a component for student success in postsecondary education (Deil-Amen and DeLuca, 2010; Billings, Deming, and Rockoff, 2014). The findings from this study, while not statistically significant, might indicate African American students enrolled in the North Carolina Community College System’s Associate Degree in Nursing program lack the high school academic preparation necessary for success and retention leading to degree completion.

**Research Question Two**

The research question guiding this section follows:

Are there differences on the impact of high school quality (high school
wealth and the percentage of pass rates for the Reading portion of the ACT® College Readiness Exam) and academic preparation (highest level of earned educational credentials) between African American and White community college nursing students’ first year retention?

With the exception of the age variable identified in Model 1 logistic regression and discussed in the previous section, the second logistic regression, Model 2 with race interaction variables, did not identify any additional statistically significant findings that might provide a definitive answer to this question.

White nursing students represented the majority in the population \((N = 525, 78.6\%)\) and in the sample of North Carolina high school graduates \((N = 349, 87.25\%)\). These findings suggest that nursing programs located in the participating community colleges lack diversity. When compared to data from the National Center for Educational Statistic’s IPEDS database, (2015) each of the participating community college nursing programs had a larger proportion of white nursing students than the proportion of white students attending the community college. Seven of the participating community colleges were located in counties with over 80% of the population identifying as White on the 2010 US Census and the White nursing student majority finding was anticipated. These community colleges had African American student enrollment near or exceeding the proportion of African Americans residing in the local population. However, two community colleges (CC 5 and CC 14) residing in minority - majority counties had much higher than anticipated white nursing student enrollment in contrast to the low white student enrollment at the college. Only one
community college (CC 9) nursing program is as diversified as the local population. Table 21 shows the population percentages for the community college nursing programs, IPEDS data for the community college, and US Census data for the county the community college is located.

Table 21
Population percentages for students in the population

<table>
<thead>
<tr>
<th>CC Nursing Program</th>
<th>IPEDS</th>
<th>US Census</th>
<th>IPEDS Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>% White</td>
<td>% African American</td>
<td>% White</td>
<td>% African American</td>
</tr>
<tr>
<td>CC 1</td>
<td>65%</td>
<td>20%</td>
<td>42%</td>
</tr>
<tr>
<td>CC 2</td>
<td>86%</td>
<td>0</td>
<td>80%</td>
</tr>
<tr>
<td>CC 3</td>
<td>92%</td>
<td>0</td>
<td>74%</td>
</tr>
<tr>
<td>CC 4</td>
<td>90%</td>
<td>0</td>
<td>80%</td>
</tr>
<tr>
<td>CC 5</td>
<td>68%</td>
<td>29%</td>
<td>37%</td>
</tr>
<tr>
<td>CC 6</td>
<td>74%</td>
<td>1%</td>
<td>61%</td>
</tr>
<tr>
<td>CC 7</td>
<td>88%</td>
<td>3%</td>
<td>70%</td>
</tr>
<tr>
<td>CC 8</td>
<td>86%</td>
<td>0</td>
<td>68%</td>
</tr>
<tr>
<td>CC 9</td>
<td>57%</td>
<td>29%</td>
<td>50%</td>
</tr>
<tr>
<td>CC 10</td>
<td>68%</td>
<td>25%</td>
<td>54%</td>
</tr>
<tr>
<td>CC 11</td>
<td>66%</td>
<td>17%</td>
<td>42%</td>
</tr>
<tr>
<td>CC 12</td>
<td>87%</td>
<td>4%</td>
<td>82%</td>
</tr>
<tr>
<td>CC 13</td>
<td>90%</td>
<td>2%</td>
<td>61%</td>
</tr>
<tr>
<td>CC 14</td>
<td>65%</td>
<td>25%</td>
<td>49%</td>
</tr>
<tr>
<td>CC 15</td>
<td>87%</td>
<td>8%</td>
<td>57%</td>
</tr>
<tr>
<td>CC 16</td>
<td>72%</td>
<td>13%</td>
<td>7%</td>
</tr>
<tr>
<td>CC 17</td>
<td>91%</td>
<td>2%</td>
<td>84%</td>
</tr>
</tbody>
</table>

This study’s logistic regression analysis found that White nursing students were 2.17 times as likely as African American nursing students to be retained in the nursing program.
after the first year. Retention rates for White nursing students in the population \((N = 373, 71\%)\) and the sample of North Carolina high school graduates \((N = 243, 70\%)\) were higher than either the retention rate for the total population \((69\%)\) or the North Carolina high school graduate sample \((66.75\%)\). There were 39 white male nursing students in the population representing 11\% of the white nursing student population; twenty-three \((59\%)\) male nursing students were retained while 16 \((41\%)\) white male nursing students left the nursing program during the first year. Age did affect the retention rates for White nursing students with those over 40 years of age having a 56\% retention rate. Table 22 provides retention details by age group for White nursing students in the sample.

<table>
<thead>
<tr>
<th>Age</th>
<th>Retained</th>
<th>Not Retained</th>
<th>Total</th>
<th>Retention Rate</th>
<th>Attrition Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Under 24</td>
<td>106</td>
<td>46</td>
<td>152</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>Age 24-40</td>
<td>118</td>
<td>45</td>
<td>163</td>
<td>72%</td>
<td>28%</td>
</tr>
<tr>
<td>Age over 40</td>
<td>19</td>
<td>15</td>
<td>34</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Total</td>
<td>243</td>
<td>106</td>
<td>349</td>
<td>70%</td>
<td>30%</td>
</tr>
</tbody>
</table>

White nursing students attended schools whose student population possessed wealth. For those attending North Carolina high schools \((N= 349)\), White nursing students graduated from High Poverty \((more than 80\% receive FRL)\) high schools \((N = 10, 3\%)\), Majority High Poverty \((more than 60 \% receive FRL)\) high schools \((N = 57, 16\%)\), Average \((40-60\% receive FRL)\) wealth high schools \((N = 180, 52\%)\), and Majority Affluent \((less than 40\% receive FRL)\) \((N = 95, 27\%)\). Seven White nursing students \((2\%)\) had attended a high school categorized as Affluent \((less than 20\% receive FRL)\). One hundred fifty-five \((44.4\%)\) White
nursing students attended a high school with a wealth score below 50%. Retention rates were over 58% for White nursing student in four groups: High Poverty ($N = 7, 70\%$), Majority High Poverty ($N = 33, 58\%$), Average ($N = 130, 72\%$), and Majority Affluent ($N = 70, 74\%$). Three White nursing students (43%) were retained who attended Affluent high schools. The majority of the retained White nursing students ($N = 200, 57.3\%$) attended high schools categorized as Average or Majority Affluent and 194 (55.6\%) graduated from a high school with a wealth score over 50%.

White nursing students were distributed evenly across the four groups of percentage of students passing the ACT® College Readiness Exam in Reading. White nursing students graduated from a high school categorized as Lowest ($N = 77, 22\%$), Low ($N = 86, 25\%$), High ($N = 92, 26\%$), or Highest ($N = 94, 27\%$). Retention rates were over 57% for White nursing students in each of the four groups: Lowest ($N = 44, 57\%$), Low ($N = 64, 74\%$), High ($N = 67, 73\%$), and Highest ($N = 68, 72\%$). Table 23 shows the retention / attrition rate for the five high school wealth categories and the four reading categories for White nursing students ($N = 349$).

All of the White nursing students in the sample were graduates of North Carolina public high schools. Included in this group were nursing students who had completed a baccalaureate degree or higher ($N = 46, 13\%$). For those nursing students with a baccalaureate degree, 33 (77\%) were retained compared to those who were not retained ($N = 9, 23\%$) by their respective community college nursing program. Five of the nine non-retained nursing students with baccalaureate degrees graduated from a high school
categorized as High Poverty (more than 80% receive FRL) and were not retained in their respective community college nursing program.

Table 23
White nursing student retention by high school wealth and reading (N = 349)

<table>
<thead>
<tr>
<th>High School Wealth</th>
<th>Retained</th>
<th>Attrition</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Cum %</td>
<td>Row %</td>
</tr>
<tr>
<td>High Poverty</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Majority High Poverty</td>
<td>33</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>Average</td>
<td>130</td>
<td>170</td>
<td>53</td>
</tr>
<tr>
<td>Majority Affluent</td>
<td>70</td>
<td>240</td>
<td>29</td>
</tr>
<tr>
<td>Affluent</td>
<td>3</td>
<td>243</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>243</td>
<td>243</td>
<td>70</td>
</tr>
</tbody>
</table>

High School Percentage Pass ACT Reading exam

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Cum %</th>
<th>Row %</th>
<th>N</th>
<th>Cum %</th>
<th>Row %</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest</td>
<td>44</td>
<td>44</td>
<td>18</td>
<td>57</td>
<td>33</td>
<td>33</td>
<td>31</td>
<td>43</td>
</tr>
<tr>
<td>Low</td>
<td>64</td>
<td>108</td>
<td>26</td>
<td>74</td>
<td>22</td>
<td>55</td>
<td>21</td>
<td>26</td>
</tr>
<tr>
<td>High</td>
<td>67</td>
<td>175</td>
<td>28</td>
<td>73</td>
<td>25</td>
<td>80</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>Highest</td>
<td>68</td>
<td>243</td>
<td>28</td>
<td>72</td>
<td>26</td>
<td>106</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>243</td>
<td>243</td>
<td>70</td>
<td>106</td>
<td>106</td>
<td>30</td>
<td>349</td>
<td>100</td>
</tr>
</tbody>
</table>

Compare and Contrast

White nursing students attended wealthier schools than their African American peers. Twenty-two of the 24 (92%) retained African American nursing students graduated from a High Poverty, Majority High Poverty, or Average wealth high school while 30% (N = 73) of retained White students graduated from a high school categorized as Majority Affluent or Affluent. Over half (56%) of the retained White nursing students (N = 135) attended high schools with a greater percentage of students passing the ACT® College Readiness Exam in Reading. Like the African American students in the sample of North Carolina educated
students, all White nursing students had earned high school diplomas but a larger number had earned a baccalaureate degree ($N = 46$) compared to the number of African Americans who had earned a baccalaureate degree ($N = 15$). Table 24 provides the means of variables AGE, WEALTH, and ACT© College Readiness Exam in Reading pass rates by race and shows the differences between the two nursing student populations.

### Table 24

*Means of Age, Wealth, and ACT© College Readiness Exam in Reading pass rates by race*

<table>
<thead>
<tr>
<th>Race</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>51</td>
<td>32.92</td>
<td>8.62</td>
<td>21</td>
<td>58</td>
</tr>
<tr>
<td>School Wealth</td>
<td>51</td>
<td>38.24</td>
<td>16.43</td>
<td>5.36</td>
<td>88.14</td>
</tr>
<tr>
<td>ACT Reading</td>
<td>51</td>
<td>17.57</td>
<td>9.59</td>
<td>6.80</td>
<td>67.00</td>
</tr>
<tr>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>349</td>
<td>27.14</td>
<td>8.02</td>
<td>18</td>
<td>56</td>
</tr>
<tr>
<td>School Wealth</td>
<td>349</td>
<td>51.34</td>
<td>15.24</td>
<td>5.62</td>
<td>90.57</td>
</tr>
<tr>
<td>ACT Reading</td>
<td>349</td>
<td>26.44</td>
<td>10.75</td>
<td>4.9</td>
<td>69.5</td>
</tr>
</tbody>
</table>

In summary, retained White students attended schools of higher wealth and with a higher percentage of students passing the ACT© College Readiness Exam in Reading. This finding suggests that retained White students’ high school quality results in more academic preparation than the African American students’ academic preparation. This finding supports the findings by Jeffreys, (2007), Seago et al.,( 2008), Seago et al., (2012), and Shelton (2012) in which successful students in the associate degree in nursing programs were White, from higher socioeconomic backgrounds, and had better academic preparation.
Implications for Policy and Practice

North Carolina Community College Associate Degree in Nursing programs located in densely populated areas have a large pool of prospective nursing students to select from and fill their classes. Smaller community colleges, especially those in sparsely populated, low wealth and rural areas, have a smaller selection pool of prospective students for their associate degree in nursing programs. Consequently, the smaller community college nursing programs are more likely to select students who graduated from the local high schools with documented low performance on the NCDPI performance measures. Program coordinators and nursing instructors need to recognize that a large percentage of their nursing students might lack the skills and academic experience for success in the nursing curriculum.

Several community colleges participating in this study had high retention rates for both African American and White nursing students. I suggest program coordinators and instructors in programs with low retention rates collaborate with their peers at these institutions with high retention rates to learn what practices the successful schools have in place. These collaborations will assist in knowledge sharing and produce positive results, not only for the nursing programs but also for the health of the local communities. One possible explanation for the success of these programs with high retention rates might be the quality and quantity of clinical experiences. Changes in access to health care have resulted in the recent closure of several rural hospitals in North Carolina and the merger of local medical practices. These actions might be affecting not only the opportunity and access to clinical experiences but also reduced quality of the clinical experience and therefore must be
considered as a possible reason for student attrition in the community college service areas affected by the reduced access to healthcare.

To assist in the retention of all nursing students, program coordinators might consider planning and implementing an expanded orientation program to include reading strategies and study skills. Community college presidents, academic deans, and department chairs of academic programs must consider the restructuring of curriculum instruction along with professional development to assist curriculum instructors in the implementation of active learning and instructional strategies designed to assist students in developing deep learning strategies for knowledge attainment and understanding beyond the surface learning techniques employed by students. Community college leaders need to meet with their local boards of education and local high school professionals to increase student academic preparation. Finally, the North Carolina General Assembly, the legislative body in charge of North Carolina’s budget, must provide adequate funding to support the mission of the community college and the K-12 educational systems that will assist these institutions in meeting both the educational and workforce needs of the local communities.

**Significance of this Study**

The framework for this study used Tinto’s (1975) theoretical framework for student persistence and incorporated the examination of high school qualities along with student academic performance and student demographic characteristics as predictors of retention in the NCCCS ADN programs. Tinto (1975) theorized that all students are characterized by
family background, individual attributes, and their pre-collegiate school experiences. Tinto (1975) identified the pre-collegiate educational experiences as a background characteristic that each student brings to the postsecondary institution. Specifically, Tinto suggested that characteristics of the high school directly and indirectly affect a student’s academic performance (1975).

In North Carolina, the individual school districts are funded inequitably. Lower wealth schools and school districts have fewer resources to provide high quality teaching and learning experiences. There is documented evidence that the majority of students attending low wealth high schools have reduced academic preparation compared to those students attending higher wealth schools (Jackson, 2009; Michelson and Everett, 2008; Sirin, 2005). The findings from this study add to the small body of literature in this area. North Carolina implemented the statewide assessment of the ACT® College Readiness Exam to measure student performance and preparation for college. While top students from low wealth high school classes have been found to be initially successful in their university studies, there has been little research that has examined high school quality and retention and student success for students attending the community college in general, and specifically, those enrolled in the nursing programs offered by the community college. This study found that African American students (50%) graduated from low wealth schools and 87.7% graduated from high schools with low academic preparation given the percentage of students passing the ACT® College Readiness Exam in Reading. The finding that retention rates for African American nursing students was 49.32% \( (N = 36) \) compared to the overall retention rate of 68.56% \( (N = \)
458) in the population suggests that pre-collegiate school experiences including academic preparation, as described by Tinto, are relevant for community college students.

This study adds to the small body of literature focused on the community college student and specifically on the retention and success factors of the associate degree in nursing student. This study expands the knowledge base on the importance of early academic preparation in K-12 and specifically 9-12 and the effect on post-secondary academic success by building on earlier work by North Carolina educational researchers. These researchers include Stephen Billings (2014) and Roslyn Mickelson (2008) affiliated with the University of North Carolina in Charlotte, Charles Clotfelter, Helen Ladd, and Jacob Vigdor (2007, 2008, 2009, 2010, and 2013), affiliated with the Sanford School of Public Policy, Duke University, and Clement (Kirabo) Jackson (2009) affiliated with Northwestern University.

**Limitations of this study**

There were five main limitations of this study: low participation by the community colleges, inconsistency in the data collected and or entered into the database, low enrollment by African American students, demographic changes, and the use of the ACT College readiness exam for older students. First, the inability to recruit more participating community colleges hindered this study. With only 17 institutions participating, representing 31% of the 55 community colleges located in North Carolina offering the associate degree in nursing program, the sample was small and the findings were not as robust as desired. Several community college presidents declined to participate citing the lack of resources to
collect the requested data. North Carolina’s community colleges have experienced budget cuts since the Great Recession that began in 2008 and the NC General Legislature continues to reduce funding to most educational institutions in the state.

The second limitation of this study was the inconsistency of data collected by the individual community colleges and entered into the individual student record. This limitation resulted in the removal of one of the proposed variables from the logistic regression. Several of the participating community colleges did not collect this data resulting in the removal of a variable from the conceptual framework and the research questions. The North Carolina Community College System is planning and implementing an initiative to improve data collection that might address this problem in future research.

The third limitation, the small number of African American nursing students enrolled in the participating community college associate degree in nursing programs limited this study. Only 51 African American nursing students were in the sample of 400 nursing students who had graduated from North Carolina public high schools. Four of the 17 participating community colleges did not enroll any African American students in their associate degree in nursing program. Seven of the 17 participating community colleges had associate degree in nursing programs with African American nursing students composing more than 10% of the cohort; African American participation did not exceed 29% in any individual community college associate degree in nursing program. Consequently, the logistic regression and other statistical analyses performed in this study lacked the power to identify significant findings for the variables identified in the literature as having relevance to
academic preparation for success in higher education and in the associate degree in nursing programs.

Fourth, demographics in North Carolina have changed in recent years in North Carolina. North Carolina has experienced a large increase in the Latino population as well as refugees from other countries around the globe. The state has also experienced an increase in federally designated Title 1 schools based on the percentage of free and reduced lunch participants. North Carolina public schools are seeing an increase in the student population who are living in poverty. This study used information provided by North Carolina Department of Public Instruction for the academic year of 2013-2014. Consequently, the school wealth composite used in this study might be different from the wealth composite of the school at the time the individual students participating in this study were enrolled in the high school.

Finally, this study used the percentage of students passing the reading section of the ACT College Readiness Exam. North Carolina has used the ACT College Readiness Exam as a statewide performance measure since the 2012-2013 academic school year. Currently, all eleventh graders enrolled in North Carolina public high schools take this exam at North Carolina Department of Public Instruction expense. Prior to implementation of this performance measure, students desiring to use this test for college entrance paid out of pocket to take the ACT. Consequently, ACT scores might not be the best measure for high school quality for older students. However, it is one of the few performance measures available to measure high school academic quality.
Suggestions for Future Research

Reviewing the retention studies discussed in the literature review, I identified three types of study: individual community college nursing program, multi-cohort single institution, or surveying nursing students attending multiple institutions. In the studies based on a single institution, the researcher had access to student records including academic records (Abele, Penphrase, and Ternes, 2013; Jeffreys, 1993, 2004, and 2007; Whyte, Madigan, and Drinkwater, 2011). Data for multiple cohorts at a single institution, a methodology utilized by Jordan, Davies, and Green (1999) and Pryjmachuk, Easton, and Littlewood (2009), would increase the size of the sample population but would also create additional expense for the participating community colleges. The survey studies involved multiple institutions working on a collaborative project (Pence 2011; Seago et al., 2008; Shelton, 2012). In each of the multiple institution studies, the researcher had access to the students and/or their student records.

Fraher et al. (2008) suggested that the unequal quality of the North Carolina’s public school education system and low community wealth might be possible barriers to retention of students in the associate degree in nursing programs located in communities of low wealth. Six community colleges located in rural, low wealth regions participated in this study. Two of these community colleges were also located in minority-majority population areas and each enrolled a larger percentage of White nursing students than the percentage of White people in the local community or in the community college population. Additionally, four of the six low wealth community college nursing programs in this study also had the highest
attrition rates, 50% -60%, compared to the other participating community colleges in the study.

One goal of this study was to obtain a current snapshot of student retention in the North Carolina Community College System associate degree in nursing program. Given the diverse geography, demographics, and economies found across the state, if I was to replicate this study, I would focus on the 15 community colleges located along and east of the Interstate 95 corridor; eight of the participating 17 colleges in this study are located in this geographic area. Seven of these institutions accounted for 36 of the 73 (50%) African American nursing students in the population and 26 of the 51 (50%) African American nursing students in the sample. The four community colleges with attrition rates of 50% or more were located in this geographic area as were the two community colleges located in minority-majority communities. I would collect data from multiple cohorts to have a sample size large enough for the use of logistic regression.

I recommend additional research on the professional development for nursing instructors on an expanded student orientation with workshops focused on instructional reading strategies and study skills designed to develop deep learning to assist student grades and retention. I suggest future research focused on the implementation of instructional strategies for all community college instructors but especially those teaching in the nursing curriculum to learn how this action increases student retention.

I also recommend further examination of the community college associate degree nursing programs with high retention rates. Several programs had high retention rates for
both White and African American students. It would be worthwhile to learn what practices these institutions implement to promote high retention and completion rates and see if these practices could be replicated at the community colleges with low retention rates to improve retention and completion. I encourage community college administrators and nursing program personnel to collaborate with their counterparts at the successful community colleges to identify and implement the practices they use to increase their retention and completion rates.

One major obstacle I encountered while conducting this research was the concern by college administrators that releasing the information to me would violate the federal Family Educational Rights and Privacy Act (FERPA), a regulation designed to protect student’s privacy. Several community college presidents refused to participate citing their small size (not fear of future litigation) if the information requested such as race, age, high school of graduation, and whether the student was retained by the community college’s associate degree in nursing program could be traced to specific students if the data were released. However, educational researchers and policy makers need to know more about the academic backgrounds of the successful and unsuccessful nursing students to learn how to design and implement targeted retention programs.

To learn more about the academic preparation and other barriers to retention, I recommend researchers implement a qualitative method of inquiry. Qualitative methodologies will allow the researcher to learn about the individual academic preparation and performance. For example, if a student was a graduate from a low wealth high school or
a high school with low pass rates on the ACT® College Readiness Exam, what type and quantity of coursework did the student complete prior to enrollment in the nursing program? Did this student need to take developmental coursework? Did the student need to repeat any courses? What courses in the general education curriculum at the community college did the student take and how did these courses prepare the student for success in the nursing curriculum? For African American students attending majority Affluent and Affluent public high schools, did they participate in rigorous course work provided by Advanced Placement courses and AIG programs? Answers to these questions will provide academic retention researchers, NCCCS administrators, and NCCCS faculty a better understanding of the academic preparation African American students have prior to admission to the NCCCS Associate Degree of Nursing program.

Summary

This research builds on the 2008 study conducted by the University of North Carolina – Chapel Hill’s Cecil G. Sheps Center for Health Services Research on the nursing situation in North Carolina. One of the key findings of the 2008 study identified that being African American was a barrier to completion for students enrolled in the NCCCS ADN programs. But, until this research study, there have been no follow up studies to determine what specific barriers contribute to the African American associate degree in nursing student attrition rate. Furthermore, the Sheps Center study authors suggested that the unequal quality of the North Carolina’s public school education system and low community wealth might be possible
barriers to retention of students in the associate degree in nursing programs located in communities of low wealth.

The framework for this study used Tinto’s (1975) theoretical framework for student persistence and incorporated the examination of high school qualities along with student academic performance and student demographic characteristics as predictors of retention in the NCCCS Associate Degree in Nursing programs. This study provided evidence to confirm the Sheps Center finding that African American nursing students are at risk of attrition. African American nursing students are retained at a much lower rate than White students. African American nursing students attended North Carolina public high schools of lower wealth and with lower percentage of students passing the ACT® College Readiness Exam in Reading. Therefore, high school student wealth composition and high school performance on the ACT® College Readiness Exam in Reading are both indicators of unequal quality among high schools in North Carolina and serve as barriers to the retention of students in the associate degree in nursing programs offered by community colleges in low wealth communities.

Ultimately, the findings from this investigation will serve as a preliminary needs assessment for North Carolina’s community colleges and their associate degree in nursing programs. The primary mission of the North Carolina Community College System is to provide all students with the opportunity to pursue the American Dream through participation in higher education. Associate degree in nursing programs offered by the NCCCS must diversify its enrollment, implement retention strategies, and create pathways to completion
for students living in low wealth communities including African American and other minority students. Until the North Carolina Community College System institutions change their enrollment and retention practices for the associate degree in nursing program, North Carolina cannot diversify its nursing workforce to better mirror the population and North Carolina will fail to meet the diversity goals as set forth by the Institute of Medicine.
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*Brown v Board of Board of Education of Topeka, 347 U.S. 483 (1954)*


*Elementary and Secondary Education Act (1965)*

*Family Education Rights and Privacy Act (1974)*


*No Child Left Behind: The Reauthorization of the Elementary and Secondary Education Act of 2001.*


*The Civil Rights Act of 1964*


APPENDICES
### Table 25

*Demographic variables for White nursing students (N = 525)*

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<th>Variable</th>
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## Appendix B

**Table 26**

*Descriptive statistics for White nursing students*

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Appendix C

Table 27
*Demographic variables for all minority students* (N = 143)

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## Appendix D

**Table 28**  
*Descriptive statistics for all minority-nursing students*

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### Table 29
**Demographic variables for African American nursing students (N = 73)**

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Appendix E
Appendix F

Table 30
Descriptive statistics for African American nursing students

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